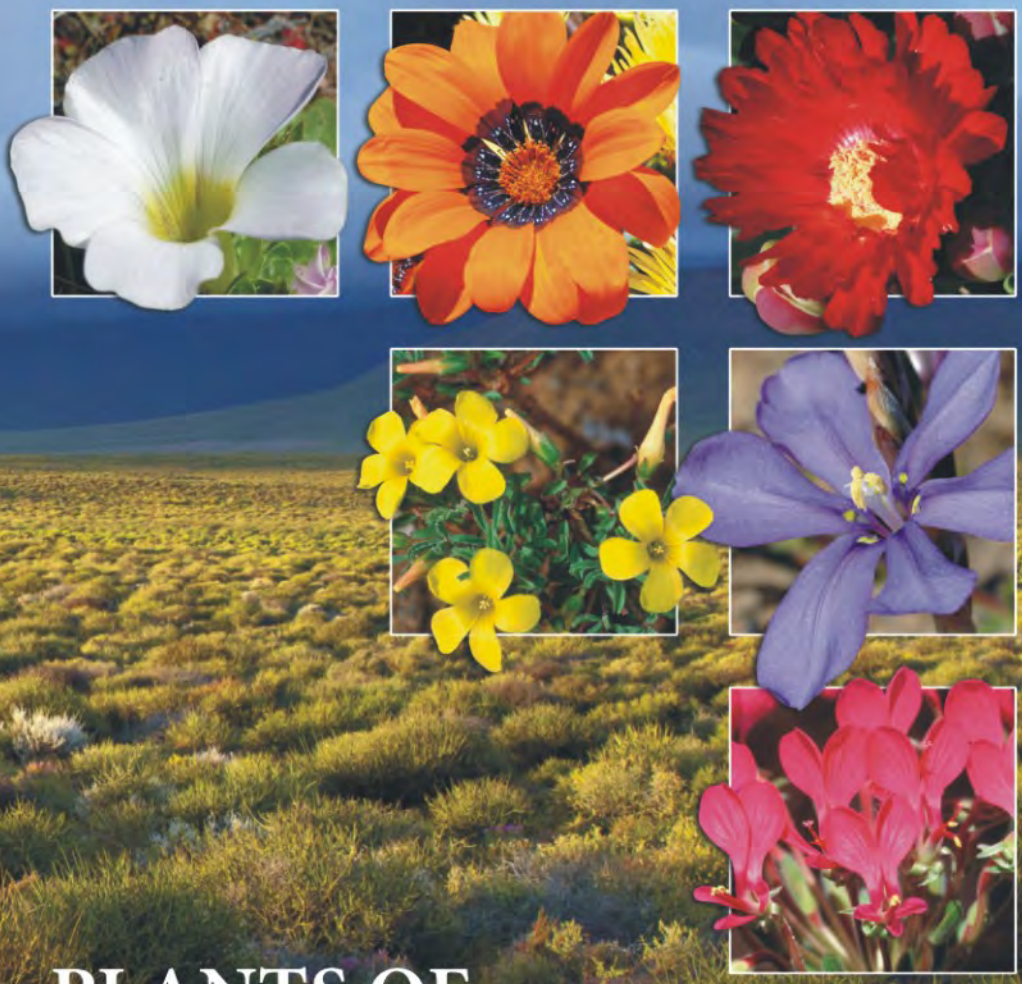


PLANTS OF THE GREATER CAPE FLORISTIC REGION

2: The Extra Cape Flora

D.A. Snijman (Editor)

STRELITZIA 30

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PLANTS OF THE GREATER CAPE FLORISTIC REGION

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SANBI
Biodiversity for Life

Pretoria
2013

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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The names of the compilers appear directly below the family names and also below the genus names in some cases. A reference to a family or genus treatment from the book should therefore be cited as in the examples below.

Family treatment:

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Genus treatment with compiler(s) given for the family as a whole:

LINDER, H.P. & SNIJMAN, D.A. 2013. *Hypodiscus*. In D.A. Snijman (ed.), Plants of the Greater Cape Floristic Region, Vol. 2: the Extra Cape flora. *Strelitzia* 30: 154. South African National Biodiversity Institute, Pretoria.

Genus treatment with compiler(s) given for the individual genus:

DUNCAN, G.D. 2013. *Lachenalia*. In D.A. Snijman (ed.), Plants of the Greater Cape Floristic Region, Vol. 2: the Extra Cape flora. *Strelitzia* 30: 69. South African National Biodiversity Institute, Pretoria.

New combinations and synonyms published in this volume

Combinations

ANACAMPSEROTACEAE

Anacampseros gariepensis *(G.Will.) Snijman*, comb. nov.
Anacampseros perplexa *(G.Will.) Snijman*, comb. nov.

ASTERACEAE

Orbivestus obionifolius *(O.Hoffm.) J.C.Manning*, comb. nov.
Orbivestus obionifolius subsp. **dentatus** *(Merxm.) J.C.Manning*, comb. nov.

HYACINTHACEAE

Albuca gildenhuysii *(Van Jaarsv.) J.C.Manning & Goldblatt*, comb. nov.

Synonyms

ANACAMPSEROTACEAE

Avonia gariepensis G.Will., syn. nov. of **Anacampseros gariepensis** (G.Will.) Snijman.
Avonia perplexa G.Will., syn. nov. of **Anacampseros perplexa** (G.Will.) Snijman.

ASTERACEAE

Vernonia obionifolia O.Hoffm., syn. nov. of **Orbivestus obionifolius** (O.Hoffm.) J.C.Manning.
Vernonia obionifolia subsp. *dentata* Merxm., syn. nov. of **Orbivestus obionifolius** subsp. **dentatus** (Merxm.) J.C.Manning.

HYACINTHACEAE

Ornithogalum gildenhuysii Van Jaarsv., syn. nov. of **Albuca gildenhuysii** (Van Jaarsv.) J.C.Manning & Goldblatt.

Phylogenetic classification of the families of vascular plants in the Extra Cape Flora

The following broad divisions, based on the classifications proposed by Chase & Reveal (2009), Christenhusz *et al*. (2011), and Reveal & Chase (2011), reflect the phylogenetic relationships of the vascular plants found in the Extra Cape flora. The family circumscriptions of the angiosperms follow the Angiosperm Phylogeny Group system (APG III 2009), except those preceded by a dot which follow APG II (2003).

LYCOPODS CLUB MOSSES and QUILLWORTS

QUILLWORTS
Order Isoëtales
Isoëtaceae

MONILOPHYTES FERNS and HORSETAILS

HORSETAILS
Order Equisetales
Equisetaceae
ADDER'S-TONGUE FERNS
Order Ophioglossales
Ophioglossaceae
TRUE FERNS
Order Osmundales
Osmundaceae
Order Schizaeales
Anemiaceae
Order Salviniales
Marsileaceae
Salviniaceae
Order Polypodiales
Pteridaceae
Aspleniaceae
Blechnaceae
Dryopteridaceae

ANGIOSPERMS FLOWERING PLANTS

PALAEODICOTS
Order Piperales
Hydnoraceae
MONOCOTS
Order Alismatales
Araceae (= *Lemnaceae*)
Aponogetonaceae
Juncaginaceae
Potamogetonaceae (= *Zannichelliaceae*)
Ruppiaceae
Order Dioscoreales
Dioscoreaceae
Order Liliales
Colchicaceae
Order Asparagales
Orchidaceae
Hypoxidaceae
Tecophilaeaceae
Iridaceae
·Hemerocallidaceae (=*Anthericaceae* in part)
·Asphodelaceae
·Amaryllidaceae
·Alliaceae
·Asparagaceae
·Ruscaceae (= *Convallariaceae, Dracaenaceae, Eriospermaceae*)
·Agavaceae (= *Anthericaceae* in part, *Behniaceae*)
·Hyacinthaceae
Order Commelinales
Haemodoraceae
Order Poales

Juncaceae
Cyperaceae
Restionaceae
Poaceae (= *Gramineae*)
EUDICOTS
Order Ranunculales
·Papaveraceae
·Fumariaceae
Menispermaceae
Ranunculaceae
Order Proteales
Proteaceae
Order Saxifragales
Crassulaceae
Order Zygophyllales
Zygophyllaceae
Order Fabales
Fabaceae (= *Leguminosae*)
Polygalaceae
Order Rosales
Rosaceae
Rhamnaceae
Moraceae
Urticaceae
Myricaceae
Order Cucurbitales
Cucurbitaceae
Order Celastrales
Celastraceae
Order Oxalidales
Oxalidaceae
Order Malpighiales
Elatinaceae
Euphorbiaceae
Salicaceae (= *Flacourtiaceae* in part)
Achariaceae (= *Flacourtiaceae* in part, *Kiggelariaceae*)
Order Geraniales
Geraniaceae
Melianthaceae
Order Myrtales
Onagraceae
Order Sapindales
Burseraceae
Anacardiaceae
Sapindaceae
Rutaceae (= *Ptaeroxylaceae*)
Meliaceae
Order Malvales
Cytinaceae
Neuradaceae
Malvaceae (= *Sterculiaceae, Tiliaceae*)
Thymelaeaceae
Order Brassicales
Resedaceae
Capparaceae
Cleomaceae
Brassicaceae (= *Cruciferae*)
Order Santalales
Santalaceae (= *Viscaceae*)
Loranthaceae
Order Caryophyllales
Frankeniaceae
Tamaricaceae
Plumbaginaceae
Polygonaceae
Droseraceae
Caryophyllaceae
Amaranthaceae (= *Chenopodiaceae*)
Limeaceae
Lophiocarpaceae
Gisekiaceae
Aizoaceae (= *Mesembryanthemaceae*)
Nyctaginaceae
Molluginaceae
Didiereaceae (Portulacaceae in part)
Anacampserotaceae (Portulacaceae in part)
Order Cornales
Loasaceae
Order Ericales
Ebenaceae
·Theophrastaceae
Ericaceae
Order Gentianales
Rubiaceae
Gentianaceae
Apocynaceae (= *Asclepiadaceae*)
Order Vahliales
Vahliaceae
Order Boraginales
Boraginaceae
Order Solanales
Convolvulaceae
Solanaceae
Montiniaceae
Order Lamiales
Oleaceae
Plantaginaceae
Scrophulariaceae (= *Buddlejaceae*)
Stilbaceae
Pedaliaceae
Lamiaceae (= *Labiatae*)
Orobanchaceae
Acanthaceae

Bignoniaceae
Verbenaceae
Order Asterales
·Campanulaceae
·Lobeliaceae
Asteraceae (= *Compositae*)
Order Bruniales
Bruniaceae
Order Dipsacales
·Dipsacaceae
Order Apiales
Apiaceae

Dedication

Dedicated, with love, to the memory of Colin Paterson-Jones, whose passion for photographing South Africa's rich flora has been a source of constant inspiration.

Photographs

Front cover: the Tanqua Karoo below the Roggeveld Escarpment; (from left to right) *Oxalis adenodes* on the Kamiesberg Mountains, *Gazania rigida* in the Klein Roggeveld, *Ruschia marianae* between Swartruggens and Tanqua Karoo, *Oxalis* sp. (allied to *O. lineolata*) in the Tanqua Karoo, *Moraea herrei* in the Kamiesberg Mountains, *Pelargonium incrassatum* near Kamieskroon, Namaqualand.

Back cover: daisies, *Dimorphotheca pluvialis* and *Gazania lichtensteinii*, with the red-flowered *Nymania capensis* in the Richtersveld; *Brunsvigia bosmaniae* below the Gifberg, near Vanrhynsdorp; *Bulbinella nutans* on the Roggeveld Escarpment.

The Greater Cape Floristic Region: The Extra Cape Subregion

by D.A. Snijman

Introduction

The Greater Cape Floristic Region covers the predominantly winter rainfall area in the west of southern Africa as well as a non-seasonal rainfall area in the extreme south and southeast. When first mapping the flora of the Cape, Drège (1843–1844) took a broad view and emphasised the flora's coherence throughout the winter rainfall region. This concept of a Cape flora was rejected by Bolus (1875) however, who separated Namaqualand and a mostly inland Karoo Region from a narrowly defined South Western Region, an area restricted to the extreme southwestern tip of South Africa that subsequently has become known as the Cape Floristic Region. Although most authors of the twentieth century largely agree on this concept, slightly different interpretations persisted. Unlike Bond & Goldblatt (1984), who treated the region as a contiguous area, Marloth (1908) included the isolated Kamiesberg area in the extreme north, whereas Weimarck (1941) defined it even more broadly to include the Hantam-Roggeveld area in the northeast. The introduction of the Biome concept, based largely on a classification of growth forms and major climatic determinants, then led to the description of the Fynbos and Succulent Karoo Biomes that occupy southern Africa's southwest region (Rutherford & Westfall 1986). Thereafter, the influence of conservation biology took effect and assessments of global hotspots prompted the recognition of the Cape Floristic Region and the Succulent Karoo region as two of Earth's biologically richest and most endangered terrestrial ecoregions (Mittermeier *et al.* 1999). As a result, these regions gained even further prominence as two quite separate entities.

The present acceptance of a broadly conceived, so-called 'winter rainfall region' flora began with Bayer (1984). The concept, however, was fully developed by Jürgens (1991, 1997) who, by realigning the Succulent Karoo region—which up till then had been included in the Karoo-Namib Region (*sensu* Werger 1978)—with the Cape Floristic Region, brought about the recognition of the temperate Greater Cape Flora. Conclusive support for the recognition of what has become known as the Greater Cape Floristic Region came from Born *et al.* (2007), who estimated that total endemism in the western part of southern Africa was greatest when the Cape flora in the south was combined with the arid, predominantly winter rainfall flora to the north and east of the Cape Floristic Region.

The core area within the Greater Cape Floristic Region, traditionally known as the Cape Floristic Region (CFR), has been relatively well studied and a large body of literature exists for this area (Levyns 1964; Goldblatt 1997; Linder 2003, 2005). A huge benefit to the many students working in the core area has been a well-researched Conspectus of Cape Plants, now in its third revised edition (Bond & Goldblatt 1984; Goldblatt & Manning 2000a; Manning & Goldblatt 2012). The literature currently available on the semi-arid parts of the Greater CFR is less extensive. Most of this deals with the plant ecology and vegetation of parts of the region (Jürgens 1991, 2004; Hilton-Taylor 1996; Cowling &

Hilton-Taylor 1999; Cowling *et al.* 1999; Esler & Rundel 1999; Schmiedel 2004; Mucina *et al.* 2006; Van der Merwe *et al.* 2008a, 2008b; Helme 2009), whereas several field guides and popular books have served the interests of wildflower enthusiasts (Manning & Goldblatt 1997; Cowling & Pierce 1999; Williamson 2000; Le Roux 2005; Mannheimer *et al.* 2008; Manning 2008; Van der Merwe & Van Rooyen 2010). Apart from a few floristic studies on the Hantam (Snijman & Perry 1987) and Roggeveld (Clark *et al.* 2011), this work is the first publication of a rigorously compiled floristic account of the entire semi-arid region.

This account aims to fill the need for detailed taxonomic information on the plants from the semi-arid parts of the Greater CFR outside the core Cape area. Based on a careful study of herbarium specimens by a large number of specialists in various families and genera, it provides concise taxonomic descriptions of all the known vascular plants of this semi-arid region and includes comparative data with the Core Cape flora (Manning & Goldblatt 2012), and an assessment of the floristic diversity of the Greater Cape flora.

The name Extra Cape Subregion (ECR) is used here to describe the study area that is part of the Greater CFR but is not included in the traditionally recognised CFR, which is referred to here as the Core Cape Subregion (CCR). The choice of name is expressly floristic, being conceptually independent of considerations of biomes and vegetation types. The ECR comprises a contiguous area of 98 869 km^2, which incorporates the southern Namib, the western Richtersveld, Namaqualand, the Western Mountain Karoo (referred to by Nordenstam (1969) as the Western Upper Karoo) and the Tanqua (Ceres) Karoo-southern Great Karoo (*sensu* Jürgens 1991 excluding the Little Karoo and the Worcester-Robertson Karoo) (see Figure 1). By defining the boundaries of the ECR in this way, the Greater CFR is more widely delimited than it was previously, with the Western Mountain Karoo excluded by Jürgens 1991 or the southern Namib excluded by Born *et al.* (2007).

The boundary of the ECR in South Africa follows the northern and western limits of the Succulent Karoo Biome, following Mucina *et al.* (2006). Outlying, non-contiguous parts of this biome, namely the inselbergs of northern Bushmanland and the intermontane valleys of the Worcester-Robertson Karoo and Little Karoo are excluded from the ECR. The Bushmanland inselbergs are embedded within the Nama-Karoo Biome and the Worcester-Robertson and Little Karoo have by tradition been included in the CFR by Bond & Goldblatt (1984), Goldblatt & Manning (2000a), and Manning & Goldblatt (2012), who originally circumscribed the CFR to include the maximum contiguous area of fynbos heathland. The outlying areas of the Fynbos Biome found in Namaqualand and the Roggeveld were excluded from the CCR and these areas of fynbos and renosterveld vegetation are now incorporated under the ECR. Consequently, although the two major parts of the Greater CFR are partially congruent with the Fynbos and Succulent Karoo Biomes respectively, they incorporate a mix of both biomes to some extent.

The boundary between the CCR and ECR is most abrupt where marked differences in altitude, geology, moisture availability, and to some degree the effect of fire, coincide (Mucina & Rutherford 2006). This is particularly evident along the west-facing slopes of the Bokkeveld Mountains (belonging to the CCR), which drop into the low-lying plains of the Knersvlakte (in the ECR). In contrast, the boundary between the two regions on the sandy lowland interface around Klawer is a gradual transition, changing from Sand Fynbos to Sandy Shrubland, and is often difficult to discern.

In the north and east of the ECR there is an extensive zone of contact with the Nama-Karoo Biome. The interface, which is determined primarily by differing rainfall seasonality, runs from Hottentots Bay in the Lüderitz district, Namibia, through an area lying mainly west of the Great Escarpment in the Northern and Western Cape Provinces, and extends inland of the CCR to the Hantam, Roggeveld, and the Nuweveld Mountains in

the east. In the extreme southeast, the ECR skirts the north-facing slopes of the Swartberg Mountains, ending just north of Willowmore in the east, so forming a narrow strip between the CCR and the Nama-Karoo. The major area of the ECR to the west of this boundary receives 60% of its rain in winter, whereas the inland Nama-Karoo receives a greater proportion of rainfall in summer. There are certain limitations to the ease of demarcating the boundary however, as nowhere is the shift from a unimodal winter to unimodal summer rainfall pattern abrupt. Rather, the transition is gradual, as on the Roggeveld Escarpment where the rainfall pattern is bimodal with pronounced peaks in March and June. In contrast, most of the precipitation to the east in the adjacent Upper Karoo occurs in autumn, with a peak in March (Mucina *et al.* 2006). Nevertheless, rainfall is a major parameter in determining the favourability of the growing season; so in essence, the ECR is demarcated by a short and cool growing season, as opposed to a long and cool one for the fynbos of the CCR, and a short and warm one in the Nama-Karoo (Ellery *et al.* 1991).

The close association between the two major Subregions of the Greater CFR dictates that this work should be used alongside the updated account of the Core Cape flora (Manning & Goldblatt 2012), as together they provide the first complete account of the vascular plants of the entire Greater CFR. Their publication adds to the growing body of floristic literature becoming available for various regions of southern Africa (Retief & Herman 1997, Retief & Meyer in prep., Bredenkamp in prep.) and when used in combination with the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina & Rutherford 2006) they should support the drive to conserve this country's rich biodiversity, by providing baseline information on plant diversity in southern Africa.

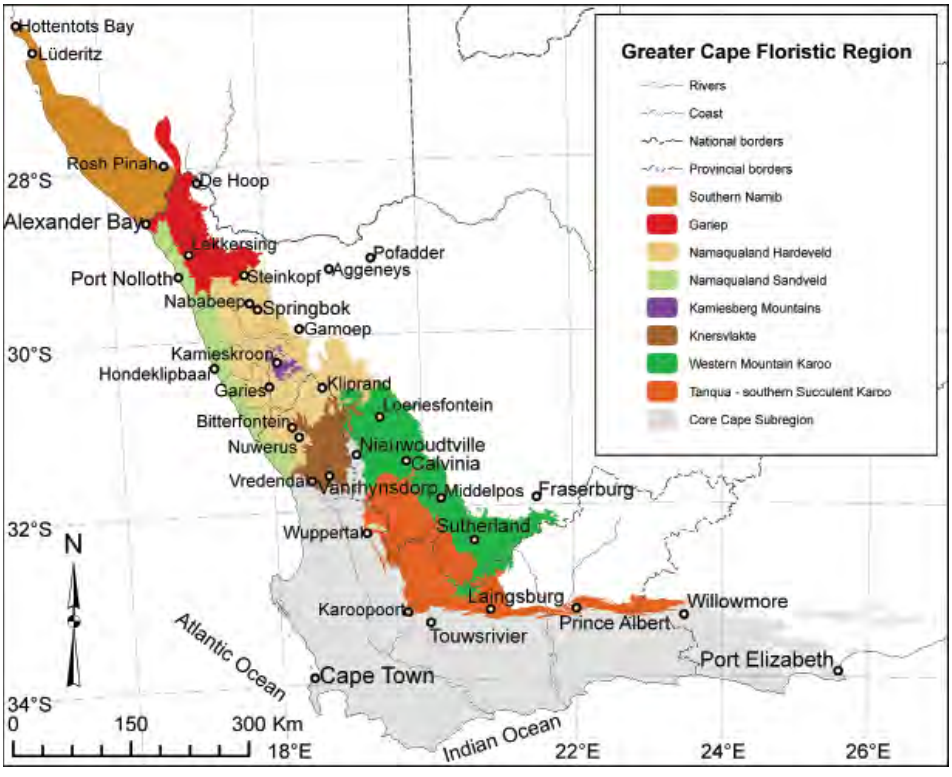


FIGURE 1.—The Greater Cape Floristic Region of southern Africa showing the Extra Cape Subregion divided into eight ecogeographic units. The Core Cape Subregion is shown in the south.

Physical characteristics and the ecogeographical units

Phytogeographically, the Core Cape Subregion (CCR), is relatively well understood. However, particular areas that reflect major floristic discontinuities in the Extra Cape Subregion (ECR) are yet to be identified as this depends on georeferenced data from the major herbaria for this region (BOL and NBG) being made electronically accessible. To date only the Gariep, Kamiesberg, Knersvlakte, and Western Mountain Karoo have been recognised as centres of endemism, although authors still disagree on their boundaries (Weimarck 1941; Nordenstam 1969; Hartmann 1991; Hilliard 1994; Hilton-Taylor 1996; Van Wyk & Smith 2001). Given the absence of well-established, overarching floristic patterns within the ECR, we have chosen to use several well-known ecogeographical units as a means to describe the species' distributions and to assess areas of species richness (Figure 1). Each has its own distinctive landscape and climate and is recognised in the vegetation map of South Africa (Mucina & Rutherford 2006). Data given for the units discussed below come from Schulze (1965, 1997), Pallett (1995), Rubin (1998), Cowling *et al.* (1999), Williamson (2000), Van Wyk & Smith (2001), Jürgens *et al.* (2006), Mucina *et al.* (2006), and Rebelo *et al.* (2006).

Southern Namib (SN)—Located at the northern extremity of southern Africa's winter rainfall region, the southern Namib unit includes almost the entire Sperrgebiet plus a narrow strip to its east in the southwest corner of Namibia. Hottentots Bay, lying nearly 40 km north of Lüderitz, demarcates the northern border. Natural borders in the west and south are the Atlantic Ocean and the Orange River (referred to here as the Gariep) respectively. The eastern border roughly follows a line parallel to the coast from Hottentots Bay to Lüderitz and thereafter extends inland to near Aus and southwards to Sendelingsdrif (Figure 1).

Landscape: covering 15 908 km^2 in extent, the unit comprises a mosaic of varied landscapes—coastal salt pans, sand or gravel plains, mobile dune fields, dry valleys, rocky mountain ranges, and high inselbergs. The land rises from west to east, changing from coastal to inland sand plains, above which rise several mountain massifs. These include the Grillenthal, the central Klinghardt Mountains (1 000 m), the Aurus Mountains (1 082 m high), the Obib Mountains just southwest of Rosh Pinah, and the Schakalsberg (rising to above 600 m) in the south (Figure 2).

Climate: rainfall over the area is extremely limited, generally increasing from the coast (Lüderitz: 17 mm per annum) towards the inland escarpment (Aus: 85 mm per annum), but rarely totalling more than 100 mm per annum. The proportion of rain falling in winter decreases towards the northeastern part of the Sperrgebiet. Precipitation from fog is greatest on the elevated inselbergs and occurs most frequently in February and March. The effectiveness of fog as a moisture source is enhanced by low temperatures along the coast, which are less variable and more moderate than further inland. Mean daily maximum and minimum temperatures for Lüderitz are about 22°C and 14°C for January, and 18°C and 10°C respectively for July. Those for Aus are about 31°C and 15°C for January, and 18°C and 4°C respectively for July. Wind here is a powerful environmental factor. Strong southerly coastal winds prevail in summer (30–80 km per hour) and short-duration berg winds blow from inland in winter. The elevated slopes of the mountains collect extra moisture from fog and the rocky terrain provides protection from the wind.

Frequently cited localities and quarter degree grids: Lüderitz (2615CA), Haalenberg (2615CB), Aus (2616CB), Klinghardt Mountains (2715BC), Buchuberg (2715DD), Aurus

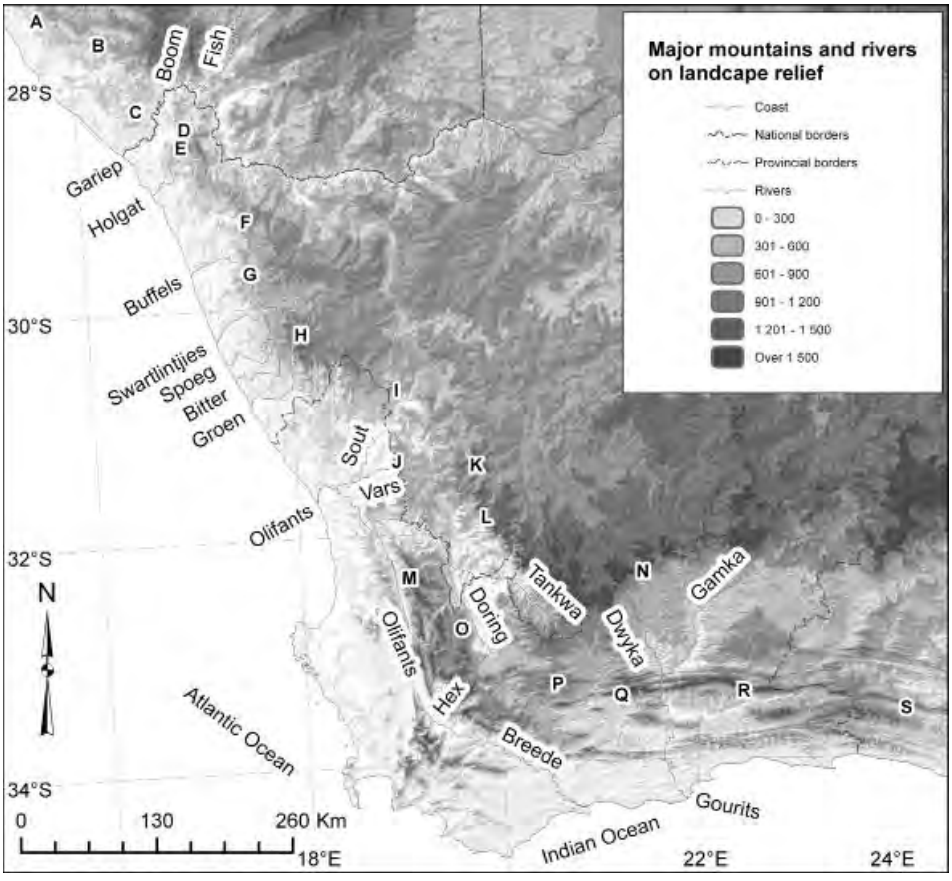


FIGURE 2.—Relief map of southern Africa showing the major rivers and mountain ranges in the Extra Cape Subregion of the Greater Cape Floristic Region. A, Klinghardt Mountains; B, Aurus Mountains; C, Schakalsberg; D, Vandersterrberg; E, Ploegberg; F, Anenousberg; G, Spektakelberg; H, Kamiesberg Mountains; I, Langberg; J, Bokkeveld Mountains; K, Hantamsberg; L, Roggeveld Mountains; M, Cederberg Mountains; N, Nuweveld Mountains; O, Swartruggens; P, Witteberg Mountains; Q, Klein Swartberg Mountains; R, Groot Swartberg Mountains; S, Baviaanskloof Mountains.

Mountains (2716CB), Witpütz (2716DA), Rosh Pinah (2716DC), Schakalsberg (2816BA), Obib Mountains (2816BA & BB), and Oranjemund (2816BB).

Gariep (G)—As used here, the Gariep unit extends southwards from the Namus Mountains, the Lorelei and Sonberg, lying just south of Rosh Pinah in southern Namibia, across the lower Gariep Valley into the Richtersveld in the northwest corner of the Northern Cape Province, to the base of the Anenousberg and Steinkopf in the south. In the west it extends from about 12 km inland of the Atlantic coastline and stretches eastwards as far as De Hoop, which is located south of the mouth of the Fish River and the Tatasberg (Figure 1). The extremely arid eastern Richtersveld, lying south of the Tatasberg and east of the Oemsberg and Stinkfontein Mountains, forms part of the summer rainfall Eastern Gariep Desert (Jürgens *et al.* 2006) and was excluded from this study. Our decision to exclude this area follows the finding by Born *et al.* (2007) that its inclusion in the Greater CFR fails to maximise endemism.

Landscape: with an area of 9 058 km^2, the landscape is dominated by a geologically complex, north–south trending mountain belt of ancient pre-Gondwanan rocks (± > 2.5 billion years old) that are extensively intruded by more recent (at least a billion years old) granite and gneiss. It stretches from southern Namibia into the Richtersveld National Park along the Vandersterrberg (1 366 m), Ploegberg (1 292 m), and Stinkfontein Mountains (1 230 m), reaching close to Eksteenfontein in the south (Figure 2). The low lying plains of recent sands and loam that cover most of the area between the steep inland mountains and the coast are a mosaic of mobile, wind-blown sand dunes, shallow soils interspersed with pebbly quartz patches, exposed dolerite or granite and other rock outcrops, and sandy riverbeds. Included in the unit is the narrow, undulating, gravel plain that extends along the lower reaches of the Gariep Valley to just south of the Gariep Estuary. Apart from the southern Namib, this is the only other element in the ECR that falls in the Desert Biome. The area experiences extremely low and erratic winter rainfall and supports vegetation that is classified as part of the Western Gariep Desert (Jürgens *et al.* 2006).

Climate: the lower Gariep Valley forms an important corridor for fog and cool moist air to move inland from the Gariep Estuary (a phenomenon known locally as 'malmokkie') and for dry, hot winds from the interior to blow offshore. The distance to which fog is able to drift inland along this valley makes it a somewhat distinctive element of the region (Van Jaarsveld 1981; Jürgens 1991; Jürgens *et al.* 2006). In the true desert areas of the Gariep unit along the Gariep Valley, annual precipitation is unpredictable and as low as 45 mm per annum. Outside this area the rainfall increases, ranging from up to 70 mm on the low-lying plains to as much as 200 mm per annum in the mountains of central Richtersveld. Some areas of the Richtersveld (Arrisdrif to near Khubus and east of Oograbies) are subject to extreme offshore winds, which shift enormous amounts of sand seawards and cause hugely abrasive sandblasting. Temperatures vary greatly. In summer, mean daily temperatures vary from 17°C near the coast to 40°C near Sendelingsdrif. In winter the central mountains sometimes experience subzero temperatures and snow falls on rare occasions.

Frequently cited localities and quarter degree grids: Namuskluft (2716DD/2816BB), Lorelei (2816BB), Sendlingsdrif (2816BB), Numees (2816BD), Cornellskop (2816BD), Alexander Bay (2816DA), Boegoeberg (2816DC), Khubus (2817AC), Paradyskloof (2817AC), Oemsberg (2817AC), Ploegberg (2817CA), Cornellsberg (2817CA), Vandersterrberg (2817CA), Helskloof (2817CB), Eksteenfontein (2817CC), Lekkersing (2817CC), Karachabpoort (2917AA), Oograbies (2917AA/AC), and Kosies (2917BA).

Namaqualand Sandveld (NS)—The Namaqualand Sandveld covers the coastal plain from the Holgatrivier, between Alexander Bay and Port Nolloth in the north, to the Olifants River in the south. The northern part reaches about 12 km inland from the sea where it abuts the Gariep unit, but south of Port Nolloth the coastal plain broadens, bordering on the elevated Namaqualand Hardeveld at approximately 300 m above sea level. In the extreme south it extends about 25 km inland where it adjoins the Knersvlakte (Figure 1).

Landscape: the 7 998 km^2 coastal plain is a flat to slightly undulating strip of late Tertiary and Quaternary sands that are semi-mobile to highly mobile in the northern parts. Grey calcareous sands, the most recent in origin, occur on the coastal margin, whereas late Tertiary yellow and red sands occur further inland (Francis *et al.* 2007). The calcium-rich marine sands are relatively fertile, unlike the deep, more acidic, wind-blown red sands derived from both coastal and inland sources. Hardpans of siliceous or calcareous material underlie most of the sandy landscape. Large quartz fields occur in the central Sandveld in the surrounds of Riethuis and Soebatsfontein near the Swartlintjiesrivier and to the east of Wallekraal. The coastal plain is occasionally interrupted by low, rocky hills, and the coastline is broken by arid estuaries at the mouths of several rivers, notably the Spoegrivier, Groenrivier, and Olifants River (Figure 2).

Climate: rainfall varies from 50–80 mm per annum in the north to almost 200 mm per annum in the south. Extreme southerly winds and sandblasting are major features along the coast as far south as Port Nolloth. The occurrence of fog, a significant additional source of moisture, increases northwards along the coast. Port Nolloth, for instance, experiences 150 fog days per year. The highest temperatures in summer are 25–30°C and lowest temperatures in winter are 5–10°C.

Commonly cited localities and quarter degree grids: Holgatrivier (2816DC/DD), Port Nolloth (2916BB), Kleinsee (2917CA), Buffelsrivier (2917CA/CB), Sonnekwa (2917CC), Oubees-se-Sand (2917DC), Riethuis (3017AB), Hondeklipbaai (3017AD), Wallekraal (3017BC), Groenrivier Mouth (3017DC), Kotzesrus (3017DD), Brand-se-Baai (3117BD), Koekenaap (3118CB), and Lutzville (3118CB).

Namaqualand Hardeveld (NH)—The Namaqualand Hardeveld occupies the north-central and central regions of Namaqualand. The Anenousberg, lying slightly southwest of Steinkopf, demarcates the northern boundary and its southern border runs from near Nuwerus in the west, eastwards to the Langberg, northwest of Loeriesfontein. The western border, at approximately 300 m above sea level, adjoins the Namaqualand Sandveld and the eastern boundary, demarcated by the winter and summer rainfall interface, merges into the inland plains of Bushmanland. This interface follows a rough line from just east of Steinkopf, Concordia, and the Goegab Nature Reserve near Springbok to Gamoep, through to the northern foothills of the Langberg (Figure 1).

Landscape: covering 21 400 km^2, the elevated Hardeveld (120–1 260 m) is dominated by large, solid domes and broken koppies of granitic gneisses. In addition, seams of quartzite are exposed in the foothills to the west, notably on the Kourkammaberg, whereas Nama-sediments, chiefly shales, are visible in a narrow band on the escarpment near Spektakel Pass west of Springbok. The largest rivers traversing the Hardeveld are the non-perennial Buffelsrivier, Spoegrivier, and Groenrivier that mostly follow underground courses during dry periods (Figure 2). The area of greatest topographic diversity is the elevated escarpment between Springbok and Steinkopf.

Climate: most of the Hardeveld receives about 200 mm of rain per annum, but the elevated slopes receive 300 mm or more. Mean daily maximum and minimum temperatures for large parts of the region are 30°C and 15°C for January, and 20°C and 5°C respectively for July. Further inland temperatures are more extreme and near Platbakkies the temperature may increase to 37°C in January and fall to -3°C in July.

Frequently cited localities and quarter degree grids: Anenous Pass (2917BA), Steinkopf (2917BA), Komaggas (2917CD/DC), Spektakel Pass (2917DA), Springbok (2917DB), Wildeperdehoek Pass (2917DC), Grootvlei (3017BB), Kamieskroon (3017BB), Karkams (3017BD), Garies (3017DB), Kliprand (3018DA), Bitterfontein (3118AB), and Nuwerus (3118AB).

Kamiesberg Mountains (KB)—The Kamiesberg massif lies east of Kamieskroon and Garies and extends inland to the vicinity slightly east of Leliefontein (Figure 1). Rising upwards from about 1 200 m to 1 706 m, it is the highest, coldest, and wettest part of Namaqualand and, like the surrounding Namaqualand Hardeveld, it is dominated by granitic gneisses, mostly in the form of massive, exposed domes and bornhardts. The boundary accepted here is approximated by the low altitude limit of 1 450 m.

Landscape: covering a total area of 742 km^2, the mountain range is delimited by an imposing scarp of granite in the west, but grades gently into the lower lying eastern Hardeveld along the eastern slopes. Key habitats for endemic species are seasonal wetlands,

seepage areas, and streams that characterise the higher slopes and high-lying valleys. In many places the extra moisture derived from the run-off from large granite domes and boulders accumulates in shallow rock pools (!gau or bakkies) and the fringes of rock outcrops that are home to several ephemeral aquatics.

Climate: although the mean rainfall per annum for the area is 355 m, the higher parts of the Kamiesberg Mountains receive 400 mm or more rain per year. The highest peaks, particularly the Rooiberg (1 706 m), Eselkop (1 664 m), Sneeukop (1 588 m), Kamiesberg (1 527 m), and Weeskind (1 440 m), experience regular winter frosts and receive occasional snowfalls. Mean daily maximum and minimum temperatures are about 25°C and 10°C for January and 15 °C and 2°C respectively for July.

Frequently cited localities and quarter degree grids: Sneeukop (3017BB), Leliefontein (3018AC), Eselkop (3018AC), Rooiberg (3018AC), and Stalberg (3018AC).

Knersvlakte (KV)—Abutting the high-lying, broken granite landscape of the Hardeveld in the north and the Olifants River and Klawer in the south is the extensive, low-lying plain called the Knersvlakte. The Knersvlakte adjoins the sandy coastal plains of the Sandveld, at approximately 250 m above sea level, in the west and extends to the base of the steep sandstone slopes of the Matsikamma and Bokkeveld Mountains in the east (Figure 1).

Landscape: covering 5 537 km^2, the undulating plain decreases in altitude from north to south (800–200 m), reaching as low as 40 m in some areas. Several, often salt-rich, watercourses drain the southern part. The largest of these are the non-perennial Soutrivier and Varsrivier. The Nama-system forms the basement of much of the region and includes quartz-veined shales and occasional bands of limestone. Weathering of the palaeo-Karoo River Delta, located in the Knersvlakte, has produced a complex mosaic of quartz fields, exposed shale beds, dolomite outcrops, and red sand plumes. Highly conspicuous are the pebble-strewn quartz fields, characterised by a dense layer of white, angular quartz stones. Local differences in the quartz stones and soils give rise to two forms of quartz fields. The non-saline quartz fields have shallow, strongly acidic underlying soil and high stone content on the surface, whereas the saline quartz fields have deeper, neutral to slightly acidic soils with a relatively sparse covering of gravel (Schmiedel & Jürgens 1999; Ellis & Weis 2006). These represent the extremes of a habitat continuum, but often the quartz patches have sharply defined borders that create conspicuous, island-like habitats (Schmiedel 2004). The surface temperatures of quartz patches are often relatively cooler than those of surrounding areas in summer and inversely so in winter (Schmiedel & Jürgens 2004).

Climate: the mean annual rainfall of the Knersvlakte is mostly less than 150 mm per annum but precipitation is occasionally increased by fog that drifts inland from the cold Atlantic Ocean. The lowest temperatures in winter are 5–10°C, whereas the highest temperatures in summer are 30–35°C.

Frequently cited localities and quarter degree grids: Kwaggaskop (3118AB), Farm Rooiberg (3118AB/BA), Moedverloor (3118AD), Soutrivier (3118BC), Varsrivier (3118BC/BD), Holrivier (3118 CB/DA), Vredendal (3118DA), Vanrhynsdorp (3118DA), and Klawer (3118DC).

Western Mountain Karoo (WM)—The Western Mountain Karoo occupies the inland plateau from the Langberg, northwest of Loeriesfontein, to Nieuwoudtville where the sediments of the Karoo Supergroup meet the sandstones of the Cape Supergroup that demarcate the core CFR. From here it stretches eastwards through the Hantam region to

Calvinia and then southwards through the Roggeveld, incorporating a narrow western belt of the Great Escarpment at elevations of 800–1 700 m. From the southwestern boundary near the Komsberg, the unit extends eastwards along the Great Escarpment until the easternmost part of the Nuweveld Mountains, south of Fraserburg (Figures 1 & 2).

Landscape: covering 19 242 km^2, the area comprises a gently undulating to steeply rolling plateau with scattered hills and low mountains. The landscape is dominated by the western Great Escarpment which comprises erosion-resistant Karoo sandstone and dolerites. Rocks of the Dwyka and Ecca Groups cover most of the Western Mountain Karoo, but dolerite intrusions also occur and form many of the rocky ridges in the area. The soils of the gently undulating plateau generally tend to be stony and shallow, unlike the heavy reddish clay soils of the dolerite beds that are spongy and crack on drying. The westward-flowing Doringrivier drains the plateau between Nieuwoudtville and Calvinia, and the northward-flowing Visrivier and Renosterrivier drain the Roggeveld plateau. Some of the highest peaks along the Escarpment provide special habitats: the seasonal wetlands on the Hantamsberg plateau (1 672 m), and the relatively moist, well-shaded, southeast-facing dolerite cliffs of Sneeukrans (1 713 m) and Aasvoëlkrans (1 859 m), west and south of Sutherland.

Climate: rainfall over much of the area varies from 150–250 mm per annum. The average annual rainfall is highest on the edge and for a short distance inland of the Great Escarpment (up to 430 mm) and then decreases rapidly further inland. On the Roggeveld the mean daily maximum and minimum temperatures are 29.3°C and a little over 10°C for January. Frost occurs regularly in winter and snow falls about five times a year, mainly on the mountains west and south of Sutherland. The mean daily minimum temperature at Sutherland during July is -2.4°C and extremes of -13.6°C have been recorded in some years, making the Roggeveld one of the coldest places in South Africa (Weather Bureau 1998).

Frequently cited localities and quarter degree grids: Langberg (3018DB), Kubiskouberg (3019CD), Loeriesfontein (3019CD), Nieuwoudtville (3119AC), Calvinia (3119BD), Hantamsberg (3119BD), Middelpos (3120CC), Gannaga Pass (3220AA), Ouberg Pass (3220AD), Uitkyk (3220AD), Sutherland (3220BC), Verlatekloof Pass (3220DA), Komsberg Pass (3220DB), and Nuweveld Mountains (3221BA).

Tanqua-southern Succulent Karoo (TS)—Comprising a more-or-less L-shaped valley within the rain shadow of the inland Cape Fold Mountains, this unit includes the broad, low-lying (below 750 m), basin-like valley of the Tanqua Karoo in the northwest and the narrow strip of Southern Succulent Karoo in the southeast.

The Tanqua Karoo is bordered by the Hantam Plateau in the north, the eastern Cederberg Mountains in the west, the Roggeveld Escarpment in the east, and the mountains either side of Karoopoort in the south. The Southern Succulent Karoo valley is about 400 km long and runs eastward from between the Klein Roggeveld and Witteberg Mountains to the Bosmanspoort area, north of Willowmore. It narrows from approximately 100 km wide in the west to about 60 km as it approaches the southern edge of the Great Karoo, covering a total area of 18 984 km^2 (Figure 1).

Landscape: the Tanqua Karoo basin descends from about 750 m at its rim to 200 m on the valley bottom, where huge expanses of exposed Dwyka tillites, as well as shales, mudstones, and sandstones of the Ecca Group have been exposed by extreme erosion. The landscape is mostly flat, comprising extensive gravel plains, occasionally broken by dolerite dykes and Kimberlite hills. Traversing the area are a network of drainage lines

with broad Quaternary alluvial beds that run into the westward-flowing Tankwarivier and northwestward-flowing Ongeluksrivier and Doringrivier (Figure 2).

The slightly more elevated Southern Succulent Karoo unit, at 500–900(–1 120) m, is a flat-bottomed valley consisting of plains, washes, and drainage lines. The underlying strata are Ecca shales and Dwyka tillite. Sandy soils occur mostly in and along drainage lines. The two main rivers, the Dwyka and Gamka Rivers, flow in a general southward direction, leading from the Great Escarpment to the Indian Ocean via gaps in the Cape Fold Mountains.

Climate: in the Tanqua Karoo rainfall shows high spatial variability (72–112 mm per annum). Most falls in winter, although 25% of the mean annual precipitation occurs in summer, mostly in April. The average annual rainfall in the southern Great Karoo near Prince Albert is slightly higher (167 mm), but the pattern here is bimodal with winter rain accounting for only 46% of the total. Heavy rains are most likely to fall in the region in autumn (March to April) and early summer (October to November). In the Tanqua Karoo the mean daily maximum temperature for January is 35.9°C and the mean daily minimum for July is 5.7°C. Temperatures range from 30°C to below 0°C near Prince Albert where the incidence of frost is quite high.

Frequently cited localities and quarter degree grids: bottom of Bloukranz Pass (3119DA/DB), Elandsberg (3219BB), Elandsvlei (3219BC), Karoopoort (3319BA), Laingsburg (3320BB), Matjiesfontein (3320BA), Ghaapkop (3320BA), Prince Albert (3321DC), and Tierberg (3322AB).

Vegetation

The most widespread vegetation types in the Extra Cape Subregion (ECR) are succulent shrublands and vygieveld, which cover approximately 90 850 km^2 of the entire subregion, 71 648 km^2 of which fall in South Africa (Table 1). Unlike the structurally diverse vegetation types of other arid regions in the world, these succulent shrublands are compositionally relatively uniform and unique to southern Africa (Cowling *et al.* 1999). They are dominated by shallow-rooted, short-lived, mostly succulent-leaved shrubs of less than 1 m tall. Most belong to the Aizoaceae and are commonly called 'vygies', but many also belong to Crassulaceae, Asphodelaceae, and Asteraceae. The ECR encompasses as many as 50 of the 63 vegetation units recognised in the Succulent Karoo Biome by Mucina *et al.* (2006). Thus as much as 91.9% of the ECR falls within the Succulent Karoo Biome (Table 1).

Table 1.—Area occupied by biomes in the Extra Cape Subregion (ECR).

Biome	Area within ECR	% Area within ECR	% Area of entire biome
Succulent Karoo[1]	90 850 km^2	91.9%	88.7%
Fynbos	4 443 km^2	4.5%	5.3%
Desert	1 719 km^2	1.7%	23.9%
Azonal	1 857 km^2	1.9%	
TOTAL	98 869 km^2	100%	

[1] The area includes the southwestern part of Namibia following the classification of Rutherford & Westfall (1986).

As explained by Mucina *et al*. (2006), the term succulent shrubland does not imply that all the plants in this vegetation are succulent. Rather, it focuses on the presence of succulent plants as a recurring feature, but expressed at varying levels of abundance throughout the biome. The shrubland vegetation found on the uplands of the Richtersveld and Hardeveld has a scattered tree flora of both succulent species such as *Aloe dichotoma* (Asphodelaceae), and non-succulent species including *Ozoroa dispar* (Anacardiaceae), *Olea europaea* subsp. *africana* (Oleaceae) and *Ficus ilicina* (Moraceae), and fairly tall succulent shrubs like *Stoeberia arborea* (Aizoaceae) and *Roepera morgsana* (Zygophyllaceae). The strandveld, the predominant vegetation of the stabilised dunes and deep sands of the Namaqualand Sandveld, has a full range of succulent and fairly tall non-succulent shrubs. Whereas the quartz fields of the Richtersveld, Sandveld, and Knersvlakte are unique in having dwarf to low, almost entirely succulent, vygieveld.

In comparison with the succulent component, the non-succulent vegetation types of the ECR cover a much smaller area. The Fynbos Biome occupies as little as 4.5% of the ECR (Table 1). Sand Fynbos is found in a series of large, separate areas between Komaggas and Koekenaap where the water table is shallow. Its success here is determined by the superior water-holding capacity of the wind-blown acid sands to which it is confined (Cowling & Pierce 1999). Dominant species include *Leucospermum praemorsum* and *L. rodolentum* (Proteaceae), and *Thamnochortus bachmannii* and *Willdenowia incurvata* (Restionaceae). Further inland, fynbos is restricted to a few relatively moist, high-altitude refugia. *Restio sieberi* (Restionaceae)*, Euryops tenuissimus* (Asteraceae), and *Lobostemon echioides* (Boraginaceae) occur on the quartzites of the Stinkfontein Mountains, Richtersveld, whereas several endemic species, *Restio vilis* (Restionaceae), and *Protea namaquana* and *Vexatorella alpina* (Proteaceae), grow on the granite gneisses of the Kamiesberg Mountains. Compared with the other high-lying parts of the ECR, the Hantamsberg and Roggeveld are conspicuously lacking in true fynbos vegetation. In these parts the sandstones in the moist, high-lying areas support only three species of Restionaceae (*Restio distractus*, *R. gossypinus* and *R. sieberi*) without any known species of *Erica* or Proteaceae. Here the shales and dolerites are covered by renosterveld, which is dominated by evergreen shrubs, notably *Elytropappus rhinocerotis* and other species of Asteraceae. Renosterveld occurs in the northern Namaqualand Hardeveld near Spektakelberg and on the clay-rich south-facing slopes of the Kamiesberg Mountains.

In addition to elements of the Fynbos Biome, 4.5% of the ECR falls within the Desert Biome in South Africa (Table 1). Vegetation units of South Africa's Desert Biome, which are included in the ECR, extend from the mouth of the Gariep inland along a 20 km zone adjacent to the river and ending at its confluence with the Fish River. The vegetation along the lower Gariep Valley is sparse, low shrubland, dominated by deciduous, woody shrubs and leaf- and stem-succulent shrubs, mainly in the family Aizoaceae (especially *Dracophilus dealbatus, Hartmanthus pergamentaceus, Mesembryanthemum arenosum, M. marlothii, M. pseudoschlichtianum*, and *Stoeberia gigas*). Although the southern Namib, which extends as far north as Hottentots Bay, is commonly referred to as a desert (Pallett 1995; Mannheimer *et al*. 2008), it is still regarded as part of the Succulent Karoo Biome (Rutherford & Westfall 1986).

Other minor vegetation units within the ECR are habitat specific and cover smaller areas than any of those mentioned above. The banks and small islands along the lower reaches of the Gariep provide a linear oasis that supports tall, dense, evergreen riparian thicket. Dominant species are *Searsia pendulina* (Anacardiaceae), *Euclea pseudebenus* (Ebenaceae), *Ziziphus mucronata* (Rhamnaceae), *Salix mucronata* (Salicaceae), and *Tamarix usneoides* (Tamaricaceae). In contrast, the dry riverbeds of Namaqualand supports lower alluvial shrubland, in which *Acacia karroo* is the dominant tree. The estuary

at the mouth of the Gariep itself ranks as southern Africa's sixth most important coastal wetland (Pallett 1995). Similar, although smaller, arid estuarine salt marshes are found at the mouths of Namaqualand's non-perennial rivers. The dominant salt-tolerant species at these river mouths are species of *Salicornia* and *Sarcocornia* (Amaranthaceae), *Juncus acutus* (Juncaceae), and the cosmopolitan grass *Sporobolus virginicus* (Poaceae). Specialised salt-tolerant plant communities also occur inland in a series of pans extending from near Hottentots Bay in the north to near the Olifants River Mouth in the south. Although mostly devoid of vegetation, they only occasionally support highly salt-tolerant shrubs of *Caroxylon* (= *Salsola* in part) (Amaranthaceae) and *Malephora* (Aizoaceae). In the Port Nolloth and Kleinsee area, pans have been buried under layers of wind-blown sand and some are home to an unusual endemic species with a broom-like habit, *Polygonum snijmaniae* (Polygonaceae).

Floristic composition

Major families—110 families are recognised in the Extra Cape flora. Of these, 100 are seed plants and 10 are lycopods and monilophytes. The extraordinary feature of the Extra Cape flora are the massive predominance of the Aizoaceae. Comprising mainly succulent plants, the family has a total of 658 species in the Extra Cape flora (Table 2). Asteraceae (495 species) are the second largest family, falling short of its typical ranking as the largest family in the Core Cape flora, as well as in floras of other arid to semi-arid regions. The placement of Iridaceae as third among the largest families is similar to the Core Cape flora. The extraordinarily high representation by Iridaceae (286 species) in the Extra Cape Subregion (ECR) is an unusual aspect of this flora, as it is for the Core Cape flora and, consequently, of the southern African flora as a whole. Scrophulariaceae (230 species) are the fourth largest family, followed in size by Hyacinthaceae (177 species), which are one place ahead of the Fabaceae with 140 species. Interestingly, the placement of Hyacinthaceae among the largest five families has not been reported before in similar studies (Hilton-Taylor 1996; Born *et al.* 2007), possibly because the datasets available to earlier studies were suboptimal for the family. Thereafter follow Crassulaceae, Poaceae, Asphodelaceae, Geraniaceae, Cyperaceae, and Apiaceae that also all rank among the 20 largest families of the Core Cape flora, albeit in a different sequence. The inclusion of Apocynaceae, Oxalidaceae, Amaryllidaceae, Euphorbiaceae, Amaranthaceae (including Chenopodiaceae), Ruscaceae, Malvaceae, and Brassicaceae within the eight remaining positions is peculiar to the Extra Cape flora when compared to the 20 largest families of the Core Cape flora. The richness of Amaranthaceae in the dry regions, as is the case in Australia and Eurasia, however, is not unusual.

The assemblage of the top-ranking families within the Extra Cape and Core Cape floras shows two clear differences. Most notable for the Extra Cape is the predominance of the Aizoaceae, Crassulaceae, Apocynaceae (specifically Asclepiodoideae), Geraniaceae, and Euphorbiaceae, which contribute hugely to the succulent component of the flora. Secondly, two geophytic families that feature prominently in the Extra Cape flora are the Oxalidaceae and Amaryllidaceae, which is not the case for the geophytic-rich Core Cape flora. Possibly the most obvious difference from the Core Cape flora, however, is the extremely poor representation of Ericaceae, Proteaceae, Restionaceae, and Rutaceae. These families are confined to areas of the ECR that support fynbos communities, which invariably occupy nutrient-poor soils of the Cape Supergroup rather than the richer soils of the Karoo Supergroup.

An assessment of the 20 largest families in the Succulent Karoo Biome as a whole by Hilton-Taylor (1996) generated essentially the same set of families as those shown in Ta-

Table 2.—The 20 largest families in the Extra Cape flora ranked according to the number of native species in each.

	Family	Species	No. & % Species endemic to ECR–CCR	No. & % Species endemic to ECR	Genera	Genera endemic to ECR–CCR	Genera endemic to ECR	Species / Genus
1	Aizoaceae	658	(75) 11.4%	(455) 69.1%	80	18	26	8.2
2	Asteraceae	495	(150) 30.3%	(140) 28.3%	82	8	4	6.0
3	Iridaceae	286	(100) 35.0%	(156) 54.5%	21	4	1	13.6
4	Scrophulariaceae	230	(73) 31.7%	(84) 36.5%	30	5	0	7.7
5	Hyacinthaceae	177	(59) 33.3%	(83) 46.9%	13	0	1	13.6
6	Fabaceae	140	(48) 34.3%	(55) 39.3%	27	5	0	5.2
7	Crassulaceae	134	(32) 23.9%	(47) 35.1%	4	0	0	33.5
8	Poaceae	117	(20) 17.1%	(14) 12.0%	46	0	0	2.5
9	Asphodelaceae	111	(40) 36.0%	(46) 41.4%	9	0	0	12.3
10	Apocynaceae	110	(20) 18.2%	(37) 33.6%	29	2	3	3.8
11	Geraniaceae	92	(35) 38.0%	(36) 39.1%	2	0	0	46.0
12	Oxalidaceae	87	(26) 29.9%	(53) 60.9%	1	0	0	87.0
13	Amaryllidaceae	82	(24) 29.3%	(50) 61.0%	13	2	0	6.3
14	Euphorbiaceae	63	(12) 19.0%	(20) 31.7%	3	0	0	21.0
15	Amaranthaceae	52	(5) 9.6%	(23) 44.2%	15	0	0	3.5
16	Ruscaceae	51	(17) 33.3%	(30) 58.8%	1	0	0	51.0
17	Cyperaceae	48	(13) 27.1%	(4) 8.3%	11	0	0	4.4
18	Malvaceae	48	(13) 27.1%	(9) 18.7%	5	0	0	9.6
19	Brassicaceae	37	(12) 32.4%	(10) 27.0%	4	0	0	9.3
20	Apiaceae	35	(14) 40.0%	(9) 25.7%	19	2	2	1.8
	TOTAL	3 053 (82.2% of all 3 715 native spp. in the Extra Cape flora)			415 (67.5% of all 615 genera in the Extra Cape flora)			

ble 2, apart from the inclusion of Molluginaceae as the nineteenth largest family for the biome. Recent changes to family circumscriptions account for several small differences in Hilton-Taylor's listing and probably for some of the differences in the ranking of certain families. Nevertheless, the placement of Aizoaceae, Asteraceae, and Iridaceae as the three largest families remains constant.

Poaceae are only moderately represented in the Extra Cape flora, being eighth in size in total number of species. As in the Core Cape flora, it is more richly represented than Cyperaceae. This relatively low ranking of the Poaceae is unlike its prominence in adjacent areas of Namibia and the inland Karoo. In the flora of Namibia, for instance, Poaceae is the largest family (Maggs *et al.* 1998; Craven 1999). It also ranks among the five largest families in southern Africa excluding the Core Cape Subregion (CCR) (Manning & Goldblatt 2012).

Although 110 families of vascular plants are represented in the Extra Cape flora, remarkably few families account for the bulk of the species. The 20 largest families in the flora

for instance account for 82.2% of the total flora. Only 10 families in the flora have over 100 species each and just 4 families contain more than 200 species. Of these, the Asteraceae and Aizoaceae reach as many as 495 and 658 species respectively (Table 2). Further evidence of the hugely unequal distribution of species among families is provided by the fact that 19 families have just one representative each in the Extra Cape flora. In total, the 10 largest families combined account for 2 348 species, or 63.3% of the total Extra Cape flora.

None of the families represented in the Extra Cape flora are endemic to the ECR, and none are endemic to the Greater Cape Floristic Region. Inversely, none of the nine vascular plant families that are endemic to southern Africa (Bruniaceae, Curtisiaceae, Geissolomataceae, Grubbiaceae, Lanariaceae, Penaeaceae, Rhynchocalycaceae, Roridulaceae, and Stangeriaceae) are known in the ECR.

Major genera—615 genera of vascular plants (603 genera of seed plants and 12 of lycopods and monilophytes) are found in the Extra Cape flora (Appendix). This represents a little under two-thirds of the number of genera in the Core Cape flora and about one quarter of the genera found in the flora of southern Africa. Only 38 (6.2%) genera are endemic to the ECR, 26 of which belong to the Aizoaceae (Table 3). The genera endemic to this subregion characteristically have few species and 20 of them are monotypic. This degree of generic endemism is small compared with the value of 15.5% (154 endemic genera within a total of 996 genera) for the Core Cape flora given by Manning & Goldblatt (2012).

At a larger scale, 55 genera are broadly endemic to an area straddling the ECR and CCR. Thus a total of 94 (15.3%) genera of the Extra Cape flora are endemic to the Greater CFR as a whole. Of particular significance is the discovery that the level of generic endemism (248 endemic genera in a total of 1 119 genera) for the entire flora of the Greater CFR is 22.2%, which is greater than that of each of the regions treated separately. This elevated level of endemism, at the rank of genus, thus satisfies one further criterion that justifies the recognition of the Greater CFR as a valid floristic region (Takhtajan 1986; Born *et al.* 2007).

The ratio of species per genus for the Extra Cape flora is 6.0 (i.e. 3715/615), which is unusually high compared with arid lands in the Sahara, Arabia, and North America (Cowling & Hilton-Taylor 1999). The average sizes of the vascular plant genera in the Extra Cape flora are nevertheless much smaller than those given by Manning & Goldblatt (2012) for the Core Cape flora (9.1 species per genus) and for the southern African flora as a whole (9.6 species per genus).

Table 3.—Genera endemic to the Extra Cape Subregion (ECR) and the number of native species in each.

Genera endemic to the ECR (species in each)	**Family**
Argyroderma (11), *Astridia* (8), *Didymaotus* (1), *Dracophilus* (2), *Eberlanzia* (8), *Enarganthe* (1), *Fenestraria* (1), *Hallianthus* (2), *Hartmanthus* (2), *Jacobsenia* (3), *Jensenbotrya* (1), *Juttadinteria* (5), *Meyerophytum* (2), *Mitrophyllum* (6), *Namaquanthus* (1), *Namibia* (3), *Nelia* (2), *Odontophorus* (4), *Oophytum* (2), *Ottosonderia* (1), *Polymita* (2), *Psammophora* (4), *Ruschianthus* (1), *Schlechteranthus* (2), *Vanheerdia* (2), *Wooleya* (1)	Aizoaceae
Marlothiella (1), *Scaraboides* (1)	Apiaceae
Notechidnopsis (1), *Rhyssolobium* (1), *Richtersveldia* (1)	Apocynaceae
Adenoglossa (1), *Alatoseta* (1), *Antithrixia* (1), *Eremothamnus* (1)	Asteraceae
Hexacyrtis (1)	Colchicaceae
Namophila (1)	Hyacinthaceae
Devia (1)	Iridaceae

Oxalis (Oxalidaceae) is the largest genus in the Extra Cape flora with 87 species, followed closely by *Conophytum* (Aizoaceae) and *Crassula* (Crassulaceae), both with 81 species each (Table 4). The next of the large genera are *Mesembryanthemum* (Aizoaceae) and *Pelargonium* (Geraniaceae), each with 77 species, followed by *Ruschia* (Aizoaceae), *Moraea* (Iridaceae), *Antimima* (Aizoaceae), *Lachenalia* (Hyacinthaceae), and *Euphorbia* (Euphorbiaceae). Thereafter species' numbers drop from 51 for *Eriospermum* (Ruscaceae), ranked eleventh place among the 20 largest genera, to 36 species in *Tylecodon* (Crassulaceae), which is placed twentieth.

Genera that have a particularly large number of species that are endemic to the ECR (i.e. exceeding 50% of the total species that a genus contributes to the flora) are *Oxalis*, *Conophytum*, *Mesembryanthemum*, *Ruschia*, *Moraea*, *Antimima*, *Lachenalia*, *Eriospermum*, *Babiana* (Iridaceae), *Othonna* (Asteraceae), *Bulbine* (Asphodelaceae), *Romulea* (Iridaceae), and *Tylecodon* (Table 4). The most obvious factors shared by all these species-rich genera are either the succulent or geophytic habit.

Alien taxa—In addition to 3 715 native species, the Extra Cape flora has 117 alien species, many apparently naturalised. The majority of these aliens belong to the family Poaceae (38 species) followed by Fabaceae (14 species), Caryophyllaceae (9 species), Amaranthaceae and Brassicaceae (7 species each), and Boraginaceae (6 species). Other families with smaller numbers of weedy species are Asteraceae, Polygonaceae, and Solanaceae. Invasive trees are *Acacia cyclops*, found largely in Sand Fynbos along Namaqua-

Table 4.—The 20 largest genera in the Extra Cape flora ranked according to the number of native species in each.

	Genus	Species	No. & % Endemic to ECR–CCR	No. & % Endemic to ECR
1	Oxalis	87	(26) 29.9%	(53) 60.9%
2	Conophytum	81	(3) 3.7%	(68) 83.9%
3	Crassula	81	(26) 32.1%	(17) 21.0%
4	Mesembryanthemum	77	(11) 14.3%	(41) 53.2%
5	Pelargonium	77	(34) 44.2%	(28) 36.4%
6	Ruschia	69	(3) 4.3%	(50) 72.5%
7	Moraea	68	(22) 32.4%	(35) 51.5%
8	Antimima	62	(9) 14.5%	(51) 82.2%
9	Lachenalia	59	(18) 30.5%	(37) 62.7%
10	Euphorbia	58	(10) 17.2%	(19) 32.8%
11	Eriospermum	51	(17) 33.3%	(30) 58.8%
12	Babiana	45	(13) 28.9%	(31) 68.9%
13	Albuca	42	(17) 40.5%	(14) 33.3%
14	Senecio	42	(14) 33.3%	(9) 21.4%
15	Othonna	41	(7) 17.1%	(24) 58.5%
16	Pteronia	41	(13) 31.7%	(11) 26.8%
17	Hermannia	40	(9) 22.5%	(8) 20.0%
18	Bulbine	37	(10) 27.0%	(23) 62.2%
19	Romulea	37	(11) 29.7%	(22) 59.5%
20	Tylecodon	36	(2) 5.5%	(29) 80.5%
	TOTAL	1 131 (30.4% of all 3 715 native species in the Extra Cape flora)		

land's coast, *Acacia saligna*, occurring mostly in the southeast, and *Prosopis glandulosa* and *P. velutina,* both widespread along drainage lines and around water points. *Nicotiana glauca*, a tall shrub or small tree, is common along dry river beds throughout the ECR, whereas *Tamarix ramosissima* occurs along perennial rivers in the southern Great Karoo. Most of the invasive shrubs are Australian species of *Atriplex*, which are well suited to the saline soils of semi-arid southern Africa. Although they may exceed trees and shrubs in cover and abundance, the species of alien annuals and short-lived perennials are less prominent and mostly confined to disturbed, heavily grazed areas. Most of these are annual alien grasses (29 species). The local floras around Nieuwoudtville and Vanrhynsdorp are particularly adversely affected by invasive grasses and as a result many geophytes and annuals in these areas are threatened.

Diversity and endemism

Overall diversity—The Extra Cape Subregion (ECR) occupies an area of approximately 99 000 km^2 and has a native flora of 3 715 vascular plant species, with 40.4% species endemism. The large proportion of species (27%) in the ECR that extends solely into the adjacent Core Cape Subregion (CCR) is a good indication that the floristic boundary between the two areas is far from absolute. Due to the absence of available data for other warm deserts and semi-arid areas in Africa and elsewhere, comparisons with the Extra Cape flora are not easily made. Nevertheless, species endemism in the Sonoran Desert (650 endemics in 310 000 km^2) and Saharan Desert (162 endemics in 9 million km^2) is known to be considerably lower at 26.6% and 25% respectively (Cowling & Hilton-Taylor 1999).

Using recent data from Manning & Goldblatt (2012) for the Core Cape flora, we estimate that the total number of native vascular plant species in the Greater Cape Floristic Region (CFR) is 11 423, i.e. the total number of species in the Extra Cape flora plus that for the Core Cape flora (9 381) minus the total number of species in the ECR that penetrate the CCR (1 673). This estimate for the Greater CFR is only slightly higher than that of 11 057 species given by Born *et al.* (2007), which suggests that the general floristic pattern emerging for the Greater CFR is relatively robust.

Based on the taxonomic accounts presented here and by Manning & Goldblatt (2012), the overall species endemism for the Greater CFR is estimated to be 77.9%, which is higher than the 68.3% for the CCR on its own. This is not surprising given that the Extra Cape flora adds another 2 500 endemic species (1 500 species that are narrowly endemic to the ECR and 1 000 species that extend into the CCR) to the 6 403 species endemic to the CCR. This differs somewhat from the 66.6% species endemism given by Born *et al.* (2007) estimated from data in PRECIS, the South African National Biodiversity Institute's Computerised Information System. However, it is likely that this data source is suboptimal for species in Aizoaceae, the family that contributes most to the high levels of endemism in the Extra Cape flora. Unfortunately, until the taxonomy of this complex family is stabilised, differing taxonomic interpretations of the Aizoaceae will probably continue to hinder an accurate assessment of species endemism for the Greater CFR. Even so, the estimates of 66.6% and 77.9% species endemism are exceptionally high and comparable to figures for isolated oceanic islands.

The flora of Namaqualand, taken here to include all ecogeographic units except the southern Namib, Western Mountain Karoo and Tanqua-southern Succulent Karoo, is estimated to have a total of 2 761 species with 26.8% endemism. This is remarkably similar to the estimated total of 2 750 species given by Cowling *et al.* (1999). Nineteen genera are

endemic to the region, all belonging to Aizoaceae except *Richtersveldia* (Apocynaceae) and the asteraceous genera *Adenoglossa* and *Antithrixia*.

Diversity within ecogeographic units—Table 5 gives a summary of the patterns of species richness and endemism in the eight ecogeographic units of the ECR. The Namaqualand Hardeveld (NH), which lies centrally in the northwestern part of the Extra CFR, has the largest flora (1 513 species) with the highest degree of species endemism (12.1%). The Western Mountain Karoo (WM) follows in size with a total of 1 237 species and 170 endemic species (11.3%), a level of endemism that is very similar to the 176 species given by Clark *et al.* (2011) for the Hantam-Roggeveld region. Although the flora of the Gariep unit (G), with 1 304 species, is slightly larger than that of the Western Mountain Karoo, its level of endemism is slightly lower at 9.9%. The area covered by the Gariep unit is, nevertheless, half that of the WM. Interestingly, the plant species richness of the Richtersveld's desert vegetation units located in G, has been reported to be as high as that in the Succulent Karoo vegetation of the Richtersveld (Jürgens 2004). Unfortunately the scale of our study did not permit such detailed comparisons to be made. The floras of the southern Namib (SN) in the extreme north, and the Tanqua-southern Succulent Karoo (TS) in the east, are the smallest relative to their large surface areas. The Knersvlakte (KV), which covers only 5.6% of the ECR, has a flora of 863 species and accounts for 8.7% of the Extra Cape flora's endemicity. Covering as little as 0.8% of the ECR, the Kamiesberg Mountain unit (KB) has the smallest local flora (693 species), yet it holds 3.9% of the Extra Cape flora's endemic species. Lastly, the Namaqualand Sandveld (NS) on the coastal forelands has a relatively small flora of 767 species, which accounts for only 3.5% of the ECR's endemic species.

In a TWINSPAN analysis of endemism in the Greater CFR (Born *et al.* 2007), the Springbok area (belonging to the Namaqualand Hardeveld), the Knersvlakte, and the Roggeveld Escarpment (in the Western Mountain Karoo) emerged as centres of highest endemism. Our data show a similar pattern for NH, KV, and WM (Table 5), although the Gariep unit also stands out as having high endemicity. Species endemism in each of these units is about twice that of the other ecogeographic units and is likely a reflection of the greater heterogeneity in topography, climate, and soils of these particular regions. The soils of Namaqualand are now known to possess many highly specialised features that compensate for the aridity of the area. These features mainly affect water infiltration, hydraulic conductivity, and subsurface storage, all of which ultimately influence the provision of water to plants (Francis *et al.* 2007). The particular impact of spatial variability in soils has been studied in greatest detail in the sandveld of the northern Richtersveld (Oguz *et al.* 2004) and on the Knersvlakte, where many highly localised habitat specialists exist in small and isolated populations (Schmiedel & Jürgens 1999, 2004; Ellis & Weis 2006).

Extra Cape Subregion–Core Cape Subregion connections—To highlight the floristic affinities between the ECR and CCR we examined the ecogeographical unit's floras to determine the number of Greater CFR endemics in each that straddle the Extra Cape and Core Cape Subregions. The unit with the highest percentage of such Greater CFR endemic species (46.7%) is the Tanqua-southern Succulent Karoo (TS) (Table 5). This is not surprising given the absence of a sharp boundary along the extended eastward-trending interface between the TS and the Witteberg and Swartberg Mountain ranges of the CCR. Two other units that have almost equally large proportions of endemic Greater CFR species which extend across both regions are the Knersvlakte (40.3%) and Namaqualand Sandveld (41.1%). Both abut on the CCR, but the interface zone is relatively small compared with that of the TS. In contrast, the Kamiesberg Mountains (KB), an enclave which is disconnected from the CCR, has as many as 295 endemic Greater CFR species (42.6%), many of which have widely disjunct distributions between the KB and the CCR. Based on the presence of several species of *Erica*, Proteaceae and *Amphithalea* (Fabaceae), the

Table 5.—Numbers of native vascular plant species and levels of endemism per ecogeographical unit in the Extra Cape Subregion (ECR).

Ecogeographical unit	Total species (% endemicity per unit)	Local endemics per unit [1] (% Extra Cape endemicity)	No. & % Extra Cape endemics per unit [2]	No. & % Extra–Core Cape endemics per unit [3]	Area per unit (% ECR)
Southern Namib (SN)	797 (11.2%)	89 (5.9%)	273 (34.2%)	88 (11.0%)	15 908 km² (16.1%)
Gariep (G)	1 304 (11.4%)	148 (9.9%)	503 (38.6%)	218 (16.7%)	9 058 km² (9.2%)
Namaqualand Sandveld (NS)	767 (6.9%)	53 (3.5%)	215 (28.0%)	315 (41.1%)	7 998 km² (8.1%)
Namaqualand Hardeveld (NH)	1 513 (12.0%)	181 (12.1%)	569 (37.6%)	433 (28.6%)	21 400 km² (21.6%)
Kamiesberg Mountains (KB)	693 (8.5%)	59 (3.9%)	189 (27.3%)	295 (42.6%)	742 km² (0.8%)
Knersvlakte (KV)	863 (15.2%)	131 (8.7%)	255 (29.5%)	348 (40.3%)	5 537 km² (5.6%)
Western Mountain Karoo (WM)	1 237 (13.7%)	170 (11.3%)	283 (22.9%)	404 (32.7%)	19 242 km² (19.5%)
Tanqua-southern Succulent Karoo (TS)	762 (8.5%)	65 (4.3%)	138 (18.1%)	356 (46.7%)	18 984 km² (19.2%)
Endemic to two or more of the units above		604 (40.3%)			
TOTAL[4]		1 500 (100%)		1 000	98 869 km² (100%)

[1] The number of species endemic to each ecogeographical unit. In the taxonomic descriptions these species are marked **(ece)**.

[2] The number of species in a particular unit endemic to the ECR. In the taxonomic descriptions these species are marked **(ece)**.

[3] The number of species in a particular unit that penetrate exclusively into the CCR. These are endemic to the Greater CFR and are marked in the taxonomic descriptions as **(gce)**.

[4] 1 500 = the total number of species endemic to the ECR: marked **(ece)**. 1 000 = the total number of Extra–Core Cape endemics present in the ECR: species marked **(gce)**.

Kamiesberg Mountains have long been recognised as an outlier of the traditionally known Cape flora (Marloth 1908; Adamson 1938; Weimarck 1941; Helme 2009).

Despite its exclusion from the CCR by Bond & Goldblatt (1984) and Goldblatt & Manning (2000a), who referred to the subregion as the Cape Floristic Region, the Western Mountain Karoo was tentatively regarded by Weimarck (1941) as part of what we call the CCR, and its affinity with the North West Centre of CCR has been supported most recently by the analyses of Born *et al.* (2007). The affinities of its geophyte flora with that of the CCR were also recognised by Manning *et al.* (2002). Our assessment of the Western Mountain Karoo (WM) shows that 32.7% of this flora comprises endemic Greater CFR species that range from the ECR into the CCR. Many of the typical Core Cape elements (species of *Agathosma*, *Cliffortia*, *Euryops,* and *Polhillia*) that inhabit the WM unit, however, are narrowly endemic species, so they do not contribute to the percentage of shared species reflected here.

Lastly, the ecogeographic units in the far northwest of the ECR show even fewer links with the CCR: the Namaqualand Hardeveld (28.6%), the Gariep unit (16.7%), and Southern Namib (11%). Our estimate of endemism for the Southern Namib differs from that of Burke (2004), who recorded 184 endemic vascular plant species (17.7%) in the region. It is likely that our data is an underestimate for this remote and poorly collected region. Nevertheless, the presence of many of the plants on the checklist compiled for the region by Burke & Mannheimer (2004) was considered doubtful by the specialists contributing

to our study. In these northwestern floras, more than half of the widespread species extend northwards and eastwards beyond the borders of the Greater CFR into the neighbouring Nama Karoo Region of the Palaeotropical Kingdom (Jürgens 1991, 1997). Thus they include several families with subtropical affinities (Acanthaceae, Capparaceae, Cleomaceae, and Cucurbitaceae). The Gariep unit clearly comprises an admixture of floras derived both from relic subtropical lineages and drought-adapted temperate lineages. Evidence of the latter comes from several Core Cape outliers that contribute to the Gariep flora. These are *Cyrtanthus herrei*, which is sister to the southwestern Cape *C. carneus*, *Amaryllis paradisicola*, which is sister to the Western Cape *A. belladonna*, *Moraea gariepensis*, which is sister to the Core Cape-centred *M. ramosissima*, and *Trachyandra adamsonii* and *Walleria gracilis*, both of which have disjunct populations in the Richtersveld and Western Cape (Manning 1990; Snijman & Williamson 1998; Manning *et al.* 2001; Goldblatt *et al.* 2002; Snijman & Meerow 2010). Like those of the Kamiesberg Mountains, these disjunctions suggest a history of vicariance, probably corresponding with phases of range expansion and contraction during climatic oscillations of the Pleistocene (Midgley *et al.* 2001, 2005).

Western Mountain Karoo–Drakensberg connections—Particularly interesting is the group of Afromontane species in the Western Mountain Karoo flora that extends along the Great Escarpment to the Drakensberg Mountains in Lesotho and KwaZulu-Natal. Examples of species with this distribution pattern are *Isolepis angelica* (Cyperaceae), *Zaluzianskya glareosa* (Scrophulariaceae), *Brachypodium bolusii* (Poaceae), and several Asteraceae: *Bolandia pedunculosa, Cineraria mollis, Eriocephalus eximius, Euryops empetrifolius, Helichrysum trilineatum*, and *Pentzia tortuosa*. Further examples that suggest that the Afromontane flora was once more extensive come from the Roggeveld endemic *Manulea incana,* which is closely allied to *M. dregei* and *M. platystigma* on the Drakensberg massif (Hilliard 1994), *Saniella occidentalis*, which is confined to high altitudes in the Cold Bokkeveld and Hantam–Roggeveld and is sister to *S. verna*, found on the Drakensberg Mountains much further east (Burtt 2000), as well as *Crocosmia fucata* from the Kamiesberg Mountains that is most closely related to *C. pearsei* and *C. paniculata* from the Drakensberg Mountains in KwaZulu-Natal and Mpumalanga (Goldblatt *et al.* 2004). This link between the Western Mountain Karoo and the Drakensberg Mountains is not surprising, given the pronounced environmental similarities between the high-lying parts of the WM and the Drakensberg Alpine Centre, most notably regular snowfalls and equally rich, heavy soils.

Regional diversity—Studies on regional diversity within the Succulent Karoo Biome show that its flora has the highest regional diversity (the species richness of areas that encompass more than one community at a scale of 10^1–10^6 km^2) relative to other winter rainfall, semi-arid zones of the world (Cowling & Hilton Taylor 1999). This biome supports 2.65 times more species than equivalent-sized areas of the Nama-Karoo Biome, and 3.8 times more species than the winter rainfall desert areas in America (Cowling *et al.* 1999). These data also apply to those parts of the ECR that fall within the boundaries of the Succulent Karoo Biome, but the pattern of regional diversity for the Western Mountain Karoo may possibly be more comparable to that reported for the Fynbos Biome.

Local diversity—Within-community diversity or alpha diversity is very high. A mean of 74 species has been recorded at the 0.1 ha scale, ranging from 30–40 species on the edaphically uniform habitats of the Namaqualand Sandveld to 90–115 on the heterogeneous Namaqualand Hardeveld habitats (Cowling *et al.* 1999). The Succulent Karoo communities thus have the third highest richness of all the biomes in southern Africa (Cowling & Hilton-Taylor 1999). When compared with semi-deserts and deserts elsewhere, this diversity is similar to values from the winter rainfall, semi-arid steppes, and deserts of the Middle East, where more than 100 species per site is not uncommon (Aronson & Shmida 1992).

Growth forms

In examining the growth forms of the plants in the Extra Cape flora, we followed the system given in Mucina *et al.* (2006). Succulent trees and non-succulent trees are grouped together. Herbs are separated from shrubs by the absence of woody tissues, and graminoids are identified by their 'grassy' appearance. The composition of the Extra Cape flora is summarised in Table 6.

Shrubs—Similar to the Core Cape flora, the characteristic feature of the Extra Cape flora is the predominance of shrubs and dwarf shrubs. A little over half of the species are shallow-rooted shrubs and perennial herbs, accounting for an estimated 2 095 species or 56.4% of the Extra Cape flora. Although diverse in form, the majority of shrubs are typically succulent-leafed and/or succulent-stemmed. The dominance by leaf succulents contrasts with other deserts, including winter rainfall ones, where this growth form is rare (Esler & Rundel 1999). Elsewhere, only the northern parts of the Canary Islands have a relatively rich assemblage of leaf succulents (Shmida & Werger 1992). In contrast to this habit, only a small proportion of shrubs in the Extra Cape flora are evergreen, non-succulent plants. The majority of these are sclerophyllous and confined to the fynbos and renosterveld communities, on the uplands of the Richtersveld and Namaqualand, in the central and southern parts of the Namaqualand Sandveld, and in the high-lying Western Mountain Karoo. Other non-sclerophyllous shrubs in the families Asteraceae, Ebenaceae, and Fabaceae are found along water courses and in habitats at the base of granite domes.

Approximately one third of the shrubby species (626 species) belong to the Aizoaceae and most of these are dwarf succulents, never more than 0.5 m tall. Shrubs within the Aizoaceae nevertheless show great diversity in form, particularly in the branching pattern, leaf-shapes, the presence or absence of windows in the leaves, specialisations of the leaf epidermis, such as the presences of bladder cells or cutinised bodies or incrustations in the epidermal walls, and the structure of the fruiting capsules. They include 3.5 m tall leaf-succulents (e.g. *Stoeberia*), and a large number of minute, highly reduced leaf-succulents with a sunken growth habit (e.g. *Argyroderma* and *Conophytum*). The latter are so reduced in size (sometimes only 20 mm tall) that even the descriptor 'dwarf shrublet' ascribed to these species would appear to be a misnomer.

Other families contributing large numbers of shrubs to the flora are Asteraceae (± 300 species), and Apocynaceae and Fabaceae (± 100 species each). Fabaceae are conspicuous

Table 6.—Growth forms of plants in the Extra Cape flora.

Growth form [1]	No. species	% Extra Cape flora
Trees	52	1.4%
Shrubs and subshrubs	1 780	47.9%
Herbs:		
Annual	456	12.3%
Perennial	315	8.5%
Geophytic	898	24.2%
Aquatic	18	0.5%
Graminoids:		
Annual	55	1.5%
Perennial	141	3.8%
TOTAL	3 715	100%

[1] The system of growth forms follows Mucina *et al.* (2006).

in lacking any succulent species. Asteraceae on the other hand, are fairly rich in succulents, particularly *Othonna* which contributes many leaf-succulent and caudiciform species. Genera of Apocynaceae that contribute a high proportion of stem-succulents are *Hoodia, Huernia*, and *Larryleachia*. The tallest is the iconic *Pachypodium namaquanum*, which is endemic to southern Namibia, the Richtersveld, and the inselbergs of northern Bushmanland.

Geophytes—Approximately 24.2% (898 species) of the Extra Cape flora is geophytic, which is even higher than the geophytic component (17%) of the Core Cape flora (Manning & Goldblatt 2012). Most of the geophytes are monocotyledonous, although several dicotyledonous genera contribute a large percentage as well, most notably *Oxalis* (Oxalidaceae), *Pelargonium* (Geraniaceae), and *Othonna* (Asteraceae). Most of the geophytes are bulbous plants concentrated in the families Amaryllidaceae, Hyacinthaceae, and Oxalidaceae, which together add approximately 340 species to the flora. The family richest in cormous plants is Iridaceae, which contributes 286 species. The distribution of the geophytic habit is uneven across the Extra Cape Subregion (CCR). The largest number of *Oxalis* species, for example, is found in the Namaqualand Hardeveld (40 species of which 25% are endemic to the unit) and from here numbers decline to 30 species for the Knersvlakte (33.3% endemic), and 28 species on the Western Mountain Karoo (28.5% endemic). Geophytic representatives from the petaloid monocotyledonous families show similar patterns of species richness and endemism. The highest concentrations are in the Namaqualand Hardeveld (282 species, 16.3% endemism) and Western Mountain Karoo (275 species, 24.7% endemism) with numbers dropping dramatically in the Southern Namib (85 species, 14.1% endemism) and Namaqualand Sandveld (109 species, 8.2% endemism). Within the Succulent Karoo Biome too there is a significant correlation between this growth form and a relatively high degree of endemism (Hilton-Taylor 1996).

The storage organs of the flora's geophytes vary greatly in size, the most pronounced variation being found among the Amaryllidaceae. Species of *Boophone*, *Brunsvigia*, and *Crossyne* for instance, have the largest bulbs (up to 160 mm diam.) in the Extra Cape flora, whereas species of *Strumaria* have some of the smallest (10 mm diam.). Several geophytic petaloid monocotyledons in the families Amaryllidaceae, Hyacinthaceae, Iridaceae, Orchidaceae, and Ruscaceae also show remarkable specialisations in leaf habit: coiled (*Albuca, Dipcadi, Gethyllis*), pleated (*Babiana, Empodium*), elaborated and appendaged (*Eriospermum*), or tightly pressed to the soil surface (*Brunsvigia*, *Crossyne*, *Daubenya*, *Eriospermum*, *Holothrix*, and *Massonia*). Proches *et al.* (2006) have suggested that such coiling and enlargement of the leaf surface by appendages may have evolved to maximise photosynthetic activity in the cool growing season that characterises the winter-wet climate of the Greater Cape Region. Vogel & Müller-Doblies (2011), however, have postulated that the peculiar leaf shapes of geophytes in the Succulent Karoo Biome are for collecting dew and fog.

Other specialised features associated with the geophytic habit are geocarpy, either passive in *Kedrostis psammophila* (Cucurbitaceae) and *Ixia acaulis* and *Syringodea longituba* (Iridaceae), or active by the curvature of the pedicel in several species of *Romulea* (Iridaceae) and *Oxalis* (Oxalidaceae) and by the contraction of the pedicel in *Moraea ciliata* (Iridaceae); amphicarpy in *Empodium* (Hypoxidaceae) and *Gethyllis* (Amaryllidaceae); as well as basicarpy in *Colchicum* (Colchicaceae), *Daubenya* and *Massonia* (Hyacinthaceae), and *Afrocrocus*, *Babiana* and *Lapeirousia* (Iridaceae).

Annuals—In most of the ecogeographic units of the ECR, annuals contribute relatively low numbers to the flora (12.3% annual herbs and 1.5% annual graminoids) compared to geophytes. This relatively low proportion differs strikingly from floras of other arid lands of the Old World that have similarly high species richness and low growth form diversity,

but in which most of the diversity is associated with the annual habit (Aronson & Shmida 1992; Cowling & Hilton-Taylor 1999). Families that contribute most annual species to the Extra Cape flora are Scrophulariaceae with 137 species and Asteraceae with 113 species. The tribe Limoselleae (previously Manuleae) of Scrophulariaceae include many annual species that are narrowly endemic (Hilliard 1994). *Manulea*, which has 17 annual species in the Extra Cape flora, contributes several endemic annuals to the Gariep Centre (following Nordenstam 1969), Hilliard's Namaqualand Centre, and Nordenstam's Western Upper Karoo Centre. Other annual species of Limoselleae richly concentrated in these Centres are *Phyllopodium*, *Polycarena*, and especially *Zaluzianskya.* The latter has 11 annual species in the Western Upper Karoo Centre alone. Other genera with particularly high numbers of annuals are *Heliophila* (Brassicaceae) with 27 species, *Nemesia* and *Diascia* (Scrophulariaceae) with 25 and 22 species respectively, followed by *Wahlenbergia* (Campanulaceae) (19 species), and *Crassula* (Crassulaceae) (18 species). Distribution patterns for most of these latter genera are less well known as they await monographic study.

The relatively lower number of annual species compared to geophytic species, although remarkable for the entire Extra Cape flora, is not consistent throughout the ECR (Table 7). The pattern is reversed in the Southern Namib (SN) where annuals rank more highly than geophytes, whereas in the Gariep (G) and Namaqualand Sandveld annuals and geophytes are almost equally represented. Geophytes exceed annuals most strongly in the Knersvlakte and Western Mountain Karoo.

Other growth forms—The graminoid growth form is poorly represented in the Extra Cape flora, with 55 (1.5%) annual and 141 (3.8%) perennial species (Table 6). Not surprisingly, Poaceae are the dominant family for this growth form, followed by Cyperaceae, Restionaceae, and Juncaceae. Like the flora of the CCR, that of the ECR has relatively few trees: 52 species, contributing less than 1.5% to the flora. Very few tree species are succulent, the most charismatic being *Aloe dichotoma* and the endangered *Aloe pillansii* of southern Namibia and the Richtersveld. No single family contributes especially to the tree flora, although most of the trees belong to Anacardiaceae, Capparaceae, Celastraceae, Ebenaceae, Moraceae, and Sapindaceae. Ecogeographic units that have the most tree species are the Southern Namib and Gariep, albeit comprising only 3.4% and 3.5% of their floras. The only tree species endemic to the ECR are *Aloe pillansii* (Asphodelaceae) from

Table 7.—Proportion of species of annuals, geophytes, and trees per ecogeographical unit of the Extra Cape Subregion (ECR).

Ecogeographical unit	Total species of all growth forms	No. & % annuals per unit	No. & % geophytes per unit	No. & % trees per unit	Area per unit (% ECR)
Southern Namib (SN)	797	147 (18.4%)	86 (10.8%)	27 (3.4%)	15 908 km^2 (16.1%)
Gariep (G)	1 304	188 (14.4%)	221 (16.9%)	46 (3.5%)	9 058 km^2 (9.2%)
Namaqualand Sandveld (NS)	767	135 (17.6%)	129 (16.8%)	10 (1.3%)	7 998 km^2 (8.1%)
Namaqualand Hardeveld (NH)	1 513	245 (16.2%)	368 (24.3%)	26 (1.7%)	21 400 km^2 (21.6%)
Kamiesberg Mountains (KB)	693	130 (18.8%)	175 (25.2%)	16 (2.3%)	742 km^2 (0.8%)
Knersvlakte (KV)	863	143 (16.6%)	227 (26.3%)	8 (0.9%)	5 537 km^2 (5.6%)
Western Mountain Karoo (WM)	1 237	211 (17.1%)	341 (27.6%)	18 (1.4%)	19 242 km^2 (19.5%)
Tanqua-southern Succulent Karoo (TS)	762	156 (20.5%)	205 (26.9%)	11 (1.4%)	18 984 km^2 (19.2%)
Entire Extra Cape Subregion	3 715	511 (13.7%)	898 (24.2%)	52 (1.4%)	98 869 km^2 (100%)

the Richtersveld, *Ozoroa concolor* (Anacardiaceae) from southern Namibia and the Richtersveld, and *Cliffortia arborea* (Rosaceae) from the Hantamsberg–Roggeveld–Nuweveld Escarpment. Aquatics amount to a mere 18 species of the Extra Cape flora.

Species radiation

Recent phylogenetic studies on succulent karoo- and fynbos-endemic lineages across 17 groups of plants (including genera of Amaryllidaceae, Iridaceae, Poaceae, Restionaceae, Orchidaceae, Brassicaceae, Geraniaceae, Melianthaceae, Polygalaceae, Scrophulariaceae, and Zygophyllaceae) have given new insights into the relative ages of lineages in these major regions and hence of their floras (Verboom *et al.* 2009). Of the 55 succulent karoo-endemic lineages and 41 fynbos-endemic lineages that were analysed by Verboom *et al.* (2009), a few of the fynbos lineages were substantially older than 20 My, whereas only eight succulent karoo-endemic lineages were older than 10 My, the oldest being dated at 17.36 My. Notwithstanding the potential sources of error when inferring dates on ancestral lineages, the absence of succulent karoo-endemic lineages older than 17.5 My identifies the flora of the arid areas of the Greater Cape Floristic Region as being relatively young. This is in agreement with the earlier ideas of several authors who have proposed that the vast majority of range-restricted species in Namaqualand are neoendemics: species that are mostly members of large genera and have many close relatives, which are often species in different habitats in the same landscape. Moreover, many of Namaqualand's leaf succulents have relatively short life spans (5–10 years), which lead to rapid generation turnover and highly dynamic communities (Cowling *et al*. 1999; Jürgens *et al.* 1999). Studies on the ruschioid Aizoaceae in particular, a richly represented group in the semi-arid Greater CFR, suggest that the explosive radiation of these plants is as recent as within the last 3.8–8.7 My (Klak *et al*. 2004).

At least some of the speciation within the Aizoaceae of the semi-arid areas of the Greater CFR is the result of adaptation along habitat gradients (Ellis & Weis 2006; Ellis *et al.* 2006), but research on the geophytic and annual genera also points to diversification being promoted by shifts in chromosome number (Touloumenidou *et al*. 2004) and pollinator-flower co-evolution. Most notable examples are oil collecting bees on *Colpias* and *Diascia* (Scrophulariaceae) (Whitehead & Steiner 1985, 2001; Steiner & Whitehead 2002), and long-proboscid flies on species of Iridaceae, as well as on the xerophytic winter rainfall species of *Pelargonium* (Geraniaceae) (Goldblatt *et al*. 1995; Manning & Goldblatt 1996; Goldblatt & Manning 2000b; Becker & Albers 2010).

Goldblatt & Manning (1996) suggest that parapatric speciation, linked to edaphic specialisation, provided the initial impetus for genetic differentiation between founder and parent populations, thereby providing an important mode of speciation in some taxa, especially in the genus *Lapeirousia* (Iridaceae). The mosaic of strikingly different substrates and soil types that characterise Namaqualand would favour an increase in species diversity by providing a strong selective differential (Ellis & Weis 2006; Francis *et al.* 2007).

In conclusion, there is no evidence to suggest that the rich diversification of the Extra Cape flora is the result of an unusually long and stable history (Cowling & Hilton-Taylor 1999; Verboom *et al.* 2009). Rather, it is probably best explained by a model of local speciation in the presence of a remarkably predictable rainfall regime which, when interrupted by occasional droughts, provides opportunities for diversification as a result of habitat fragmentation and generation turnover.

How to use this account

Keys—Keys to the genera within each family precede each family treatment which deals with more than one genus. Keys to the families are not included in this account.

Arrangement of taxa—The family circumscriptions used here follow the Angiosperm Phylogeny Group system of APG III (2009), except some in the Asparagales, Ranunculales, Ericales, Asterales, and Dipsacales, which follow APG II (2003). Plant families are arranged alphabetically within the major categories lycopods, monilophytes, and angiosperms: palaeodicots, monocots, and eudicots. Genera are arranged alphabetically within each family. Species within each genus are generally also listed alphabetically but in many instances they have been grouped in various ways as an aid to identification at the species level. Where possible, the larger genera have been subdivided using more-or-less readily visible characters, but in two instances (*Drimia* and *Moraea*), the generic circumscriptions have been grouped informally in their previous taxonomic arrangements as an aid to locating them. The grouping of species in the larger genera is usually indicated in the form of a dichotomous key. Each lead is labelled alphabetically in turn (e.g. A., A.', A."). Recognised species are listed in bold. Species that we consider conspecific, but that are currently recognised nomenclaturally, are included in parenthesis and in bold (e.g. including **B. halli** G.Will.). Synonyms are indicated in parenthesis and in italics (e.g. = *Androcymbium dregei* C.Presl.). Common names that apply to particular species are provided after the species name and synonyms.

Species entries—Each species entry contains information on habit and morphology, flowering time, habitat, occurrence in ecogeographical unit, and geographical distribution. In some instances, information on flowering time or habitat may be lacking and this is indicated by a '?' in the appropriate place.

Habit and morphology—The brief descriptions are intended to provide a working picture of the species, including, where appropriate or available, diagnostic characters useful in distinguishing the species. Most entries include the following information: habit (annual, perennial, or geophyte) and a measure of size, usually height at flowering; leaf arrangement, shape, indumentum and other features appropriate to the group; and flower arrangement, colour, shape if variable in the genus, and various critical features; fruit characters are included if striking or diagnostic.

Flowering time—The flowering period is indicated in months. In species that also occur outside the Greater Cape Floristic Region, flowering time applies specifically to populations occurring within the study area.

Habitat—Information on the habitat of the species is given when available and includes slope, soil, and moisture regime. Many species in the Greater Cape Floristic Region are more-or-less specific to sandy, clay, limestone, or quartzitic substrates. Detailed descriptions of the climate, geology, and soils of the study area can be found in Mucina & Rutherford (2006).

Ecogeographic units and distribution—The eight ecogeographic units recognised in the Extra Cape Subregion (ECR) of the Greater CFR are shown in Figure 1. Occurrence of

a species in each of these units is indicated by the abbreviations **SN** (Southern Namib), **G** (Gariep), **NS** (Namaqualand Sandveld), **NH** (Namaqualand Hardeveld), **KB** (Kamiesberg Mountains), **KV** (Knersvlakte), **WM** (Western Mountain Karoo), **TS** (Tanqua-southern Succulent Karoo), and **CCR** (Core Cape Subregion, i.e. the area at the southwestern tip of Africa situated between latitudes 31° and 34° 30' S). A more complete indication of the geographic range, from north to south and west to east, follows in parenthesis. The term 'Lüderitz-South', used here to describe the distribution of several species, especially of Aizoaceae, refers to the area lying between Lüderitz in the north, the Gariep (or Orange River) in the south, the Atlantic coastline in the west, and the inland escarpment in the east. It should not be confused with the locality 'south of Lüderitz' which refers to the narrow coastal strip south of Lüderitz.

Endemic taxa—Families, genera, and species that are endemic to the Greater Cape Floristic Region are indicated by **(gce)**. Those endemic to the Extra Cape Subregion (i.e. lying outside the Core Cape Subregion but within the Greater CFR) are shown by **(ece)**.

Alien taxa—Families, genera, and species that are not native to southern Africa are marked with the symbol * before each entry. We include only those which have become naturalised and might be mistaken for part of the native flora.

Statistics on families and genera—The data given in the Appendix are based on those available at the end of December 2010. Any minor discrepancies between the number of species in the Appendix and in the taxonomic treatments are due to new data coming to hand after 2010, during the technical editing of the text.

The Greater Cape Floristic Region: the Extra Cape flora

LYCOPODS Quillworts

by J.P. Roux

ISOËTACEAE

ISOËTES QUILLWORTS ± 150 spp., nearly cosmopolitan

eludens J.P.Roux, Hopper & R.J.Smith Deciduous, aquatic geophyte with a strongly 3-lobed rhizomorph, scales absent. Sporophylls up to 12, erect, stiff, up to 50 × 3 mm, shallowly grooved adaxially, narrowly winged for ± ⅓ their length, ligule absent. Velum complete. Megaspores chalk-white when immature, drying graphite-black at maturity, with a prominent equatorial flange and narrow but tall laesura, proximal faces laevigate, distal face laevigate or with very low, almost inconspicuous verrucae. In seasonal, granite rock pool, 1 280 m, KB (Kamiesberg Mountains). **(ece)**

toximontana L.J.Musselman & J.P.Roux GIFBERG QUILLWORT Deciduous geophyte with 3-lobed rhizomorph, scales not evident. Sporophylls up to 16, erect, filiform, up to 42 mm long, narrowly winged for up to ⅓ their length, ligule cordate. Velum absent. Megaspores grey-green, uniformly tuberculate on proximal face, distal face with occasional rugi. In shallow soil in seasonal seepages, 1 280 m, KB, CCR (Kamiesberg Mountains to Pakhuis Pass). **(gce)**

sp. A Deciduous geophyte with 3-lobed rhizomorph, scales broad and horny. Sporophylls up to 12, mostly arching, flattened adaxially, up to 30 mm long, narrowly winged for half their length, ligule cordate. Velum incomplete. Megaspores with few, low tubercules on distal face. In shallow soil in seasonal seepages, 1 600 m, WM (Roggeveld Escarpment). **(ece)**

MONILOPHYTES Ferns & Horsetails

by J.P. Roux

ANEMIACEAE

MOHRIA SCENTED FERNS 7 spp., southern and E Africa and the Mascarene region

caffrorum (L.) Desv. SCENTED FERN Rhizomatous perennial. Fronds erect, the fertile usually longer than the sterile, stipe cylindrical, scaled, up to 160 mm long, lamina 2-pinnatifid to 3-pinnate, up to 270 mm long, sparsely hairy above, densely hairy and scaled beneath. Sporangia near-marginal, globose, without indusium, protected by revolute, segment tooth. Mostly in rock crevices and at shaded rock bases, dormant during dry summer months, 800–1 700 m, NH, KB, CCR (Richtersveld to SW Cape and E Cape). **(gce)**

ASPLENIACEAE

ASPLENIUM SPLEENWORTS ± 650 spp., cosmopolitan

adiantum-nigrum L. BLACK SPLEENWORT, BLACK MAIDENHAIR Perennial with short rhizome. Fronds erect, crowded, up to 190 mm long, stipe dark brown, glossy, shallowly grooved above, initially sparsely scaled, lamina firmly herbaceous, narrowly deltoid, 2- to 3-pinnate, pinnae unequally cuneate, pinnules oblong, shallowly lobed to deeply pinnatifid, serrate to dentate, minutely scaled beneath. Sori linear, indusium entire. At shaded rock bases, 1 500–1 650 m, WM, CCR (Roggeveld Escarpment, Eurasia, and Mexico).

cordatum (Thunb.) Sw. RESURRECTION FERN Perennial with short rhizome. Fronds in a tuft, suberect, thinly leathery, involute when dry, stipe densely scaled, lamina elliptic to narrowly elliptic, 1-pinnate-pinnatifid, pinnae narrowly oblong, weakly undulate, densely scaled beneath. Sori linear, mostly obscured by scales, apogamous. In shaded rock crevices and at boulder bases, 840–1 600 m, SN, G, NH, KB, WM, TS, CCR (southern Namibia to Prince Albert, widespread in southern Africa). *A. cordatum* var. *namaquensis* (Pappe & Rawson) Sim is sexual. KB (Kamiesberg Mountains).

BLECHNACEAE

BLECHNUM DEER FERNS ± 150 spp., cosmopolitan

australe L. SOUTHERN DEER FERN Perennial with branched rhizome. Fronds erect to arching, firm, dimorphic, stipe sparsely scaled, lamina narrowly elliptic, up to 640 mm long, 1-pinnate, sterile pinnae oblong-acute, mucronate, base somewhat auriculate, up to 25 mm long, fertile pinnae linear, falcate, up to 40 mm long. Sori parallel to the costa, extending most of the pinna length, indusium lacerate. In rock crevices and at shaded boulder bases, 800–1 700 m, KB, CCR (Kamiesberg Mountains, Little Karoo, widespread in southern Africa, E Africa and S Atlantic Islands).

DRYOPTERIDACEAE

POLYSTICHUM SHIELD FERNS ± 220 spp., cosmopolitan

monticola N.C.Anthony & Schelpe MOUNTAIN SHIELD FERN Perennial with short decumbent rhizome. Fronds suberect to arching, firmly herbaceous, stipe densely scaled, larger scales often bicolourous, lamina ovate-truncate, 2-pinnate to 3-pinnatifid, pinnules often crescent-shaped, aristate, subglabrous above, sparsely scaled beneath. Sori circular, indusium peltate, erose. Plants form small clonal stands mostly in seasonally moist shaded rock overhangs, 1 670 m, KB, CCR (Kamiesberg Mountains and SW Cape to northeastern Free State).

EQUISETACEAE

EQUISETUM HORSETAILS, SCOURING RUSHES 15 spp., temperate regions of the world, except Australasia

ramosissimum Desf. AFRICAN HORSETAIL, PERDESTERT, LIDJIESGRAS Perennial with branched underground rhizome. Aerial stems erect, hollow, ribbed, branches borne in whorls at nodes, leaves fused, forming a reduced papery whorl at each node. Strobili terminal on branches. Along streams and riverbanks, 50–150 m, SN, G, CCR (mostly along the lower Gariep Valley, Cape Infanta to W Africa and Madagascar).

MARSILEACEAE

MARSILEA WATER CLOVERS ± 65 spp., near-cosmopolitan

burchellii (Kunze) A.Braun BURCHELL-SE-WATERKLAWER Seasonal, aquatic perennial. Fronds with short or slender, mostly glabrous stipes, pinnae variable, mostly narrowly cuneate, pedicels free, straight, short or slender, pilose at first. Sporocarps crowded, small, subcircular, pyriform, lateral ribs not apparent, superior tooth developed, conical. In seasonal vleis, streams, and rivers, depauperate during the dry season, 1 400–1 650 m, WM, CCR (Namibia, Botswana, Roggeveld Escarpment, and E Cape).

capensis A.Braun CAPE WATER CLOVER Seasonal, aquatic perennial. Fronds with slender, usually crowded stipes, pinnae narrowly obdeltate, flanks slightly concave, pedicels solitary, free, slender. Sporocarps obliquely broad-oblong or irregularly rhombic in lateral view, lateral ribs absent, superior tooth distinct, conical, erect or recurved. In seasonal vleis and along streambanks, 900–1 250 m, WM, TS, CCR (Botterkloof Pass to Prince Albert, widespread in Africa).

OPHIOGLOSSACEAE

OPHIOGLOSSUM ADDER'S-TONGUE FERNS ± 50 spp., cosmopolitan

bergianum Schltdl. BERGIUS'S ADDER'S TONGUE Perennial with a spindle-shaped rhizome, with persistent leaf bases, roots proliferous. Leaves 2–4, tropophore narrowly lanceolate, up to 35 mm long. Sporophore arising from leaf base, apparently independently, up to 45 mm long, with 4–7 sporangium pairs, apiculus acute. In seasonal seepage areas, 1 500 m, KB, WM, CCR (Kamiesberg Mountains and Roggeveld Escarpment to Cape Peninsula). **(gce)**

nudicaule L.f. SLENDER ADDER'S TONGUE Perennial with linear rhizome, with persistent leaf bases, roots proliferous, leaves 2–5, tropophore elliptic to narrowly ovate, up to 35 mm long. Sporophore inserted at tropophore base, up to 50 mm long, with 5–9 sporangium pairs. Seasonally moist clay soils in karroid scrub, 200–1 200 m, NH, KB, CCR (Springbok to SW Cape and E Cape). **(gce)**

polyphyllum A.Braun Perennial with spindle-shaped rhizome, with persistent leaf bases, roots proliferous. Leaves 1 or 2, tropophore elliptic to narrowly ovate, up to 60 mm long. Sporophore inserted at tropophore base, up to 100 mm long, with 11–36 sporangium pairs, apiculus acute. Seasonally moist sandy patches in karroid scrub, 70–1 200 m, SN, G, NS, NH, WM, TS, CCR (southern Namibia to Nuweveld Mountains, Africa, and Indian subcontinent).

OSMUNDACEAE

TODEA 2 spp., Africa, SE Asia and Australia

barbara (L.) T.Moore Perennial with massive rhizome. Fronds erect, stipe with loose tomentum, lamina up to 1.5 m long, but never this long in region, 2-pinnatifid, pinnules oblong with broadened adnate bases, sporangia on basal third of pinnae. Sori confluent at maturity. In moist shaded conditions in rock overhangs, 1 500 m, KB, CCR (Kamiesberg and Cederberg Mountains to W Cape and eastern southern Africa).

PTERIDACEAE

1. Sori borne on reflexed marginal flaps ..... **Adiantum**
1.' Sori borne on lamina surface near margin and often covered by it:
2. Ultimate segments not articulated ..... **Cheilanthes**
2.' Ultimate segments articulated ..... **Pellaea**

ADIANTUM MAIDENHAIR FERNS ± 150 spp., pantropical

capillus-veneris L. BLACK MAIDENHAIR, SWART VROUEHAAR Rhizomatous perennial. Fronds arching, soft, stipe dark, glossy, glabrous, lamina ovate-deltate, 3-pinnate, pinnules cuneate, shallowly to deeply lobed, petiolulate, minutely crenate-dentate, veins ending in teeth. Sori along outer margins of pinnules, indusial flaps crescent-shaped to oblong. Shaded moist rock faces, 600 m, G, CCR (Richtersveld Mountains, near-cosmopolitan).

CHEILANTHES LIP FERNS ± 200 spp., cosmopolitan

A. Stipe cylindrical or adaxially flattened along entire length

contracta (Kunze) Mett. ex Kuhn Rhizomatous perennial, often forming large clonal stands. Fronds erect, firm, stipe with hairs and scales, lamina lanceolate, 2-pinnate to 3-pinnatifid, up to 300 mm long, pinnules up to 7-lobed, hairy on both surfaces. Sori on ultimate lobes, protected by revolute margin, indusium absent. Mostly in rock crevices or at boulder bases, exposed or shaded, 100–1 500 m, SN, KB, TS, CCR (Sperrgebiet and Kamiesberg Mountains to SW Cape, E Cape, and Mpumalanga).

eckloniana (Kunze) Mett. ECKLON'S LIP FERN, RESURRECTION FERN Rhizomatous perennial. Fronds erect, leathery, stipe scaled, lamina narrowly oblong, up to 110 mm long, 2-pinnate to 3-pinnatifid, pinna segments pinnatifid into obtuse lobes, white hairy above, densely set with pale scales below. Sori marginal, forming an interrupted soral line, indusium small. In rock crevices on outcrops, exposed or partially shaded, 1 260–1 600 m, TS, CCR (Matjiesfontein to Fraserburg, throughout the central and eastern parts of South Africa and Zimbabwe).

parviloba (Sw.) Sw. Rhizomatous perennial. Fronds erect, firmly herbaceous, up to 250 mm long, stipe pilose, lamina ovate-lanceolate, 2-pinnate to 3-pinnatifid, pinnae pinnatifid into oblong segments, viscid beneath. Sori at apices of ultimate segments, exindusiate. In rock crevices and at boulder bases, in shade or full sun, 1 200–1 300 m, TS, CCR (Namibia, Laingsburg to Prince Albert, and elsewhere in South Africa).

rawsonii (Pappe) Mett. ex Kuhn Rhizomatous perennial. Fronds erect, firmly herbaceous, up to 200 mm long, stipe dark, cylindrical, tomentose with pale branched hairs, lamina narrowly linear, 1-pinnate to 2-pinnatifid, pinnae oblong-deltate, upper surface pilose, tomentum beneath composed of branched hairs. Sori discrete, marginal, elongate, obscured by tomentum, exindusiate. In rock crevices and at boulder bases, 700–750 m, SN, G, NH (Sperrgebiet to Springbok). **(ece)**

A.' Stipe grooved in upper half or along its entire length
B. Sori discrete

dinteri Brause Rhizomatous perennial. Fronds erect, firmly herbaceous, stipe sparsely scaled. Lamina narrowly ovate-deltate, up to 3-pinnate, basal pinnae largest, pinnules narrowly deltate to hastate, divided into oblong to deltate, shallowly crenulate lobes, glabrous on both surfaces. Lamina axes dark brown. Sori at margins of ultimate segments, indusium pale. In rock crevices and at boulder bases, shaded or in full sun, 1 100 m, NH (Namibia to Springbok).

depauperata Baker Rhizomatous perennial. Fronds erect, leathery, stipe scaled, lamina linear, up to 170 mm long, 2-pinnate, pinnule lobes oblong-lanceolate with crenate recurved margins, with yellowish hairs beneath. Sori protected by revolute margins, exindusiate. Mostly in partial shade around boulders and at foot of low cliffs, forming large stands, 1 260–1 600 m, WM, TS, CCR (Gannaga Pass to Matjiesfontein and SW Cape). **(gce)**

induta Kunze Perennial with spreading rhizome. Fronds erect, leathery, stipe scaled, lamina broadly lanceolate, 3-pinnate to 4-pinnatifid, ultimate segments deeply pinnatifid into rounded-oblong, crenate segments, tomentose beneath. Sori marginal, indusium discontinuous. In rock crevices and at boulder bases, in sun or shaded, 1 200–1 700 m, KB, WM, TS, CCR (Richtersveld and Cederberg Mountains to E Cape).

multifida (Sw.) Sw. Perennial with short creeping rhizome. Fronds erect, leathery, up to 230 mm long, stipe dark, subglabrous, lamina oblong-ovate, 4- or 5-pinnatifid, proximal pinnae basiscopically developed, pinnules pinnatifid into ovate-oblong lobes. Sori discrete, around margins of ultimate segments, indusium entire to lacerate. In rock crevices and at boulder bases, exposed

or partially shaded, G, NH, KB, KV, WM, TS, CCR (St Helena and widespread in southern Africa to E Africa).

B.' Sori linear, or appearing uninterrupted

capensis (Thunb.) Sw. Rhizomatous perennial. Fronds soft, stipe dark, usually glabrous, lamina ovate-deltate, up to 120 mm long, 3-pinnatifid, proximal pinna pair basiscopically developed, ultimate segments serrate-crenate, with few scales along costa and costules. Sori at vein endings near margin, indusium erose. In rock crevices, at boulder bases, and below bushes, mostly shaded, 900–1 700 m, SN, G, NH, KB, WM, TS, CCR (Lüderitz to SW Cape and E Cape, northeastern Free State and Lesotho).

deltoidea Kunze Perennial with short rhizome. Fronds erect, firmly herbaceous, stipe glabrous, lamina broadly deltate, up to 100 mm long, 2- or 3-pinnatifid, proximal pinnae basiscopically developed, rachis winged. Sori linear, indusium continuous, erose. Rock outcrops and open ground in karroid scrub, 500–1 000 m, SN, G, NS, NH, CCR (Lüderitz to Paleisheuwel). **(gce)**

hastata (L.f.) Kunze Rhizomatous perennial. Fronds erect, soft herbaceous, up to 200 mm long, stipe glabrous at maturity, lamina linear-lanceolate, 1-pinnate to 1-pinnate-pinnatifid, pinnae ovate to broadly ovate, often auriculate, acute to obtuse, crenulated, up to 20 mm long. Sori marginal, linear, indusium membranous. In rock crevices and at boulder bases, mostly partially shaded, 1 260–1 550 m, SN, G, NH, KB, WM, TS, CCR (southern Namibia to Knysna). **(gce)**

kunzei Mett. Rhizomatous perennial. Fronds erect, herbaceous, stipe dark brown, glossy, grooved in upper half, mostly glabrous, lamina ovate-acute, 1-pinnate to 3-pinnatifid, up to 70 mm long, lower pinnae reduced, pinnae ovate to oblong, ultimate segments deltate or oblong-obtuse, glabrous on both surfaces, rachis sulcate, winged near apex. Sori at vein endings, often appearing continuous at maturity, indusium irregular. In moist rock crevices, 600–1 000 m, SN, G, NH (southern Namibia to Garies). **(ece)**

namaquensis (Baker) Schelpe & N.C.Anthony Rhizomatous perennial. Fronds erect, thinly leathery, up to 200 mm long, stipe distally shallowly grooved, lamina oblong-ovate, 3-pinnatifid, proximal pinnae largest, ultimate segments oblong-obtuse to hastate. Sori along margins of ultimate segments, indusium erose. In rock crevices, exposed or in light shade, 1 250–1 700 m, SN, G, NH, WM, TS, CCR (Sperrgebiet and Richtersveld to Cape Peninsula and Witteberg Mountains). **(gce)**

robusta (Kunze) R.M.Tryon Rhizomatous perennial, forming clonal stands. Fronds erect, firmly herbaceous, up to 100 mm long, stipe glabrous, lamina oblong-ovate, 3-pinnatifid, ultimate segments narrowly hastate to ovate. Sori marginal, indusium linear, irregularly minutely erose. Exposed gravelly soils among low scrub, 350–1 700 m, SN, G, NS, NH, CCR (southern Namibia to Hopefield). **(gce)**

PELLAEA CLIFFBRAKES ± 35 spp., mostly SE United States of America, Africa, Madagascar, and the Indian subcontinent

rufa A.F.Tryon Rhizomatous perennial. Fronds erect, leathery, stipe proximally scaled, lamina narrowly oblong-elliptic, 2- or 3-pinnate, pinnules broadly elliptic, entire, articulated to short petiolules. Sori marginal, linear, indusium subentire. In rock crevices and at boulder bases, 1 000–1 550 m, WM, TS, CCR (Sutherland to Laingsburg and Nuweveld Mountains). **(gce)**

SALVINIACEAE

AZOLLA 6 spp., sub-Saharan Africa, but mainly pantropical

***filiculoides** Lam. MOSQUITO FERN, RED FERN Free-floating, perennial herb with horizontal, minutely papillate rhizome, roots borne singly. Upper leaf lobe ovate, lower lobe hyaline. Megasporocarps with prominent dark apex, microsporocarps borne singly or subtended by a megasporocarp. Dams, vleis, and backwaters of slow-flowing rivers, 600 m, SN, G, CCR (mostly along the lower Gariep Valley, widespread in South Africa, S American weed).

ANGIOSPERMS Flowering plants

PALAEODICOTS

HYDNORACEAE

by D.A. Snijman

HYDNORA BOBBEJAANKOS, JAKKALSKOS ± 7 or 8 spp., Africa, Arabian Peninsula, and Madagascar

africana Thunb. Leafless root parasite, exposed by up to 150 mm, without chlorophyll. Flower 1, club-shaped, fleshy and warty or scaly, with 3, erect, ciliate tepals, tepal lobes 22–45 mm long, with tips usually lightly joined at anthesis, forming 3, large, elliptic, lateral openings, brown with orange inside, foetid-smelling. Aug.–Oct. Parasitic on *Euphorbia caput-medusae*, *E. mauritanica* and *E. rhombifolia* (as interpreted below), G, NS, KV, TS, CCR (southern Namibia: Namuskluft to Cape Peninsula to E Cape).

triceps Drège & E.Mey. Leafless root parasite, mostly subterranean, without chlorophyll. Flower 1, up to 150 mm long, fleshy, warty and scaly, with 3, erect tepal lobes partially fused to each other, forming a cap-like structure with small, circular, lateral openings, each with flared rims, pale brown with pinkish brown inside, foetid-smelling. Sept. Parasitic on *Euphorbia dregeana*, in sandy soils, G, NS (southern Namibia: Namuskluft to between Port Nolloth and Okiep). **(ece)**

visseri Bolin, E.Maass & Musselman Like **H. africana** but tepal lobes > 55 mm long and usually free at apex at anthesis. Oct.–Jan. Parasitic on *Euphorbia gregaria* and *E. gummifera*, usually in flat, sandy soils, G (Karas Mountains to Richtersveld and Bushmanland).

MONOCOTS

AGAVACEAE (= *ANTHERICACEAE* in part, *BEHNIACEAE*)

by G.F. Smith, **Chlorophytum** by D.A. Snijman

1. Robust, succulent perennials; leaves leathery or succulent; perianth tubular, fleshy, long-lasting; ovary inferior ..... **Agave**
1.' Herbaceous perennials; leaves soft-textured; perianth rotate, fugacious; ovary superior .... **Chlorophytum**

***AGAVE** CENTURY PLANTS, GARINGBOME ± 275 spp., New World

***americana** L. AMERICAN AGAVE Massive, stemless or short-stemmed, monocarpic, rosulate, leaf succulents. Rosettes up to 2 m tall at maturity. Profusely proliferous through basal suckers. Leaves light blue, erect at first, becoming spreading to reflexed, sword-shaped, apically very sharp-tipped. Leaf margins armed with numerous, simple teeth. Flowering pole massive, branched, tree-like, never bulbiliferous. Flowers erect, yellow to greenish yellow. Late Dec.–early Feb. Rocky outcrops and drainage lines, NS, NH, CCR (var. **americana** naturalised around sites of habitation in southern Africa, mainly in karroid regions).

***sisalana** Perrine SISAL Medium-sized to large, stemless or short-stemmed, monocarpic, rosulate, leaf succulents. Rosettes up to 2 m tall at maturity. Profusely proliferous through elongated rhizomes. Leaves dark green, erect throughout, sword-shaped, apically very sharp-tipped. Leaf margins lacking teeth. Flowering pole massive, branched, tree-like, profusely bulbiliferous. Flowers erect, green to dull greenish white. Dec.–Mar. Erosion channels and watercourses, NS, NH, CCR (mainly in summer rainfall regions of southern Africa, invasive).

CHLOROPHYTUM (= *ANTHERICUM* in part) GRASS LILY ± 150 spp., mainly tropical Africa, also Asia

A. Flowers with smooth filaments; capsule ovoid with an apical beak

rangei (Engl. & K.Krause) Nordal (= *Anthericum rangei* Engl. & Krause) Rhizomatous geophyte, up to 400 mm tall, roots wiry with scattered tubers near tips. Leaves grass-like, margin minutely ciliate. Flowers in simple or lax, branched racemes, white, filaments smooth, pedicels articulated in lower third. Capsules ovoid, smooth, apically beaked. Sept.–Mar. Sandy flats or stony, often granitic, slopes, SN, G, NS, CCR (Aus, Richtersveld, Brand-se-Baai, Bokkeveld Escarpment to Cape Peninsula). **(gce)**

A.' Flowers with rough filaments; capsules 3-winged, apex shallowly notched

crassinerve (Baker) Oberm. Like **C. undulatum** but leaves broad, margin thick and red. July–Oct. On slopes in granite-derived soil, NH, KB (Springbok to Garies and Kamiesberg Mountains). **(ece)**

lewisiae Oberm. Pubescent, rhizomatous geophyte, up to 400 mm tall, roots thin, wiry and shortly woolly. Leaves basal, linear-lanceolate, under surface bearing separate stiff hairs on ribs, with fewer hairs on upper surface. Flowers in unbranched or 1-branched racemes on a pubescent peduncle, white, filaments rough, pedicels articulated in lower half. Capsule unknown. Sept. On plateau in sandy, stony soil, TS (Botterkloof Pass and foothills of Roggeveld Escarpment). **(ece)**

namaquense Poelln. Rhizomatous geophyte, up to 0.8 m tall, roots wiry, dark, slender throughout. Leaves in an elongated rosette, lanceolate, clasping at base, margin mostly smooth. Flowers in unbranched or few branched racemes, white with a dark keel, filaments rough, pedicels articulated in lower third. Capsules 3-winged, smooth. Aug.–Sept. Amongst rocks on S slopes, SN, G, NS, NH, (Rosh Pinah, Richtersveld National Park, Springbok, Kourkammaberg through to Soebatsfontein). **(ece)**

triflorum (Aiton) Kunth Rhizomatous geophyte, up to 1 m tall, roots hard, dark and tapering towards tips. Leaves lanceolate, margin often minutely ciliate. Flowers in unbranched racemes, white, reddish on reverse, filaments rough, pedicels articulated near middle. Capsules 3-winged, smooth. July–Oct. Sandy slopes and flats, NS, CCR (Liebendal towards Elandsbaai and Cape Peninsula). **(gce)**

undulatum (Jacq.) Oberm. Rhizomatous geophyte, up to 0.5 m tall, roots stiff, slender throughout, usually with short tubers close to rhizome. Leaves lanceolate, variable in size, spreading from base, margin minutely ciliate, sometimes undulate. Flowers in unbranched racemes, white with red keels, filaments rough, pedicels articulated near middle. Capsules 3-winged, smooth. July–Oct. Stony flats and slopes in sand or loam, G, NS, NH, KV, WM, TS, CCR (widespread from near Steinkopf to Vanrhynsdorp, Bokkeveld Escarpment, Roggeveld Escarpment, Matjiesfontein, SW Cape and Gamkaberg). **(gce)**

viscosum Kunth Rhizomatous geophyte, up to 0.6 m tall, roots slightly swollen throughout, pinkish. Leaves more-or-less linear, stiff, closely ribbed, glandular and sticky. Flowers in simple or laxly branched, glandular racemes, white with dark keels, filaments rough, pedicels articulated near base. Capsules 3-winged, transversely ridged. June–Oct. In sandy soils on flats or rocky sandstone slopes, SN, G, NS, KV, CCR (Klinghardt Mountains, lower Gariep Valley, Eksteenfontein, and from Kotzesrus to Piketberg). **(gce)**

sp. A Small, pubescent, rhizomatous geophyte, up to 160 mm tall, roots thin, wiry. Leaves spreading from base, narrowly lanceolate, hard-textured, closely-ribbed, slightly twisted, under surface bearing stiff long hairs in tufts along ribs, upper surface with separate short hairs. Flowers in a laxly branched raceme on a smooth peduncle, white, filaments rough, pedicels articulated in lower third. Capsule 3-winged. Nov. In granite-derived soil or on shale, on slopes, NH (uplands between Nababeep and Springbok). **(ece)**

ALLIACEAE

by D.A. Snijman

1. Rootstock a bulb; flowers campanulate to urceolate, tepals connate at the base, without a corona; inner filaments tricuspidate; flowers white to pink ..... **Allium**

1.' Rootstock a rhizome; flowers more-or-less tubular, tepals fused below into a tube, with a corona; anthers sessile; flowers mauve, cream, green or brown . . . . . **Tulbaghia**

ALLIUM WILD ONION ± 550 spp., mainly N hemisphere

dregeanum Kunth AJUIN, WILDE UI, WILDE UINTJIE Bulbous geophyte, 0.35–1 m tall, strongly aromatic, sometimes forming bulbils. Leaves dry at flowering, linear, suberect, sheathing at base. Flowers in a compact spherical head on a sturdy scape, white to pink with a green or purplish midvein. Sept.–Dec. Dry stony slopes and flats, G, NH, KB, KV, WM, TS, CCR (dry areas throughout southern Africa).

TULBAGHIA WILD GARLIC, WILDE KNOFFEL 21 spp., South Africa to Tanzania

capensis L. Rhizomatous herb, 150–350 mm tall, strongly aromatic, often forming clumps. Leaves spreading, narrowly strap-shaped, immature or well developed at flowering. Flowers in a ± lax head on a slender scape, brownish, or greenish purple, sweetly fragrant, corona fleshy, brown or orange with deeply divided lobes. Mar.–Oct. Rocky slopes and flats in clay and loamy soils, KV, CCR (Nuwerus through to SW Cape and Langkloof). **(gce)**

dregeana Kunth Rhizomatous herb, 150–250 mm tall, strongly aromatic, often in clumps. Leaves narrowly strap-shaped, spreading, well developed at flowering. Flowers in a lax head on a slender scape, cream, brown to pinkish or purple, sweetly fragrant, segments inserted at same level below corona, corona fleshy, solid and yellow with a slightly uneven rim. Mar.–Oct. Slopes or flats in sandy, clay or loamy soils, G, NH, KB, KV, WM, CCR (southern Namibia: Zebrafontein, Eksteenfontein to Nieuwoudtville, Calvinia, Cederberg Mountains and SW Cape). **(gce)**

AMARYLLIDACEAE

by D.A. Snijman

1. Scape hollow or rarely solid; fruit dehiscent and papery; seeds dry, black and flattened. . . . . **Cyrtanthus**
1.' Scape solid; fruit dehiscent and papery or indehiscent and papery to fleshy; seeds moist, cream, pink, reddish or green, ovoid or subglobose and slightly angled by compression; embryo usually green:
2. Leaves often spirally twisted; inflorescence acaulescent, 1-flowered; fruit clavate, cylindrical or occasionally ellipsoidal, much longer than wide, neither ribbed nor conspicuously veined . . . . . **Gethyllis**
2.' Leaves rarely spirally twisted; inflorescence well developed above ground, (1–)many-flowered; fruit subfusiform to globose or trigonous, rarely much longer than wide and then ribbed or conspicuously veined:
3. Plants bulbous, tunics not producing extensible threads when torn; leaves often speckled with red; spathe valves 4 or more, often conspicuous; fruit indehiscent, fleshy or pulpy . . . . . **Haemanthus**
3.' Plants bulbous, tunics producing extensible threads when torn; leaves immaculate, or if speckled, then fringed with long bristles; spathe valves 2, inconspicuous; fruit dehiscent or indehiscent, papery or membranous:
4. Leaf margins hyaline, more-or-less fringed with short, branched cilia; pedicels usually shorter than the flowers at anthesis; filaments free to the base; fruit indehiscent, often beaked; seeds thinly cork-covered:
5. Leaves annual, closely abutting each other to form an erect fan; all leaf tips subacute to obtuse; fruiting head detaching from the scape apex; fruit trigonous, prominently 3-ribbed . . . . . **Boophone**
5.' Leaves perennial, suberect or prostrate; tips of all but the youngest leaves truncate; fruiting head not detaching from the scape apex; fruit irregularly-shaped, smooth or 6-ribbed:
6. Leaves evenly spreading, channelled, suberect to recurved; perianth tube curved, narrowly cylindrical in the lower half (in species from Greater Cape Region) **Crinum**
6.' Leaves biflabellate, flat, prostrate; perianth tube straight, not narrowly cylindrical below . . . . . **Ammocharis**

4.' Leaf margins smooth, softly pubescent or raised and fringed with long bristles or short, branched, red cilia; pedicels rarely shorter than the flowers at anthesis; filaments connate at the base, or if free, then fused to the style base; fruit dehiscent, beakless; seeds cutinous, not corky:
7. Leaves with a prominent midrib; perianth > 80 mm long; seeds slightly angled by compression, pink to colourless, with only the embryo green. . . . . **Amaryllis**
7.' Leaves without a midrib; flowers < 80 mm long; seeds ovoid, usually reddish, with the integument and embryo green:
8. Flowers zygomorphic (occasionally only by the deflexed style), rarely actinomorphic but then bright red:
9. Leaves narrow, usually < 25 mm wide, subsucculent; pedicels slender, rarely longer than the flowers; tepal margins often undulate; capsules subglobose, membranous, without conspicuous transversal veins . . . . . **Nerine**
9.' Leaves broad, usually > 25 mm wide, leathery; pedicels stout, usually much longer than the flowers; tepal margins rarely crisped; capsules trigonous to fusiform, with conspicuous transversal veins:
10. Leaves immaculate, margins smooth or with short, branched cilia; pedicels obscurely 3-angled in cross section; flowers > 25 mm long, tepals ± spreading, filaments tightly clustered, not bulbous at the base; capsules prominently ribbed, tardily dehiscent . . . . . **Brunsvigia**
10.' Leaves speckled with red, margins with long bristles; pedicels sharply triangular in cross section; flowers < 20 mm long, tepals reflexed, filaments more-or-less separate, bulbous at the base; capsules not ribbed, readily dehiscent **Crossyne**
8.' Flowers actinomorphic:
11. Leaves 2(3), glabrous; flowers persisting after anthesis; filaments connate into a short to long tube, free from the style; anthers centrifixed to subcentrifixed; style slender. . . . . **Hessea**
11.' Leaves 2–6, glabrous or hairy; flowers withering after anthesis; filaments free or if fused, then the filament tube trilocular; at least one filament whorl adnate to the style base; anthers subcentrifixed to dorsifixed. . . . . **Strumaria**

AMARYLLIS BELLADONNA LILY, MARCH LILY 2 spp., N Cape and W Cape (gce)

paradisicola Snijman Bulbous geophyte, up to 0.8 m tall. Bulb half exposed. Leaves many, absent at flowering time, spreading in a basal rosette, broadly tongue-shaped, covered with short hairs, occasionally hairy only when young, midrib prominent, margins often undulate. Flowers large, trumpet-shaped, uniformly pink, fragrant. Apr., after good autumn showers. Quartzite screes and rock ledges, G (Richtersveld National Park). **(ece)**

AMMOCHARIS SEEROOGBLOM 7 spp., southern Africa, Angola to E Africa and Sudan

longifolia (L.) M.Roem. (= *Cybistetes longifolia* (L.) Milne-Redh. & Schweick.) Bulbous geophyte, 250–400 mm tall. Leaves many, present or absent at flowering time, flat on ground, broadly strap-shaped, curved sideways, truncate tips. Flowers widely funnel-shaped, cream to pink, lily-scented, pedicels elongating and becoming rigid at fruiting stage. Capsules opening as fruiting head tumbles on the ground. Dec.–Apr. Flats and slopes in sand or stony alluvial soil, SN, G, NS, KV, CCR (southern Namibia, lower Gariep Valley, western Namaqualand to Cape Peninsula and Bonnievale). **(gce)**

BOOPHONE KOPSEERBLOM, MALKOPGIF 2 spp., southern and tropical Africa

disticha (L.f.) Herb. Bulbous geophyte, 250–500 mm tall. Leaves many, usually dry at flowering time, in an upright fan, margins often undulate, tips acute. Flowers in a dense spreading cluster, pink to red, pedicels elongating in fruit. Sept.–Mar. Rocky slopes and flats, G, CCR (Namibia, E of Witpütz N to Angola, Kalahari, Great Karoo, tropical E Africa to Robertson and Bredasdorp).

haemanthoides F.M.Leight. Bulbous geophyte, 300–500 mm tall. Leaves many, dry at flowering time, in an upright fan, margins often undulate, tips usually blunt. Flowers in a compact,

brush-like cluster, cream, turning pink when old, fragrant, pedicels elongating in fruit. Mainly Nov.–Feb. Rocky slopes and flats, sand, clay or stony soils, G, NS, WM, CCR (southern Namibia, S of Witpütz, Richtersveld, Namaqualand, Langberg, Nieuwoudtville, Calvinia, W Coast to Saldanha). **(gce)**

BRUNSVIGIA CANDELABRA LILY, KANDELAAR, MAARTLELIE ± 20 spp., southern Africa

A. Flowers pink, borne on straight pedicels

bosmaniae F.M.Leight. Bulbous geophyte, up to 200 mm tall. Leaves 5 or 6, dry at flowering, prostrate, upper surface dark green, under surface pale green. Flowers ± 20–70, in a dense rounded head, tepals almost regular, pale to deep pink with darker veins, outer stamens about half as long as inner, fragrant. Capsule sharply three-angled, heavily ribbed. Mar.–May. Flat plains in coastal sand, clay, and granite-derived soils, G, NS, NH, KV, WM, TS, CCR (Namibia, S of Witpütz, Richtersveld, Namaqualand, Loeriesfontein, Nieuwoudtville and Calvinia to Karoopoort and Tygerberg). **(gce)**

comptonii W.F.Barker Bulbous geophyte, 50–100 mm tall. Leaves 3 or 4(5), dry at flowering, flat on ground, upper surface smooth. Flowers ± 4–19, widely spreading, tepals flared upwards or one remaining basal, pale pink with dark veins, stamens and style outspread, as long as the tepals. Capsule rounded, not ribbed. Feb.–Apr. Slopes and flats in clay, loamy, and often stony soils, WM, TS (Bushmanland, foothills of Langberg, Loeriesfontein, Tanqua Karoo and Middelpos to Laingsburg).

herrei F.M.Leight. ex W.F.Barker Bulbous geophyte, 300–500 mm tall, bulb often exposed. Leaves 6 or 7, dry at flowering, suberect to spreading, leathery, both surfaces dull, glaucous green. Flowers 20–40, in a loose rounded head, tepals almost regular, delicate pink with deeper veins, outer stamens about half as long as inner. Capsule sharply three-angled, heavily ribbed. Mar.–May. Stony slopes and rock crevices, in shale or quartzite, SN, G, NH (Schakalsberg, Richtersveld Mountains to near Bulletrap Pass and mountains in Bushmanland).

namaquana D.Müll.-Doblies & U.Müll.-Doblies Bulbous geophyte, 30–150 mm tall. Leaves (2)3 or 4, dry at flowering, ± strap-shaped, spreading on ground, upper surface pustulate, bearing straw-coloured bristles, rarely smooth. Flowers 4–8, in a small compact head, tepals flared upwards or occasionally one remaining basal, pink, stamens and style usually descending and longer than tepals. Nov.–May. Stony slopes and plains, in quartzite or granite outcrops, G, NS, NH (SE Namibia, plains N of Steinkopf, near Wallekraal, E of Springbok to Bushmanland).

pulchra (W.F.Barker) D.Müll.-Doblies & U.Müll.-Doblies Bulbous geophyte, 200–300 mm tall. Leaves 5–7, dry at flowering, prostrate, upper surface rough. Flowers in a compact, brush-like head, pedicels soon spreading and elongating, tepals almost regular, ruby red to rose pink, stamens suberect. Capsule three-angled and heavily ribbed. Mar.–May. Stony slopes, in gravel and granite-derived soils, NH, KB (Steinkopf to Kamiesberg Mountains). **(ece)**

radula (Jacq.) W.T.Aiton Bulbous geophyte, 80–160 mm tall. Leaves 2(3), dry at flowering, broadly elliptical, pressed on the ground, upper surface covered with prominent, straw-coloured bristles. Flowers 5–11, in a small compact head, tepals flared upwards, pale to dark pink, stamens and style usually outspread, slightly longer than tepals. Nov.–May, after rain. In rocky soil and in rock crevices, KV (Knersvlakte). **(ece)**

A.' Flowers red, borne on pedicels curved below the ovary

josephinae (Delile) Ker Gawl. Bulbous geophyte, up to 0.65 m tall. Bulb usually half exposed. Leaves numerous, dry at flowering, suberect to recurved, greyish green, smooth. Flowers 20–60 in a large, open hemispherical head, red, tepals fused below for 10–15 mm, unequally rolled back. Capsules narrowly ovoid. Feb.–Mar. Rocky slopes and clay flats in renosterveld, WM, TS, CCR (near Nieuwoudtville, Roggeveld Escarpment, Worcester, Malgas to Baviaanskloof Mountains). **(gce)**

orientalis (L.) Aiton ex Eckl. Bulbous geophyte, 400–500 mm tall. Leaves usually 6, dry at flowering, prostate, upper surface rough. Flowers 20–40 in a dense, spherical head, red, tepals fused below for 2–5 mm, unequally rolled back. Capsules sharply 3-angled, heavily ribbed. Feb.–Apr. Sandy flats, mostly on coastal forelands, rarely in loamy soils, NS, KV, CCR (Brand-se-Baai, Vanrhynsdorp to Cape Peninsula, Worcester to Plettenberg Bay). **(gce)**

CRINUM MARSH LILY ± 65 spp., pantropical but mainly sub-Saharan Africa

variabile (Jacq.) Herb. Bulbous geophyte, 0.4–0.6 m tall. Leaves several, usually partially green at flowering, spreading, channelled. Flowers large, trumpet-shaped, pale to deep pink, heavily scented. Jan.–May. In perennial or seasonal rivers and streams, NH, KV, WM, TS, CCR (Nigramoep Plateau, Groenrivier, Varsrivier, Nieuwoudtville, Roggeveld Escarpment and Doringrivier). **(gce)**

CROSSYNE MAARTBLOM, MARCH LILY 2 spp., Namaqualand and W Cape **(gce)**

flava (W.F.Barker ex Snijman) D.Müll.-Doblies & U.Müll.-Doblies Bulbous geophyte, up to 0.5 m tall. Leaves 4–6, dry at flowering, prostrate, margins bristly. Flowers as many as ± 200, small, pale yellow, curved downwards. Mar.–May. Rocky slopes or open plains, in clay, loam or granite-derived soils, G, NS, NH, KV, WM, CCR (Eksteenfontein, Namaqualand, Vanrhynsdorp, Nieuwoudtville to Cederberg Mountains). **(gce)**

CYRTANTHUS ± 50 spp., southern and tropical Africa

herrei (F.M.Leight.) R.A.Dyer Bulbous geophyte, up to 450 mm tall, bulbs partly exposed, in clusters. Leaves several, green at flowering, suberect, greyish green. Flowers 14–28, pendulous, narrowly tubular, red with greenish yellow segments. Mar.–Apr. On rock ledges and screes, in quartzite or granite, G, NH (southern Namibia, Numees, Richtersveld, northern Namaqualand, Harrasberg). **(ece)**

GETHYLLIS KUKUMAKRANKA ± 32 spp., southern Namibia and Botswana, N Cape and W Cape to Free State

A. Flowers ± fleshy; anthers 6 to numerous, style straight, stigma narrow and trifid

afra L. Bulbous geophyte, 100–140 mm tall. Leaves 12–30, dry at flowering, erect, spiralled, glabrous or shortly ciliate. Flowers white, keeled with red on reverse, anthers > 6. Dec.–Jan. Sandy flats and stony alluvial plains, NS, CCR (Brand-se-Baai to Cape Peninsula to Agulhas Plain). **(gce)**

britteniana Baker Bulbous geophyte, ± 100–250 mm tall, occasionally clumped. Leaves 19–45, dry at flowering, densely tufted, suberect, spiralled, smooth, surrounded by 2 prominent, spotted basal sheaths. Flower large, cup-shaped, white, cream or pink, anthers 35–60 in 6 or more clusters. Fruit large, succulent, yellow. Oct.–Mar. Coastal sands or rocky slopes, G, NS, NH, KV, CCR (Richtersveld Mountains, Steinkopf, Komaggas, Vanrhynsdorp, Clanwilliam to Darling). **(gce)**

campanulata L.Bolus (including **G. multifolia** L.Bolus) Bulbous geophyte, ± 150 mm tall, occasionally clumped. Leaves 9–23, dry at flowering, in dense tufts, suberect, scarcely twisted, lightly hairy on margins. Flower large, cup-shaped, white to cream, anthers 12 in 6 pairs. Nov.–Jan. Flat, often-rocky plains in loamy or clay soils, WM, TS, CCR (Nieuwoudtville and Roggeveld Escarpment to Worcester and Touwsrivier). **(gce)**

ciliaris (Thunb.) Thunb. Bulbous geophyte, ± 150–300 mm tall. Leaves 15–25, dry at flowering, suberect, spiralled, firm, shiny green, margins fringed with rigid, upturned hairs, surrounded by a mostly subterranean, pale sheath that becomes spotted with maroon when exposed. Flower large, cup-shaped, ivory to deep pink, waxy, anthers > 20 in 6 clusters. Fruit fleshy, yellow. Nov.–Feb. On mountain slopes or flat lowlands, in deep sand, NS, KV, CCR (Koekenaap, Vanrhynsdorp to Cape Peninsula). **(gce)**

grandiflora L.Bolus Robust, bulbous geophyte, 100–300 mm tall. Leaves ± 50 or more, dry at flowering, densely tufted, suberect, hardly twisted, smooth or the margins occasionally sparsely hairy, surrounded by 2 prominent, spotted, basal sheaths. Flower large, deeply cup-shaped, white, anthers ± 40 in 6 clusters. Oct.–Dec. In sand or stony soils, G, NH (Richtersveld Mountains, E of Port Nolloth to Spektakelberg and Komaggas). **(ece)**

gregoriana D.Müll.-Doblies Bulbous geophyte, ± 150 mm tall. Bulb deep seated, forming clumps. Leaves 1 or 2, dry at flowering, flat, never coiled, glaucous, surfaces usually covered with long,

soft, hairs. Flower salver-shaped, white, anthers 6. Fruit leathery, cream to olive green with maroon speckles. Dec.–Jan. Uplands on sandy or clay plains, KV, CCR (Nieuwoudtville, Vanrhynsdorp to Cederberg Mountains). **(gce)**

hallii D.Müll.-Doblies Bulbous geophyte, ± 50–70 mm tall, forming clumps. Leaves ± 20, dry at flowering, spreading on ground, never coiled, covered with prominent elongated papillae. Flower salver-shaped, pink, anthers 7–10. Nov. In sandy soil on flat plains, NS, KV (Nuwerus to Vredendal). **(ece)**

latifolia Baker Robust, bulbous geophyte, ± 120 mm tall. Bulb with a long, smooth, sheathing neck up to 230 mm. Leaves ± 12, dry at flowering, spreading, ± 12 mm broad, twisted and smooth. Flower firm, white to pinkish, anthers ± 20 in 6 clusters. Fruit fleshy, cream below, increasingly speckled with red towards a ± solid red tip. Feb. In stony soil, NH (Meerhofkasteel, SW of Bitterfontein). **(ece)**

namaquensis (Schönland) Oberm. Robust, bulbous geophyte, ± 200–300 mm tall. Leaves ± 40, dry at flowering, laxly spiralled, blades flat, densely tufted, surrounded by 2 prominent, inflated basal sheaths. Flower large, cup-shaped, white or lilac, stamens 6, filaments joined at base. Fruit large, succulent, pale yellow. Nov.–Dec. On coastal dunes and mountain slopes, in sand or gravel, SN, G, NS (Aurus, Klinghardt, Obib, Namus and Richtersveld Mountains to Oograbies). **(ece)**

A.' Flowers ± delicate; anthers 6, style curved sideways, stigma distinctly 3-lobed
B. Leaves smooth or covered with simple hairs

fimbriatula D.Müll.-Doblies Like **G. lanuginosa** but both leaf surfaces more-or-less smooth and the margins densely fringed with short, stiff, spreading hairs. ?Nov.–Dec. ?Between rocks on S-facing slopes, TS (Matjiesfontein). **(ece)**

lanuginosa Marloth Bulbous geophyte, 40–100 mm tall, usually clumped. Leaves ± 7–18, dry at flowering, linear to narrowly strap-shaped, suberect, coiled, sparsely hairy on both surfaces. Flower salver-shaped, white to pale pink. Fruit succulent, yellow to orange. Sept.–Dec. Sandy or clay soils on slopes or in depressions, often near rocks, G, NS, NH, KB, KV, WM, CCR (Richtersveld, Anenousberg, Springbok, Kamiesberg Mountains, Loeriesfontein, Bokkeveld Escarpment, Vredendal, Gifberg, Hopefield, Karoopoort). **(gce)**

lata L.Bolus Bulbous geophyte, 30–40 mm tall, solitary. Leaves 2–6, dry at flowering, prostrate, broad and flat, glabrous with a raised, pinkish or straw-coloured, cartilaginous margin. Flower salver-shaped, white to pale pink. Oct.–Nov. On clay flats, KV, WM (western Knersvlakte to Nieuwoudtville and Calvinia Plateau). **(ece)**

linearis L.Bolus Bulbous geophyte, 30–100 mm tall, often in compact clumps. Leaves 5–10, dry at flowering, narrowly strap-shaped, spreading to suberect, tightly coiled, glabrous or at least minutely papillate on both surfaces, often glaucous. Flowers salver-shaped, white to delicate pink. Fruit succulent, yellowish. Oct.–Nov. On sandy or gravelly plains, NH, KV, WM (near Gamoep, Langberg, Loeriesfontein, Nieuwoudtville to Vanrhynsdorp). **(ece)**

pectinata D.Müll.-Doblies Bulbous geophyte, ± 50 mm tall. Leaves 4, dry at flowering, prostrate, broad and flat, glaucous, smooth but shortly fringed with straw-coloured, tooth-like bristles. Flower salver-shaped, white. Fruit slender, fleshy, dull yellow with red speckles. ?Nov. On clay flats, WM (Plateau between Nieuwoudtville and Calvinia). **(ece)**

roggeveldensis D.Müll.-Doblies (including **G. uteana** D.Müll.-Doblies) Bulbous geophyte, ± 70 mm tall, occasionally clumped. Leaves 5–15, dry at flowering, broadly lanceolate, prostrate, occasionally upturned at apex, flaccid to subsucculent, glabrous or under surface occasionally sparsely hairy, green, margin minutely papillate. Flower salver-shaped, white to delicate pink. Fruit succulent, yellow tipped with red, aromatic. Nov.–Dec. Stony clays on S-facing slopes, WM, TS (Calvinia, Roggeveld Escarpment to Matjiesfontein). **(ece)**

transkarooica D.Müll.-Doblies Bulbous geophyte, ± 80–100 mm tall, forming clumps. Leaves ± 6–12, dry at flowering, linear, suberect, curled towards apex, glabrous or occasionally blades sparsely hairy. Flower salver-shaped, solid rose pink, anthers sagittate with somewhat diverging basal lobes. Fruit fleshy, pink to yellow, fragrant. Nov.–Dec. In sandy or loamy soils, often near rocks, WM, CCR (Cold Bokkeveld, Roggeveld Escarpment, Great Karoo, Free State and Botswana).

verticillata R.Br. ex Herb. (including **G. cavidens** D.Müll.-Doblies) Bulbous geophyte, ± 100–250 mm tall, solitary. Leaves ± 5–10, dry at flowering, linear, suberect, coiled towards the apex, shiny green, glabrous, basal sheaths paired, white with maroon spots and fringed margin. Flower

salver-shaped, pure white, stigma broadly three-lobed. Fruit fleshy, yellow. Nov.–Feb. On open sandy plains or on sandstone or granite slopes, NH, KB, WM, CCR (Steinkopf to Nuwerus, Vanrhyns Pass and SW Cape). **(gce)**

sp. A Robust bulbous geophyte, 150–200 mm tall. Bulb with long, softly fibrous, subterranean neck. Leaves 8–11, suberect, coiled near the apex, both surfaces softly hairy. Flower ?deep pink, anthers 6. Jan. In deep sand, NS (Buffelsrivier). **(ece)**

sp. B Bulbous geophyte, ± 70 mm tall. Leaves (2)3, dry at flowering, strap-shaped, suberect, edges undulate, sparsely covered with long soft hairs, margins thickened and minutely papillate. Flower salver-shaped, white. ?Flowering time. Lower gneissic slopes, G (southern Namibian Escarpment, W of Boomrivier). **(ece)**

B.' Leaves covered with compressed T-shaped hairs, occasionally only on margin

longistyla Bolus Bulbous geophyte, up to ± 80 mm tall, in small clusters. Leaves 12–18, dry at flowering, spreading, ± curved towards tips, surfaces covered with parallel clusters of stiff, white, longitudinally orientated hairs, affixed to blade at middle, margin covered with clusters of transversally orientated hairs. Flower salver-shaped, pink. Nov.–Dec. In pebbly soil and rock crevices, WM (Nuweveld Mountains to Agter Sneeuberg Mountains near Murraysburg and Sneeuberg Mountains near Nieu-Bethesda).

setosa Marloth Bulbous geophyte, ± 70 mm tall, solitary. Leaves 4–8, dry at flowering, spreading to erect, not coiled, surfaces covered with firm, centrally affixed hairs clustered together length-wise in groups of 5 or more, clusters of hairs joined by scale-like attachment to blade, otherwise somewhat spreading, hairs on leaf tips dense, interlocking and straw-coloured. Flower salver-shaped, white to pink. Nov. In sand or loam in rocky habitats, NH, KB, WM, TS (Steinkopf, Kamiesberg Mountains, Roggeveld Escarpment, Klein Roggeveld). **(ece)**

verrucosa Marloth Bulbous geophyte, ± 50–80 mm tall, solitary. Leaves 3–8, dry at flowering, spreading, slightly curled, both surfaces covered with silver, parallel-armed, scale-like hairs clustered together length-wise in groups of 5 or more and centrally affixed to a dark red tubercle. Flower salver-shaped, white to pale pink. Oct.–Dec. Lower slopes and flats in shale soils, WM, TS, CCR (Loeriesfontein, Calvinia, Laingsburg, and Agulhas Plain). **(gce)**

villosa (Thunb.) Thunb. Bulbous geophyte, ± 50–150 mm tall, solitary. Leaves 3–12, dry at flowering, suberect, coiled, both surfaces covered with soft, centrally-affixed hairs clustered together in groups of 2 or 3, arms of hairs spreading. Flower salver-shaped, white to pale pink. Fruit slender, white to transparent, not aromatic, seeds red. Nov.–Jan. Flats or slopes in sand, clay or limestone, G, NH, KV, WM, TS, CCR (Eksteenfontein to Vanrhynsdorp, Calvinia, Fraserburg, Williston, Clanwilliam, Tanqua Karoo, Worcester, Cape Peninsula to Riversdale).

sp. C Bulbous geophyte, ± 70–100 mm tall, solitary. Leaves 5, dry at flowering, suberect, coiled in upper half, surfaces smooth, margin densely fringed with centrally-affixed, whitish, scale-like hairs, arms of hairs spreading transversally over leaf surfaces. Flower salver-shaped, white to pink. ?Flowering time. Rocky outcrops on northern slopes, TS (Klein Roggeveld). **(ece)**

HAEMANTHUS PAINTBRUSH, POWDERPUFF 22 spp., southern Africa, mainly Namaqualand

A. Flowers pink or white, bracts spreading

amarylloides Jacq. Bulbous geophyte, up to 250 mm tall. Leaves 2, dry at flowering, prostrate to erect, strap-shaped, glabrous, plane, unmarked, margin occasionally red. Flowers in a spreading head, pink, bracts thin-textured, pink. Feb.–Apr. Seasonally moist sites in granite or sandstone-derived soils, NH, KB, CCR (Springbok, Kamiesberg and Bokkeveld Mountains, Gifberg to Clanwilliam). **(gce)**

barkerae Snijman Bulbous geophyte, 100–250 mm tall, often clumped. Leaves 2, dry at flowering, recurved to spreading, strap-shaped, channelled or plane, glabrous or sparsely hirsute, barred with dark green or maroon towards base of under surface, margin reddish or green. Flowers in a spreading head, pink, bracts thin textured, pink. Mar.–Apr. On elevated plains in heavy soils near rocks, WM, TS (Loeriesfontein, Nieuwoudtville, Calvinia, northern Tanqua Karoo, ?Roggeveld). **(ece)**

lanceifolius Jacq. Bulbous geophyte, ± 200 mm tall. Leaves 2, dry at flowering, prostrate, broadly elliptical, plane, usually unmarked, margin minutely fringed. Flowers in a lax, spreading head, pale pink, bracts membranous, soon wilting. Mar.–Apr. In pockets of sand overlying dolomite outcrops, KV, ?TS (near Vanrhynsdorp, possibly northern Tanqua Karoo). **(ece)**

tristis Snijman Bulbous geophyte, ± 100 mm tall. Leaves 2, dry at flowering, spreading, strap-shaped, channelled, flushed with pink near base, margin red, smooth. Flowers in a spreading head, cream to pink, bracts thin-textured, pinkish. Mar. On flat plains, in seasonal washes, TS (southern Tanqua Karoo). **(ece)**

A.' Flowers red, rarely pink or white, bracts erect to suberect

coccineus L. APRIL FOOL Bulbous geophyte, 60–200 mm tall. Leaves 2, dry at flowering, spreading, tongue-shaped, fleshy, often ciliate, usually speckled on under surface, margin often rolled back. Flowers in a compact, head, scape mostly spotted with dark red, bracts many, stiff and fleshy, scarlet. Feb.–Apr. Coastal scrub and rocky slopes, SN, G, NS, NH, KV, WM, TS, CCR (widespread in the Greater Cape Floristic Region to near Alicedale).

crispus Snijman Bulbous geophyte, 40–100 mm tall. Leaves 2, dry at flowering, spreading to suberect, narrowly strap-shaped, channelled, smooth or sparsely covered with short, stiff hairs, edges undulate, base speckled. Flowers in a small, compact head, bracts 4 or 5, blunt and broadest above the middle, waxy, red or occasionally pink. Mar.–Apr. Stony lower slopes, usually in heavy soils, G, NH, KB, KV, WM, CCR (Kosies, Springbok, Kamiesberg Mountains, Loeriesfontein, Vanrhyns Pass to Olifants River Valley). **(gce)**

dasyphyllus Snijman Bulbous geophyte, ± 200–300 mm tall, in clumps. Leaves 2, dry at flowering, lanceolate, erect, slightly twisted, channelled, mostly softly hairy. Flowers in a compact head, scape smooth or softly hairy, bracts firm, red. Feb.–Mar. Amongst shale or granite outcrops, NH, WM (near Kliprand, Langberg and Kubiskouberg). **(ece)**

graniticus Snijman Bulbous geophyte, 150–280 mm tall, in clumps. Leaves 2, dry at flowering, erect, lanceolate, smooth, shiny green, without markings. Flowers in a compact head, bracts red to pale carmine. Mar.–Apr. Near seasonal watercourses in coarse, granite-derived soils, NH, KB (near Springbok and Kamiesberg Mountains). **(ece)**

namaquensis R.A.Dyer Bulbous geophyte, 170–450 mm tall, in large clumps. Leaves 2, dry at flowering, erect, oblong-lanceolate, thick and tough, smooth, margins slightly undulate basally. Flowers in a compact head, bracts firm but not fleshy, red. Mar.–Apr. Between granite and quartz rocks or under low bushes, SN, G, NS, NH (S of Lüderitz, Cornellsberg, Steinkopf, Kourkammaberg, Karkams). **(ece)**

pubescens L.f. Bulbous geophyte, up to 300 mm tall, often forming clumps. Leaves 2, dry at flowering, recurved to prostrate, narrowly to broadly strap-shaped, hairy on the upper or lower surface or the margin only. Flowers in a compact head, scape occasionally hairy, bracts as long as or much longer than flowers, distinctly pointed at apex. Mar.–Apr. Coastal sands and inland sand plumes, SN, NS, KV, CCR (near Spitskop, Oograbies West, Kleinsee, Wallekraal, Klawer, Graafwater to Cape Peninsula). **(gce)**

unifoliatus Snijman Bulbous geophyte, usually 100–200 mm tall. Leaf 1, dry at flowering, erect or curved sideways, somewhat elliptic, light green, hairy, margin red. Flowers in a compact, narrow head, scape occasionally hairy, bracts stiff, scarlet. Mar.–Apr. Usually on S-facing slopes in stony, granite-derived soils, NH (Anenous Pass to near Komaggas). **(ece)**

HESSEA SAMBREELTJIE 14 spp., southern Namibia, N Cape and W Cape

breviflora Herb. Bulbous geophyte, up to 150 mm tall. Bulb tunics thick and felt-like, neck stout. Leaves 2, dry at flowering, spreading, narrowly strap-shaped, curved sideways, smooth, basal sheath exserted, red. Flowers stellate, pink, in a small cluster, stamens slightly shorter to longer than tepals. Apr.–May. Sandy pockets between rocks on lower slopes, G, NS, NH, KV, CCR (southern Richtersveld, Springbok, Karkams, Garies, Vredendal, Olifants River Valley to Hopefield). **(gce)**

incana Snijman Bulbous geophyte, 80–200 mm tall. Leaves 2, dry at flowering, suberect to spreading, strap-shaped, under surface covered with minute retrorse hairs. Flowers stellate, pink with a deeper pink centre, in a spreading cluster, stamens much shorter than tepals. July–Aug. Elevated sandy plains in granite-derived soil, KB (Kamiesberg Mountains). **(ece)**

pilosula D.Müll.-Doblies & U.Müll.-Doblies Bulbous geophyte, 70–170 mm tall. Leaves 2, dry at flowering, spreading, narrowly strap-shaped, slightly channelled, smooth or with short, out-

spread hairs on both surfaces or under surface. Flowers stellate, pink with a white or darker pink centre, in a dense, widely spreading head, stamens consistently shorter than tepals. May–June. On flat, sandy plains, G, NS, NH (southern Richtersveld, Steinkopf to near Wallekraal). **(ece)**

pulcherrima (D.Müll.-Doblies & U.Müll.-Doblies) Snijman (= *Dewinterella pulcherrima* (D.Müll.-Doblies & U.Müll.-Doblies) D.Müll.-Doblies & U.Müll.-Doblies) Bulbous geophyte, up to 100 mm tall. Leaves 2, dry at flowering, spreading, spiralled towards apex, smooth. Flowers delicate, white, centre usually crimson, in a small head, filaments basally hooked. May. On flat plains in clay soils, KV, WM (below Bokkeveld Escarpment to Nieuwoudtville and Calvinia Plateau). **(ece)**

stellaris (Jacq.) Herb. Bulbous geophyte, 70–150 mm tall. Bulb tunics thin, neck slender. Leaves 2, dry at flowering, spreading, narrow, smooth. Flowers stellate, pale to deep pink, occasionally with a dark star-shaped centre, in a small cluster, stamens shorter to equalling tepals. Apr.–June. Sandy or clay flats, KV, WM, TS, CCR (Loeriesfontein, Vanrhynsdorp, Tanqua Karoo, Worcester, Matjiesfontein, Little Karoo to Oudtshoorn). **(gce)**

stenosiphon (Snijman) D.Müll.-Doblies & U.Müll.-Doblies Bulbous geophyte, 60–200 mm tall. Leaves 2, dry at flowering, spreading, narrowly strap-shaped, channelled, smooth. Flowers with a long, slender, greenish to reddish tube and narrow, recurved, pale lemon tepals, in a spreading cluster, inner filaments appearing jointed, longer than outer filaments. Apr.–May. Seasonally moist rock crevices and soil pockets on granite domes, KB (Kamiesberg Mountains, with a doubtful record from near Pofadder). **(ece)**

tenuipedicellata Snijman Bulbous geophyte, 180–200 mm tall. Leaves 2, dry at flowering, spreading, linear, smooth. Flowers somewhat stellate, glistening white, in a laxly spreading cluster, tepals occasionally with undulate edges, stamens shorter than tepals. Apr.–May. Soil pockets on granite domes, NH (NE of Bitterfontein). **(ece)**

sp. A Bulbous geophyte, up to ± 150 mm tall. Leaves 2(3), dry at flowering, linear, smooth. Flowers stellate, glistening pale pink, in a spreading cluster, tepals with a dark pink or rarely greenish, narrow, median band, distinctly crisped on edges, stamens slightly shorter than tepals. May–June. In coarse sand on edge of seasonal clay pans, NH (Toringberg). **(ece)**

NAMAQUANULA 2 spp., southern Namibia and N Cape

bruce-bayeri D.Müll.-Doblies & U.Müll.-Doblies Bulbous geophyte, ± 150 mm tall. Leaves 2 or 3(4), dry at flowering, spreading, narrowly strap-shaped, firm, fleshy and elliptical in cross section, smooth, slightly sticky, curved towards apex. Flowers funnel-shaped, in a spreading cluster, pale pink and translucent, scape sticky, filaments thick and the inner surface papillose at base. Feb.–Mar. Alluvial gravel plains, SN, G (near Aus to lower Gariep Valley and Richtersveld National Park). **(ece)**

NERINE NERINE ± 23 spp., southern Africa

humilis (Jacq.) Herb. (including **N. breachiae** W.F.Barker, **N. tulbaghensis** W.F.Barker) Bulbous geophyte, 150–350 mm tall. Leaves several, dry or emergent at flowering, spreading to prostrate, 4–10 mm wide. Flowers flared upwards, tepals ± 4 mm wide, undulate, pink. Apr.–June. Loamy soils among rocks, TS, CCR (Clanwilliam to Worcester, Bredasdorp, Montagu, Komsberg foothills to western Swartberg Mountains). **(gce)**

STRUMARIA CAPE-SNOWFLAKE, TOLBOL 28 spp., southern Namibia to W Cape, Karoo and Free State

A. Flowers bell- or funnel-shaped
*B. Leaves smooth, arranged in one plane like a fan (except **S. prolifera**)*

barbarae Oberm. Bulbous geophyte, ± 200 mm tall. Leaves 2–4, suberect, arranged in a fan, shiny green, smooth. Flowers in a pendulous cluster, funnel-shaped, white to pale pink, stamens included. Apr. On exposed limestone screes and rock ledges, G (S of Aus and N of Rooiberg, Richtersveld National Park). **(ece)**

bidentata Schinz Bulbous geophyte, 50–100 mm tall. Leaves 3 or 4, dry at flowering, erect, arranged in a fan, broadest at apex, smooth, slightly sticky. Flowers in an erect, compact cluster,

campanulate, white to pale pink, stamens exserted, filaments thick in lower half. Mar.–Apr. On exposed gravel plains, SN, G (lower Gariep Valley). **(ece)**

hardyana D.Müll.-Doblies & U.Müll.-Doblies Like **S. truncata** but leaves not twisted, margin hyaline, apex blunt, shallowly notched especially when young. Mar.–Apr. Amongst schist and limestone, often in crevices, G (Witpütz to Rosh Pinah). **(ece)**

luteoloba Snijman Bulbous geophyte, 180–280 mm tall. Leaves 2–4, usually dry at flowering, oblong, erect, spreading apart like a fan, smooth. Flowers in a drooping cluster, narrowly tubular below with pale lemon to cream-coloured, deeply-channelled, recurved tepals above, stamens exserted. ?May. On rocky slopes in dolomite or granite, G (Rosh Pinah to near Eksteenfontein). **(ece)**

phonolithica Dinter Bulbous geophyte, 130–200 mm tall, clumped. Leaves 3 or 4, often emerging at flowering, strap-shaped, suberect, arranged in a fan, light green, smooth. Flowers in a compact cluster, narrowly funnel-shaped with tepals recurved towards apex, white to pink, stamens exserted. ?May. On steep, S-facing slopes, SN (Klinghardt and Aurus Mountains). **(ece)**

prolifera Snijman Bulbous geophyte, 120–200 mm tall, forming clumps. Leaves 2 or 3, emerging at flowering, strap-shaped, recurved to spreading, not in a fan, thin-textured, light green, smooth. Flowers funnel-shaped, shell pink, drooping, stamens included. ?May. In the shade of rocks on S-facing slopes, NH (Kourkammaberg). **(ece)**

speciosa Snijman Bulbous geophyte, 230–330 mm tall. Leaves 4–6, emerging at flowering, strap-shaped, erect, arranged in a fan, light green, smooth. Flowers in a widely spreading down-turned cluster, campanulate below with tepals recurved in the distal half, pure white, stamens exserted. ?May. On S-facing slopes below dolomite rocks, G (southern Namibia, on Sonberg). **(ece)**

truncata Jacq. NAMAQUALAND SNOWFLAKE Bulbous geophyte, 200–350 mm tall. Leaves 2–6, usually dry at flowering, strap-shaped, erect, arranged in a fan, usually twisted 1–3 times, glaucous, smooth. Flowers in a nodding cluster, funnel-shaped, white to pink, stamens exserted. Apr.–June. Sandy or stony flats, G, NS, NH, KV, WM, CCR (Cornellskop, Steinkopf, Komaggas, Loeriesfontein, Nuwerus, Vanrhynsdorp, Nieuwoudtville, Calvinia, Klawer). **(gce)**

B.' Leaves hairy or ciliate, spreading apart opposite each other

aestivalis Snijman Bulbous geophyte, 70–120 mm tall. Leaves 2(3), dry at flowering, recurved, strap-shaped, both surfaces covered with long silky white hairs. Flowers in a dense cluster, widely funnel-shaped, white with a pale pink median stripe on each tepal. Jan. On slopes and ledges amongst shale chips, WM (Langberg, NW of Loeriesfontein). **(ece)**

perryae Snijman Bulbous geophyte, 50–250 mm tall. Leaves 2, dry at flowering, recurved, narrowly strap-shaped, softly hairy on both surfaces. Flowers in a lax cluster, widely funnel-shaped, pale pink with a deeper pink median band on each tepal, stamens slightly exserted. May. On flat plain in heavy soil, WM (northern Bokkeveld Escarpment). **(ece)**

picta W.F.Barker Bulbous geophyte, 60–130 mm tall. Leaves 2, dry at flowering, spreading, broadly strap-shaped, leathery, greyish, minutely ciliate. Flowers ± ascending on minutely hairy pedicels from a ± sideways deflected scape, widely bell-shaped, white with broad reddish brown central bands beneath, scented. May–June. Clay flats on tillite, NW, CCR (Bokkeveld Escarpment). **(gce)**

pubescens W.F.Barker Bulbous geophyte, ± 200 mm tall. Leaves 2(3), dry at flowering, spreading, strap-shaped, upper surface usually softly hairy, occasionally smooth, margin softly fringed. Flowers in a spreading cluster, funnel-shaped, delicate pink, stamens much shorter than tepals. Feb.–Mar.(Apr.). On S-facing slopes under shale rock ledges, WM, TS (southern Roggeveld Escarpment and Matjiesfontein). **(ece)**

A.' Flowers star-shaped
C. Leaves filiform, suberect and smooth

pygmaea Snijman Bulbous geophyte, ± 80 mm tall, dwarf. Leaves 2, dry at flowering, spreading, filiform, smooth. Flowers in a spreading cluster, stellate, white or occasionally pale pink, scape wiry, spiralled at least near base. May. At base of quartz or granite outcrops, NH, KV (between Kliprand, Bitterfontein and Koekenaap). **(ece)**

tenella (L.f.) Snijman Bulbous geophyte, 100–200 mm tall, slender. Leaves up to 6, usually present at flowering, spreading, filiform, smooth. Flowers in a spreading cluster, stellate, white, occasionally flushed with pink, scape straight. Apr.–July. Seasonally damp, loamy flats, WM, CCR (Bokkeveld Escarpment, Calvinia, Roggeveld Escarpment, Cape Peninsula to Montagu, and Free State).

C.' Leaves strap-shaped to elliptic, spreading to prostrate, usually hairy or pustulate

discifera Marloth ex Snijman Bulbous geophyte, up to 150 mm tall. Leaves 2, dry at flowering, spreading, strap-shaped, softly hairy. Flowers in a spreading cluster, stellate, white, thinly striped with green or pink, often scented. Mar.–May. Heavy clay soils, KV, WM, CCR (Loeriesfontein, Vanrhynsdorp, Nieuwoudtville, Calvinia, Roggeveld Escarpment). **(gce)**

karooica (W.F.Barker) Snijman Bulbous geophyte, 140–200 mm tall. Leaves 2, dry at flowering, prostrate, elliptical, both surfaces smooth or rarely sparsely hairy on upper surface, margin minutely fringed. Flowers in a spreading cluster, stellate, pink with darker pink median stripe on each tepal. Mar.–Apr. Open flat sites in doleritic or shaley soils, WM, TS (southern Roggeveld Escarpment and Matjiesfontein). **(ece)**

karoopoortensis (D.Müll.-Doblies & U.Müll.-Doblies) Snijman Bulbous geophyte, up to 200 mm tall. Leaves 2 or 3, dry at flowering, recurved, broadly strap-shaped, smooth or sparsely fringed, flaccid. Flowers in a spreading cluster, stellate, large, white with a deep pink, median stripe on each tepal. Mar. On low S- or E-facing slopes, in loamy soils, TS (southern Tanqua Karoo and northern foothills of Anysberg). **(ece)**

massoniella (D.Müll.-Doblies & U.Müll.-Doblies) Snijman Bulbous geophyte, 120–150 mm tall. Leaves 2, dry at flowering, prostrate, narrowly elliptical, 'hump-backed' in appearance. Flowers in a spreading cluster, stellate, pale pink with a narrow, olive green median stripe on each tepal. Apr.–May. On sandy plains, NH (Vaalputs, Kliprand to Gifkop). **(ece)**

merxmuelleriana (D.Müll.-Doblies & U.Müll.-Doblies) Snijman Bulbous geophyte, 80–150 mm tall. Leaves 2, dry at flowering, prostrate, narrowly elliptical, dark shiny green, edges minutely scabrid. Flowers in a spreading cluster, stellate, pink with darker pink median stripe. Apr. On elevated, sandy plains in seasonally moist sites, G, NH (Kosies to Wildepaardehoek Pass). **(ece)**

villosa Snijman Bulbous geophyte, 80–150 mm tall. Leaves 2, dry at flowering, prostrate, narrowly elliptical, upper surface densely hairy. Flowers in a spreading cluster, stellate, white to pink with a narrow median stripe on each tepal. Mar.–Apr. On flat plains amongst quartz pebbles, G, NH (near Eksteenfontein, Kosies, and Harrasberg). **(ece)**

sp. A Like **S. pubescens** in shape, size and hairiness of leaves but flowers like those of **S. karoopoortensis**. ?Mar. In shade on granite hill, NH (W of Gamoep). **(ece)**

sp. B Bulbous geophyte, up to ± 175 mm tall. Leaves 3 or 4, opposite, suberect to recurved, narrowly lorate, smooth. Flowers in a narrow, spreading cluster, pale pink, not striped, faintly scented. Apr. In seasonally damp shaded habitats, NH (Spektakelberg). **(ece)**

APONOGETONACEAE

by D.A. Snijman

APONOGETON CAPE PONDWEED, WATERBLOMMETJIE ± 48 spp., palaeotropics and southern Africa

distachyos L.f. Rhizomatous aquatic. Leaves with long slender petioles, floating blades oblong, 60–230 mm long. Inflorescence of 2 spikes on a scape up to 800 mm long. Flowers arranged in 2 rows on one side of each spike, white, with 1 large tepal, scented and edible. July–Dec. Pools, dams and ditches, TS, CCR (Bokkeveld Mountains and Tanqua Karoo to SW Cape, Laingsburg and Knysna). **(gce)**

ARACEAE (= *LEMNACEAE*)

by D.A. Snijman

ZANTEDESCHIA ARUM LILY, VARKLELIE 8 spp., southern Africa

aethiopica (L.) Spreng. Rhizomatous geophyte, 0.6–1 m tall. Leaves sagittate, on long spongy petioles. Flowers on a yellow spadix, surrounded by a large, funnel-shaped, white spathe, faintly

scented. Berries soft and yellow when ripe, peduncle erect in fruit. June–Dec. Sandy or rocky places, in permanent springs or seasonally damp depressions, G, KB, CCR (Richtersveld National Park, Kamiesberg and Bokkeveld Mountains through to SW Cape and Limpopo Province). **(gce)**

odorata P.L.Perry Rhizomatous geophyte, ± 0.75 m tall. Leaves sagittate, on long spongy petioles. Flowers on a yellow spadix, surrounded by a large, weakly flaring, white spathe, strongly freesia-scented. Berries green and firm when ripe, peduncle recurved in fruit. July–Aug. Seasonally moist places on dolerite outcrops, WM (Bokkeveld Escarpment near Nieuwoudtville). **(ece)**

ASPARAGACEAE

by D.A. Snijman

ASPARAGUS (= *MYRSIPHYLLUM, PROTASPARAGUS*) KATDORING, KRULKRANSIE, WILDE-ASPERSIE ± 120 spp., mainly Africa, also Asia

*A. Stems mostly spineless; cladodes usually broad, leaf-like and solitary in the axils (except **A. declinatus** and **A. fasciculatus**); tepals cohering below; stamens closely surrounding the ovary; filaments flattened*

asparagoides (L.) Druce Spineless scrambler, up to 3 m long, root tubers spindle-shaped, close to but radiating from rhizome. Cladodes solitary, ovate. Flowers nodding, solitary in axils, tepals fused below, filaments straight. July–Sept. In partial shade, KB, CCR (Kamiesberg Mountains, Gifberg to Port Elizabeth through to tropical Africa, through to warm parts of Europe, naturalised in Australia).

declinatus L. Much-branched, delicate, spineless scrambler, up to 1 m long, root tubers spindle-shaped, usually covering rhizome, branches curved downwards in loops. Cladodes 3 in fascicles, linear. Flowers nodding, solitary in axils, tepals cohering below, filaments perpendicular. June–Oct. Mostly on rock outcrops, in sand or clay, SN, G, NS, KV, WM, CCR (southern Namibia, Richtersveld National Park, Kotzesrus, Liebendal, Calvinia to Riversdale). **(gce)**

fasciculatus Thunb. Soft shrublet, up to 1 m tall, sprawling or scrambling, roots long and swollen from a woody rhizome, spineless or with a few, short, brittle spines below. Cladodes 15–30 in feathery fascicles, filiform, internodes usually bare. Flowers nodding, 1–3 in axils, tepals cohering below, filaments perpendicular. Mar.–June. Rocky slopes in light shade of bushes, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia: Rooiberg, Richtersveld National Park, and Bitterfontein through to Bokkeveld Plateau, Roggeveld Escarpment, Matjiesfontein and SW Cape). **(gce)**

juniperoides Engl. (including **A. alopecurus** (Oberm.) Malcomber & Sebsebe) Erect, spineless, 'cats tail'-like shrublet, up to ± 0.8 m tall, roots with spindle-shaped tubers densely packed on rhizome or 10–120 mm from rhizome. Cladodes solitary, linear, closely overlapping, fringed at least near the tips. Flowers erect, solitary in axils, tepals cohering below, filaments perpendicular. Apr.–May. Rocky slopes and flats, SN, G, NS, NH, CCR (Namibia, Witpütz, lower Gariep Valley, Springbok towards Vredendal and Clanwilliam). **(gce)**

kraussianus (Kunth) J.F.Macbr. Sprawling, spineless shrublet, up to 1 m tall, rhizome covered by congested tubers, tapering into long roots distally. Cladodes solitary, lanceolate with a distinct midrib. Flowers nodding, solitary in axils, tepals cohering below, filaments perpendicular. Sept.–Oct. Sheltered S-facing slopes or flats, G, CCR (Richtersveld National Park, Clanwilliam to Stilbaai). **(gce)**

multituberosus R.A.Dyer Twining, spineless scrambler, up to 450 mm long, rhizome thin, covered with cylindrical, overlapping, pointed, woody tubers. Cladodes solitary, ovate to heart-shaped, many-veined. Flowers nodding, 1–3 in axils, tepals cohering below, filaments perpendicular. July–Sept. Rocky lower slopes and flats, in sand or clay, SN, G, NS, NH, KV, WM, TS, CCR (Namibia, Richtersveld National Park to Vanrhynsdorp, Bokkeveld Plateau and Roggeveld Escarpment, Karoopoort and Matjiesfontein). **(gce)**

undulatus (L.f.) Thunb. Erect, stiff, freely-branched, spineless shrublet, up to 400 mm tall, some roots large and spindle-shaped but slender towards tips. Cladodes solitary, lanceolate, ribbed,

often folded together near tip. Flowers nodding, 1–3 in axils, tepals cohering below, filaments perpendicular. July–Oct. Sandy slopes, often in shade, SN, G, NS, KV, WM, CCR (Klinghardt Mountains, Port Nolloth, Vanrhynsdorp, Calvinia to SW Cape). **(gce)**

*A.' Stems usually with spines; cladodes linear to needle-like, in fascicles (except **A. striatus**); tepals free and spreading from base; stamens spreading; filaments filiform*
B. Flowers 1–3(–many) on an apical disc

burchellii Baker Erect to sprawling spiny shrub, up to 1.5 m tall, spines recurved. Cladodes 2 or 3 in fascicles, terete. Flowers 1–3, shortly stalked, on an apical disc, tepals and filaments spreading. Feb.–May. Mainly in dry bush, TS, CCR (Matjiesfontein to Stellenbosch through to Queenstown).

capensis L. KATDORING Erect, dense, spiny shrub, up to 0.5 m tall, stems brush-like, spines in threes, the central longest. Cladodes mostly 5 in clusters, sublinear, hairy or rarely smooth. Flowers 1 or 2, sessile, on an apical disc, tepals and filaments spreading. Mainly Apr.–Aug. Rocky slopes, in sand or loam, SN, G, NS, NH, KV, WM, TS, CCR (widespread from Namibia to SW Cape through to E Cape).

striatus (L.f.) Thunb. Rigid, erect shrublet, up to 0.75 m tall, stems minutely striate, spines poorly developed, confined to basal parts. Cladodes solitary, linear, hard and striate. Flowers few to many on an apical disc, tepals and filaments spreading. Aug.–Jan. In sand, clay or gravel, SN, NH, WM, TS, CCR (southern Namibia, Kliprand, Loeriesfontein, Roggeveld Escarpment, Matjiesfontein, Prince Albert, Agulhas to Free State).

suaveolens Burch. Erect, spiny shrub, up to 1 m tall, stems sometimes brush-like with spine-tipped branches, spines along stems in twos or threes, straight. Cladodes 1–6 in fascicles, terete, often closely overlapping. Flowers 1–3, shortly stalked, on an apical disc, tepals and filaments spreading. Mainly Apr.–Sept. Sandy, stony or loamy flats and slopes, G, NH, WM, TS, CCR (widespread in southern Africa and scattered through to tropical E Africa).

B. Flowers few in the axils or several in axillary racemes

aethiopicus L. Spiny climber, up to 3 m long, stems pale, ribbed when young, spines short, hooked. Cladodes 4–6 in fascicles, terete, greyish green. Flowers in axillary racemes. Jan.–June. Mainly in dry shrubland, NS, NH, TS, CCR (Springbok to Cape Peninsula, Matjiesfontein, Prince Albert, Great Karoo to Transkei).

bayeri (Oberm.) Fellingham & N.L.Mey. Erect, bluish grey, very spiny shrub, up to ± 1 m tall with erect branches, stems and branches smooth, dark grey, spine-tipped. Cladodes 4–10 per fascicle, filiform. Flowers 2–4, clustered in axils; tepals ?spreading. ?Flowering time. In sand amongst granite rocks, NH (near Kamieskroon). **(ece)**

confertus K.Krause Erect, spiny shrub, up to 1 m tall, stems ribbed, papillate, spines tipped with orange-brown. Cladodes 2–5 in fascicles, linear, 10–15 mm long. Flowers 1–3 in axillary racemes, tepals and filaments spreading. ?Flowering time. ?Habitat, SN (southern Namibia: Schakalskuppe. Specimens given by Goldblatt & Manning (2000a) from the Little Karoo and southern Karoo are probably **A. krebsianus** (Kunth) Jessop). **(ece)**

exuvialis Burch. Erect or scrambling shrub, 0.5–2 m tall, stems zigzagged, epidermis white, membranous and peeling off and exposing dark grey stems, spines minute or absent. Cladodes in fascicles, filiform. Flowers 2–6 clustered in axils, tepals and filaments spreading. Oct.–Apr. Mainly dry areas, SN, NS, NH, KV, WM, CCR (Rosh Pinah, Springbok to Vanrhynsdorp, Loeriesfontein, and other dry parts of South Africa, Namibia and Botswana).

graniticus (Oberm.) Fellingham & N.L.Mey. Erect, very spiny, greyish shrub, ± 1 m tall, stems zigzagged, epidermis usually rough, spines closely spaced along stem, thick, straight and sharp. Cladodes numerous, in fascicles, filiform, greyish. Flowers 2–4, clustered in axils, tepals not known. ?Jan. Granite slopes and sandy flats, SN, NS, NH (Sperrgebiet, Port Nolloth, Springbok, Soebatsfontein, Bitterfontein). **(ece)**

krebsianus (Kunth) Jessop Like **A. confertus** but cladodes 150–200 mm long. Stony flats and slopes, TS, CCR (Moordenaars Karoo and Little Karoo through Prince Albert to E Cape).

lignosus Burm.f. Spiny shrublet, up to 0.8 m tall, stems spreading to erect, pale or grey, often conspicuously striate. Cladodes terete, firm, in stiff fascicles. Flowers 1–4, clustered in axils. Oct.–May. Rocky slopes and marshy flats, WM, CCR (Clanwilliam, Roggeveld Escarpment to Mossel Bay). **(gce)**

mollis (Oberm.) Fellingham & N.L.Mey. Soft, slender, climber, stems thin, shiny brown, spines poorly developed. Cladodes 10–20 in fascicles, filiform, curved, usually covering the branches. Flowers solitary, nodding, axillary, tepals in a loose tube below, upper half recurved, filaments spreading in upper half. Superficially resembling **A. fasciculatus**. Jan. On Dwyka tillite, WM, TS (Jagerskraal, Verlatekloof Pass). **(ece)**

mucronatus Jessop Erect, spiny shrub, up to 1 m tall, branches grey, with recurved spines, young branches pubescent. Cladodes grey, 1–4 in fascicles. Flowers ± 2 in axils, tepals and filaments spreading. Oct.–Dec. On shale flats, TS, CCR (southern Tanqua Karoo to Paarl, Prince Albert, Kimberley and Queenstown).

recurvispinus (Oberm.) Fellingham & N.L.Mey. Erect, spiny shrub, ± 1 m tall, stems and branches dark grey, with hooked spines along their length and straight spines apically. Cladodes 1–3 in fascicles, terete. Flowers paired in axils, tepals and filaments spreading. Nov. On flats, often near meerkat burrows, TS, CCR (Ladismith, Oudtshoorn, Prince Albert, Steytlerville, southern Karoo).

retrofractus L. Scrambling, spiny shrub, up to 3 m tall, stems and branches usually zigzagged, grey and ribbed when young, nodes widely spaced, usually swollen, epidermis not peeling, spines short, recurved. Cladodes in feathery fascicles, filiform. Flowers 2–7, clustered in axils, tepals and filaments spreading. Apr.–June. In bushes and around boulders, SN, NS, NH, WM, TS, CCR (Namibia, Rooiberg, Port Nolloth, Springbok to Bokkeveld Escarpment, Prince Albert to E Cape).

rubicundus P.J.Bergius Erect, spiny shrub, up to 1.5 m tall, stems dark reddish brown, glossy, with recurved spines. Cladodes ± 10 in fascicles, terete, closely overlapping. Flowers 1 or 2 in axils, tepals and filaments spreading. Mainly Mar.–June. Sandy and granite slopes, NH, WM, CCR (Kamieskroon, Bokkeveld Plateau and Roggeveld Escarpment, SW Cape to Uitenhage). **(gce)**

ASPHODELACEAE

by D.A. Snijman, **Aloe** & **Chortolirion** by R.R. Klopper & G.F. Smith

1. Tepals free or connate at the base, spreading or campanulate:
 2. Flowers long-lived, the perianth persistent; filaments smooth; seeds 1 or 2 per locule, shield-shaped . . . . . **Bulbinella**
 2.' Flowers lasting less than a day, the perianth dropping off early; filaments scabrid or bearded; seeds usually many, angled:
  3. Filaments retrorsely scabrid; flower white . . . . . **Trachyandra**
  3.' Filaments densely bearded; flowers yellow or orange . . . . . **Bulbine**
1.' Tepals fused below into a tube, erect or shortly spreading above:
 4. Inflorescence terminal, usually a simple dense spike; leaves basal, soft, immaculate, usually keeled. . . . . **Kniphofia**
 4.' Inflorescence apparently axillary, sometimes branched; leaves various but usually succulent, hard, thick, prickly, maculate or immaculate, in basal or apical rosettes or cauline, rounded on the back:
  5. Stamens as long as or longer than the perianth:
   6. Perianth tube distinctly curved near the middle and more-or-less inflated below . . . . . **Gasteria**
   6.' Perianth more-or-less straight, at most upturned near the tip but then not inflated below. . . . **Aloe**
  5.' Stamens shorter than the perianth and included in it:
   7. Underground parts bulbous . . . . . **Chortolirion**
   7.' Underground parts stoloniferous:
    8. Perianth distinctly bilabiate. . . . . **Haworthia**
    8.' Perianth regular or at most weakly bilabiate . . . . . **Astroloba**

ALOE ALOE, AALWYN ± 550 spp., Africa, Arabia, Madagascar, Socotra

A. Plants with a single erect, unbranched trunk, or trunk branching higher than ± 1 m above ground level
B. Plants with trunk generally branching > 1 m above ground level

dichotoma Masson GARAS, KOKERBOOM, QUIVER TREE Tree aloe, 3–9 m tall. Branches smooth, repeatedly forked, often forming densely rounded crowns; bark on trunk forms large golden-brown scales with razor-sharp edges. Leaves blue-green, narrow, oblong, ± 300 mm long, 50 mm wide at base, ranked in vertical rows in juvenile plants, gradually becoming spirally arranged

in terminal rosettes in older plants, margins with inconspicuous teeth. Flowers in short, erect, branched racemes, bright yellow, comparatively large and short, swollen in middle. June–Aug. Namaqualand broken veld, succulent karoo and various karroid grassland veld types, SN, G, NH, WM (Brandberg to along Gariep Valley to Pella and Upington, Kenhardt and Nieuwoudtville).

pillansii L.Guthrie GIANT QUIVER TREE, REUSE KOKERBOOM Tree aloe, 1–12 m tall. Branches robust, erect, never spreading, carrying large rosettes at terminal ends. Leaves grey-green, fairly large, up to 600 mm long, ± 100 mm wide at base, distinctly clasping branches, margins with small white teeth. Flowers in branched, recurved racemes arising from lowest leaves of rosettes, yellow, slightly swollen in middle. Oct. Stony hillsides, G (Richtersveld and adjacent parts of southern Namibia). **(ece)**

B.' Plants usually with a single, erect, unbranched stem

comosa Marloth & A.Berger CLANWILLIAM ALOE Single-stemmed, erect, 1–2 m tall. Leaves distinctly grey, ± 0.7 m long, gracefully recurved, margins pinkish, with small reddish brown teeth. Flowers in very long, erect, usually unbranched racemes, nodding, buds red, opening dull pink or white. Dec.–Jan. Dry rocky slopes, KV, TS, CCR (base of Kobee and Maskam Mountains to Katbakkies Pass in Swartruggens Mountains and Hex River Valley). **(gce)**

khamiesensis Pillans KAMIESBERGAALWYN, WILDE-AALWYN Usually single-stemmed with only one rosette, sometimes branched into two, erect, 0.5–2 m tall. Leaves long, relatively narrow, ± 400 mm long, 80 mm wide at base, usually with small white spots on upper and particularly lower surfaces, margins with reddish brown triangular teeth. Flowers in repeatedly branched, broadly triangular racemes, orange-red with greenish yellow tips. June–July. Rocky outcrops, G, NH, KB, WM (Steinkopf to Kamiesberg and Bokkeveld Mountains, N of Nieuwoudtville and Hantamsberg). **(ece)**

A.' Plants much branched, robust shrubs, stemless or stems short, if long then creeping or pendent
C. Plants robust, much-branched shrubs; branches erect to ascending

pearsonii Schönland PEARSON'S ALOE Large, much-branched shrub, 1–2 m tall. Stem erect, carrying leaves for most of their length. Leaves dull blue-green, often reddish especially during drought, almost triangular, neatly arranged in vertical rows, curved backwards. Flowers in branched, capitate panicles, red to orange-red or yellow. Dec.–Jan. Pockets of sandy soil amongst rocks, SN, G (Richtersveld and adjacent parts of southern Namibia). **(ece)**

ramosissima Pillans BROODBOS, MAIDEN'S QUIVER TREE, NOOIENS-KOKERBOOM Shrubby, profusely branched, 2–3 m tall. Stem smooth, with relatively small terminal rosettes. Leaves narrow, oblong, up to 200 mm long, 20 mm wide at base, margins with very small brownish teeth. Flowers in fairly short, branched racemes, yellow, comparatively large, swollen. June–Aug. Arid, rocky hills and mountains, SN, G (Aurus Mountains to Richtersveld). **(ece)**

C.' Plants stemless or stems short, if long, then creeping or pendent
D. Leaf margins smooth or with minute dentations; stem absent

buhrii Lavranos Acaulescent, up to 300 mm tall, forming dense clumps. Leaves yellow-green to glaucous green, erect, with distinct H-shaped spots, margins reddish, smooth to minutely toothed. Flowers in branched, sparse, capitate, rounded panicles, nodding, orange-red or rarely yellow. Aug.–Oct. Rocky slopes, WM (Bokkeveld Escarpment near Nieuwoudtville). **(ece)**

karasbergensis Pillans Acaulescent or short-stemmed, up to 0.3 m tall. Leaves blue-green, flat, broad, distinctly boat-shaped, with distinct longitudinal lines, margins white, spineless. Flowers in branched, capitate, rounded panicles, nodding, with slight basal swellings, pinkish red. Jan.–Mar. Rocky mountain slopes, SN, G, NH (Aurus Mountains and Kubus Mountains near Aus to Richtersveld and Springbok, also near Kenhardt, Prieska and Carnarvon).

komaggasensis Kritz. & Van Jaarsv. Acaulescent or short-stemmed, up to 0.75 m tall. Leaves greyish white, flat, broad, distinctly boat-shaped, with faint longitudinal lines, margins white to yellow, spineless. Flowers in branched, capitate, rounded panicles, nodding, with slight basal swellings, yellow or rarely orange. Dec.–Jan. Rocky mountain slopes, NH (mountains around Komaggas). **(ece)**

variegata L. BONTAALWYN, KANNIEDOOD, PARTRIDGE BREAST ALOE, VARIEGATED ALOE Acaulescent, 100–300 mm tall. Leaves green or brownish, mottled white, keeled, without spines or

prickles, distinctly 3-ranked, margins white, horny, with closely spaced small teeth. Flowers in usually branched, conical racemes, relatively large, nodding, dull pink to red, rarely yellow. July–Sept. Stony ground, usually in protection of small bushes, SN, G, NH, KV, WM, TS, CCR (widespread, southern Namibia, mountains near Aus to Great Karas, Steinkopf and Laingsburg, to Luckhof and Somerset East).

D.' Leaf margins toothed; stem, if present, sometimes creeping along ground or pendent

E. Plants with creeping or pendent stems

arenicola Reynolds BONT-OT'KORRIE, SAND ALOE Dense, medium-sized shrub, 150–400 mm tall. Stems numerous, creeping, leafy portions always erect. Leaves blue-green, fairly narrow, up to 200 mm long, copiously white-spotted on both surfaces, upturned, quite densely arranged in terminal rosettes, margins with whitish edges and very small teeth. Flowers in tightly packed, rarely branched, capitate panicles, pale red. (In north) July–Dec. (in south). Coastal sandveld, NS, CCR (Gariep Mouth to Hondeklipbaai and Lambert's Bay). **(gce)**

meyeri Van Jaarsv. Pendulous, with stem up to 1 m long, branching from base or forming offshoots along length of stem. Leaves blue-green, up to 300 mm long, erectly spreading, dry leaves soon dropping, margins with small, white teeth. Flowers in unbranched, capitate, upcurved panicles, reddish orange with green tips. Dec.–Feb. On vertical cliff faces, G (Richtersveld: Rosyntjieberg). **(ece)**

mitriformis Mill. (= *A. perfoliata* sensu auct.) KRANSAALWYN, MITRE ALOE Stem long, creeping, with side-shoots along its length, up to 2 m long, horizontal with terminal leaf-bearing portion erect. Leaves blue-green, erectly spreading to incurved, margins with small, white teeth that turn dark brown to yellow on old leaves. Flowers in branched, conical to capitate, densely flowered panicles, dull to bright red. (Aug.–)Dec.–Feb. Rocky flats, slopes and cliffs, NS, WM, TS, CCR (Spoegrivier, Bokkeveld Mountains near Nieuwoudtville to Steytlerville). **(gce)**

pavelkae Van Jaarsv., Swanepoel, A.E.van Wyk & Lavranos Pendulous, with stem up to 1.5 m long, branching from base. Leaves dark green, becoming reddish on lower surface in dry conditions, 180–280 mm long, spreading or incurved in drought, dry leaves persistent, margins with small, white teeth. Flowers in unbranched, capitate, upcurved panicles, reddish orange with yellow tips. May–July. On vertical cliff faces, G (southern Namibia: Sonberg and Kuamsibberg). **(ece)**

E.' Plants stemless or stem short and erect, rarely horizontal

claviflora Burch. AANTEELAALWYN, KANONAALWYN, KRAALAALWYN Acaulescent, forming dense groups, rosettes not erect, facing outwards, 150–250 mm tall. Leaves grey-green, up to 200 mm long, few spines along tip of keel, margins with sharp brown spines. Flowers in almost horizontal, usually unbranched, dense, cylindrical racemes, club-shaped, bright red, yellowing with age, anthers well exerted. Aug.–Sept. Usually on calcrete, margins of Kalahari thornveld, G, WM, TS (widespread, Warmbad and Klein Karas, Kuruman, along Gariep Valley to Pella and Upington, to Beaufort West and Somerset East).

erinacea D.S.Hardy Acaulescent, forming small compact clumps, 200–300 mm tall. Leaves grey-green to grey-blue, upper surface with black prickles, lower surface obscurely keeled towards tip with a row of black prickles, margins with hard, black teeth, leaf tip with a pungent spine. Flowers not often seen, crimson in bud, turning yellowish orange with age, mouth slightly upturned. May–Aug. Pockets of sandy soil in rock outcrops, SN, G (SW Namibia). **(ece)**

falcata Baker Acaulescent or short-stemmed, forming dense groups, rosettes facing outwards, 200–400 mm tall. Leaves green to greyish green, incurved, with rough, sandpaper-like surfaces, margins with pale to dark brown teeth. Flowers in branched, erect, conical racemes, nodding, dull red, rarely yellow, anthers exserted. Dec. Sandy flats, G, NH, KV, WM, TS, CCR (Richtersveld to Loeriesfontein, W of Calvinia, and Klawer). **(gce)**

framesii L.Bolus BITTERAALWYN Acaulescent, forming dense groups. Leaves long, relatively narrow, ± 300 mm long, 70 mm wide at base, usually copiously white-spotted on both surfaces, margins with reddish brown triangular teeth. Flowers in unbranched or few-branched, conical racemes, nodding, usually orange-red with greenish yellow tips. June–July. Sandy coastal flats, NS, CCR (Port Nolloth to Saldanha). **(gce)**

gariepensis Pillans ORANGE RIVER ALOE Short-stemmed, usually solitary, up to 1 m tall. Leaves with numerous longitudinal lines, copiously spotted on both surfaces in young plants, some

spots on upper surface in mature plants, unarmed, margins brown, horn-like, with small, sharp, triangular teeth. Flowers in unbranched, narrow, oblong racemes, yellow to greenish yellow, buds sometimes red, hidden by long bracts. (In west) July–Sept. (in east). Steep rocky slopes, SN, G (Warmbad and along Gariep Valley from Grootderm to Keimoes).

glauca Mill. BLOUAALWYN Acaulescent or short-stemmed, 300–600 mm tall. Leaves distinctly blue-grey, up to 400 mm long, without spots, with faint longitudinal lines, lower surfaces often with small, scattered spines towards tips, margins with contrasting reddish brown teeth. Flowers in stout, unbranched, conical racemes, nodding, pink to pale orange, buds covered by large bracts. Aug.–Oct. Clay soils in mountain renosterveld, also in karoo vegetation, G, NH, WM, TS, CCR (Steinkopf to Laingsburg and Swellendam). **(gce)**

knersvlakensis S.J.Marais Short-stemmed, solitary or usually with rosettes densely clustered around main stem, up to ± 1.5 m tall. Leaves dull green to reddish brown, 300–400 × 50–80 mm, white spotted and lineate on both surfaces, spots more copious above, without spines or prickles, margins horn-like, with sharp, reddish brown, triangular teeth. Flowers in branched, long, conical racemes, nodding, yellow, with greenish tips, buds orange-red. Mar.–Apr. Quartzitic sandstone ridges, KV (between Kliprand, Nuwerus and Vanrhynsdorp). **(ece)**

krapohliana Marloth KRAPOHL'S ALOE Acaulescent, rosettes usually single or in dense groups of up to 15, up to 200 mm across. Leaves grey-green, with greyish brown transverse bands, narrow, oblong, up to 200 mm long, 60 mm wide at base, without spots or spines, margins with minute white teeth. Flowers in unbranched, sometimes two-branched, dense, oblong, remarkably large racemes, dull red with greenish yellow tips. June–Aug. Sandy flats and rocky slopes, G, NS, NH, KV, WM (lower Gariep Valley from Grootderm to Pella and to Vanrhynsdorp and Calvinia).

longistyla Baker RAMENAS Acaulescent, rosettes single or occasionally 2 or 3, 150–250 mm tall. Leaves greyish green, densely crowded, distinctly waxy, ± 150 mm long, 30 mm wide at base, both surfaces and margins with firm white spines. Flowers in unbranched, dense, broadly conical racemes, exceptionally large relative to plant, up to 55 mm long, pale salmon-pink to coral-red, mouth upturned, unusually long stamens and style exserted by > 20 mm. July–Aug. Flat stony or sandy areas, or on gentle slopes, usually in shade of small bushes, TS, CCR (Calitzdorp to Grahamstown and Middelburg).

melanacantha A.Berger GOREE, KLEIN BERGAALWYN Short-stemmed, rosettes single, dense, ball-shaped, more often in groups of 10 or more, 200–300 mm tall. Leaves brownish green, narrow, triangular, ± 200 mm long, 40 mm wide at base, incurved, surface rough, keel and margins with large, black, thorn-like teeth up to 10 mm long. Flowers in usually unbranched, oblong racemes, bright red, yellowing with age. May–June. Sandy and rocky hillsides, G, NH, KV (southern Namibian Escarpment to Bitterfontein). **(ece)**

microstigma Salm-Dyck Acaulescent or short-stemmed, 0.5–2 m tall, rosettes usually solitary, sometimes in small groups. Leaves reddish green, long, relatively narrow, ± 300 mm long, 60 mm wide at base, both surfaces copiously white-spotted, without spines or prickles, margins with sharp, reddish brown, triangular teeth. Flowers in unbranched, conical racemes, nodding, buds dull red, yellowing with age, sometimes uniformly yellow or red. May–July. Dry karroid slopes, SN, WM, TS, CCR (Gubub Mountains near Aus, western Tanqua Karoo, Gannaga Pass, Ceres and Worcester, to Cradock and Great Fish River Valley).

pachygaster Dinter Acaulescent, rosettes erect, in small dense groups, 200–350 mm tall. Leaves greyish to yellowish green, lower surface with median row of ± 6 black spines at tip, margins with dark brown to black teeth. Flowers in unbranched, dense, usually horizontal racemes, coral-red, mouth slightly upturned. Sept.–Oct. Dolomitic outcrops on edge of winter rainfall desert, SN (SW Namibia).

ASTROLOBA (= *POELLNITZIA*) 8 spp., W Cape and E Cape, Karoo

bullulata (Jacq.) Uitewaal Caulescent succulent, up to 300 mm tall. Leaves dark green, pungent, usually with fairly prominent tubercles, scattered or in rows. Flowers in lax racemes, erect, greenish brown with yellow tepals. Nov.–June. Karroid scrub, TS, CCR (Verlatekloof Pass to Ceres Karoo and Laingsburg). **(gce)**

herrei Uitewaal Caulescent succulent, up to 200 mm tall. Leaves light green, not pungent, smooth and finely striate. Flowers in lax racemes, erect, white with yellow tepals, midribs pale green, outer tepals sometimes slightly inflated below. June–Oct. Karroid flats and slopes, TS, CCR (Prince Albert to Uniondale). **(gce)**

sp. A [= sp. 1 in Manning & Goldblatt (2000a)] Caulescent succulent, up to 150 mm tall. Leaves light green with dark veins, pungent, with inconspicuous whitish tubercles. Flowers in lax racemes, erect, greenish white with bright to creamy yellow tepals. Nov.–May. Shaley ridges, TS, CCR (Laingsburg and Prince Albert). **(gce)**

BULBINE BULBINE, KOPIEVA ± 50 spp., southern Africa to tropical Africa and Australia

A. Rootstock a compact rhizome with slender, wiry roots

abyssinica A.Rich. (= *Bulbine asphodeloides* (L.) Willd. in part) Geophyte, 400–600 mm tall, forming large, compact, rhizomatous tufts. Leaves linear, straight, basal sheaths yellowish and papery. Flowers in a dense, erect raceme, yellow. Capsule globose, 8–10 mm diam., on stout, spreading pedicels. Mainly Aug.–Nov. Flats and slopes, SN, NS, WM, TS, CCR (Sperrgebiet, Port Nolloth, Bushmanland, Roggeveld Escarpment, southern Tanqua Karoo, Worcester to tropical Africa).

caput-medusae G.Will. (possibly not distinct from **B. namaensis**) Geophyte, 100–300 mm tall, forming dense, rhizomatous clumps. Leaves spreading, narrow, shallowly channelled, tightly curled, basal sheaths white and papery. Flowers in a short raceme, light canary yellow, raceme spreading horizontally in fruit. Capsule globose-oblong, ± 12 mm long. May–July. Wind swept sand plains, SN (Sperrgebiet). **(ece)**

frutescens (L.) Willd. (including **B. triebneri** Dinter) RANKKOPIEVA Shrublet, 200–600 mm tall. Leaves subterete, surrounded below by hard, grey sheaths. Flowers in a dense, long, raceme, yellow, orange or white. Capsules small, subglobose, ± 4 mm diam., spreading to upcurved. Sept.–Apr. In shale or sandy soils, often near rocks, SN, G, NS, NH, TS, CCR (Sperrgebiet, Richtersveld National Park, Port Nolloth, Springbok, Wallekraal, Matjiesfontein, and dry areas elsewhere in southern Africa).

namaensis Schinz Geophyte, ± 300 mm tall, forming dense rhizomatous clusters. Leaves narrow, erect, curled towards apex, clasped below by loose, pale lemon, membranous sheaths. Flowers in a compact raceme, yellow. Capsules round, ± 10 mm diam., on down-curved pedicels. Sept.–Apr. In deep sand, SN, G (Aus, Buchuberg, Richtersveld National Park, Bushmanland).

ophiophylla G.Will. Geophyte, ± 200 mm tall, solitary or rarely clumped, rhizome compact, roots orange. Leaves succulent, spreading, curled towards apices, surrounded below by many, hard, grey sheaths. Flowers in a sparse raceme with a curved scape, peach-coloured. Capsule globose, ± 5 mm diam., outspread. May–July. Sandy places, on southwestern and eastern sides of rock outcrops, SN, NS (N of Oranjemund to Port Nolloth). **(ece)**

A.' Rootstock a tuber with swollen tapering roots or stolons
B. Large plants with inflorescences > 300 mm long, leaves unmarked and scarcely clasping below

alooides (L.) Willd. Geophyte, 300–600 mm tall, often clumped, tuber large, yellow, with a fibrous neck, roots spreading laterally. Leaves 6–12, emerging at flowering, suberect, lanceolate, scarcely clasping below, margins often ciliate. Flowers clustered in a long, crowded raceme, yellow. Capsule, ellipsoidal, ± 5 mm long. Mar.–May. Rocky or sandy slopes and flats, NS, NH, KB, WM, CCR (Springbok to Nuwerus, Nieuwoudtville, Roggeveld Escarpment to Darling and Worcester). **(gce)**

brunsvigaefolia Baker Geophyte, 300–700 mm tall, tuber with a short, dense, fibrous collar, roots spreading laterally. Leaves 5–8, spreading, flat, broadly lanceolate, > 30 mm wide, pale green, faintly many-veined, scarcely clasping below, margin densely fringed. Flowers in 1 or 2, long, dense racemes, yellow. Capsule oblong-ellipsoidal, ± 10 mm long. Aug. In sand or clay between rocks, NH (Kamieskroon to Nuwerus) **(ece)**

capensis Baijnath & G.Will. Geophyte, 390–550 mm tall, tubers large, covered by several, persistent, fleshy semi-lunar or claw-like outer scales, topped with a few long, soft fibres. Leaves 4–8, rosulate, ± erect, narrowly lanceolate, scarcely clasping below. Flowers in a long, many-flowered raceme, inner tepals scalloped. Capsule ellipsoidal, ± 9 mm long. Sept.–Oct. In sandy loam on flats and hills, KV, TS, CCR (from near Vanrhynsdorp through to southern Tanqua Karoo and Klein Roggeveld). **(gce)**

B.' Moderate-sized to dwarf plants with inflorescences < 300 mm long (if longer then leaves sheathing at base to form a long neck)
C. Leaves narrowly linear, not clasping the base of the scape

flexuosa Schltr. Geophyte, 100–200 mm tall, tuber solitary or forming clumps. Leaves 1–3, often absent or emerging at flowering, filiform, basal sheaths loose, pale and papery. Flowers in 1 or 2 wiry-based, flexuose racemes, yellow, scape and pedicels persisting and remaining green long after fruiting. Capsules obovoid, ± 5 mm long. Apr. Sand on rock sheets, NH, KV, TS, CCR (Wallekraal, Nuwerus, Pakhuis Mountains to Doringrivier). **(gce)**

torta N.E.Br. (including **B. circinata** Poelln.) Geophyte, 80–250 mm tall, tuber pinkish, often with spreading roots. Leaves 4–20, linear, curled or rarely ± straight, smooth or rarely shortly hairy, surrounded by several, loose, papery sheaths. Flowers in a short, lax or dense raceme, yellow. Capsules globose, ± 4 mm diam. July–Sept. Sand or clay on rock outcrops, NH, WM, TS, CCR (Kamieskroon, Nieuwoudtville to Cederberg Mountains, Hantamsberg to Klein Roggeveld). **(gce)**

C.' Leaves variously shaped, if narrowly linear then sheathing the base of the scape
*D. Leaf bases sheathing and ± equal in length, forming a prominent, solid neck 30 mm or more long (see also **B. sedifolia**)*

filifolia Baker (including **B. foleyi** E.Phillips) Geophyte, 80–400 mm tall, tuber basally flattened with laterally spreading roots. Leaves 5 or 6, usually withered at flowering, linear, ± erect, curving when withering, clasped below into a (40–)75–150 mm long neck of soft, matted fibres. Flowers in 1–3, long, dense, racemes, yellow. Capsule globose, ovoid, ± 5 mm long. Oct.–Feb. Mainly shale flats and slopes, WM, CCR (Nieuwoudtville, Roggeveld Escarpment and Clanwilliam to Albertinia to northern provinces).

melanovaginata G.Will. Like **B. quartzicola** but 130–250 mm tall, and tuber large. Leaves 6–8, withered at flowering, erect, slender, curling in upper third, clasping below into a 40–70 mm long, rough, dark neck. Flowers in 1–3, wiry racemes, greenish yellow to yellow. Capsule ovoid, ± 3 mm long. Oct.–Nov. Well-drained soil, often over rock pavements, KV, WM, CCR (Vredendal and Nieuwoudtville, Olifants River Valley to near Darling). **(gce)**

quartzicola G.Will. (including **B. torsiva** G.Will.) Geophyte, 60–180 mm tall, tuber rounded with laterally, extended roots. Leaves 2–6, erect, withering and forming tight spirals or curling back from apex at flowering, succulent, tightly clasping below to form a (30–)40–50 mm long, smooth, solid neck of white to dark, papery sheaths. Flowers in an erect, wiry raceme, light yellow. Capsule not known. Sept.–Nov. On pebbly, quartzite pavements and ledges, G, NH, KV (southern Richtersveld to Bulletrap Pass and central Knersvlakte). **(ece)**

D.' Leaf bases sheathing for < 20 mm or scarcely so, if for > 30mm, then as a series of overlapping, unequally long sheaths
*E. Leaves < 10, not in a compact rosette, green or dull greyish green, unmarked (except in **B. bruynsii**) and hairless (except in **B. navicularifolia**)*

bruynsii S.A.Hammer Like **B. diphylla** with respect to unequal, paired, erect, succulent leaves with bases clasping below into a narrow, short, stalk-like neck and proliferating from secondary tubers, but leaves transversally ridged (like those of **B. francescae**), transparent and transversally banded in red and bright green. July. Quartz gravel, NH (W of Bitterfontein and towards Groenrivier). **(ece)**

dactylopsoides G.Will. Geophyte, 110–300 mm tall, proliferating from secondary tubers near root tips. Leaves 2–4, erect, succulent, finger-like, light green to pinkish maroon, basal sheath membranous. Flowers in a sparse raceme, yellow. Capsule ellipsoidal, ± 10 mm long. Aug.–Sept. S-facing slopes of low hills amongst quartz pebbles, KV (SW Knersvlakte). **(ece)**

diphylla Schltr. ex Poelln. Geophyte, 100–150 mm tall, proliferating from secondary tubers on lateral roots. Leaves 2 or 3, unequal, ovoid, highly succulent, greyish green or reddish when old, clasping below into a slender neck reaching up to 20 mm at flowering. Flowers in a lax raceme, yellow. Capsule ellipsoidal, ± 5 mm long. May–July. On quartzite patches and granite outcrops, KV, CCR (Bitterfontein to Vredendal and Pakhuis Mountains). **(gce)**

dissimilis G.Will. (including **B. erumpens** S.A.Hammer, **B. lavrani** G.Will. & Baijnath) Geophyte, up to 240 mm tall, tuber ± carrot-like, dark and tapering, occasionally pencil-like and widely spreading. Leaves 1–3, emerging at flowering or shortly after, erect, rigid and turgid, greyish green or dark, shiny green, tips acute, with apical third often curling as leaf withers, basal sheaths 3–5, pale and papery. Flowers in a slender raceme, golden-yellow to bright orange. Capsule ovoid to spheroidal, ± 3 mm long. Mar.–May. Wedged in pinkish shale or quartz in loamy soils, G, NS, NH (Richtersveld: near Klipbok, Vyftien-myl-se-Berg, and Bulletrap Pass to near Wallekraal). **(ece)**

fragilis G.Will. Geophyte, 80–150 mm tall, tuber flattened. Leaves 2 or 3, erect or loosely flexuose if wilted, narrowly lanceolate, fragile, pale glistening green, inner leaf shortest, surrounded below by a membranous sheath. Flowers in a sparse raceme, cadmium yellow. Capsule ellipsoidal, ± 4 mm long. July–Sept. In pebbly, loose soil shaded by overhanging rocks, G, NH (N of Steinkopf and near Nuwerus). **(ece)**

francescae G.Will. & Baijnath Geophyte, 40–110 mm tall, tuber broad based. Leaves 2, ± erect, succulent, lanceolate, unequal, narrow and partially clasping below, translucent, pale green and concolorous; larger leaf with ± 20 transverse constrictions along blade; smaller leaf smooth, surrounded below by a membranous sheath. Flowers in a sparse raceme, bright yellow. Capsule ellipsoidal, ± 5 mm long. July. In protected quartz crevices, SN (Schakalsberg). **(ece)**

longifolia Schinz Like **B. praemorsa** but more delicate, 150–200 mm tall, tuber small. Leaves 1–4, slightly succulent, slender and tapering, sheathing below for up to 40 mm. Flowers in 1 or 2 racemes with curved scape, yellow. Capsule ellipsoidal, ± 5 mm long. Aug.–Sept. S-facing rocky slopes, SN, G, NH, KB, TS, CCR (southern Namibia, Kamiesberg Mountains, Nuwerus, Cederberg Mountains, Karoopoort, Klein Roggeveld, Swartberg Mountains and southern Karoo). **(gce)**

mesembryanthoides Haw. WATERGLAS, WATERKANNETJIES Dwarf geophyte, 80–200 mm tall, tuber small. Leaves 2 or 3, one sometimes inconspicuous, short, erect, succulent, apex, broad, truncate and translucent. Flowers few, in a lax raceme, pale yellow. Capsule ovoid, ± 4 mm long. Aug.–Nov. Rocky slopes and flats, clay or sandstone, G, NS, NH, TS, CCR (southern Richtersveld, Kleinsee to near Klawer, Worcester to Steytlerville). **(gce)**

navicularifolia G.Will. Like **B. succulenta** but 250–500 mm tall. Leaves 3, extremely succulent, boat-shaped, clasping in lower half and sheathing towards base, margin fringed below, surrounded basally by clusters of firm, straight bristles. Flowers in a dense raceme, light yellow. Capsule ovoid, ± 5 mm long. Aug. On gentle slopes, in stony clay, TS (S of Nieuwoudtville to Botterkloof Pass). **(ece)**

pendens G.Will. & Baijnath Geophyte, 40–180 mm tall, tuber small, solitary, with several swollen roots. Leaves 1 or 2, succulent, recurved, soon drying off from apex, clasped below by a membranous sheath. Flowers in 1 or 2 lax racemes, bright yellow. Capsule ovoid, ± 3 mm diam. Sept.–Oct. In deeply shaded cracks on quartzite cliffs, G (Richtersveld National Park). **(ece)**

praemorsa (Jacq.) Roem. & Schult. Geophyte, 400–600 mm tall, tuber small or large and ± flattened below, solitary, with spreading roots. Leaves (2–)4–9, ± opposite, fleshy, unequal, increasing in length upwards, narrowly channelled, loosely sheathing below to form a pseudostem up to ± 40 mm long, often surrounded below by a short, softly fibrous neck. Flowers in 1 or 2 dense racemes, yellow to salmon. Capsule ellipsoidal, ± 10 mm long. June–Sept. On sand plains or granite and sandstone slopes, SN, G, NS, NH, KV, WM, TS, CCR (southern Namibia to Nieuwoudtville, Karoopoort, Cape Peninsula and to Riversdale). **(gce)**

rhopalophylla Dinter Like **B. succulenta** but 30–70 mm tall and tuber broad with several, lateral, swollen roots, sometimes clumped. Leaves 4 or 5, ± curved, ± club-shaped, succulent, pale green to greyish green, apex shortly pointed, base surrounded by 2 or 3 membranous sheaths. Flowers yellowish brown. Capsule ovoid, ± 7 mm long. June–Sept. On slopes in micaceous schist and on flats in quartz gravel, SN, G (Sperrgebiet and Gariep Valley). **(ece)**

stolonifera Baijnath & G.Will. Like **B. praemorsa** but proliferating by offshoots from small tubers that develop on long, spreading stolons and having a 40–70 mm long pseudostem of unequally long, succulent leaf bases. June–Aug. In sandy soil amongst rock outcrops, NH (Ratelpoort near Springbok and near Loeriesfontein). **(ece)**

succulenta Compton (including **B. hantamensis** Poelln.) Geophyte, 100–200 mm tall, tuber woody and dark, tapering downwards to several, hard, basal roots, topped with a dense collar of short, stiff fibres. Leaves 3–10, short, fleshy and finger-like, slightly curved, dark green. Flowers in 1–3, lax racemes, yellow. Capsule ovoid, ± 10 mm long. July–Sept. TS, CCR (base of Bloukranz Pass to Karoopoort and Witteberg Mountains). **(gce)**

vitrea G.Will. & Baijnath Like **B. bruynsii** and **B. francescae** but smaller, ± 50 mm tall, tubers stubby, solitary or usually in clumps and forming large mats. Leaves usually 2 per tuber, ± erect, delicate, succulent, narrowly cylindrical, translucent, pale green, evenly paired except for one leaf constricted transversely 3–5 times. Flowers in a lax, wiry raceme, dark yellow. Capsule globose, ± 3 mm diam. Oct.–Nov. In quartzite rock crevices on E-facing cliffs, G (Richtersveld: Black Face Mountain in the NE and Oograbies Mountains in the SW). **(ece)**

*E.' Leaves usually > 10, in a dense basal tuft or compact rosette (except occasionally in **B. sedifolia**), usually shiny grey, silvery or patterned, often sparsely ciliate*

alveolata S.A.Hammer Like **B. haworthioides** but smaller, more delicate and becoming clustered. Leaves collapsing at flowering, crêpe-like in texture, with prominent, white, longitudinal and transverse veins and numerous, small, translucent patches, margin smooth. Flowers in ± 5 racemes, yellow. Capsule globose. ?Oct. In shale crevices, KV (eastern Knersvlakte, on lower slopes of Bokkeveld Mountains). **(ece)**

fallax Poelln. Geophyte, 100–270 mm tall, tuber oblong with hard, basal roots. Leaves 12–20, recurved and pressed to the ground, up to 12 mm wide, upper surface flat, edges boldly patterned with several broad, rectangular windows bordered in pale green, withering and turning orange at flowering, margin finely ciliate. Flowers yellowish. Capsule oblong-ellipsoidal, ± 10 mm long. Aug.–Sept. In hard clayey soil near quartz pebble patches, NH, KV (NE of Garies to eastern Knersvlakte). **(ece)**

haworthioides B.Nord. Dwarf geophyte, 90–150 mm tall, tuber solitary, broadly oblong or rounded. Leaves ± 14, in a tight rosette pressed to the ground, boat-shaped, succulent, ± 5 mm wide, upper surface ± flat, grey-green with prominent white longitudinal and transverse veins interspersed with large pellucid patches, midvein often sparsely fringed, margin densely fringed, withering at flowering. Flowers in a wiry raceme, dull yellow. Capsule not known. Oct.–Nov. Quartz gravel on hillocks, KV (SW Knersvlakte near Lutzville). **(ece)**

lolita S.A.Hammer Like **B. mesembryanthoides** but leaves 12–16, in a close spiral, up to 3 mm long, 4 mm diam., depressed globose, pale bluish green, chequered, tapering abruptly to a soft point. Flowers 12–20, yellow, on a tortuous, tough, reddish brown scape up to 120 mm long. Capsule ± ovoid, ± 2 mm long, wrinkled. Flowering in wild unknown. Decomposed gneiss, KV (S of Nuwerus below Tepelberg). **(ece)**

louwii L.I.Hall Small geophyte, 100–130 mm tall, tuber solitary, round. Leaves 25–30, in a tight, ± spreading rosette, succulent, spathulate, upper surface ± concave, partially fenestrate, without white veining, margin coarsely fringed, basal sheath membranous. Flowers in a short dense raceme, pale yellow. Capsule 4 mm long. July–Aug. In open patches amongst quartz pebbles, NS, NH, KV (near Bitterfontein and Platbakkies to southern Knersvlakte). **(ece)**

margarethae L.I.Hall Like **B. haworthioides** with respect to tight rosette and ± reticulate markings on leaves, but tubers globose and densely clustered. Leaves present at flowering, pressed to the ground or occasionally spreading, 5 mm wide, bright green or greyish to reddish green, upper surface convex, margin and midvein smooth or occasionally ciliate. Capsule ovoid, 4 mm long. Aug.–Sept. In limestone rock crevices, KV (central Knersvlakte). **(ece)**

sedifolia Schltr. ex Poelln. (including **B. hallii** G.Will., **B. lamprophylla** G.Will., **B. truncata** G.Will.) Geophyte, 70–300 mm tall, tuber small with laterally spreading roots. Leaves 4–20, arising in a tuft from a short bristly neck or a membranous sheath mostly up to 20 mm or rarely up to 40 mm long, succulent, pale green with a grey metallic sheen, covered with microscopic, elongated, whitish micropapillae, curving inwards from an acute tip when withering, margin usually with a few, widely spaced, blunt hairs below. Flowers in a wiry raceme with a curved scape, yellow. Capsule ellipsoidal, ± 3 mm long. July–Sept. Among quartz pebbles and in sand pockets on granite boulders, NH, KV (Steinkopf to Nuwerus). **(ece)**

vittatifolia G.Will. Geophyte, 50–80 mm tall, tuber large with several, tapering roots, leaves 15–20, falcate-secund, subcylindrical, upper surface flattened, succulent, longitudinally lined with white, nonciliate, new leaves surrounded at base by a pale, membranous sheath amongst soft, ± dense fibres. Flowers in a raceme with a curved scape, greenish yellow, sweetly scented. Capsule spherical, ± 7 mm diam. Mar.–May. On sand plains between granite boulders, NH, KB (Steinkopf and bordering on western Bushmanland to Kamiesberg Mountains). **(ece)**

wiesei L.I.Hall Dwarf geophyte, ± 100 mm tall, tuber solitary, with a flat base and topped with a collar of short, straight fibrous bristles. Leaves 20 or more, in a spreading rosette, succulent,

pale whitish green with a silvery sheen, upper surface ± concave, margins smooth, apex pointed. Flowers in a lax raceme, pale yellow. Capsule ovoid, 4 mm long. Aug.–Sept. In loam amongst quartz pebbles or rocks, NS, NH, KV (from near Kotzesrus and Platbakkies to southern Knersvlakte). **(ece)**

[**Excluded species: B. urgineoides** Baker, probably a species of **Trachyandra**.]

BULBINELLA BULBINELLA, KATSTERT ± 23 spp., winter rainfall region of southern Africa, New Zealand

*A. Leaves all subequal; plants mostly < 0.6 m tall (see also **B. caudafelis**)*
B. Leaves emerging at flowering

divaginata P.L.Perry Rhizomatous geophyte, up to 450 mm tall with a fibrous neck surrounding a long, membranous sheath. Leaves 4–10, filiform, smooth, emerging at flowering. Flowers in a narrowly cylindrical raceme, yellow. Mar.–June. In clay or sandy loam on flats or rocky slopes, NS, NH, WM, CCR (Bulletrap Pass to Bokkeveld Escarpment through to SW Cape). **(gce)**

nana P.L.Perry Delicate, rhizomatous geophyte, up to 250 mm tall with a short, sparsely fibrous neck. Leaves 10–20, fine and filiform, smooth, emerging at flowering. Flowers in a broadly cylindrical raceme, yellow. Apr.–June. S-facing rocky slopes, NH (Ratelpoort to Steinkopf). **(ece)**

B.' Leaves fully developed or withering at flowering

ciliolata Kunth Rhizomatous geophyte, up to 0.6 m tall with a coarse, loose, straight, bristly neck. Leaves 12–40, filiform, margin irregularly and shortly toothed. Flowers in a dense narrowly conical to subcylindrical raceme, white flushed delicate pink. July–Oct. Seasonally damp sandy loam between granite hills, NH, KB (Okiep to Springbok and Kamiesberg Mountains). **(ece)**

elegans Schltr. ex P.L.Perry Rhizomatous geophyte, up to 0.6 m tall, fibrous neck compact and netted. Leaves 3–25, linear, margins finely and irregularly toothed. Flowers in a compact, cylindrical raceme, lemon yellow (on Bokkeveld Mountains) or white with a pink tinge. Mainly Aug.–Sept. Various soils, WM, TS, CCR (Bokkeveld Mountains and Roggeveld Escarpment to Witteberg Mountains). **(gce)**

gracilis Kunth Rhizomatous geophyte, up to 300 mm tall, basal neck short, of 1 or 2 membranous sheaths without fibres. Leaves 4–8, linear, succulent, smooth. Flowers in a broadly conical raceme, yellow. June–Aug. Seasonally damp plains or S-facing slopes, G, NS, NH, KV (Cornellsberg, Springbok, Brand-se-Baai and Vanrhynsdorp). **(ece)**

triquetra (L.f.) Kunth Rhizomatous geophyte, up to 350 mm tall, basal sheaths softly fibrous. Leaves 10–40, filiform, 3-angled across, margins finely toothed. Flowers in a subcorymbose to narrowly conical raceme, yellow. Mainly Sept.–Nov. Damp sand and clay, G, KB, WM, TS, CCR (Eksteenfontein, Kamiesberg and Bokkeveld Mountains, Roggeveld Escarpment, W Cape to Bredasdorp). **(gce)**

A.' Leaves unequal, the inner smaller than the outer; plants usually > 0.6 m tall

caudafelis (L.f.) T.Durand & Schinz Rhizomatous geophyte, up to 0.8 m tall, base densely fibrous, roots white. Leaves 5–11, linear, channelled, up to 9 mm wide, margins sometimes finely toothed. Flowers in a narrowly conical raceme, white with pink keels and buds. Aug.–Dec. Sandstone, granite or clay flats or slopes, NH, KV, WM, TS, CCR (Steinkopf, Vanrhynsdorp, Roggeveld Escarpment, W Cape, Laingsburg to Avontuur). **(gce)**

graminifolia P.L.Perry Rhizomatous geophyte, up to 0.65 m tall, base softly fibrous, roots white. Leaves 4–9, linear, up to 6 mm wide, channelled, margins minutely toothed. Flowers in a narrowly cylindrical raceme, white with faint salmon-coloured buds. July–Aug. Clay or loam on S-facing slopes, NH, CCR (Kamieskroon, Bokkeveld Mountains to Citrusdal). **(gce)**

latifolia Kunth (including **B. elata** P.L.Perry in part) Like **B. nutans** but leaves broader, up to 65 mm wide, spreading to recurved, raceme narrower, up to 45 mm wide. Flowers deep to pale yellow, orange (on dolerite) or cream (on Matsikamma Plateau). Aug.–Oct. Seasonally damp soils

on sandstone, granite, or dolerite, NH, KB, WM, CCR (Okiep, Spektakel Pass, Kamieskroon, Bokkeveld Escarpment, Cederberg Mountains and Roggeveld Escarpment). **(gce)**

nutans (Thunb.) T.Durand & Schinz Rhizomatous geophyte, up to 1 m tall, neck fibrous, roots orange-yellow. Leaves 5–13, slender and tapering, erect to spreading, up to 25 mm wide, channelled. Flowers in a conical raceme to 55 mm wide, yellow (from Loeriesfontein to Roggeveld Escarpment and to Citrusdal) or cream with peach to yellowish buds (in SW Cape). July–Oct. Clayey or peaty soils on flats or slopes, KV, WM, CCR (Loeriesfontein, Nieuwoudtville and Roggeveld Escarpment to Cape Peninsula and to Swellendam). **(gce)**

CHORTOLIRION 3 spp., southern Africa: Angola, Botswana, Lesotho, Namibia, South Africa, Zimbabwe

angolense (Baker) A.Berger Acaulescent, bulbous perennial. Bulb with loosely packed, membranous scales covering slightly fleshy leaf bases. Leaves light green to glaucous-green, erect, slender, grass-like, deciduous, usually once or twice twisted, white-spotted near base, margins with soft, white, decurved teeth. *Haworthia*-like flowers in lax, unbranched racemes, zygomorphic, greenish, brownish or pinkish white with greenish keels to segments. Aug.–Nov. Sparse or dense grasslands, SN (widespread in summer rainfall region of southern Africa, entering the winter rainfall region in southern Namibia).

GASTERIA BONTAALWYN, GASTERIA ± 16 spp., dry areas of southern Africa

pillansii Kensit Acaulescent succulent, up to 1.5 m tall. Leaves distichous, oblong, surface rough to tuberculate, margins toothed. Flowers in an inclined raceme, nodding, pink and pale green, barely inflated below. Nov.–Apr. Well-drained soils on S- and E-facing slopes, G, NS, NH, WM, TS, CCR (southern Namibia and Richtersveld National Park to Bokkeveld Escarpment, Clanwilliam, southern Tanqua Karoo). **(gce)**

HAWORTHIA HAWORTHIA ± 70 spp., dry parts of southern Africa

arachnoidea (L.) Duval SPINNEKOPBOLLETJIE Acaulescent succulent, forming round rosettes, up to 100 mm diam. Leaves green, opaque, with long, white, soft spines, rarely smooth and purplish near tips. Flowers in a slender raceme, white. Nov.–Dec. Rocky slopes and under bushes, G, NS, NH, WM, TS, CCR (Richtersveld National Park to Bokkeveld Plateau, Roggeveld Escarpment, Worcester to E Cape).

marumiana Uitewaal Acaulescent succulent forming dense clumps. Leaves erect, incurved, purplish green, opaque, with reticulate markings, margins and keels with short spines, rarely smooth. Flowers in a slender raceme, white. Oct.–Feb. In rock cracks and under shrubs, TS, CCR (Laingsburg and Little Karoo to E Cape).

nortieri G.G.Sm. Acaulescent succulent with small rosettes, up to 50 mm diam., forming clumps. Leaves pale to purplish green, mottled with translucent spots, margins and keels with short spines. Flowers in a slender raceme, greyish white, yellowish in tube. Sept.–Oct. In rock crevices, NH, KV, WM, TS, CCR (Groenrivier, NE Knersvlakte, Bokkeveld Mountains, Roggeveld Escarpment to Ceres and Laingsburg). **(gce)**

pumila (L.) M.B.Bayer (= *Haworthia maxima* (Haw.) Duval) VRATJIESAALWEE Acaulescent succulent, up to 150 mm diam., rosettes solitary. Leaves hard, brown to olive-green with large whitish to brown tubercles. Flowers in a sparsely branched raceme, tube straight, yellow with green veins, tipped with brown. Nov.–Dec. Karroid scrub, TS, CCR (Worcester to Matjiesfontein). **(gce)**

venosa (Lam.) Haw. KLEINKANNIEDOOD Acaulescent or shortly caulescent succulent. Leaves hard, dark green to brownish, short and spreading, upper surface reticulate patterned, lower surface usually scabrid. Flowers in a slender raceme, white. Nov.–Dec. On rocky slopes, G, NH, WM, TS, CCR (Aurus, Richtersveld National Park, Springbok, Bokkeveld Mountains, Roggeveld Escarpment, Karoopoort to Breede River Valley and Upper Karoo).

viscosa (L.) Haw. Caulescent succulent, forming clumps, stems up to 30 mm long. Leaves hard, closely overlapping, 3-ranked, spreading, greyish brown, slightly scabrid with sharp tips. Flowers in a slender raceme, greenish white. Sept.–Apr. Dry stony slopes, TS, CCR (Klein Roggeveld, Laingsburg, Little Karoo to Graaff-Reinet).

KNIPHOFIA RED-HOT POKER, VUURPYL 65 spp., sub-Saharan Africa, S Arabia

sarmentosa (Andrews) Kunth Rhizomatous perennial, up to 600 mm tall. Leaves greyish, strap-shaped. Flowers in ovoid to cylindrical racemes, reddish, opening buff. June–Oct. Mountain streams, moist hollows and on dolerite outcrops, WM, TS, CCR (Nieuwoudtville, Hantamsberg to Klein Roggeveld and Hex River Mountains). **(gce)**

uvaria (L.) Oken Rhizomatous perennial, 0.5–1.2 m tall, in small clumps. Leaves strap-shaped, fibrotic. Flowers in oblong to globose racemes, orange to greenish yellow. Mostly Oct.–Dec. Seeps, marshes and streams on sandstone slopes, KB, WM, CCR (Kamiesberg and Bokkeveld Mountains to W Cape and to Barkly East).

TRACHYANDRA CAPE SPINACH, WILDEBLOMKOOL 52 spp., southern and tropical E Africa and Madagascar, mainly W Cape

A. Subshrubs with leaves growing from the tips of aerial stems

adamsonii (Compton) Oberm. Sparsely branched, subwoody shrub, up to 1 m tall, roots many, slender. Leaves lanceolate, succulent, margin sparsely toothed. Flowers in a few-branched raceme, white, all tepals spotted yellow at base. Capsule narrow, ± 12 mm long, held erect. Aug.–Sept. Rocky slopes under bushes, G, NS, CCR (Richtersveld National Park, Kotzesrus and Olifants River Valley). **(gce)**

aridimontana J.C.Manning Subwoody shrub, up to 450 mm tall. Leaves in apical tufts, somewhat succulent, smooth, greyish green, usually on short branches. Flowers in a simple or occasionally branched raceme, white, inner tepals spotted yellow at base. Capsule narrow, ± 10 mm long, held erect. July–Sept. W slopes amongst rocks, G (Koedoesberg to Kodaspiek). **(ece)**

involucrata (Baker) Oberm. Small, woody subshrub, up to 0.6 m tall. Leaves in apical tufts, usually on short branches, succulent, margin sometimes sparsely toothed. Flowers in a simple or branched raceme, white, striped green, without spots. Capsule narrow, ± 18 mm long, pendulous. May–July. On mountain slopes, often under bushes, G, NS, NH, KV (Eksteenfontein, Springbok, Kotzesrus, Bitterfontein, Vanrhynsdorp). **(ece)**

A.' Geophytes with leaves growing from underground rhizomes
B. Inflorescence with a succulent scape and conspicuous, long or broad bracts

arenicola J.C.Manning & Goldblatt Rhizomatous perennial, up to 0.5 m tall, some roots thin, others swollen and tapering to tips. Leaves (2–)4–12, erect, strap-shaped, somewhat falcate, margin slightly scabrid. Flowers white, spotted at base, close set in several, few-branched racemes, young scape with conspicuous, concolorous bracts, sometimes roughly hairy, becoming decumbent in fruit. Capsules narrow, 10–12 mm long, held erect. July–Aug.(Sept.). On flats in red, windblown sand, G, NS, KV, CCR (Anenous flats and Kleinsee through to Graafwater, Klawer and Swartruggens). **(gce)**

divaricata (Jacq.) Kunth Rhizomatous perennial, up to 0.9 m tall, stout, fleshy and smooth, roots slender. Leaves usually evergreen and shiny. Panicle stout, succulent, much branched with broad, white bracts. Capsule ellipsoidal, ± 10 mm long, held erect. July–Sept. Littoral dunes and sand flats, NS, CCR (Hondeklipbaai to Port Alfred).

ciliata (L.f.) Kunth VELDKOOL Rhizomatous perennial, up to 0.5 m tall, roots few, rather fleshy. Leaves few, straggling, strap-shaped, channelled, spongy, usually hairy. Flowers white, spotted yellow at base, in several, long, sprawling, usually hairy racemes with conspicuous overlapping bracts. Capsules ovoid, 6–14 mm long, on recurved pedicels up to 20 mm long. June–Oct. Coastal sands or inland windblown sand deposits, SN, G, NS, KV, CCR (Klinghardt Mountains and Kotzesrus to Cape Peninsula and Grahamstown).

falcata (L.f.) Kunth BOKKOOL Rhizomatous perennial, up to 1 m tall, roots many, slender. Leaves ± 4, lanceolate and falcate, leathery, smooth or hairy. Flowers white, spotted yellow at base, often hairy, in a stout, simple or sparsely branched raceme with conspicuous, overlapping, brown-tipped bracts, lowermost sheathing the scape. Capsules top-shaped, ± 12 mm long, held erect. July–Oct. Stony, often granitic slopes, SN, G, NS, NH, KB, KV, WM, CCR (Aus to Nieuwoudtville, Calvinia and Worcester). **(gce)**

B.' Inflorescence with a rigid to wiry scape and short, narrow bracts
C. Roots pencil-like or slender and wiry, spreading

bulbinifolia (Dinter) Oberm. SOLKNOL Rhizomatous perennial, up to 400 mm tall, roots many, hard and spreading. Leaves many, linear, succulent usually loosely curled towards tips, membranous sheaths irregularly fringed. Flowers white, yellow spotted at base, in a widely branched panicle. Capsules ellipsoidal, up to ± 8 mm long, held erect. July–Oct. In sand, often amongst rocks, SN, G, NS, NH, (Lüderitz to Port Nolloth, Steinkopf and Wallekraal). **(ece)**

lanata (Dinter) Oberm. Rhizomatous perennial, up to 200 mm tall, roots few, felted and pencil-like. Leaves ± 4, linear, curved, densely covered with long, soft, white hairs. Flowers white, spotted at base, in a panicle with many branches from near apex. Capsule globose, ± 5 mm diam., held erect. Aug.–Sept. In loose sand, SN (Haalenberg and Pomona). **(ece)**

laxa (N.E.Br.) Oberm. Like **T. revoluta** but leaves terete, hairless, often glutinous and bearing sand. Aug.–Sept. In sand, SN (Namibia, Botswana and Upper Karoo).

muricata (L.f.) Kunth BEESBLOM Like **T. paniculata** but roots many, firm and long. Flowers spreading. Capsule globose, ± 5 mm diam., held erect. July–Oct. Stony hillsides or flats in sand or clay, SN, G, NS, NH, KV, CCR (Klinghardt Mountains to Cape Peninsula and Steytlerville). **(gce)**

revoluta (L.) Kunth Rhizomatous perennial, up to 0.9 m tall, roots many, more-or-less wiry and spreading, proliferating from stolons. Leaves many, linear, 1–4 mm wide, firm, scabrid, emerging from a short horizontal rhizome. Flowers white, spotted at base, nodding, in a divaricate panicle, scape scabrid below. Capsule ellipsoidal, ± 5 mm long, held erect. Aug.–Nov. Sandy or clay flats, G, NS, NH, KV, CCR (Eksteenfontein to Cape Peninsula and Port Alfred).

C.' Roots swollen and spreading or bulbous, compact and fused

dissecta Oberm. Rhizomatous perennial, up to 0.5 m tall, roots few, short and tuberous. Leaves up to 10, filiform, occasionally wavy, smooth or rarely sparsely hairy, surrounded at base by a hard, brown neck occasionally extended into a transversely striped sheath. Flowers white, spotted yellow at base, in a slender, widely spreading, few-branched raceme with minute bracts. Capsule ovoid, 5 mm long, held erect on pedicels < 10 mm long. July–Oct. On flats in stony and clay-rich soil, KV, TS, CCR (Vanrhynsdorp to Cold Bokkeveld). **(gce)**

flexifolia (L.f.) Kunth (including **T. oligotricha** (Baker) Oberm.) Rhizomatous perennial, up to 300 mm tall, roots few, thick and compact. Leaves few to many, linear, often undulate, usually hairy. Flowers white, spotted at base, nodding, in a panicle, scape slender and pubescent below. Capsule globose, ± 4 mm diam., on short, erect pedicels. May–Sept. Sandy and shale flats and slopes, NH, KV, WM, TS, CCR (Steinkopf to Vanrhynsdorp, Calvinia, Bredasdorp and Little Karoo). **(gce)**

gracilenta Oberm. Graceful, grass-like rhizomatous perennial, up to 400 mm tall, roots many, with felt-like covering, swollen towards tips. Leaves linear, rolled, grass-like, ribbed, covered with small, white, curly hairs. Flowers white, dark keeled, in a lax raceme on a slender scape. Capsule unknown. Aug.–Sept. Shale slopes, G, CCR (Stinkfontein Mountains and Lokenberg, Gifberg to Cederberg Mountains). **(gce)**

hantamensis Boatwr. & J.C.Manning Like **T. sanguinorhiza** but leaves hairy and straight, peduncle hairy, and pedicels 8–15 vs. 3–6 mm long. Aug.–Sept. On tillite and clay soils, WM (Loeriesfontein to Nieuwoudtville). **(ece)**

jacquiniana (Roem. & Schult.) Oberm. ANYSBLOM Rhizomatous perennial, up to 0.5 m tall, roots few, bulbous. Leaves many, linear, undulate when young, often softly hairy. Flowers white, spotted at base, nodding, in a panicle with many ascending branches. Capsule narrowly ovoid, to ± 8 mm long, pressed upwards against rachis. July–Sept. Stony clay slopes, NH, KV, WM, TS, CCR (Steinkopf to Loeriesfontein, Vanrhynsdorp, Calvinia, Montagu and Beaufort West).

kamiesbergensis Boatwr. & J.C.Manning Like **T. karroica** but leaves and peduncle puberulous, pedicels up to 12 mm vs. 10–20(–40) mm long. Oct.–Nov. Sandy of stony granite soils, KB (Kamiesberg Mountains). **(ece)**

karrooica Oberm. Rhizomatous perennial, up to 150 mm tall, roots fused with rhizome into 2 or 3 hard tubers, staining purple when pressed. Leaves 3–7, filiform, glabrous to hispid. Flowers white, spotted yellow at base, pedicels widely spreading to 30 mm long, in a 1–3 branched raceme. Capsule globose, ± 3 mm diam., somewhat pendulous. Feb.–Apr. Stony soils amongst bushes, G, NH, KV, TS (Namibia to eastern Knersvlakte to Laingsburg and Upper Karoo).

paniculata Oberm. Rhizomatous perennial, up to 300 mm tall, roots many, short and thick, spreading. Leaves few, lanceolate, up to 10 mm broad, flat, straight or wavy, margin raised, usu-

ally minutely fringed. Flowers white, spotted at base, nodding, in a panicle with many branches arising from axils. Capsule ovoid, ± 7 mm long, held erect. Sept.–Oct. Stony clay slopes, SN, G, KV, CCR (Klinghardt Mountains, Richtersveld, central Knersvlakte to Wellington). **(gce)**

patens Oberm. Rhizomatous perennial, up to 300 mm tall, roots few, thick and spreading. Leaves few to many, filiform, sometimes hairy. Flowers white, basally spotted, in a rounded panicle, scape hairy below. Capsule globose, ± 3 mm diam., on spreading pedicels up to 15 mm long. Aug.–Oct. Stony clay slopes, NH, CCR (Steinkopf to Worcester). **(gce)**

prolifera P.L.Perry Rhizomatous perennial, up to 200 mm tall, proliferating from swollen tubers along spreading roots, rhizome staining purple when pressed. Leaves 2–6, erect, linear, emerging at flowering. Flowers white, spotted yellow at base, in a simple, sparse raceme, scape somewhat hispid below. Capsules unknown. Mar.–Apr. Clay flats on tillite, WM (Nieuwoudtville). **(ece)**

sanguinorhiza Boatwr. & J.C.Manning Rhizomatous perennial, 100–350 mm tall, roots few, bulbous, fused with short rhizome, staining purple when pressed. Leaves 4–20, filiform, rough, curled towards tips. Flowers pinkish white, spotted at base, in a panicle with several, suberect branches. Capsules globose, ± 3 mm diam. Aug.–Sept. Sandy loam on stony plateaux, WM, TS (Doringrivier to Klein Roggeveld). **(ece)**

thyrsoidea (Baker) Oberm. Rhizomatous perennial, up to 180 mm tall, roots several, spreading, swollen towards tips. Leaves 3–12, linear, covered with long, tawny hairs, rarely smooth. Flowers pale pink, in a compact, many-branched panicle with conspicuous, white bracts. Capsules globose, 5 mm diam., held erect. July–Sept. Stony flats and slopes, TS (Klein Roggeveld and Matjiesfontein to Prince Albert). **(ece)**

tortilis (Baker) Oberm. Rhizomatous perennial, up to 200 mm tall, roots few, bulbous. Leaves few, lanceolate or linear-lanceolate, transversely pleated, rarely plane. Flowers white or pale pink, spotted basally, nodding, in a compact, panicle. Capsules ellipsoidal, 5 mm long, on recurved pedicels. July–Sept. Sandy and clay flats, G, NH, KV, CCR (Eksteenfontein to Kliprand, Loeriesfontein, Vanrhynsdorp to Hopefield). **(gce)**

zebrina (Schltr. ex Poelln.) Oberm. Rhizomatous perennial, up to 200 mm tall, roots many, bulbous, spreading. Leaves ± 2–8, linear, straight or wavy, smooth or softly hairy, surrounded at base by 1 or more prominent, usually transversely striped sheaths. Flowers white or pinkish mauve, spotted basally, in a compact, shortly-branched panicle. Capsules globose, ± 4 mm diam., covered with a few rough hairs, held erect. May–Aug. In granitic loam and hard sandveld, G, NS, NH, (Kubus to Wallekraal and Garies). **(ece)**

[**Imperfectly known species**: **T. peculiaris** (Dinter) Oberm.]

COLCHICACEAE

by J.C. Manning

1. Inflorescence spicate; flowers sessile, ebracteate; tepals free or fused . . . . . **Wurmbea**
1.' Inflorescence corymbose or racemose; flowers bracteate; tepals free:
2. Corm tunics coarsely netted; leaves collecting sand; stem branched, flowers in umbel-like cymes in upper leaf axils; stylodia fused for half their length or more . . . . . **Hexacyrtis**
2.' Corm tunics cartilaginous; leaves not collecting sand; stem unbranched, flowers racemose or corymbose; stylodia free:
3. Flowers erect on short pedicels, exposed or congested and overtopped by green or petaloid bracts; nectary at base of filament; stylodia ± erect . . . . . **Colchicum**
3.' Flowers erect or nodding on long pedicels; nectary a pocket or pouch-like structure at base of tepal blade above filament insertion; stylodia filiform, spreading . . . . . **Ornithoglossum**

COLCHICUM (= *ANDROCYMBIUM*) CUP-AND-SAUCER, PATRYSBLOM ± 150 spp., Africa, Europe and Asia

A. Flowers exposed, tepal blades plane, not auriculate-cucullate

cruciatum (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium cruciatum* U.Müll.-Doblies & D.Müll.-Doblies) Acaulescent, cormous geophyte. Leaves 3–5,

spreading, oblong-lanceolate, upper surface minutely papillate, margins minutely denticulate, 15–25 × 2–6 mm. Flower 1, tepal claw 10–12 mm long, blade spreading, oblong-lanceolate, channelled, apiculate, white with pinkish or green tip, 8–12 mm long; filaments filiform, 5–7 mm long; ovary papillate, styloids filiform, 11–17 mm long. June. Gravelly washes, NH (Steinkopf to Springbok). **(ece)**

dregei (C.Presl.) J.C.Manning & Vinnersten (= *Androcymbium dregei* C.Presl.) Cormous geophyte, stem usually developed, 5–100 mm long, rarely acaulescent. Leaves 3, linear-lanceolate, tapering or curled inwards, base sheathing, margins minutely denticulate, 4–150 × 1–4 mm; bracts foliar, base stem-clasping, papillate abaxially. Flowers 1 or 2, tepal claw 2–4 mm long, blade rhombic-lanceolate, green, 4–8 mm long; filaments basally pulvinate, purple, 1–2 mm long; styloids 1–2 mm long, smooth or papillate. Capsules shortly exserted on pedicels up to 25 mm long. June–Aug. Rocky slopes in shade of boulders, NH, TS, CCR (Springbok to Bitterfontein, Koebee, Bloukrans Pass and Montagu). **(gce)**

exiguum (Roessler) J.C.Manning & Vinnersten (= *Androcymbium exiguum* Roessler, *A. vogelii* U.Müll.-Doblies & D.Müll.-Doblies) Acaulescent, cormous geophyte. Leaves 3–5(–10), suberect, linear-lanceolate, tapering or curled inwards, base sheathing, margins minutely denticulate, 30–120 × 2–4(–8) mm; bracts foliar, base stem-clasping, under surface papillate. Flowers 1 or 2(–4), tepal claw 5–7 mm long, blade lanceolate, green, 5–8 mm long; filaments basally pulvinate, purple, 1–2 mm long; styloids 2–5 mm long, papillate. Capsules strongly exserted at dehiscence, pedicels elongating up to 50–80 mm long. July–Aug. Rocky slopes in shade of boulders, SN, G, NH (Aurus Mountains to Bitterfontein). **(ece)**

A.' Flowers partially or wholly concealed by the floral bracts, tepal blades basally auriculate and cucullate
B. Leaves tristichous, all spreading

cuspidatum (Baker) J.C.Manning & Vinnersten (= *Androcymbium cuspidatum* Baker) Acaulescent, cormous geophyte. Leaves 3, spreading, tristichous, ovate-lanceolate, margins hyaline, 20–50 × 8–22 mm long; bracts similar but much smaller, broadly ovate, shorter than flowers. Flowers 1 or 2, tepal claw 6–8(–10) mm long, blade auriculate-cucullate, green, 5–7 mm long; filaments purplish, 3.5–5 mm long; styloids slender, ± 6 mm long. July–Sept. Clay flats, KB, WM, TS, CCR (Kamiesberg Mountains, Hantam and Roggeveld through Little Karoo to Uniondale). **(gce)**

kunkelianum (U.Müll.-Doblies, P.Hirsch., Stearn & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium kunkelianum* U.Müll.-Doblies, P.Hirsch., Stearn & D.Müll.-Doblies) Like **C. cuspidatum** but plants gregarious, corms very deeply buried and with several growing points. July. Clay flats, WM (Sutherland). **(ece)**

B.' Leaves distichous
C. Leaves grading into the floral bracts

etesionamibense (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium etesionamibense* U.Müll.-Doblies & D.Müll.-Doblies) Like **C. walteri** but larger, longest leaf 90–190 mm long and bracts lanceolate. Aug. Stony slopes, SN (southern Namibia: Witpütz). **(ece)**

henssenianum (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium henssenianum* U.Müll.-Doblies & D.Müll.-Doblies) Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading, linear-lanceolate, 40–100 × 1–2 mm, uppermost erect, bract-like; bracts ovate-lanceolate. Flower 1, tepal claw twice as long as blade, 4–7 mm long, blade auriculate-cucullate, green, 2–3 mm long; filaments 1.5–2 mm long, anthers ± 1 mm long; styloids tapering, much longer than perianth, 6–8 mm long, stigmas linear. Aug. Dry sandy valley, G (Richtersveld: Eksteenfontein). **(ece)**

huntleyi (Pedrola, Membrives, J.M.Monts. & Caujapé) J.C.Manning & Vinnersten (= *Androcymbium huntleyi* Pedrola, Membrives, J.M.Monts. & Caujapé) Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading, narrowly lanceolate, glaucous, 55–95 × 8–18 mm, uppermost erect, bract-like; bracts ovate. Flowers hidden by bracts, 1 or 2, tepal claw 2.5–4 mm long, blade auriculate-cucullate, 2.5–5 mm; filaments longer than tepals, 3–5.5 mm long, anthers 1.5–2 mm; styloids 2.5–3 mm long. July–Aug. Sandy flats, G (Richtersveld: Anenous flats). **(ece)**

poeltianum (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium poeltianum* U.Müll.-Doblies & D.Müll.-Doblies) Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading, narrowly lanceolate, ± 100 × 6–7 mm, uppermost erect, bract-like; bracts lanceolate,

margins minutely denticulate. Flower 1, tepal claw ± 7 mm, blade auriculate-cucullate, green, ± 7 mm long; filaments maroon, 5 mm long, anthers 1.5 mm long; stylodia 7 mm long. Aug. Sandy flats, NH (Concordia, Nababeep, Okiep, Kliprand). **(ece)**

walteri (Pedrola, Membrives & J.M.Monts.) J.C.Manning & Vinnersten (= *Androcymbium amphigaripense* U.Müll.-Doblies, Weiglin, M.Gottlieb & D.Müll.-Doblies, *A. walteri* Pedrola, Membrives & J.M.Monts.) Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading, lanceolate, 40–150 × 5–25 mm, uppermost erect, bract-like; bracts ovate. Flowers 1 or 2, unpleasantly scented, tepal claw 5–10 mm, blade auriculate-cucullate, green, 10–15(–20) mm long; filaments maroon, 6–11 mm long, anthers bluish, 5–10 mm long; stylodia 7–9 mm long. Aug. Rocky slopes, SN, G, NH (Witpütz and Richtersveld to Springbok). **(ece)**

C.' Lower leaves ± dissimilar in shape, colour, texture or margins from the uppermost leaf and the bracts
D. Anthers small, 1–3 mm long

capense (L.) J.C.Manning & Vinnersten (= *Androcymbium capense* (L.) K.Krause, *A. ciliolatum* Schltr. & K.Krause, *A. fenestratum* Schltr. & K.Krause, *A. hantamense* Engl.) BOBBEJAANSKOEN, SUIKERKANNETJIE, UILBLAAR Acaulescent, cormous geophyte, often clumped. Leaves 3, lower 2 lanceolate, margins ciliate, 40–120 × 15–30, uppermost erect, bract-like; outer bracts ovate, white or pale green, margins ciliate, inner smaller. Flowers hidden by bracts, 2 or 3, tepal claw 8–10 mm long, blade auriculate-cucullate, margins minutely ciliolate, 6–8 mm long; filaments green or purple, 6–8 mm long, anthers ± 2 mm; styloids 7–10 mm long. July–Aug.(Sept.). Stony clay and gravelly flats, NH, KB, KV, WM, TS, CCR (central Namaqualand and Knersvlakte through Hantam, Roggeveld and Tanqua Karoo to SW Cape). **(gce)**

crispum (Schinz) J.C.Manning & Vinnersten (= *Androcymbium crispum* Schinz) Acaulescent, cormous geophyte, usually clumped. Leaves 3, lower 2 spreading, narrowly lanceolate, margins crispulate, thickened and cartilaginous, coarsely fringed with simple or branched, brown bristles, uppermost leaf suberect, ovate-lanceolate, white with green reticulations in lower half; bracts ovate, white or flushed green apically, margins smooth or sparsely ciliate, keels brown-bristly apically. Flowers 2 or 3, tepal claw 7–10 mm long, blade auriculate-cucullate, 6–9 mm long; filaments slightly longer than blades, green or purple, 8–11 mm long, anthers ± 2 mm long; styloids 6–11 mm long. July–Aug. Shale flats, WM (Calvinia). **(ece)**

D.' Anthers large, 4–8 mm long
E. Filaments ± twice as long as tepal blades

coloratum J.C.Manning & Vinnersten (= *Androcymbium burchellii* Baker, *A. latifolium* Schinz, *A. pulchrum* Schltr. & K.Krause) ROOIPATRYSBLOM Acaulescent, cormous geophyte. Leaves 3, lower 2 ovate, leathery, margins sparsely ciliate, 120–210 × 16–40 mm, uppermost bract-like; outer bracts ovate-orbicular, thinner-textured, red (subsp. **coloratum**) or white with green reticulation (subsp. **burchellii** (Baker) J.C.Manning & Vinnersten), keel denticulate, inner smaller. Flowers hidden by bracts, 1–6, unpleasantly scented, tepal claw 10–20 mm long, blade cucullate, green, 5–9 mm long; filaments purple, ± twice as long as tepal limbs, 8–13 mm, anthers 6–8 mm long; styloids 11–18 mm long. June–Aug. Shale and dolerite flats, WM, TS, CCR (Bokkeveld, Hantam, Roggeveld and Nuweveld through Tanqua Karoo to Montagu). **(gce)**

crenulatum U.Müll.-Doblies, E.G.H.Oliver & D.Müll.-Doblies Like **C. coloratum** subsp. **burchellii** but tepal blades orbicular-crenulate. July–Aug. Stony flats, WM (Brandvlei-Loeriesfontein).

E.' Filaments ± as long as the tepal blades
F. Lower leaves coiled, undulate-crispulate, or hairy

albofenestratum J.C.Manning & Snijman Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading or prostrate, glaucous, lanceolate to ovate, closely undulate or crispulate, margins smooth, 20–45 × 6–30(–45) mm, uppermost erect and bract-like, thin-textured; bracts broadly ovate-oblong to obovate, white and conspicuously tessellated by green longitudinal and transverse veins, margin plane or slightly undulate, smooth, keel hyaline and cartilaginous, smooth or papillate. Flowers 1 or 2, tepal claw 5–6 mm long, blade auriculate-cucullate, 7 mm long; filaments ± as long as tepal limb, 7 mm long, anthers oblong, 5.5–6 mm long; styloids ± 7 mm long. July(Aug.). Clay and loamy flats, KV (Knersvlakte). **(ece)**

circinatum (Baker) J.C.Manning & Vinnersten (= *Androcymbium circinatum* Baker, *A. guttatum* Schltr. & K.Krause) Acaulescent, cormous geophyte, usually clumped. Leaves 3, glaucous, often purple-spotted, lower 2 narrowly lanceolate-attenuate, coiled and often undulate or crispulate, under surface sometimes pubescent, margins smooth or ciliate, 60–150 × 5–20 mm, uppermost erect, bract-like; bracts ovate, glaucous, often purple-spotted, margins smooth or ciliate. Flowers hidden by bracts, 1 or 2, tepal claw 5–6 mm long, blade auriculate, green, 7–10 mm long; filaments 6–8 mm long, anthers 4–5 mm long; styloids ± 6 mm long. July–Sept. Stony and rocky flats and slopes, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

villosum (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium villosum* U.Müll.-Doblies & D.Müll.-Doblies) Acaulescent, cormous geophyte, usually clumped. Leaves 3, lower 2 elliptical or narrowly obovate, villose with shaggy hairs 2–4 mm long, ± 50 × 10 mm, uppermost bract-like; bracts narrowly ovate, upper surface and margins villose towards apex. Flower 1, tepal claw 8 mm long, blade auriculate-cucullate, pale green, 7 mm long; filaments pale brown, 8 mm long, anthers ± 4 mm long; styloids 8 mm long. Aug. Gravelly slopes among rock ledges, NH (Kliprand towards Bitterfontein). **(ece)**

volutare (Burch.) J.C.Manning & Vinnersten (= *Androcymbium volutare* Burch.) Acaulescent, cormous geophyte, usually clumped. Leaves 3, lower 2 linear-lanceolate, coiled at tips, pale green, 80–150 × 8–15 mm, uppermost bract-like; bracts large, ovate, pale green with reticulate venation, margins smooth. Flowers hidden by bracts, 1 or 2, tepal claw 6–8 mm, blade auriculate-cucullate, pale green, 6–7 mm long; filaments purple, slightly longer than blade, 7–9 mm long, anthers 4–5 mm long; styloids 4–6 mm long. July–Aug.(Sept.). Clay flats and washes, WM, TS, CCR (Hantam and Upper Karoo through Tanqua Karoo to Laingsburg and Hex River Pass).

F.' Lower leaves plane and hairless
G. Leaf margin thickened

albomarginatum (Schinz) J.C.Manning & Vinnersten (= *Androcymbium albomarginatum* Schinz) Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading, lanceolate to ovate, glaucous and often purple-spotted, 50–150 × 15–70 mm, margins thickened and cartilaginous, smooth, uppermost erect, bract-like; bracts ovate, margins smooth or ciliolate. Flowers 1–5, tepal claw 6–10 mm long, blade auriculate-cucullate, 10–14 mm long; filaments 9–12 mm long, anthers 5–7 mm long; styloids 7–12 mm long. July–Sept. Stony and rocky slopes and flats, G, NH, KB, WM (Richtersveld to Kamiesberg Mountains, Roggeveld). **(ece)**

vanjaarsveldii (U.Müll.-Doblies, Hähnl., U.U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium vanjaarsveldii* U.Müll.-Doblies, Hähnl., U.U.Müll.-Doblies & D.Müll.-Doblies) Like **C. albomarginatum** but tepal claw short, 5–6 mm long, less than half as long as blade. July–Aug. Rock crevices and quartzite outcrops, G (Richtersveld). **(ece)**

G.' Leaf margin not thickened

eucomoides (Jacq.) J.C.Manning & Vinnersten (= *Androcymbium eucomoides* (Jacq.) Willd.) Acaulescent, cormous geophyte. Leaves 3–5, lanceolate-attenuate, lower 2–4 spreading, thin-textured, 100–200 × 15–40 mm, margins smooth, uppermost curved and erect, bract-like; bracts ovate to suborbicular. Flowers 2–5, pedicellate, green, tepal claw 5–7 mm long, blade auriculate-cucullate, 5–10 mm long; filaments 5–9 mm long, anthers 3–5 mm long; styloids 6–10 mm long. Aug.–Sept.(Oct.). Stony and clay flats, TS, CCR (Tanqua Karoo and from SW Cape through to E Cape).

irroratum (Schltr. & K.Krause) J.C.Manning & Vinnersten (= *Androcymbium irroratum* Schltr. & K.Krause) Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading, ovate to lanceolate, 50–100 × 8–50 mm, margins minutely denticulate, uppermost erect, conduplicate, bract-like; bracts oblong-rhombic, conduplicate, green, margins hyaline. Flowers 1 or 2, tepal claw 9–12 mm long, blade auriculate-cucullate, 3–7 mm long; filaments 5–8 mm long, purple, anthers 3–4 mm long; styloids ± 8 mm long. Gravelly or sandy flats and washes, NS, KV, WM, CCR (Namaqualand sandveld and Hantam to W Coast). **(gce)**

knersvlaktense (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium knersvlaktense* U.Müll.-Doblies & D.Müll.-Doblies) Acaulescent, cormous geophyte. Leaves 3, lower 2 ovate, rather thin-textured, 115–165 × 65–115 mm, margins smooth to minutely papillate, uppermost bract-like; bracts ovate, margins smooth. Flowers 5–8, tepal claw 9–12 mm long, blade auriculate-cucullate, green, 11–14 mm long; filaments 10–11 mm long, anthers 6.5–8.5 mm long; styloids 9–10 mm long. July–Aug. ?Habitat, KV (Knersvlakte). **(ece)**

praeirroratum (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium praeirroratum* U.Müll.-Doblies & D.Müll.-Doblies) Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading, ovate to lanceolate, 50–100 × 15–20 mm, margins smooth, uppermost erect, conduplicate, rhombic, bract-like; bracts rhombic, conduplicate, emarginate, green flushed red or purple basally, margins minutely ciliolate. Flowers 1 or 2, tepal claw 9–12 mm long, blade auriculate-cucullate, ± 10 mm long; filaments 5–8 mm long, purple, anthers 4–7 mm long; styloids ± 10 mm long. July–Aug. Gravelly or sandy flats and washes, WM, TS, CCR (Bokkeveld Plateau, Hantam, Roggeveld, Tanqua Karoo and western Upper Karoo).

scabromarginatum (Schltr. & K.Krause) J.C.Manning & Vinnersten (= *Androcymbium scabromarginatum* Schltr. & K.Krause) Acaulescent, cormous geophyte. Leaves 3, lower 2 spreading, ovate, glaucous, 50–90 × 30–70 mm, margins smooth or minutely ciliolate, uppermost erect and shallowly curved, bract-like; bracts ovate, margins smooth. Flowers 1–4, honey-scented, tepal claw 6–10 mm long, blade auriculate-cucullate, 8–12 mm long; filaments 5–9 mm long, anthers 4–5 mm long; styloids 7–15 mm long. July–Aug.(Sept.). Clay and gravelly flats, NH, KB (Steinkopf to Kamiesberg Mountains). **(ece)**

[**Species insufficiently known** **Colchicum buchubergense** (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium buchubergense* U.Müll.-Doblies & D.Müll.-Doblies), **Colchicum greuterocymbium** (U.Müll.-Doblies, Raus & D.Müll.-Doblies) J.C.Manning & Vinnersten (= *Androcymbium greuterocymbium* U.Müll.-Doblies, Raus & D.Müll.-Doblies)]

HEXACYRTIS DESERT LILY 1 sp., southern Namibia and Richtersveld **(ece)**

dickiana Dinter Cormous geophyte, 300–500 mm tall, corm tunics leathery and netted, stem and leaves covered with adhering sand grains. Leaves several, lanceolate. Flowers 2–6, in umbel-like cymes in axils of upper leaves, nodding, pale yellowish and chocolate-maroon, tepals recurved, free, basally spurred, 18–20 mm long; filaments 8–9 mm long; style 4 mm long. Sept.–Nov. Coastal dunes and inland sand plumes, SN, G (Lüderitz to Alexander Bay and lower Gariep Valley). **(ece)**

ORNITHOGLOSSUM SNAKE LILY 9 spp., Namibia to S tropical Africa and W Cape

*A. Flowers zygomorphic; filaments 15–25 mm long (see also **O. pulchrum** below)*

undulatum Sweet Cormous geophyte, 50–200 mm tall. Leaves 2–4, lanceolate, smooth or undulate. Flowers nodding, zygomorphic-asymmetric, white to pink with purple or maroon tips, fragrant, tepals 16–30 mm long, nectary narrowly pouch-like with upper margin sometimes tongue-like; filaments filiform or slightly swollen, 15–25 mm long. Apr.–July. Rocky slopes and stony flats, SN, G, NH, WM, TS, CCR (southern Namibia through central and eastern Namaqualand to Tanqua Karoo and to Somerset East).

*A.' Flowers actinomorphic; filaments 2–13 mm long (but ± 25–28 mm in **O. pulchrum**)*

dinteri K.Krause Like **O. vulgare** but nectary mouth protruding and funnel- or collar-like, sometimes incised. Apr.–May. Sandy and stony flats and dry riverbeds, SN (central Namibia and Sperrgebiet through eastern Richtersveld into Upper Karoo and Free State).

parviflorum B.Nord. SLANGKOP Like **O. vulgare** but smaller, tepals 6–10(–14) mm long and filaments 2–5 mm long. June–Oct. Stony and gravelly flats, SN, G, NS, NH, KB, KV, WM, TS, CCR (Lüderitz through Namaqualand to Hantam and Olifants River Valley and to Laingsburg). **(gce)**

pulchrum Snijman, B.Nord. & Mannheimer Cormous geophyte, ± 150 mm tall. Leaves 4–7, lanceolate, with undulate margins. Flowers suberect to spreading, actinomorphic, widely cup-shaped, bright to dark pink, tepals spreading, 27–32 mm long, nectary pouch-like, pale yellow; filaments ± 25–28 mm long. June–early Aug. Along edges of coarse, sandy, seasonal washes, SN (Aus). **(ece)**

vulgare B.Nord. Cormous geophyte, 60–200 mm tall. Leaves (2–)4–12, lanceolate. Flowers nodding, actinomorphic, greenish with maroon margins or red to brown, unscented, tepals spread-

ing or reflexed, (8–)10–25 mm long, nectary pouch-like; filaments thickened or swollen below, 5–13 mm long. Aug.–Oct. Stony and gravelly flats, SN, G, NH, WM, TS, CCR (Namibia through northern and eastern Namaqualand to Hantam and Tanqua Karoo, northwards into tropical Africa).

zeyheri (Baker) B.Nord. Cormous geophyte, subacaulescent, stem up to 50 mm tall. Leaves 2–several, congested, linear-lanceolate, undulate or crisped. Flowers erect but nodding in fruit, actinomorphic, pale greenish, flushed purple, fruit-scented, tepals suberect, 12–15 mm long, nectary pouch-like; filaments slightly swollen medially, 7–11 mm long. May. Gravelly pockets on granite or sandy flats, G, NS, NH (Richtersveld and central Namaqualand to Vredendal). **(ece)**

WURMBEA (= *ONIXOTIS*) SPIKE LILY 40 spp., sub-Saharan Africa, Australia

stricta (Burm.f.) J.C.Manning & Vinnersten (= *Onixotis stricta* (Burm.f.) Wijnands, *O. triquetra* (L.f.) Mabb.) RYSBLOMMETJIE Cormous geophyte, 200–500 mm tall. Leaves 3, subcylindrical, upper 2 leaves set just below spike, uppermost entirely sheathing. Flowers sessile, white to pink with red nectaries, tepals free, clawed, 8–12 mm long; filaments 4–5 mm long; styles shortly united below, filiform. Aug.–Oct. Streamsides and vernal pools, KB, KV, CCR (Kamiesberg Mountains, southern Knersvlakte, Bokkeveld Mountains to Worcester). **(gce)**

variabilis B.Nord. Cormous geophyte, 50–200 mm tall. Leaves 3, ovate to lanceolate. Flowers sessile, greenish to cream with maroon median spot and sometimes margins, foul-scented, tepals 6–12 mm long, united below in a tube 3–6(–8) mm long; filaments 3–5 mm long; styles free, subulate. Aug.–Oct. Moist clay and gravelly flats, KB, WM, TS, CCR (Kamiesberg Mountains, Hantam and Bokkeveld Plateau through Roggeveld, Nuweveld and Tanqua Karoo to Port Elizabeth). **(gce)**

CYPERACEAE

by C. Archer & A.M. Muasya

Artificial key to genera

1. Female spikelet enclosed by a perigynium (modified bract) ..... **Carex**
1.' Female spikelet not enclosed by a perigynium:
2. Style base enlarged:
3. Plants perennial; leaf blades absent; inflorescence a single spikelet..... **Eleocharis**
3.' Plants annual; leaf blades present; inflorescence an umbel of few to many spikelets .... **Fimbristylis**
2.' Style base not enlarged:
4. Nutlet borne on a gynophore:
5. Plants perennial; ligule usually well developed, papery ..... **Ficinia**
5.' Plants annual; ligule inconspicuous ..... **Isolepis marginata**
4.' Nutlet not borne on a gynophore:
6. Inflorescence paniculate:
7. Leaf blades absent; stem without nodes; basal inflorescence bract scale-like ... **Pseudoschoenus**
7.' Leaf blades well developed; stem nodose with conspicuous dark leaf sheaths; basal inflorescence bract leaf-like..... **Tetraria**
6.' Inflorescence capitate or umbellate:
8. Glumes arranged distichously (in two opposite rows) or rarely subdistichously:
9. Annual plants with hair-like leaves and stems ..... **Isolepis levynsiana**
9.' Perennial plants with variously shaped leaves and stems, if annual then plants with flat, keeled leaves and 3-angled stems ..... **Cyperus**
8.' Glumes arranged spirally:
10. Leaves arising only from the stem..... **Bolboschoenus**
10.' Leaves arising only from the base, or from the base and stem:
11. Inflorescence terminal; basal inflorescence bract scale-like or filiform ..... **Isolepis**
11.' Inflorescence pseudo-subterminal or pseudolateral; basal inflorescence bract stem-like:
12. Plants functionally dioecious..... **Scirpoides**
12.' Plants bisexual ..... **Schoenoplectus**

BOLBOSCHOENUS ± 12 spp., cosmopolitan

maritimus (L.) Palla (= *Scirpus maritimus* L.) SNYGRAS, SNYRUIGTE Rhizomatous perennial, up to 1.5 m tall. Leaf blades flat, keeled, margins serrated. Stems 3-angled, bases swollen. Inflorescence a terminal digitate head of (1–)few spikelets, occasionally stalked clusters added, basal bracts erect, leaf-like. Spikelets ovoid, 15–20 × 7 mm, glumes golden- to dark brown, awned. Oct.–Mar. Localised on marshy flats near water, mainly coastal, below 700 m, SN, WM, CCR (Sperrgebiet, northern bank of lower Gariep, Lokenburg, Skurweberge, W and E Cape, and pantropical; hybrids with **B. glaucus** (Lam.) S.G.Sm. from Lokenburg, also W and E Cape and elsewhere in southern Africa but not well documented).

CAREX ± 1 780 spp., cosmopolitan

acocksii C.Archer Tufted perennial, erect, up to 460 mm tall. Leaves about half as long as flowering stem, blades channelled, 0.75 mm wide. Stem cylindrical, ± 1 mm diam. at middle. Inflorescence a terminal oblong spike, 14–28 × 7 mm (at widest part), basal bract inconspicuous. Spikelets brown. Oct.–Nov. Seasonally moist places on dolerite and sandstone, often beneath shrubs, about 1 580 m, WM (Hantamsberg and Roggeveld Escarpment). **(ece)**

***divisa** Huds. Rhizomatous perennial, erect, 100–420 mm tall. Leaves shorter than flowering stem, blades V-shaped to flat, 2–2.5 mm wide. Stem 3-angled, 1 mm diam. at middle. Inflorescence terminal, a dense foxtail-shaped 'panicle', 12–17 × 7–8 mm, basal bract inconspicuous, occasionally well developed, leaf-like, suberect. June–Nov. Localised in marshy places, below 1 500 m, NH, KB, WM (Springbok, Kamiesberg Mountains, Calvinia and Sutherland Districts, Free State, natural to Europe).

?CHRYSITRIX 4 spp., ?Namaqualand, W Cape and Australasia

[**Uncertain record C. capensis** L. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

CYPERUS (including *MARISCUS*) MATJIESGOED ± 695 spp., cosmopolitan

***eragrostis** Lam. Tufted, erect annual, 250–900 mm tall. Leaf blades flat, keeled, 4–8 mm wide. Stem 3-angled. Inflorescence of several, rounded, stalked clusters of spikelets radiating from stem apex, overtopped by several, spreading, leaf-like basal bracts. Spikelets flattened, 2.5–3 mm wide, light green to golden-brown. Nov.–Apr. Margins of watercourses, near sea level, G (lower reaches of Gariep through to the inland summer rainfall region of South Africa, New Zealand and Europe, natural to parts of N America and S America).

laevigatus L. (= *Juncellus laevigatus* (L.) C.B.Clarke) RIVIERKWEEK Rhizomatous or tufted, erect perennial, 100–600 mm tall. Leaf blades very short, rigid. Stem cylindrical, 2–3 mm diam. at middle. Inflorescence appearing lateral, ± 10–20(–30) × ± 8–20(–30) mm, a digitate cluster of (1–)several spikelets, overtopped by the largest, erect, and rigid basal bract. Spikelets 2–2.5 mm wide, light brown or purplish. Oct.–Apr. Margins of brackish pools and dune slacks, sea level up to 1 400 m, SN, G, NS, WM, TS, CCR (Sperrgebiet, northern bank of lower Gariep, Richtersveld, Spoegrivier Mouth, Calvinia, Sutherland and Prince Albert Districts, widespread in southern Africa and tropical regions worldwide).

longus L. DOOIWORTEL, WATERBIESIE, WATERKWEEK Rhizomatous, erect perennial, up to 1(–1.5) m tall. Leaf blades flat, keeled, 3–5 mm wide. Stem 3-angled. Inflorescence of several stalked clusters of spikelets, radiating from stem apex with several, suberect, leaf-like basal bracts. Spikelets flattened, linear, 1–1.5 mm wide, glumes dark reddish brown with pale margins. Oct.–Apr. Damp flats and watercourses, SN, G, NH, WM, TS, CCR (northern bank of lower Gariep, Richtersveld, Spektakel Pass, Calvinia and Prince Albert Districts, widespread elsewhere in southern and tropical Africa (var. **tenuiflorus**) with the typical variety in eastern southern Africa and Europe).

marginatus Thunb. MATJIESGOED Rhizomatous or tufted, erect perennial, up to 1(–1.5) m tall. Leaf blades absent. Stem cylindrical, ± 2 mm diam. at middle. Inflorescence occasionally viviparous, compact or of several stalked clusters of spikelets, radiating from stem apex with 3 suberect, rigid and leaf-like basal bracts, inconspicuous or up to ± 30 mm long. Spikelets flattened, 2–3(–4) mm wide, glumes chestnut-brown with pale margins. Oct.–Feb. Rock crevices in seasonal watercourses, sometimes brackish, below 900 m, SN, G, NS, NH, KB, KV, WM, TS, CCR (Sperrgebiet,

Richtersveld, Springbok, Vanrhynsdorp, Calvinia District, widespread elsewhere in southern Africa, Angola and Kenya).

sphaerospermus Schrad. Tufted or rhizomatous, erect perennial, up to 0.6 m tall. Leaf blades flat, keeled, ± 3 mm wide. Stem 3-angled. Inflorescence of several stalked clusters of spikelets, radiating from stem apex with several, suberect, leaf-like basal bracts. Spikelets flattened, 2 mm wide, golden-brown to reddish brown. Oct.–Mar. Marshes and watercourses below 600 m, KV, CCR (Vanrhynsdorp to Uitenhage, widespread in southern Africa).

tabularis Schrad. (= *Mariscus tabularis* (Schrad.) C.B.Clarke) Rhizomatous, erect perennial, up to 0.6 m tall. Leaf blades flat, keeled, 3–5 mm wide. Stem 3-angled. Inflorescence of several, rounded, stalked clusters of spikelets, radiating from stem apex, basal bracts several, leaf-like, suberect with the largest often erect. Spikelets 1.2 mm wide, glumes dark red, often with a broad green keel. Sept.–Dec. Localised on damp flats and watercourses below 600 m, KV, WM, CCR (Vanrhynsdorp, Lokenburg, and SW to E Cape).

thunbergii Vahl (= *Mariscus thunbergii* (Vahl) Schrad.) SNYRUIGTE Robust, tufted, erect perennial, up to 1.5 m tall. Leaf blades with serrated margins, flat, keeled, 5–10 mm wide. Stem 3-angled. Inflorescence of several, dense, elongated, stalked clusters of spikelets, radiating from stem apex, overtopped by several, suberect, leaf-like basal bracts. Spikelets 1 mm wide, dull red-brown. June–Dec. Near water, below 900 m, KB, KV, WM, CCR (Kamiesberg Mountains, Vanrhynsdorp, Lokenburg, and SW to E Cape).

usitatus Burch. BOESMANUINTJIE, HOENDERGRAS, INDIAN GRASS Cormous, deciduous, erect perennial, up to 250 mm tall. Leaf blades flat, keeled, 1–2(–3) mm wide. Stem 3-angled. Inflorescence a dense, terminal cluster of spikelets, occasionally with stalked clusters added, basal bracts several, spreading or suberect, leaf-like. Spikelets 2–2.5(–3) mm wide, dark red. Dec.–Apr. Shallow soils, in somewhat bare areas, ± 1 700 m, WM, CCR (Nuweveld Mountains, SW Cape, E Cape and widespread in central southern Africa).

ELEOCHARIS ± 255 spp., nearly cosmopolitan

limosa (Schrad.) Schult. Tufted, erect perennial, 200–600 mm tall. Leaf blades absent. Stems cylindrical, ± 5 mm diam. at middle. Inflorescence a single, terminal, oblong, brown spikelet, (18–)30–35 × 4–5 mm, basal bract scale-like and green. Aug.–Dec. Pools or marshes, 600–800 m, WM, CCR (northern Namibia, Lokenburg, SW Cape to KwaZulu-Natal, Madagascar).

FICINIA ± 75 spp., tropical and southern Africa, mainly W Cape

argyropa Nees Compact, erect, tufted or rarely rhizomatous perennial, up to 250 mm tall. Leaf sheaths with conspicuous papery, whitish ligules. Stems cylindrical, ± 0.5–1 mm diam., wiry. Inflorescence a single, terminal, broadly ovoid head 6–8 × 5–8 mm, overtopped by a few erect, rigid basal bracts. Spikelet glumes dark brown. July–Oct. Widespread on sandy flats, below 1 200 m, NS, NH, KV, WM, TS, CCR (Wallekraal, Groenrivier Mouth, Kotzesrus, Brand-se-Baai, Knersvlakte, Botterkloof Pass, Sutherland District, SW Cape to Riversdale). **(gce)**

brevifolia Nees ex Kunth Densely tufted, erect, robust perennial, 0.3–0.6(–1.5 m) tall. Leaf sheaths usually reddish, with conspicuous lacerated papery, whitish to reddish ligules, blades absent or present, very short to longer, narrower than stems. Inflorescence a single, terminal, ovoid head 7–15(–25) × 5–13(–22) mm, basal bracts suberect, leaf-like, often overtopping the spikelet cluster. Spikelet glumes light to dark brown. Aug.–Dec. Scattered along watercourses on mountain slopes below 1 200 m, G, WM, CCR (Richtersveld, Lokenburg, SW Cape to Riversdale). **(gce)**

compasbergensis Drège BESEMGOED Tufted, erect perennial, up to 0.7 m tall. Leaf sheaths dark reddish brown. Inflorescence a slender, terminal, interrupted panicle, 35–45 × 10 mm, usually overtopped by erect basal bract. Glumes light brown, often with a darker central area. Sept.–Mar.(–June). Mountain peaks and slopes, 1 400–1 600 m, WM (Calvinia and Sutherland Districts to E Cape).

deusta (P.J.Bergius) Levyns Relatively robust, tufted, erect perennial, up to 0.5(–0.9) m tall. Leaf sheaths with conspicuous, whitish, papery ligules, blades rigid. Stems cylindrical, 1–2 mm diam., rigid. Inflorescence a single, terminal, oblong head, 15–30(–55) × 5–7(–10) mm, basal bract short and inconspicuous or erect, rigid, and longer than spikelet cluster. Spikelet glumes blackish. Mar.–Aug. Sandy mountain slopes or flats below 1 700 m, NS, KB, CCR (Kamiesberg Mountains, Brand-se-Baai, SW Cape to Knysna). **(gce)**

dunensis Levyns Sparsely tufted, frequently 'stoloniferous' perennial, up to 200 mm tall. Leaf sheaths frequently reddish, blades well developed, ± 1 mm wide. Inflorescence a terminal, nar-

rowly ovoid head, ± 6 × 4 mm, basal bracts erect, rigid. Spikelet glumes dark red. Aug.–Oct. Coastal dunes or mountain slopes below 1 200 m, NS, NH, WM, TS, CCR (Kamieskroon, Hondeklipbaai, Lokenburg, Botterkloof Pass, SW Cape to Port Elizabeth). **(gce)**

indica (Lam.) Pfeiffer YSTERGRAS Tufted, frequently 'stoloniferous' perennial, 100–400 mm (–1 m) tall. Leaf sheaths frequently reddish, blades well developed, hemicylindrical, 1 mm wide or flattened, up to 4 mm wide. Inflorescence a terminal, broadly ovoid head, 8–11 × 7–11 mm, basal bracts erect to spreading, rigid. Spikelet glumes chestnut-brown. July–Nov. Flats and lower slopes, up to 650 m, NS, KV, CCR (Ruitersvlei, Vanrhynsdorp, and SW to E Cape).

laevis Nees (Poorly understood) Tufted, erect perennial, up to 0.75 m tall. Leaf sheaths often reddish, blades short, rarely well developed, ± 4 mm wide. Stem cylindrical, 2–2.5 mm diam. Inflorescence a terminal, compact, broadly ovoid head, ± 12 × 10 mm, basal bracts erect, rigid. Spikelet glumes dark brown. Sept.–Nov. Scattered in moist places usually below 1 000 m, G, NH, KB, TS, CCR (Richtersveld, Springbok, Kamiesberg Mountains, Botterkloof Pass, SW Cape and E Cape).

nigrescens (Schrad.) J.Raynal Tufted, erect perennial, 70–500 mm tall. Leaf blades shorter than stem, filiform. Stem lax or rigid, filiform to 1 mm diam. Inflorescence a single, terminal, ovoid head (5–)10–15 × (5–)10–12 mm, basal bracts suberect, filiform. Spikelet glumes light to dark brown or with pale yellowish margins and a dark central area, apices recurved. May–Oct. Flats to upper slopes, often in rock cracks, below 2 000 m, G, NH, KB, KV, WM, TS, CCR (widespread from Richtersveld to SW Cape and E Cape).

nodosa (Rottb.) Goetgh., Muasya & D.A.Simpson (= *Scirpoides nodosus* (Rottb.) Soják) VLEIBIESIE Tufted, erect perennial, up to 1 m tall. Leaf sheaths truncate at apex, blades absent. Stems rigid, compressed-cylindrical, 2–3 mm diam. Inflorescence appearing subterminal or lateral, a dense, rounded, cluster of brown spikelets (5–)9–20 × (5–)9–20 mm, overtopped by an erect, rigid, basal bract with obtuse apex. Dec.–Mar. Localised in damp sandy flats in mainly coastal areas, but up to 650 m in the Succulent Karoo, NH, WM, CCR (Kamieskroon, Lokenburg and Roggeveld Escarpment, widespread in S hemisphere).

oligantha (Steud.) J.Raynal (= *F. filiformis* auct.) Slender, tufted perennial, up to 250 mm tall. Leaf sheath light brown, blades filiform. Inflorescence terminal, bract filiform. Spikelets 1–4, brown. Sept.–Jan. Mountain slopes, 750 m, NH, KB, CCR (Kamiesberg Mountains: Grootberg, Toringberg and Clanwilliam to Knysna). **(gce)**

secunda (Vahl) Kunth Stoloniferous perennial, up to 0.6 m tall. Leaf sheaths brown, blades up to 200 mm long. Inflorescence a spike, spikelets chestnut-red. Glumes distichously arranged. July–Sept. Sandy flats below 1 000 m, NS, CCR (Komaggas to Mossel Bay). **(gce)**

quartzicola Muasya & N.A.Helme Clump-forming, rhizomatous perennial, with closely spaced culms, up to 200 mm tall. Sheaths sticky, brown, blades absent. Inflorescence appearing subterminal, bract as long as spikelets and in direction of culm. Spikelets brown. Sept. On slopes among quartzite stones, below 300 m, KV (northern Knersvlakte). **(ece)**

FIMBRISTYLIS ± 300 spp., cosmopolitan

bisumbellata (Forssk.) Bub. Tufted, erect annual, 100–300 mm tall. Leaf blades flat, up to 2 mm wide. Inflorescence compound, of many stalked clusters of spikelets each individually stalked, radiating from stem apex, overtopped by suberect, leaf-like basal bracts. Spikelets ovoid, 3–4 × 1–2 mm, light brown. Aug.–Dec. Temporarily moist places close to water, near sea level, G, CCR (Namibia, Botswana, lower reaches of Gariep, NW Cape, northern South Africa and widespread in tropics).

squarrosa (Poir.) Vahl Tufted, erect annual, 100–300 mm tall. Leaf blades flat, up to 1 mm wide. Inflorescence of several stalked clusters of spikelets, each individually stalked, radiating from stem apex, basal bracts suberect, leaf-like. Spikelets ovoid–oblong, 3–5(–9) × 1.5–2 mm, glumes light brown, aristate. Style base with long white hairs enveloping nutlet when young. Oct.–Mar. Temporarily moist places close to water, from near sea level up to 350 m, ?G, TS, CCR (Namibia, Botswana, ?Gariep Mouth, NW Cape, northern South Africa, and Clanwilliam District, ± cosmopolitan).

ISOLEPIS ± 75 spp., cosmopolitan

A. Spikelets flattened with 2-ranked glume arrangement

levynsiana Muasya & D.A.Simpson (= *Cyperus tenellus* L.f., *I. tenella* (L.f.) Muasya & D.A.Simpson) Small, tufted, erect annual, up to 150 mm tall. Leaf blades hair-like. Stem hair-

like. Inflorescence terminal, a digitate cluster of (1–)few spikelets, basal bract erect to suberect, hair-like. Spikelets flattened, 1.5–3 mm wide, green or reddish. Sept.–Jan. Localised in seasonally moist places below 800 m, NH, WM, CCR (Garies, Lokenburg, SW to E Cape).

A.' Spikelets narrowly cylindrical with spirally arranged glumes

angelica B.L.Burtt Rhizomatous perennial, 30–80 mm tall. Leaf blades filiform. Stems filiform. Inflorescence terminal, of 1–few spikelets, basal bract erect, filiform. Spikelet ovoid, 3–5 × 2–2.5 mm, glumes dark red. Nutlets longitudinally ribbed. Oct. Marshy places, about 1 600 m, WM (Sutherland District, E Cape, Lesotho).

brevicaulis (Levyns) J.Raynal Tufted annual, up to 40(–90) mm tall. Leaf blades filiform. Stems filiform. Inflorescence a terminal head of 1–few spikelets, basal bracts erect–spreading, filiform. Spikelets ovoid, 3–6 × 2–3 mm, glumes green, frequently with dark red markings, aristate(–long-aristate). Nutlets tuberculate. Aug.–Oct. Scattered near pools on gravel flats, up to 1 200 m, NH, WM, TS, CCR (Springbok, Concordia, Kamieskroon, Calvinia and Sutherland Districts to SW Cape). **(gce)**

capensis Muasya (including **Scirpus dregeanus** C.B.Clarke) Minute, tufted annual, 20–70 mm tall. Leaf blades filiform. Stems filiform. Inflorescence a terminal head of 1–few spikelets, basal bracts suberect to spreading, filiform. Spikelets ovoid, 4–5 × 1.5–2 mm, glumes reddish brown with a light-coloured keel. Nutlets smooth. Sept.–Oct. Seasonally moist places below ± 1 600 m, NH, KB, WM, CCR (Springbok, Kamiesberg Mountains, Calvinia District and SW Cape). **(gce)**

cernua (Vahl) Roem. & Schult. (= *Isolepis verrucosula* (Steud.) Nees var. *setiformis* (Benth.) Muasya) Tufted annual, up to 50(–150) mm tall. Leaf sheaths frequently reddish, blades absent or rarely very short. Stems filiform. Inflorescence terminal, of 1(–2) spikelet(s), basal bract inconspicuous. Spikelet ovoid, 3 × 1.5 mm, glumes straw-coloured or reddish, with green keels, mucro < 0.1 mm long. Nutlets tuberculate. July–Dec. Localised in marshy flats, below 700 m, G, NH, CCR (Richtersveld, Anenous Pass, Springbok, S of Garies, W Cape, Australia, Tristan da Cunha (var. **setiformis**); other vars. widespread in southern Africa and cosmopolitan).

hemiuncialis (C.B.Clarke) J.Raynal Tufted annual, up to 70 mm tall. Leaf blades filiform. Stems filiform. Inflorescence terminal, a single spikelet, basal bract inconspicuous(–well developed), filiform. Spikelet ovoid, 1–2 × 1 mm, glumes reddish brown. Nutlets minutely papillose. May–Nov. Seasonally moist places, NH, KB, KV, TS (Namibia, Anenous Pass, Kamiesberg Mountains, Knersvlakte and southern Tanqua Karoo).

hystrix (Thunb.) Nees BIESIE Small, densely tufted annual, 20–100 mm tall. Leaf blades filiform. Stems filiform. Inflorescence a terminal head of 1–3 spikelets, basal bracts suberect or spreading, filiform. Spikelets ovoid, 3 × 2 mm, glumes green, mucronate. Nutlets papillose. Aug.–Nov. Damp flats, up to ± 1 600 m, KB, WM, CCR (Kamiesberg Mountains, Sutherland District and W Cape, introduced into Australia). **(gce)**

incomtula Nees Tufted annual, often entirely red-coloured, 20–80 mm tall. Leaf blades filiform. Stems filiform. Inflorescence terminal, a head of 1–few spikelets, basal bract inconspicuous to well developed, filiform, suberect to reflexed. Spikelets ovoid, 3–6 × 1.5–2 mm, glumes entirely red or green with white or red edges. Nutlets papillose. July–Oct. Localised on muddy flats or sandy pockets in sandstone, usually below 1 000 m, NS, NH, KB, KV, WM, CCR (Kamieskroon to Kotzesrus, Klawer, Calvinia and Sutherland Districts, SW Cape to Port Elizabeth). **(gce)**

karroica (C.B.Clarke) J.Raynal Small, tufted annual, up to 30(–90) mm tall. Leaf blades filiform. Stems filiform. Inflorescence terminal, a head of 1–few spikelets, basal bract inconspicuous, rarely well developed and filiform. Spikelets oblong(–ovoid), glumes straw-coloured. Nutlets faintly transversely rugose. Oct.–Feb. Watercourses below 1 700 m, G, NH, KB, WM, CCR (Namibia, NE of Steinkopf; Kabinafontein, Kamiesberg Mountains, Calvinia and Sutherland Districts and Karoo).

marginata (Thunb.) A.Dietr. (= *Isolepis cartilaginea* R.Br.) Tufted annual, 50–150(–220) mm tall. Leaf sheaths frequently dark red, blades filiform. Stems filiform. Inflorescence a terminal head of 1–several spikelets, basal bract conspicuous, filiform, suberect to spreading. Spikelets ovoid, 4–6 × 1.5–2 mm, glumes straw-coloured with dark red markings. Nutlets faintly transversely rugose, minutely papillose or smooth. (July–)Sept.–Dec. Dunes, flats and slopes in seasonally damp sandy soil, up to 1 200 m, NS, NH, KB, KV, WM, CCR (Spektakel Pass, Kamiesberg Mountains, Wallekraal, Kareeberg, Brand-se-Baai, Vanrhynsdorp, Calvinia District to E Cape, also Australia).

namaquana Muasya & J.Viljoen. Tufted annual, up to 30 mm tall. Leaf sheaths 5–72 mm long, wine-red, blade 3–137 mm long. Inflorescence terminal or pseudolateral, bract 3–12 mm long. Spikelets 1–6, 4.5–10 × 1.7–4 mm, with 12–40 spirally arranged glumes. Glumes 1.8–3.9 mm long, boat-shaped, pale green at base and wine-red towards apex, midrib green, with mucro up to 0.3 mm long. Style bifid. Nutlets 0.6–1.3 × 0.6–1 mm, lens-shaped, yellow to black, with col-

liculate (tortoise shell-like) surface. Aug.–Nov. Sandy soils in seasonal seepages, 200–600 m, NH, KV (Namaqualand National Park and Vanrhynsdorp: base of Matsikamma Mountain). **(ece)**

prolifera R.Br. Tufted perennial, up to 0.5 m tall. Leaf sheaths usually reddish, blades absent. Stems erect or lax, cylindrical, 1–2.5 mm diam. Inflorescence frequently viviparous, a terminal head of several spikelets of differing lengths, basal bract erect or suberect, scale-like, green. Spikelets oblong, 6–10 × 2 mm, glumes light or rarely dark brown. Nutlets minutely papillose. Oct.–Mar. Streamsides, marshes and seeps, ± 100 m, KV, CCR (southwestern Knersvlakte to SW and E Cape, KwaZulu-Natal, Australia, New Zealand, St Helena and Tristan da Cunha).

sepulcralis Steud. (= *Scirpus chlorostachyus* Levyns) Tufted annual, up to 80 mm tall. Leaf blades filiform. Stems filiform. Inflorescence a terminal head of 1–few spikelets, basal bract erect (–spreading), filiform. Spikelets ovoid, 1.5–2 × 1 mm, glumes dark red. Nutlets minutely papillose. Aug.–Feb. Watercourses, ± 1 100 m, KB, CCR (Kamiesberg Mountains, SW Cape to KwaZulu-Natal, widespread in sub-Saharan Africa, Madagascar and the Atlantic Islands, introduced into Australia and New Zealand).

setacea (L.) R.Br. Tufted annual, up to 150 mm tall. Stems filiform. Inflorescence a terminal head of 1–few spikelets, basal bract erect to suberect, filiform. Spikelets ovoid, 2(–3.5) × 1.5–2 mm, glumes pale, often with red markings or entirely red. Nutlets longitudinally ribbed. Sept.–Apr. Localised in seepages and watercourses, 900–1 600 m, WM, TS, CCR (Nuweveld Mountains and Prince Albert District: Botterkraal, nearly cosmopolitan).

sororia Kunth Tufted annual, up to 150 mm tall. Stems filiform. Inflorescence a terminal head of 1–3 spikelets, basal bract inconspicuous, suberect, filiform. Spikelets ovoid, 3–5 × 2 mm, glumes dark red with a green keel. Nutlets with transversely elongated vertical rows of cells. Feb. Temporarily moist places, 1 650 m, WM, CCR (Nuweveld Mountains and Riversdale to near Uitenhage). **(gce)**

striata (Nees) Kunth WATERGRAS Aquatic, mat-forming, branched perennial. Inflorescence of single stalked spikelets, 1–several produced at upper few nodes of stem, bract sheaths at these nodes dark red. Spikelets ovoid, 7 × 3 mm, glumes dark red(–green). Nutlets longitudinally finely striated. Aug.–Dec. Submerged in pools and streams at high altitudes, 1 200 m, KB, CCR (Kamiesberg and Bokkeveld Mountains to SW Cape and Albany District).

trachysperma Nees Tufted annual, up to 150 mm tall. Stems filiform. Inflorescence terminal, of 1–4 spikelets, basal bract inconspicuous to longer than inflorescence, suberect, filiform. Spikelets ovoid, 3–5 × 2 mm, glumes dark red with a green keel, mucro 0.1–0.2 mm long. Nutlets tuberculate. July–Nov. Watercourses and pool margins, 100–800 m, G, NH, KV, WM, CCR (Namibia, Richtersveld, Komaggas, Garies, Vanrhynsdorp District, Lokenburg, and W Cape, naturalised in Australia).

PSEUDOSCHOENUS 1 sp., southern Africa

inanis (Thunb.) Oteng-Yeb. (= *Scirpus inanis* (Thunb.) Steud., *S. spathaceus* Hochst.) MATJIESGOED, MATJIESRIET Rhizomatous perennial, up to 2 m tall. Leaf sheaths often dark reddish black, blades absent. Stem cylindrical, 4–7 mm diam. at middle. Inflorescence a slender, terminal panicle of numerous spikelets, basal bract erect, scale-like, brown. Spikelets pale brown, ± 8 × 2 mm. Year-round. Streamsides, sea level up to 1 500 m, G, KB, WM, TS, CCR (Namibia, lower reaches of Gariep, Kamiesberg Mountains, Klein Roggeveld, Karoopoort, Nuweveld Mountains, through to Free State and Lesotho).

SCHOENOPLECTUS ± 65 spp., southern and tropical Africa

leucanthus (Boeck.) J.Raynal Small, tufted, erect annual, 20–100 mm tall. Leaf blades absent–very short. Stems cylindrical, 0.5–0.8 mm diam. at middle. Inflorescence appearing lateral, up to 10 × 10 mm, a digitate cluster of a few spikelets or rarely solitary, overtopped by an erect, long basal bract. Spikelets green to dark brown. Aug. Riverbanks, below 700 m, G, CCR (Namibia, Botswana, Richtersveld, NW Cape, to northern South Africa and Zambia).

scirpoides (Schrad.) Browning PAPGRAS, STEEKBIESIE Reed-like, tufted, erect perennial, up to 1.5(–3) m tall. Leaf sheaths scarious, blades absent or rarely very short. Stems soft, cylindrical, ± 7 mm diam. at middle. Inflorescence appearing lateral, of numerous stalked clusters of spikelets, each individually stalked, basal bract inconspicuous or well developed, erect, rigid with a spine-like tip, shorter or longer than inflorescence. Spikelets brown, ovoid, usually ± 10 × 5 mm. Nov.–Jan. Marshes and riverbanks, mainly coastal areas below 750 m, SN, G, CCR (lower reaches of Gariep, SW Cape to Mozambique).

SCIRPOIDES ± 5 spp., nearly cosmopolitan

dioecus (Kunth) Browning (= *Scirpus dioecus* (Kunth) Boeck.) BIESIE Tufted, erect perennial, up to 1 m tall. Leaf sheaths dark reddish brown, blades absent. Stems rigid, slightly compressed-cylindrical, ± 2 mm diam. at middle. Inflorescence pseudo-subterminal, a dense, digitate cluster of spikelets ± 15–25 × 20–25 mm, overtopped by an erect, rigid, basal bract with a spine-like tip. Spikelets light to dark brown. Sept.–Dec. Banks of seasonal rivers and pans, often brackish, up to 1 400 m, SN, G, NS, NH, WM, TS, CCR (widespread in southern Africa).

TETRARIA ± 55 spp., Africa and Australasia, mainly South Africa

nigrovaginata (Nees) C.B.Clarke Tufted perennial, up to 0.5 m tall. Stem nodose, cylindrical. Leaf blades up to 300 mm long, sheaths brown. Inflorescence a slender, terminal, interrupted panicle, basal bract erect, leaf-like with a brown sheath. Spikelets brown. Jan.–Apr. Sandy mountain slopes and plateaux up to 1 200 m, NS, CCR (Komaggas, Bitterrivier to Cape Peninsula to Witteberg Mountains). **(gce)**

ustulata (L.) C.B.Clarke Tufted, erect perennial, 0.45–1.2 m tall. Stem nodose, cylindrical. Leaf blades up to ± 400 mm long, sheaths, notably on flowering stem, dark blackish brown. Inflorescence a slender, terminal, interrupted panicle, ± 200 × 10–20 mm, basal bract erect, leaf-like with a dark sheath. Spikelets reddish brown. Year-round. Sandy flats, slopes and plateaux, up to ± 1 600 m, KB, CCR (Kamiesberg Mountains, SW Cape). **(gce)**

sp. A (similar to **Tetraria picta** (Boeck.) C.B.Clarke from CCR) Tufted perennial, up to 0.6 m tall. Stem scapose, cylindric. Leaf sheaths partially open and brown at base, blades up to 50 mm long. Inflorescence a spike, lowest bract longer than inflorescence. Dec.–Feb. ?Habitat, KB (Kamiesberg Mountains: Grootberg). **(ece)**

DIOSCOREACEAE

by D.A. Snijman

DIOSCOREA YAM 400 spp., pantropical and warm temperate

elephantipes (L'Hér.) Engl. ELEPHANT'S FOOT, HOTTENTOTSBROOD Deciduous perennial with a large, exposed tuber covered with greyish, angular, corky plates, stems twisting to the left, up to 0.9 m long. Leaves heart-shaped. Male flowers in erect, spiny racemes, female flowers in spinescent, nodding to spreading spikes, yellowish green. Nov.–Feb. Dry rocky slopes, G, KB, WM, CCR (Richtersveld Mountains, Kamiesberg and Cederberg Mountains, Roggeveld Escarpment and Uniondale to Graaff-Reinet and southern Karoo).

hemicrypta Burkill Deciduous perennial with half-exposed tuber covered with greyish, angular, corky plates, base broadly lobed, stems erect or twisting to the left, up to 1.2 m long. Leaves broadly ovate, slightly heart-shaped at base. Male flowers in erect racemes, female flowers in spreading spikes, yellowish. Jan.–Apr. Dry stony slopes, TS, CCR (?near Botterkloof Pass and Little Karoo to Prince Albert). **(gce)**

HAEMODORACEAE

from Goldblatt & Manning (2000a)

WACHENDORFIA ROOIKANOL 4 spp., winter rainfall region of South Africa **(gce)**

multiflora (Klatt) J.C.Manning & Goldblatt (= *W. parviflora* W.F.Barker) Rhizomatous geophyte, 100–300 mm tall. Leaves narrow, softly hairy. Flowers in a dense, rounded panicle, dull yellow to brownish purple, style deflected to right or left of plane of symmetry, bracts green. Aug.–Sept. Sandstone and granitic soils, NS, NH, KB, CCR (Kamieskroon to Garies, Hondeklipbaai, Gifberg, Cape Peninsula and Robertson). **(gce)**

paniculata Burm. KOFFIEPIT Rhizomatous geophyte, mostly 200–700 mm tall. Leaves narrow, usually hairy. Flowers in a lax to dense panicle, apricot to yellow, style deflected to right or left of plane of symmetry, bracts scarious. Mostly Aug.–Nov. Mainly sandstone soils, KV, CCR (Vanrhynsdorp: flats below Gifberg, and Bokkeveld Mountains to Port Elizabeth). **(gce)**

HEMEROCALLIDACEAE (= *ANTHERICACEAE* in part)

by J.C. Manning

CAESIA BLUE GRASS LILY ± 12 spp., South Africa, Madagascar, Australia

sabulosa Boatwr. & J.C.Manning Grass-like rhizomatous geophyte, up to 0.6 m tall, forming clumps. Leaves strap-shaped to linear, with flattened pseudopetiole. Flowers in a branched panicle, pale pink to blue, nodding, filaments scabrid and striped blue and white. Nov.–Jan. In deep sand in strandveld, NS, CCR (NW of Kotzesrus and Bokkeveld Mountains to W Coast). **(gce)**

HYACINTHACEAE

by J.C. Manning & P. Goldblatt; **Lachenalia** by G.D. Duncan

1. Bracts (at least the lower) spurred; seed coat brittle, loose, forming a peripheral wing:
2. Flowers short-lived, lasting up to a single day; tepals ± connate below, falling off early by a complete transverse split; inflorescence unbranched or if highly branched, then erect and stiff or wiry . . . . . **Drimia**
2.' Flowers long-lived, lasting two to three days; tepals free, persistent in fruit; inflorescence highly branched, more-or-less twining, soft and fleshy . . . . . **Bowiea**
1.' Bracts never spurred; seed coat tightly adhering to endosperm:
3. Seeds flattened or angled, rarely globose but then stigma trifurcate; stigma ± trifid or capitate:
4. Tepals fused below into an elongate tube at least half as long as perianth; stamens inserted at top of tube, included or exserted:
5. Outer tunics densely fibrous; flowers in a dense, cylindrical raceme; bracteoles well developed; flowers large, perianth tube 15–25 mm long; filaments fleshy, exserted. . . . . **Pseudogaltonia**
5.' Outer tunics membranous or leathery; flowers in a lax, usually ± secund racame; bracteoles absent; flowers smaller, perianth tube < 10 mm long; filaments ± membranous, included and appressed to the tepals . . . . . **Dipcadi**
4.' Tepals free or fused less than half as long as perianth; stamens ± exserted and free from tepals above:
6. Tepals thick-textured, ± oblong, whitish or yellowish with broad, green to brown longitudinal band on adaxial surface associated with 3–5 medially aggregated veins . . . . . **Albuca**
6.' Tepals thick- or thin-textured, usually ovate or lanceolate, unicoloured or with narrow, indistinct green or brownish keel on adaxial surface not associated with medially aggregated veins . . . . . **Ornithogalum**
3.' Seeds ellipsoidal or globose to pear-shaped; stigma minute and penicillate:
7. Bracts vestigial or lacking; ovules (1)2 per locule, apparently basal; leaves usually spotted or streaked . . . . . **Ledebouria**
7.' Bracts well-developed, at least on upper flowers; ovules 2 or more per locule, clearly axile; leaves plain or spotted:
8. Filaments inserted in 2 series at different levels, never fused below; lower bracts often reduced; plants with a well-developed, tubular, membranous cataphyll . . . . . **Lachenalia**
8.' Filaments inserted in 1 series, either at the same level or obliquely, often fused below; bracts always well developed; plants without a prominent membranous cataphyll:
9. Leaves several, usually ascending; inflorescence distinctly pedunculate:
10. Inflorescence topped by a tuft of leafy bracts longer than the flowers; flowers campanulate with stamens inserted near the base of the tepals . . . . . **Eucomis**
10.' Inflorescence not topped by a tuft of leafy bracts; flowers tubular with the stamens inserted obliquely near the middle of the tube . . . . . **Veltheimia**
9.' Leaves 2, spreading or prostrate; inflorescence not distinctly pedunculate:
11. Leaves never pustulate or bristly; bulb tunics decaying above into a neck of narrow, flat, papery segments; bracts usually shorter than flowers . . . . . **Daubenya**

11.' Leaves smooth, pustulate or bristly; bulb tunics not decaying above into narrow segments; bracts usually equalling or longer than the flowers:
12. Tepals caudate; capsule narrowly ovoid, not distinctly 3-lobed, remaining enclosed by the perianth at maturity ..... **Namophila**
12.' Tepals acute but never caudate; capsule obtriangular and deeply 3-angled or -winged, exposed from the withered perianth at maturity ..... **Massonia**

ALBUCA (= *COILONOX, STELLARIOIDES*) 110–140 spp., mainly sub-Saharan Africa, especially winter rainfall region with 1 sp. extending into Ethiopia

Osmyne group

Tepal whorls ± similar, both spreading

A. Style shorter than to ± as long as ovary and stamens, erect; stigma small, without long papillae; leaf solitary, elliptical to ovate

deserticola J.C.Manning & Goldblatt (= *Ornithogalum etesiogaripense* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, 50–70 mm tall. Leaf 1 or 2, withering from the tip at flowering, falcate, narrowly lanceolate-attenuate, canaliculate, glaucous, glabrous or pubescent. Flowers spreading on pedicels 2–6 mm long, whitish with darker keels, tepals 5–6 mm long, filaments lanceolate, 4–5 mm long. Aug.–Sept. Gravel plains, SN, G, NH (southern Namibia to northern Namaqualand). **(ece)**

psammophora (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ornithogalum psammophorum* U.Müll.-Doblies & D.Müll.-Doblies) Like **A. deserticola** but leaf acute (not attenuate) and not withering from tip at flowering, rough with adhering sand grains. Sept.–Oct. Sandy flats and hollows, NH, KV (Namaqualand to Knersvlakte). **(ece)**

strigulosa (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ornithogalum strigulosum* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, 50–70 mm tall. Leaf 1, dry at flowering, prostrate, elliptical, densely strigose on upper surface and margins with golden hairs. Flowers spreading on pedicels 2–6 mm long, buff with darker keels, tepals 5–6 mm long, filaments ovate, 4–5 mm long. Oct.–Dec. Quartz and gravel plains, SN, NH (southern Namibia to eastern Namaqualand). **(ece)**

unifolia (Retz) J.C.Manning & Goldblatt (= *Ornithogalum ovatum* Thunb., *O. unifolium* Retz.) Bulbous geophyte, 60–300 mm tall. Leaf 1(2 or 3), usually dry at flowering, spreading, oblong to ovate, leathery, sometimes puberulous, margins sometimes cartilaginous. Flowers spreading on pedicels 5–15 mm long, pale yellow to cream or buff with dark keels, tepals 10 mm long, filaments ovate-quadrate, 5 mm long. Capsule subglobose, ± 8 mm long. Sept.–Nov. Stony flats, SN, G, NH, KB, WM, TS, CCR (southern Namibia through Namaqualand, Bushmanland and Roggeveld to Tanqua Karoo and western Little Karoo).

A.' Style twice as long as ovary, often deflexed; stigma capitate, conspicuously papillate
*B. Leaf solitary (see also **A. sabulosa** below)*
C. Leaf ribbed and scabridulous

karachabpoortensis (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ornithogalum karachabpoortense* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, up to 150 mm tall. Leaf 1, dry at flowering, spreading, elliptical, leathery, scabridulous and collecting sand, longitudinally closely ribbed. Flowers as in **A. unifoliata**. Sept.–Oct. Gravelly quartz and granite flats, G, NH (Richtersveld to Steinkopf). **(ece)**

scabrocostata (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ornithogalum scabrocostatum* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, up to 150 mm tall. Leaf 1, dry at flowering, spreading, succulent, subterete, scabridulous, longitudinally closely ribbed with a broad, sunken, hyaline, longitudinal window dorsally. Flowers as in **A. unifoliata**. Sept.–Oct. Gravelly and quartzitic slopes, G (Richtersveld: Helskoof, Eksteenfontein and Khubus). **(ece)**

C.' Leaf smooth

dilucula (Oberm.) J.C.Manning & Goldblatt (= *Ornithogalum diluculum* Oberm.) Bulbous geophyte, up to 250 mm tall. Leaf 1(2), dry at flowering, spreading, oblong-ovate, canaliculate, ± 80 × 15–20 mm, margin thickened, cartilaginous and pale, often crisped. Flowers slightly nodding, firm-textured, yellow with greyish green keels, opening in early morning, tepals oblong, ± 15 × 5 mm, filaments subulate, ± 8 mm long. Sept. Stony flats, KV, WM, TS, CCR (Knersvlakte through Hantam to Witteberg Mountains). **(gce)**

stuetzeliana (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ornithogalum stuetzelianum* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, up to 100 mm tall. Leaf 1, linear-involute, ± canaliculate-cylindrical, ± 1 mm diam. Flowers as in **A. unifoliata**. Apr.–May. Rocky slopes, SN, G (southern Namibia and Richtersveld). **(ece)**

unifoliata G.D.Rowley (= *Ornithogalum unifoliatum* (G.D.Rowley) Oberm.) Bulbous geophyte, up to 120 mm tall. Leaf 1, dry at flowering, erect, succulent, clavate, acute, ± 40 mm long and 10 mm diam. Flowers spreading, otherwise as for **A. dilucula**. Oct. Gravelly slopes, G, NH (Richtersveld to Steinkopf). **(ece)**

zebrina Baker (= *Ornithogalum zebrinum* (Baker) Oberm.) Bulbous geophyte, up to 250 mm tall. Leaf 1, withering at flowering, erect, terete, coiled at tip, ± 140 × 2 mm, surrounded at base by horizontally barred sheaths. Flowers spreading, firm-textured, yellow with greenish keels, tepals oblong, ± 8 × 4 mm, filaments subulate, minutely scabrid. Aug.–Sept. Sandy and gravelly slopes, G, NH (Richtersveld to central Namaqualand). **(ece)**

B.' Leaves 2–many
D. Leaves glandular or sticky

glandulifera J.C.Manning & Goldblatt (= *Ornithogalum glandulosum* Oberm.) (including **A. polyodontula** (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt, **A. subglandulosa** (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt) Bulbous geophyte, up to 200 mm tall; scape, bracts and pedicels glabrous or glandular-hairy. Leaves 4–11(–35), linear-involute, apically coiled, glandular-hairy, ± 140 × 1 mm. Flowers as in **A. suaveolens**. Sept. Sandy and gravelly flats, SN, G, NH (southern Namibia to central Namaqualand). **(ece)**

pentheri (Zahlbr.) J.C.Manning & Goldblatt (= *Ornithogalum pentheri* Zahlbr.) (including **A. pearsonii** (F.M.Leight.) J.C.Manning & Goldblatt) Bulbous geophyte, up to 200 mm tall; scape, bracts and pedicels sparsely glandular-hairy. Leaves 2–4, clasping below, linear-lanceolate, canaliculate, glandular-hairy. Flowers nodding, firm-textured, tepals reflexed, oblong, ± 15 × 5 mm, filaments lanceolate or quadrate, ± 8 mm long, style deflexed. Aug.–Oct. Rocky sandstone and dolerite outcrops, SN, G, NH, WM, CCR (southern and southeastern Namibia, Bushmanland through Namaqualand and Hantam Plateau to Olifants River Valley).

sabulosa (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ornithogalum sabulosum* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, up to 300 mm tall. Leaves (1)2, strap-shaped, attenuate, rough or smooth but always sticky and collecting sand, up to 40 × 10 mm. Flowers as in **A. suaveolens**. Sept.–Oct. Deep red sands, SN, G, NS, KV, CCR (Sperrgebiet and Richtersveld along the coast to Yzerfontein). **(gce)**

D.' Leaves not glandular or sticky
E. Leaves ± narrowly cylindrical

consanguinea (Kunth) J.C.Manning & Goldblatt (= *Ornithogalum polyphyllum* Jacq.) (including **A. semipedalis** Baker) Bulbous geophyte, 150–600 mm tall. Leaves 5–20, erect, linear, semiterete, loosely coiled apically on drying. Flowers white or rarely yellow with green keels, fragrant, otherwise as in **A. suaveolens**. Aug.–Sept. Stony slopes, NH, KB, KV, WM, CCR (northern Namaqualand through Hantam and Knersvlakte to Tulbagh). **(gce)**

obtusa J.C.Manning & Goldblatt (= *Ornithogalum bruce-bayeri* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, 100–200 mm tall. Leaves 6 or 7, flexed to one side, cylindrical-clavate, 50–100 mm long, ± 5 mm diam. Flowers in a dense, subcapitate raceme, otherwise as for **A. suaveolens**. Sept. Gravelly quartzite flats and slopes, G (Richtersveld). **(ece)**

osmynella (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ornithogalum osmynellum* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, up to 200 mm tall. Leaves

2–5, filiform, loosely coiled apically. Flowers suberect on pedicels mostly 15–30 mm long, yellow with green keels, tepals oblong, 8–11 × 2–4 mm, filaments subulate, 5–7 mm long. Mar.–Apr. Quartzite crevices, NS, NH (northern Namaqualand). **(ece)**

E.' Leaves canaliculate

paucifolia (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ornithogalum paucifolium* U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, 100–200 mm tall. Leaves 2–5, linear-canaliculate or -involute, leathery, loosely coiled, 100–200 × 5 mm. Flowers as in **A. suaveolens**, filaments marked with a broad green band. Aug.–Sept. Sandy flats and flood plains, NH, KV, WM, TS (Upper Karoo and central Namaqualand through Knersvlakte and Hantam Plateau to Tanqua Karoo).

gildenhuysii (Van Jaarsv.) J.C.Manning & Goldblatt (= *Ornithogalum gildenhuysii* Van Jaarsv.) Like **A. suaveolens** but pendent on cliffs with trailing, shallowly canaliculate leaves 250–1 000 × 10–42 m. Sept.–Oct. S-facing cliffs, NH (Skaaprivier Gorge). **(ece)**

suaveolens (Jacq.) J.C.Manning & Goldblatt (= *Ornithogalum suaveolens* Jacq., *Ornithogalum vittatum* (Ker Gawl.) Kunth) (including **A. arenosa** J.C.Manning & Goldblatt) BONTTJIENK Bulbous geophyte, 100–500 mm tall. Leaves 2–6, sometimes dry at flowering, linear-lanceolate, canaliculate, clasping at base. Flowers spreading to nodding, firm-textured, yellow with green keels, tepals oblong, ± 15 × 5 mm, filaments subulate, ± 8 mm long. Sept.–Nov. Dry slopes and flats, SN, G, NH, KV, TS, CCR (Sperrgebiet through Namaqualand to Humansdorp). **(gce)**

E." Leaves ± flat in cross section

concordiana Baker (= *Ornithogalum apertum* (I.Verd.) Oberm.) Bulbous geophyte, 100–200 mm tall. Leaves 10–20, suberect, narrowly oblong, glaucous, corkscrew-twisted. Flowers as in **A. suaveolens**. Aug.–Sept. Stony and gravelly flats, NH, KV, WM, TS, CCR (southeastern Namibia, Bushmanland through Namaqualand to Clanwilliam, Hantam Plateau, Roggeveld, Tanqua Karoo and Little Karoo to Uniondale).

secunda (Jacq.) J.C.Manning & Goldblatt (= *Ornithogalum secundum* Jacq.) Bulbous geophyte, 100–350 mm tall. Leaves 5–14, dry at flowering, suberect or spreading in a basal rosette, oblong, 50–150 × 8–15 mm, margin often hyaline or fimbriate. Flowers often in dense, cylindrical racemes on suberect pedicels up to 50 mm long, otherwise as in **A. suaveolens**. Aug.–Nov. Clay or gravelly flats, G, NH, KV, WM, TS, CCR (Richtersveld through Namaqualand to Saldanha, Tanqua Karoo, Hantam Plateau through to Matjiesfontein). **(gce)**

Albuca group

Tepal whorls dimorphic, inner erect and concealing stamens and ovary

A. Flowers always nodding; inner tepals with a hinged, apical flap
B. Flowers white and green

canadensis (L.) F.M.Leight. (= *A. altissima* Dryand., *A. maxima* Burm.f.) WITTAMARAK Bulbous, usually robust geophyte, 0.3–1.5 m tall, bulb tunics occasionally weakly fibrous above. Leaves 4–6, lanceolate-canaliculate, clasping and often inflated below. Flowers nodding on weakly arching pedicels, white with green keels, 15–25 mm long; inner tepals apically hinged; outer stamens sterile, filaments oblanceolate; style obpyramidal. Capsules erect on horizontal, apically abruptly bent pedicels. Aug.–Oct. Rocky sandstone or granitic soils, often roadsides, G, NH, KV, WM, TS, CCR (Richtersveld Mountains, Namaqualand to Riversdale). **(gce)**

leucantha U.Müll.-Doblies (= *Ornithogalum leucanthum* (U.Müll.-Doblies) J.C.Manning & Goldblatt) Bulbous geophyte, 150–500 mm tall, bulb tunics becoming fibrous above. Leaves 2 or 3, lanceolate-canaliculate, clasping below. Flowers nodding on abruptly bent pedicels, white with green keels, 15–20 mm long; inner tepals apically hinged; outer stamens sterile; style obpyramidal. Seeds with wart-like projections. Aug.–Oct. Rocky and gravelly slopes, SN, G, NH, KB, WM (southeastern Sperrgebiet and southern Richtersveld through Namaqualand to Loeriesfontein). **(ece)**

B.' Flowers yellow and green
C. Bulb tunics ± fibrous above

acuminata Baker (= *Ornithogalum acutum* J.C.Manning & Goldblatt) Bulbous geophyte, 200–500 mm tall, bulb tunics becoming fibrous above, sometimes strongly so. Leaves 2–10, linear-canaliculate, clasping below. Flowers nodding on abruptly bent pedicels, yellow to green with green keels, 15–25 mm long; inner tepals apically hinged; outer stamens sterile; style obpyramidal. Sept.–Oct. Sandy and stony flats and slopes, G, NH, KV, CCR (Richtersveld: Boegoeberg through Namaqualand to Port Alfred).

cooperi Baker (= *Ornithogalum cooperi* (Baker) J.C.Manning & Goldblatt, *A. karooica* U.Müll.-Doblies) Bulbous geophyte, 300–600 mm tall, bulb tunics fibrous. Leaves 2 or 3(4), slender, channelled, often papillate abaxially, conspicuously clasping and strongly warty below. Flowers nodding on abruptly bent pedicels, yellow with green keels, 15–25 mm long; inner tepals apically hinged; outer stamens sterile; style obpyramidal. Sept.–Nov. Stony or sandy slopes and flats, sometimes limestone, G, NH, KV, WM, TS, CCR (Richtersveld through Namaqualand and western Karoo to Cape Peninsula and to Great Karoo).

C.' Bulb tunics not fibrous
*D. Leaves hairless (see also **A. villosa**)*

flaccida Jacq. (= *Ornithogalum flaccidum* (Jacq.) J.C.Manning & Goldblatt) SLIME LILY, SLYMLELIE, TAMARAK Bulbous geophyte, 0.4–1 m, outer bulb tunics membranous. Leaves 3–6, lanceolate-canaliculate, channelled, clasping below. Flowers nodding on arching pedicels, mostly yellow, sometimes with green keels, 15–25 mm long; inner tepals apically hinged; outer stamens sterile; style prismatic, longer than the ovary. Aug.–Oct. In deep coastal sandy soils and inland sand plumes, NS, KV, CCR (Brand-se-Baai and Vredendal to Stilbaai). **(gce)**

paradoxa Dinter (= *Ornithogalum dividens* J.C.Manning & Goldblatt) Bulbous geophyte, 0.4–1 m, typically clumped or with several stems, bulb conspicuously depressed and fragmenting into segments like garlic, outer tunics membranous. Leaves 4–6, channelled, clasping and somewhat swollen below. Flowers nodding on abruptly bent pedicels, mostly yellow, sometimes with green keels, 15–25 mm long; inner tepals apically hinged; outer anthers sterile; style obpyramidal. July–Aug. Red sandy flats, SN, G, KV, TS, CCR (southern Namibia, Anenous flats, W Coast and Tanqua Karoo). **(gce)**

D.' Leaves ciliate or pubescent but not glandular

ciliaris U.Müll.-Doblies (= *Ornithogalum fimbrifolium* J.C.Manning & Goldblatt, *A. navicula* U.Müll.-Doblies) Bulbous geophyte, up to 200 mm tall, bulb depressed-globose, outer tunics thinly leathery. Leaves 5–20, short, narrowly oblong, often longitudinally twisted, margins ciliate. Flowers nodding on abruptly bent pedicels, dull greenish, 15–25 mm long; inner tepals apically hinged; outer stamens sterile; style obpyramidal. Sept.–Oct. Rocky slopes, NS, NH, KV, CCR (area N of Steinkopf to Clanwilliam). **(gce)**

namaquensis Baker (= *Ornithogalum namaquense* (Baker) J.C.Manning & Goldblatt) GROWWETAMARAK Bulbous geophyte, up to 300 mm tall, outer bulb tunics membranous. Leaves 4–20, linear-canaliculate or convolute, usually coiled above, not clasping below, scabrid or hairy but not glandular. Flowers nodding on abruptly bent pedicels, yellow with green keels, 15–25 mm long; inner tepals apically hinged; outer stamens sterile; style obpyramidal. Sept.–Oct. Stony slopes, G, NS, NH, WM, TS, CCR (Namibia to E Cape).

villosa U.Müll.-Doblies (= *Ornithoglaum lanatum* J.C.Manning & Goldblatt) Bulbous geophyte, 150–500 mm, outer tunics thinly leathery. Leaves 2–4, narrowly canaliculate, lanate or glabrous. Flowers nodding on abruptly bent pedicels, yellow with green keels; inner tepals apically hinged; outer stamens sterile; style obpyramidal [glabrous forms are best separated from **A. flaccida** by the obpyramidal style ± as long as ovary]. Aug.–Sept. Stony flats and slopes, SN, G, NH, KV, WM, TS, CCR (southern Namibia, Richtersveld, central Namaqualand to Little Karoo). **(gce)**

D." Leaves glandular

hallii U.Müll.-Doblies (= *O. glutinosum* J.C.Manning & Goldblatt) Bulbous geophyte, 100–200 mm tall, outer bulb tunics thinly leathery. Leaves 3–6, linear-semi-terete, corkscrewed above,

covered with sessile glands, subacute to obtuse. Flowers nodding on abruptly bent pedicels, yellow with green keels, 12–15 mm long; inner tepals apically hinged; outer stamens sterile; style obpyramidal and 3-horned. Mar.–May. Stony slopes, SN, G, NH, KV, WM, CCR (Lüderitz through Namaqualand, Hantamsberg and Little Karoo). **(gce)**

spiralis L.f. (= *O. volutare* J.C.Manning & Goldblatt) Bulbous geophyte, 200–500 mm, outer bulb tunics thinly leathery; scape glandular-hairy below. Leaves 5–10, linear-canaliculate or convolute, often spirally twisted or coiled above, not clasping below, glandular-hairy. Flowers nodding on geniculate pedicels, cream to yellow with green keels, 15–25 mm long; inner tepals apically hinged; outer stamens sterile; style obpyramidal. Aug.–Oct. Sandy and stony slopes, NH, KV, WM, CCR (Namaqualand to Cape Peninsula). **(gce)**

A.' Flowers erect or nodding; inner tepals apically hooded but not knobbed or hinged

E. Leaves hairless or smooth

decipiens U.Müll.-Doblies (= *Ornithogalum decipiens* (U.Müll.-Doblies) J.C.Manning & Goldblatt) Bulbous geophyte, up to 0.8 m tall, outer tunics thinly leathery. Leaves 4–6, canaliculate, clasping below. Flowers erect on abruptly bent pedicels, white with green keels, 15–25 mm long; inner tepals apically hooded, outer stamens sterile, style obpyramidal, apices minutely pointed. Aug.–Sept. Rocky granite and sandstone slopes, NS, NH, CCR (Springbok to Olifants River Valley). **(gce)**

grandis J.C.Manning & Goldblatt Robust, bulbous geophyte, up to 1.3 m tall, sometimes forming bulblets. Leaves ± 4, lanceolate-canaliculate, clasping below. Flowers nodding on arching pedicels, yellow with green keels, 20–25 mm long; inner tepals apically hooded, outer anthers slightly smaller, style trigonous, transeversely rugose. Aug.–Oct. Deep sandy flats, NS, KV, CCR (Hondeklipbaai to Knersvlakte and W Coast). **(gce)**

monophylla Baker (= *Ornithogalum angolense* J.C.Manning & Goldblatt) Bulbous geophyte, up to 400 mm tall, outer tunics thinly leathery. Leaf 1, linear-canaliculate, clasping below. Flowers nodding on short pedicels 2–5 mm long, yellow with green keels, fragrant, 12–15 mm long; inner tepals apically hooded; all stamens fertile, anthers ± equal; style prismatic. Aug.–Sept. Stony slopes, ?SN (Angola and ?southern Namibia: Schakalsberg).

E.' Leaves glandular

dinteri U.Müll.-Doblies (= *Ornithogalum namibiense* J.C.Manning & Goldblatt) Bulbous geophyte, up to 50 mm tall, outer tunics thinly leathery. Leaf 1, linear-convolute, gummy and collecting sand, clasping below, inflorescence shortly exserted. Flowers subspicate, erect on suberect pedicels up to 5 mm long, white with green keels, 10–15 mm long; inner tepals apically hooded, outer anthers smaller than inner. Aug.–Sept. Sandy flats, SN (southern Namibia: Haalenberg). **(ece)**

etesiogaripensis U.Müll.-Doblies (= *Ornithogalum etesiogaripense* (U.Müll.-Doblies) J.C.Manning & Goldblatt, *nom. illeg.*) Bulbous geophyte, up to 0.5 m tall, bulb tunics thinly leathery. Leaves 4 or 5, canaliculate-attenuate, clasping below, glandular-hairy; scape glandular-hairy. Flowers erect on suberect pedicels, white with greenish keels, 15–25 mm long, inner tepals apically hooded; all anthers subequal; ovary with conspicuous crests, style prismatic. Aug.–Sept. Dry stony and rocky slopes, SN, G, NH (southern Namibia: Witpütz to northern Namaqualand and Bushmanland).

foetida U.Müll.-Doblies (= *Ornithogalum foetidum* (U.Müll.-Doblies) J.C.Manning & Goldblatt) Bulbous geophyte, 200–400 mm, outer tunics thinly leathery. Leaves 2–4, linear-canaliculate, clasping below, glandular-hairy; scape glandular-hairy. Flowers nodding on abruptly bent pedicels, yellow with green keels, 12–20 mm long; inner tepals apically hooded, outer stamens sterile, style obpyramidal, apices minutely pointed. Sept.–Oct. Stony slopes, NH, KV, WM, TS, CCR (northern Namaqualand to Tulbagh and Little Karoo). **(gce)**

viscosa L.f. (= *Ornithogalum viscosum* (L.f.) J.C.Manning & Goldblatt) TAAITAMARAK Bulbous geophyte, 200–400 mm, bulbs ovoid, often pink, outer tunics thinly leathery and wrinkled above; scape base glandular-hairy. Leaves 4–20, linear-convolute, often spirally twisted above, glandular-hairy, not clasping below. Flowers nodding on abruptly bent pedicels, yellow with green keels, 15–25 mm long, inner tepals hooded above, outer anthers smaller than inner, style prismatic. Aug.–Oct. Stony flats, SN, G, NS, NH, KV, WM, TS, CCR (central Namibia through Namaqualand into Little Karoo and Great Karoo).

A." Flowers always erect; apex of inner tepals developed into a fleshy, often bright yellow knob
F. Leaves glandular

glandulosa Baker (= *Ornithogalum glanduliferum* J.C.Manning & Goldblatt) Bulbous geophyte, up to 350 mm tall, bulb tunics papery or thinly leathery. Leaves 1–4, canaliculate-attenuate, clasping below, glandular-hairy; scape glandular-hairy. Flowers erect on suberect pedicels, yellow with greenish keels, 15–25 mm long, inner tepals apically knobbed and bright yellow; outer stamens sterile; style obpyramidal, truncate or retuse. Aug.–Sept. Dry, stony, shale slopes, TS, CCR (Tanqua Karoo through Laingsburg into Little Karoo). **(gce)**

F.' Leaves ciliate or hairless

longipes Baker (= *Ornithogalum longipes* (Baker) J.C.Manning & Goldblatt) Bulbous geophyte, up to 300 mm tall, outer bulb tunics thinly leathery, often wrinkled above. Leaves 1–6, often dry at flowering, linear-canaliculate, not clasping below. Flowers often corymbose, erect on long, suberect pedicels, white with green keels, 10–20 mm long, inner tepals apically knobbed and bright yellow; outer anthers smaller; style prismatic. Sept.–Nov. Clay or lime slopes, SN, G, NS, NH, KV, WM, TS, CCR (Sperrgebiet, Richtersveld, through Namaqualand and western Karoo to Cape Peninsula to Willowmore). **(gce)**

setosa Jacq. (= *Ornithogalum setosum* (Jacq.) J.C.Manning & Goldblatt) DIKTAMARAK Bulbous geophyte, 150–600 mm tall, bulb large, tunics decaying into firm or wiry fibres above. Leaves 4–8, lanceolate or canaliculate, margins hyaline and often ciliolate. Flowers erect on long pedicels, suberect, yellow or white with green keels, 15–25 mm long, inner tepals apically knobbed and bright yellow; outer anthers slightly smaller; style prismatic. Oct.–Nov. Stony flats and slopes, SN, G, NS, NH, WM, TS, CCR (widespread through southern Africa).

sp. A Robust, bulbous geophyte, 300–500 mm tall, outer bulb tunics papery with horizontal rings. Leaves ± 6, lanceolate, not clasping. Flowers erect on suberect pedicels, white with green keels, 15–20 mm long; inner tepals apically knobbed; outer anthers smaller; style prismatic. July–Oct. Rock outcrops, SN, G (Klinghardt Mountains and Richtersveld). **(ece)**

[**Species insufficiently known** **A. costatula** (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt, **A. monarchos** (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt, **A. pendulina** (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt, **A. trachyphylla** U.Müll.-Doblies]

[**Taxonomic note** Recently described from the cliffs of the Skaaprivier Gorge between Steinkopf and Spektakel, *Ornithogalum gildenhuysii* Van Jaarsv. (2011) is closely allied to *Albuca suaveolens* (Jacq.) J.C.Manning & Goldblatt. This species complex requires further investigation, but we provisionally accept *O. gildenhuysii* as distinct and provide the necessary combination in *Albuca* L.

Albuca gildenhuysii (Van Jaarsv.) J.C.Manning & Goldblatt, *comb. nov. Ornithogalum gildenhuysii* Van Jaarsv. in Herbertia 65: 51 (2011). Type: Northern Cape, cliffs overlooking Skaaprivier Poort between Steinkopf and Spektakel, 19 Sept. 2007, *Van Jaarsveld, Harrower, Nicolson & Xaba 21110* (NBG, holo.!).]

BOWIEA RANKBOL 1 sp., southern and tropical Africa

volubilis Harv. ex Hook.f. (= *Bowiea gariepensis* Van Jaarsv.) Bulbous geophyte, bulb partly exposed, green. Leaves small, linear, dry at flowering. Flowers in a trailing or twining, fleshy, diffusely branched raceme, whitish green, tepals ± reflexed, 5–10 mm long. Capsule ovoid, 10–13 mm long. Mainly June–Aug. Rock slopes and scrub, G, CCR (southern Namibian Escarpment and Nababiepsberge through to Pella, Baviaanskloof Mountains and tropical Africa).

DAUBENYA 8 spp., South Africa, mainly N Cape

A. Filaments free or united up to 7 mm

aurea Lindl. Bulbous geophyte, up to 50 mm tall, acaulescent. Leaves 2, prostrate. Flowers in a capitate corymb between the leaves, red or yellow, unscented, lower flowers strongly bilabiate and

asymmetrically enlarged, lowermost pedicels 5–10 mm long, tube obliquely cylindrical, 13–20 mm long, tepals mostly ovate, 2–4 mm long but enlarged, lower tepals of lower flowers oblanceolate, 20–40 mm long, filaments basally united in an oblique tube, 5–7 mm long. Capsules ovoid, 3-angled. Aug.–Sept. Dolerite flats, WM (Roggeveld: Middelpos). **(ece)**

marginata (Willd. ex Kunth) J.C.Manning & A.M.van der Merwe Bulbous geophyte, up to 50 mm tall, acaulescent. Leaves 2, prostrate. Flowers in a short raceme between the leaves, orange to red, unscented, lowermost pedicels 1–2.5 mm long, tube compressed-cylindrical, 10–20 mm long, tepals lanceolate, 6–8 mm long, filaments united basally for 1.5–2.5 mm. Capsules obtriangular, 3-winged. May–July. Clay and silt flats, KV, WM (southern Knersvlakte, Hantam and Roggeveld). **(ece)**

namaquensis (Schltr.) J.C.Manning & Goldblatt (= *Neobakeria namaquensis* Schltr.) Bulbous geophyte, up to 50 mm tall, acaulescent. Leaves 2, prostrate. Flowers in a short raceme between the leaves, greenish yellow, fragrant, lower flowers ± oblique, lowermost pedicels up to 5 mm long, tube obliquely cylindrical, 9–15 mm long, tepals linear, 9–10 mm long, filaments free. Capsules obovoid, 3-angled. May–June. Red sandy flats along washes, NH (E of Springbok bordering on western Bushmanland). **(ece)**

A.' Filaments united in a narrow tube 8–12 mm long

alba A.M.van der Merwe Bulbous geophyte, up to 50 mm tall, acaulescent. Leaves 2, prostrate. Flowers in a capitate corymb, white with lilac stamens, fragrant, lowermost pedicels 12–19 mm long, tube narrowly cylindrical, 10–25 mm long, tepals linear, 6–13 mm long, filaments united below into a tube 7–15 mm long. Capsules obtriangular, 3-winged. May–June. Dolerite outcrops, WM (Hantam and Roggeveld). **(ece)**

capensis (Schltr.) A.M.van der Merwe & J.C.Manning (= *Androsiphon capensis* Schltr.) Bulbous geophyte, up to 50 mm tall, acaulescent. Leaves 2, prostrate. Flowers yellow with red centre, fragrant, lowermost pedicels 15–25 mm long, tube cylindrical, 6–10 mm long, tepals oblong, 11–15 mm long, filaments united below into a thick cylinder 9–12 mm long. Capsules obtriangular, 3-winged. June–July. Dolerite flats, WM, CCR (Nieuwoudtville). **(gce)**

stylosa (W.F.Barker) A.M.van der Merwe & J.C.Manning (= *Amphisiphon stylosus* W.F.Barker) Bulbous geophyte, up to 50 mm tall, acaulescent. Leaves 2, prostrate. Flowers yellow, fragrant, pedicels 1–3 mm long, tube cylindrical, 6–14 mm long, tepals ovate, 2–5 mm long, filaments inserted in lower part of tube, united below for 10–15 mm. Capsules depressed-ovoid with persistent style. May–June. Dolerite flats, WM, CCR (Nieuwoudtville). **(gce)**

DIPCADI ± 30 spp., widespread through southern and tropical Africa and Madagascar, extending into India and the Mediterranean

bakerianum Bolus (= *Ornithogalum bakerianum* (Bolus) J.C.Manning & Goldblatt) Bulbous geophyte, 250–400 mm tall. Leaves ± 4, broadly lanceolate-attenuate. Flowers not secund, green or brown, ± 18 mm long, nodding on pedicels 2–5 mm long, tepals fused for ± two thirds their length, subequal, suberect. Capsules oblong, apically knobbed on each corner, ± 15 mm long, seeds oblong, ± 7 mm long. Jan. Sandy flats, SN (near Aus and widespread through western and central southern Africa).

brevifolium (Thunb.) Fourc. Bulbous geophyte, 200–400 mm tall. Leaves 2–4, sometimes dry at flowering, linear to filiform, straight or coiled. Flowers secund, green or brown, 12–20 mm long, nodding on pedicels ± 2 mm long, tepals fused for ± half their length, unequal, outer longer and recurved, inner erect. Capsules oblong in outline, ± 15 mm long, seeds discoid, ± 7 mm diam. Aug.–Apr. Stony flats and slopes, SN, G, KV, WM, TS, CCR (southern Namibia through western and central South Africa).

crispum Baker (= *Ornithogalum crispum* (Baker) J.C.Manning & Goldblatt) KRUL-UI Bulbous geophyte, up to 300 mm tall. Leaves ± 4, narrowly lanceolate, glaucous, coiled, usually softly hairy, margins usually crisped and ciliate. Flowers secund on a hairy scape, brown to grey-green, 15–20 mm long, nodding on pedicels 2–5 mm long, tepals fused for ± ⅓ their length, unequal, outer longer, recurved with a caudate tip, inner erect. Capsules oblong in outline, ± 20 mm long, seeds discoid, ± 9 mm diam. Apr.–Dec. Stony or sandy flats and slopes, SN, G, NH, KV, WM, CCR (Namibia and western South Africa).

[**Excluded species:** No authentic material of **D. gracillimum** Baker is known in the study area.]

DRIMIA (= *LITANTHUS, RHADAMANTHUS, SCHIZOBASIS, SEKANAMA, TENICROA, URGINAVIA, URGINEA*) GIFBOL, POISON SQUILL ± 60 spp., Africa, Mediterranean, Asia

A. Raceme branched, persistent and remaining green

cuscutoides (Burch. ex Baker) J.C.Manning & Goldblatt (= *Schizobasis cuscutoides* (Burch. ex Baker) Benth. & Hook.) Bulbous geophyte, 100–500 mm tall. Leaf ephemeral, filiform. Flowers in wiry, often flexuose panicles, nodding on 6–15 mm long pedicels, campanulate, pale yellow or pink, 3–4 mm long, filaments ± 1 mm long, anthers opening by longitudinal slits, connective prolonged. Capsules erect on deflexed pedicels, ovoid, 3–5 mm long. Jan.–Mar. Stony slopes, SN, G, NH, WM, TS, CCR (dry areas of southern and tropical Africa).

intricata (Baker) J.C.Manning & Goldblatt (= *Schizobasis intricata* (Baker) Baker) Bulbous geophyte, 100–500 mm tall. Leaf ephemeral, dry at flowering. Flowers in densely branched panicles, small, white, pale yellow or pink. Jan.–Mar. Stony slopes, TS, CCR (Botterkloof to Port Elizabeth, dry areas of southern and tropical Africa).

A.' Raceme simple, deciduous
B. Filaments up to 2 mm long; flowers often nodding
C. Leaves ovate-lanceolate

karooica (Oberm.) J.C.Manning & Goldblatt (= *Rhadamanthus karooicus* Oberm.) Bulbous geophyte, 10–20 mm tall, scape striate-puberulous below. Leaves dry at flowering, spreading, oblong. Flowers nodding on 3–8 mm long pedicels, campanulate, whitish or greenish, ± 6 mm long, tepals connate for 1.5–2 mm, filaments ± 2 mm long, anthers opening by longitudinal slits. Dec.–Feb. Stony flats and slopes, WM, TS (Hantam, southern Tanqua to Great Karoo).

namibensis (Oberm.) J.C.Manning & Goldblatt (= *Rhadamanthus namibensis* Oberm.) Bulbous geophyte, 200–700 mm tall, old sheaths horizontally barred. Leaves dry at flowering, lanceolate-canaliculate. Flowers nodding on ± 8 mm long pedicels, campanulate, pale mauve, ± 9 mm long, tepals connate for ± 4 mm, filaments 1.5 mm long, anthers pointed apically, opening by longitudinal slits. Oct.–Nov. Rock crevices, SN (southern Namibia: Witpütz). **(ece)**

platyphylla (B.Nord.) J.C.Manning & Goldblatt (= *Rhadamanthus platyphyllus* B.Nord.) Bulbous geophyte, 30–150 mm tall, scape striate-puberulous below. Leaves usually 2, dry at flowering, prostrate, elliptic, longitudinally grooved, velvety. Flowers nodding on 3–10 mm long pedicels, urceolate, reddish brown to creamy pink, 4–6 mm long, tepals connate for 1–3 mm, filaments papillate, 1–1.5 mm long, anthers barbellate basally, opening by apical pores. Nov.–Jan. Rock sheets and pockets, G, NH, KV, WM, TS, CCR (Richtersveld through Namaqualand and Upper Karoo to SW Cape and E Cape).

C.' Leaves filiform

arenicola (B.Nord.) J.C.Manning & Goldblatt (= *Rhadamanthus arenicola* B.Nord.) Bulbous geophyte, 100–150 mm tall, bulb scales loosely overlapping. Leaves dry at flowering, filiform. Flowers nodding on 4–10 mm long pedicels, urceolate, whitish or light brown with brown keels, 3–4 mm long, tepals connate for ± 2 mm, filaments ± 1 mm long, anthers pointed basally, opening by apical slits. Oct.–Nov. Sandy flats and slopes, NS, NH, TS, CCR (Namaqualand to Cederberg Mountains and southern Tanqua Karoo). **(gce)**

convallarioides (L.f.) J.C.Manning & Goldblatt (= *Rhadamanthus convallarioides* (L.f.) Baker) AFRICAN SNOWDROP Bulbous geophyte, 50–300 mm tall, scape striate-puberulous in lower half. Leaves dry at flowering, suberect, subterete, sometimes with a barred sheath below. Flowers nodding on 3–10 mm long pedicels, campanulate, creamy pink to light brown, 7–10 mm long, tepals connate for 2–3 mm, filaments 1.5–2 mm long, anthers opening by apical slits. Oct.–Feb. Sandy flats and slopes, G, NH, KV, WM, TS, CCR (Richtersveld to central Namaqualand through Cederberg Mountains, Koedoesberg, and southern Tanqua to Little Karoo). **(gce)**

secunda (B.Nord.) J.C.Manning & Goldblatt (= *Rhadamanthus secundus* B.Nord.) Bulbous geophyte, 80–150 mm tall, bulb scales separate and stalked, fusiform. Leaves dry at flowering, filiform. Flowers secund, nodding on 1–2 mm long pedicels, campanulate, brownish, 4–5 mm long, tepals connate for 2.5–3 mm, filaments 1–1.5 mm long, anthers basally pointed, opening by apical pores. Sept. Mountain slopes, SN (southern Namibia: Kovisberg and Buchuberg). **(ece)**

uniflora J.C.Manning & Goldblatt (= *Litanthus pusillus* Harv.) FAIRY SNOWDROP Bulbous geophyte, 20–80 mm tall, scape striate-puberulous below. Leaves 2–4, dry at flowering, filiform. Flower 1(2), nodding on 1–1.5 mm long pedicels, tubular, white to pale pink, 4–8 mm long, tepals united for 3–7 mm, filaments 0.5 mm long, anthers opening by longitudinal slits. Capsule ovoid to ellipsoidal, 3–6 mm long. Dec.–Mar. Rock outcrops and pavement, KV, TS, CCR (southern Namaqualand eastwards to Zimbabwe).

B.' Filaments > 4 mm long
D. Tepals connate for ± ⅓ their length (2–4 mm), recurved above

capensis (Burm.f.) Wijnands (= *Drimia altissima* (L.f.) Ker Gawl., *D. forsteri* (Baker) Oberm.) MAERMAN Bulbous geophyte, 1–2 m tall. Leaves dry at flowering, spreading, oblong to lanceolate, margins sometimes fringed. Flowers in an elongate, densely whorled raceme on 2–5 mm long pedicels, white or cream, 12–20 mm long, tepals connate for 2–4 mm, reflexed above, filaments erect, 8–12 mm long, anthers green, 6–8 mm long. Capsules oblong in outline, 3-lobed, 12–15 mm long. Dec.–Mar. Stony and sandy flats, KB, KV, WM, TS, CCR (Kamiesberg Mountains and Knersvlakte to Port Elizabeth). **(gce)**

elata Jacq. BRANDUI, JEUKBOL Bulbous geophyte, up to 1 m tall, bulb reddish. Leaves dry at flowering, erect to spreading, linear-lanceolate, often undulate, sometimes hairy, margins ciliate. Flowers on 6–8 mm long pedicels, silvery white, green or purple, 10–15 mm long, tepals connate for 3–7 mm, reflexed above, filaments erect, 6–8 mm long, anthers ± 2 mm long, blue to purple. Capsules oblong in outline, 3-lobed, 10–15 mm long, seeds ovate, ± 7 mm diam. Dec.–Apr. Sandy and clay flats, WM, CCR (Bokkeveld Mountains to E Africa).

pusilla Jacq. Like **D. elata** but much smaller, 60–150 mm tall, few-flowered, capsules depressed-oblong in outline, at least as broad as long and seeds discoid, ± 10 mm diam. Dec.–Apr. Clay flats, SN, G, NH, KV, CCR (southern Namibia through Namaqualand to Cape Peninsula). **(gce)**

D.' Tepals ± free or connate basally for < 2 mm, spreading or reflexed
E. Leaves enclosed basally in a membranous or papery sheath; flowers with style deflected away from centre; tepals 6–11 mm long

exuviata (Jacq.) Jessop (= *Tenicroa exuviata* (Jacq.) Speta) Bulbous geophyte, 200–800 mm tall. Leaves about as long as raceme, few, erect, leathery, greyish, 1–4 mm diam., enclosed below in a horizontally barred sheath. Flowers spreading on 6–8 mm long pedicels, rotate, white with green keels, often flushed purple, fragrant, tepals 10–15 mm long, ± free. Capsules ovoid, 10–15(–25) mm long. Sept.–Oct. Rocky slopes, NH, WM, CCR (Nuwerus, Bokkeveld Mountains to W Cape and E Cape).

filifolia (Jacq.) J.C.Manning & Goldblatt (= *Tenicroa filifolia* (Jacq.) Oberm.) Bulbous geophyte, 150–300 mm tall. Leaves about as long as raceme, few to several, filiform, 0.5–1 mm diam., enclosed below in a horizontally barred sheath. Flowers and fruit as in **D. exuviata**. Sept.–Dec. Clay or granite soils, KB, CCR (Kamiesberg Mountains, Bokkeveld Escarpment to Swellendam). **(gce)**

fragrans (Jacq.) J.C.Manning & Goldblatt (= *Tenicroa fragrans* (Jacq.) Raf.) Bulbous geophyte, 300–800 mm tall, forming clumps. Leaves usually 15–30, cylindrical, subsucculent, ± half as long as raceme, ± 1 mm diam., enclosed below by a papery sheath with horizontal barring above. Flowers spreading on 7–10 mm long pedicels, rotate, white with dark keels, occasionally flushed pink, fragrant, tepals 10–15 mm long, ± free. Capsules narrowly ovoid, ± 20 mm long. (north) Sept.–Nov.(south). Coastal and inland flats in loose sand, NS, CCR (coastal plain just N of Groenrivier and Bokkeveld Mountains to Hex River Valley). **(gce)**

multifolia (G.J.Lewis) J.C.Manning & Goldblatt (= *Tenicroa multifolia* (G.J.Lewis) Oberm.) Bulbous geophyte, 100–200 mm tall, bulb often pinkish. Leaves numerous, filiform, coiled, ± 0.5 mm diam., enclosed below in a papery or membranous sheath. Flowers and fruit as in **D. exuviata**. Sept.–Oct. Poorly drained soils and rock pavement, G, NH, KB, WM, CCR (southern Richtersveld through Namaqualand and Hantam to Breede River Valley). **(gce)**

nana (Snijman) J.C.Manning & Goldblatt (= *Tenicroa nana* Snijman) Bulbous geophyte, 20–100 mm tall, bulb often pinkish. Leaves numerous, filiform, 0.25 mm diam., enclosed below in a membranous sheath. Flowers spreading on 7–10 mm long pedicels, rotate, pink with green spot at base, tepals reflexed, 6–11 mm long, filaments connivent, apically decurved, 3.5 mm long. Capsules ovoid, 4–7 mm long. Nov.–Jan. Seasonally moist rock flushes, NH, KB (central Namaqualand). **(ece)**

E.' Leaves not enclosed basally in a sheath; flowers with style held centrally; tepals 3–5 mm long
F. Leaves ± plane in cross section

fimbrimarginata Snijman Dwarf, bulbous geophyte, up to 60 mm tall. Leaves ± 8, ± dry at flowering, lanceolate, spreading to suberect, upper surface bearing minute, whitish, recurved trichomes in longitudinal rows. Flowers in a head-like raceme on 5–8 mm long pedicels, widely campanulate, white above, brownish below, open in the late afternoon, tepals ± 7 mm long, outer with an apical tuft of fine hairs, inner with slender cilia on margins. Capsules unknown. Nov.–Dec. On quartz fields, KV (Knersvlakte: near Moedverloor). **(ece)**

marginata (Thunb.) Jessop Bulbous geophyte, up to 200 mm tall. Leaves 1 or 2, dry at flowering, leathery, oblong, glabrous or hispidulous, spreading, margins thickened, cartilaginous, retrorse-ciliate, tips pointed. Flowers in a head-like raceme on 5–10 mm long pedicels, campanulate, brownish, tepals ± 4 mm long, connate for ± 1.5 mm, filaments ± 2 mm long. Capsules ovoid, 5–7 mm long. Oct.–Nov. Stony clay flats, WM, TS (Hantam to southern Tanqua Karoo). **(ece)**

physodes (Jacq.) Jessop BERGSLANGKOP Bulbous geophyte, up to 100 mm tall, bulbs usually large. Leaves dry at flowering, erect, twisted, lanceolate. Flowers in a subcorymbose raceme on wiry pedicels mostly 15–25 mm long, rotate, white, open in the late afternoon, tepals 4–5 mm long, connate for ± 0.5 mm. Capsules globose, ± 9 mm diam. Oct.–Apr. Stony flats, SN, G, NS, NH, KV, WM, TS, CCR (Sperrgebiet through Namaqualand and western Karoo to Nuweveld Mountains and Little Karoo).

pulchromarginata J.C.Manning & Goldblatt Like **D. marginata** but leaves elliptical to obovate and margins colliculate with a submarginal band of dense hairs on upper surface. Oct.–Nov. Gravelly flats and slopes, G, NH (Richtersveld and central Namaqualand). **(ece)**

F.' Leaves filiform, ± cylindrical in cross section

dregei (Baker) J.C.Manning & Goldblatt Bulbous geophyte, 150–300 mm tall. Leaves 1 or 2, dry at flowering, terete. Flowers in an elongate raceme on pedicels up to 2–5 mm long, campanulate, whitish with brown keels, tepals 4–5 mm long, connate for ± 1 mm, filaments ± 2 mm long. Capsules ellipsoidal, 6–10 mm long. Nov.–Mar. Seasonally moist slopes and flushes, KB, CCR (Kamiesberg Mountains and Bokkeveld Mountains to southern Cape). **(gce)**

minor (A.V.Duthie) Jessop Bulbous geophyte, 50–150 mm tall. Leaves dry at flowering, several, terete. Flowers crowded in a contracted, head-like raceme on 4–15 mm long, wiry pedicels, campanulate, brownish, tepals 3–4 mm long, connate for ± 1 mm, filaments ± 2 mm long. Capsules ovoid, 5–7 mm long. Oct.–Jan. Sandy or stony slopes, NH, KV, WM, TS, CCR (central Namaqualand to southern Tanqua and Little Karoo). **(gce)**

occultans G.Will. Bulbous geophyte, ± 50 mm tall. Leaf 1, dry at flowering, terete, slender. Flowers up to 3, in a short raceme on pedicels up to 5 mm long, campanulate, whitish with green median bands, tepals ± 6 mm long, firm, connate for ± 1 mm, filaments ± 4.5 mm. Capsule ovoid, 3-angled, ± 4 mm long. Jan.–Feb. Sandy patches between slabs of metamorphosed schist, SN (lower Gariep Valley, E of Oranjemund). **(ece)**

vermiformis J.C.Manning & Goldblatt (= *Drimia virens* auct.) Bulbous geophyte, up to 200 mm tall. Leaves 1 or 2, dry at flowering, falcate, fleshy, margins often minutely ciliate. Flowers and fruit like **D. marginata**. Sept.–Feb. Stony flats, WM, TS, CCR (Bushmanland, Hantam through Tanqua Karoo to Little Karoo).

sp. B (allied to **D. salteri** (Compton) J.C.Manning & Goldblatt) Bulbous geophyte, 50 mm tall. Leaf 1, dry at flowering, terete. Flowers in a congested raceme on 1–2 mm long pedicels, campanulate, brownish, tepals 4–5 mm long, connate for ± 1 mm, tube retrorse-puberulous within, filaments ± 2 mm long. Capsules ovoid, ± 5 mm long. Dec.–Feb. Rock sheets, G (Richtersveld: Boegoeberg). **(ece)**

EUCOMIS PINEAPPLE LILY 10 spp., N Cape and W Cape to S tropical Africa

regia (L.) L'Hér. (= *Eucomis pillansii* L.Guthrie) Bulbous geophyte, 80–150 mm tall. Leaves 4–6, prostrate or spreading, oblanceolate-spathulate, green or speckled purple at base beneath. Flowers in a congested raceme on pedicels up to 2 mm long, cream to greenish, overtopped with a tuft of leafy bracts, tepals 10–15 mm long. (July)Aug.–Sept. Sheltered rocky slopes and outcrops, NH, KB, WM, CCR (Kamiesberg Mountains, Bokkeveld and Roggeveld to Bredasdorp, and Little Karoo). **(gce)**

LACHENALIA (= *POLYXENA*) LACHENALIA, VIOOLTJIE ± 120 spp., Namibia to E Cape

A. Scape subterranean or very shortly exposed; flowering axis condensed
B. Tepals fused for > ¼ their length, the inner and outer similar

argillicola G.D.Duncan Dwarf, bulbous geophyte, (30–)60–90 mm tall. Leaves 2, lanceolate, spreading, glaucous, 0.5–1.3 mm broad. Flowers tubular, on an erect peduncle 5–10 mm long at flowering then elongating to 40 mm in fruit, tepals widely spreading, white to pale lilac, apical gibbosities and median keels pale to dark purple, stamens included. June. In seasonally inundated clay pans, NH (around Toringberg). **(ece)**

ensifolia (Thunb.) J.C.Manning & Goldblatt (= *Polyxena ensifolia* (Thunb.) Schönland) Bulbous geophyte, 20–40 mm tall. Leaves 2, broadly lanceolate, spreading, dark green to glaucous, 10–30 mm broad, upper and lower surfaces plain, clasping bases subterranean. Flowers tubular, erect, in a congested raceme produced at ground level, honey-scented, tepals white or mauve, widely spreading to recurved, with pale green or mauve apical swellings, stamens exserted. Apr.–June. In large colonies on sand or clay flats, NH, KB, WM, CCR (near Springbok to Kamiesberg Mountains, Bokkeveld Plateau, Roggeveld Escarpment to Uitenhage and Great Karoo).

longituba (A.M.van der Merwe) J.C.Manning & Goldblatt (= *Polyxena longituba* A.M.van der Merwe) Bulbous geophyte, 40–90 mm tall. Leaves 2, narrowly lanceolate, canaliculate, bright green, 5–7 mm broad, upper and lower surfaces plain, clasping bases subterranean. Flowers tubular, erect to suberect, white and pale lilac, with dark lilac apical swellings and keels, stamens included. Apr.–June. In small groups on moist, loam flats, WM (Roggeveld Plateau and Escarpment). **(ece)**

maughanii (W.F.Barker) J.C.Manning & Goldblatt (= *Polyxena maughanii* W.F.Barker) Bulbous geophyte, 3–5 mm tall. Leaves 2, broadly lanceolate, spreading, dark green, 20–30 mm broad; upper and lower surfaces plain, margins ciliolate, clasping bases subterranean. Flowers tubular, erect, in a congested raceme produced at ground level, mildly honey-scented, tepals white, widely spreading, stamens included. May–June. In groups on clay slopes and flats, WM (Bokkeveld Plateau, Hantamsberg and Roggeveld Escarpment). **(ece)**

B.' Tepals fused for < ¼ their length, or only the outer fused for more, the inner and outer often dissimilar

barkeriana U.Müll.-Doblies, B.Nord. & D.Müll.-Doblies Dwarf, bulbous geophyte, 15–20 mm tall. Leaves 3–9, linear, canaliculate, rosulate, spreading to suberect, 2–3 mm broad. Flowers tubular, erect, in a congested raceme at or just above ground level, strongly yeast-scented, tepals white, sometimes suffused with green or dull red, stamens erect, well exserted, filaments swollen in upper half. May–July. In deep red sand on flats, around clay pans or in sand pockets on granite outcrops, NS, NH (Kleinsee and Kliprand area to Groenrivier Valley and Brand-se-Baai). **(ece)**

congesta W.F.Barker Bulbous geophyte, 80–140 mm tall. Leaves 2, ovate, prostrate, 30–60 mm broad, upper surface dark green with maroon tinge, lower surface maroon. Flowers urceolate, congested, sessile, strongly sweet-scented, tepals cream with green apical swellings, stamens included. June–Aug. On stony, clay hillsides and flats, WM (Sutherland, Verlatekloof and Komsberg). **(ece)**

kliprandensis W.F.Barker Bulbous geophyte, 100–200 mm tall. Leaves 2, ovate, prostrate, dull green, 40–70 mm broad, upper surface plain or with dark brown or green pustules. Flowers narrowly campanulate, large, spreading, sessile, sweet-scented, tepals white with bright magenta tips and brownish green apical swellings and keels, stamens as long as tepals, included. Aug.–Sept. Singly or in colonies on flats in deep red gravelly sand, NH (eastern Namaqualand). **(ece)**

minima W.F.Barker Dwarf, bulbous geophyte, 20–170 mm tall. Leaves 2, lanceolate, spreading, dark green, 10–25 mm broad, upper surface plain or densely pustulate, clasping bases subterranean. Flowers oblong-campanulate, sessile, suberect, tepals pale yellow with green apical swellings and keels, stamens included. June. In colonies on moist clay flats, NH, KV (near Bitterfontein and northern and western Knersvlakte). **(ece)**

pusilla Jacq. Dwarf, bulbous geophyte, 10–40 mm tall. Leaves 3–7, lanceolate, rosulate, prostrate or spreading, pale green, with or without dark green or brown blotches on upper surface, 5–15 mm broad, margins thickened. Flowers tubular, erect, in a congested raceme at ground level, strongly yeast-scented, tepals white, stamens well exserted, erect to spreading, filaments white,

not swollen. Apr.–June. In colonies in moist, sandy soil on flats and granite outcrops, WM, CCR (Bokkeveld Plateau to Swellendam). **(gce)**

A.' Scape erect, reaching well above ground level; flowering axis extended
C. Stamens included or exserted up to 2 mm beyond perianth
*D. Flowers sessile (see also **L. marlothii** and **L. trichophylla** under D.')*

ameliae W.F.Barker Dwarf, bulbous geophyte, 40–115 mm tall. Leaves 1 or 2, broadly lanceolate, dark green, suberect to spreading, 5–20 mm broad, upper surface plain or with short to long simple hairs, lower surface dark maroon, clasping bases finely spotted with magenta. Scape slender, maroon or mottled with dark purple. Flowers urceolate, suberect, sessile, tepals greenish yellow, with or without deep magenta tips, stamens included. Aug.–Sept. Singly or in colonies on flats in red sandy clay, TS, CCR (western Tanqua Karoo to Karoopoort and Touwsrivier). **(gce)**

carnosa Baker Bulbous geophyte, 80–250 mm tall. Leaves 2, ovate, suberect to spreading, bright green to glaucous, 25–80 mm broad, upper surface plain or with sporadic large green or brown, margins brownish maroon. Scape plain green. Flowers urceolate, sessile, spreading, tepals white with bright magenta tips and greenish brown apical swellings, stamens included, much shorter than tepals. Aug.–Sept. In large colonies on granite outcrops and sandy soils, NS, NH, KB (Steinkopf to Riethuis to Kamiesberg Mountains). **(ece)**

concordiana Schltr. ex W.F.Barker Bulbous geophyte, 60–200 mm tall. Leaf 1, narrowly lanceolate, spreading to suberect, 5–10 mm broad, clasping base banded with magenta, upper surface plain, lower surface banded with green. Flowers oblong-campanulate, suberect, sessile, arranged in whorls of 3, tepals cream with green apical swellings and keels, stamens included. Sept. Singly or in small groups in deep red sand, NH, WM (Steinkopf to Loeriesfontein and Calvinia). **(ece)**

elegans W.F.Barker Bulbous geophyte, 100–300 mm tall. Leaves 1 or 2, lanceolate, suberect to spreading, canaliculate, 20–30 mm broad, pale green to glaucous, clasping bases and upper surface plain or with dark green spots, lower surface plain or flushed with dull maroon, margins flat or crisped. Scape plain or with green blotches. Flowers small, urceolate, sessile, spreading or suberect, tepals yellow, blue, mauve or purple, with white tips, scented, stamens included. July–Oct. Singly or in large colonies on sandy or clay flats and hill slopes, NH, KV, WM, TS, CCR (Springbok, Kamieskroon, Bokkeveld Escarpment to Cederberg Mountains and Karoopoort). **(gce)**

framesii W.F.Barker Dwarf, bulbous geophyte, 90–150 mm tall. Leaves 2, lanceolate, suberect to falcate, 7–35 mm broad, bright green, clasping bases unmarked, upper and lower surfaces plain, margins undulate. Scape slender, unmarked. Flowers urceolate, sessile, suberect, tepals greenish yellow with bright magenta, recurved tips and green apical swellings, stamens included. July–Aug. In large colonies in decomposed granite, deep sand or on quartz fields, NS, KV (Komaggas to just S of Vanrhynsdorp). **(ece)**

inconspicua G.D.Duncan Bulbous geophyte, 120–160 mm tall. Leaf 1, lanceolate, canaliculate, 15–20 mm broad, glaucous, upper surface with purplish brown spots, clasping base and lower surface banded with green and brownish magenta. Scape sturdy, with purplish brown blotches. Flowers oblong-campanulate, sessile, arranged in whorls of 3, tepals greenish white or bluish green with purplish brown apical swellings and keels, stamens included. July–Aug. Singly or in colonies in deep red gravelly sand, NH, (eastern Namaqualand and Bushmanland).

karooica W.F.Barker ex G.D.Duncan Bulbous geophyte, 45–220 mm tall. Leaf 1(2), lanceolate, suberect, 5–25 mm broad, glaucous with scattered blotches on upper surface, margins leathery. Scape suberect, shorter than leaves, mottled with maroon and green. Flowers oblong-campanulate, suberect, tepals greenish white with maroon or brown keels and gibbosities, stamens white, spreading. June–Sept. Singly or in small groups, often on dolomite outcrops, TS (Karoopoort, Great Karoo, SW Free State and NE Cape).

mutabilis Sweet Bulbous geophyte, 100–450 mm tall. Leaf 1, lanceolate, canaliculate, suberect, 10–35 mm broad, clasping base plain or with maroon bands, both surfaces plain yellowish green, margins crisped. Scape plain but pale to bright electric blue and usually inflated above. Flowers urceolate, spreading to nodding, mostly sessile but apical flowers on short blue pedicels and usually sterile, tepals pale blue and white, with greenish yellow tips and brown apical swellings and keels, stamens usually included, rarely exserted. July–Sept. Singly or in colonies in deep sand or on stony slopes, NS, NH, KB, KV, WM, CCR (Anenousberg to Bokkeveld Escarpment, Calvinia to western and southern Cape). **(gce)**

namaquensis Schltr. ex W.F.Barker Bulbous geophyte, 80–230 mm tall. Leaves 1 or 2, linear, canaliculate, conduplicate, suberect or arched, 5–15 mm broad, clasping bases white, both surfaces

plain green. Scape slender, erect to suberect, plain green. Flowers urceolate, sessile, suberect, tepals purplish magenta, with green or dark purplish magenta apical swellings and keels, stamens included. Aug.–Oct. In large colonies on granite outcrops, G, NS, NH (Eksteenfontein, Steinkopf, Spektakelberg and between the Spoegrivier and Groenrivier). **(ece)**

obscura Schltr. ex G.D.Duncan Bulbous geophyte, 50–380 mm tall. Leaves 2, lanceolate, erect to suberect, canaliculate, 15–45 mm broad dark green or glaucous, clasping bases and lower surface banded with green and magenta, upper surface usually unmarked. Scape blotched pale to dark purple. Flowers oblong-campanulate, arranged in whorls of 3, spreading, sessile, pale yellowish green, usually with magenta tips; stamens included or shortly exserted. June–Oct. On flats and lower slopes in stony, clay soil, NH, KB, KV, WM, TS, CCR (Steinkopf to eastern Little Karoo and S of Fraserburg). **(gce)**

undulata Masson ex Baker Bulbous geophyte, 100–300 mm tall. Leaves 2, broadly lanceolate, suberect to spreading, 20–60 mm broad, glaucous or bright green, upper surface plain or with purplish brown spots, lower surface usually plain, margins undulate and/or crisped. Scape sturdy, plain, green. Flowers oblong-campanulate, spreading, sessile, tepals pale green and white, with brown apical swellings and keels, stamens included. May–June. Singly or in colonies on stony, clay flats and lower slopes, G, NS, NH, KV, WM (Eksteenfontein to Vredendal, Vanrhynsdorp and Loeriesfontein). **(ece)**

valeriae G.D.Duncan Bulbous geophyte, 100–350 mm tall. Leaves 2, broadly lanceolate, spreading to suberect, 20–30 mm broad, dark green, clasping bases green or flushed with magenta, upper surface densely pustulate. Scape sturdy, speckled brownish purple. Flowers urceolate, sessile, spreading, tepals greenish yellow, lower inner tepal bright magenta, with green apical swellings and keels, stamens included. July–Aug. Singly or in large colonies on deep sandy flats or pockets of granite outcrops, NS (Holgatrivier to Komaggas). **(ece)**

verticillata W.F.Barker Bulbous geophyte, 100–250 mm tall. Leaf 1, lanceolate, canaliculate, 12–20 mm broad, glaucous, clasping base banded with magenta, upper surface unmarked or sporadically spotted, lower surface heavily blotched with dark green and purple. Scape mottled with purplish magenta. Flowers urceolate, sessile, spreading, arranged in whorls of 3, tepals greenish white with recurved purple tips and green apical swellings and keels, stamens included. Sept. Singly or in small groups in stony, red sand, G, NH (lower Gariep Valley, Stinkfontein Mountains, Steinkopf and Vaalputz). **(ece)**

*D.' Flowers on short to long pedicels (see also **L. mutabilis** under D.)*
E. Leaves covered with simple or stellate hairs

angelica W.F.Barker Dwarf, bulbous geophyte, 60–120 mm tall. Leaf 1, dry at flowering, prostrate or spreading, heart-shaped, 10–20 mm broad, glaucous, upper surface covered with very short stellate hairs. Scape slender, dark maroon. Flowers widely campanulate, on long white, spreading pedicels, tepals white with very pale green apical swellings, stamens shortly exserted. Oct. In large colonies in sand on quartz slopes and flats, NS (western Namaqualand). **(ece)**

hirta (Thunb.) Thunb. Bulbous geophyte, 100–300 mm tall. Leaf 1, linear, canaliculate, spreading to suberect, 5–20 mm, bright green, upper surface plain, lower surface and clasping base banded with maroon and covered with short to long rigid, simple hairs. Scape slender, suberect, mottled with purplish maroon. Flowers oblong-campanulate, nodding, on long white or pale blue pedicels, tepals pale blue and greenish yellow, with brown apical swellings and keels, stamens included, rarely exserted. Aug.–Sept. In large colonies in deep sand or gravelly-clay, NH, CCR (Kamieskroon to Bokkeveld Escarpment, Cederberg Mountains to Tygerberg). **(gce)**

trichophylla Baker Bulbous geophyte, 80–200 mm tall. Leaf 1, often dry at flowering, heart-shaped, prostrate, 20–40 mm broad, bright green or glaucous, upper surface covered with erect, short and/or long stellate hairs, lower surface maroon. Flowers tubular, suberect, arranged spirally or in whorls of 3, sessile or on short white pedicels, tepals pale yellow, or flushed with pink, with green apical swellings, stamens included. Aug.–Sept. In colonies on sandy slopes and flats, NH, KV, WM, CCR (Garies, Langberg to Olifants River Valley). **(gce)**

E.' Leaves hairless
F. Flowers pink, red or deep orange, rarely yellow

bulbifera (Cirillo) Engl. ROOINAELTJIE Bulbous geophyte, 80–300 mm tall. Leaves 1 or 2, ovate, suberect to spreading, canaliculate, 15–55 mm broad, bright green to maroonish green, both

surfaces plain or blotched with purplish brown. Scape sturdy, plain or blotched with purplish brown. Flowers tubular, nodding to pendulous, on fairly long pedicels, deep orange to red or rarely yellow, with green or purple tips, stamens included. Apr.–Sept. In colonies in deep sand or loam on slopes, flats and granite outcrops, NS, CCR (Brand-se-Baai, Olifants River Valley to southern Cape). **(gce)**

rubida Jacq. SANDVIOOLTJIE Bulbous geophyte, 60–250 mm tall. Leaves 1 or 2, lanceolate, suberect to spreading, 12–30 mm broad, immature at flowering, pale green or glaucous, both surfaces and clasping bases plain or spotted with darker green or purple. Scape erect to suberect, slender, mottled with pale to deep magenta. Flowers tubular, nodding to pendulous, on short white pedicels, stamens included. Mar.–July. In colonies in deep sand or granite or sandstone outcrops, NS, NH, KV, CCR (S of Kleinsee, Bitterfontein, Klawer to Cape Peninsula to southern Cape). **(gce)**

F.' Flowers yellowish, greenish, pale blue, cream or white
G. Leaves 2

alba W.F.Barker ex G.D.Duncan Bulbous geophyte, 100–330 mm tall. Leaves 2, lanceolate, canaliculate, suberect, 15–25 mm broad, pale green or glaucous, clasping bases occasionally flushed with dull maroon, both surfaces plain. Scape slender, erect to suberect, plain green. Flowers oblong-campanulate, suberect, on short white pedicels, tepals white with greenish brown or dull red apical swellings and keels, stamens included. Sept.–Oct. In large colonies on open clay flats, WM (Bokkeveld Plateau, Nieuwoudtville and Calvinia). **(ece)**

doleritica G.D.Duncan Bulbous geophyte, 120–180 mm tall. Leaves 2, ovate, spreading to arched, 30–40 mm broad, olive-green, both surfaces plain. Scape sturdy, unmarked or speckled with pale brown. Flowers oblong-campanulate, on fairly long pedicels, spreading to suberect, tepals pale yellowish green with darker green or brown apical swellings and keels, stamens included. Sept.–Oct. Singly or in small groups on doleritic clay, WM (Bokkeveld Plateau and from near Calvinia to Middelpos). **(ece)**

isopetala Jacq. Bulbous geophyte, 100–300 mm tall. Leaves 2, suberect to arched, canaliculate, conduplicate, 15–25 mm broad, glaucous, both surfaces plain, straw-like bristles surrounding uppermost portion of clasping bases. Scape slender, brownish green. Flowers tubular, suberect, on very short white pedicels, tepals yellowish brown with dark brown apical swellings and keels, stamens shortly exserted. Oct.–Nov. Singly or in groups, in stony, doleritic clay, WM, TS (Bokkeveld Plateau, Roggeveld to Komsberg and Nuweveld Mountains Plateau). **(ece)**

namibiensis W.F.Barker Dwarf, bulbous geophyte, 50–100 mm tall. Leaves 2, erect to suberect, narrowly lanceolate with distinct midrib, 3–12 mm broad, dark green, both surfaces plain, margins ciliolate. Scape slender, suberect, pale green, unmarked. Flowers widely campanulate, spreading to suberect, pedicels long, white with brown mottling, tepals white, apices slightly recurved, with green or brown apical swellings and keels, perianth tube long (3 mm), stamens included. Aug.–Sept. In colonies on rocky slopes in red sand, G (southern Namibian Escarpment: Namuskluft, Numees). **(ece)**

patula Jacq. Dwarf, bulbous geophyte, 50–120 mm tall. Leaves 2, erect, subterete and very fleshy, 5–10 mm broad, green or deep maroon, unmarked. Scape deep maroon. Flowers large, widely campanulate, suberect, on long white pedicels, tepals white with magenta apical swellings and keels, stamens included. Sept.–Oct. In colonies on shallow quartz flats, KV (western Knersvlakte). **(ece)**

schelpei W.F.Barker Bulbous geophyte, 100–230 mm tall. Leaves 2, suberect, lanceolate, 15–25 mm broad, glaucous, clasping bases banded green and magenta, both surfaces blotched with dark green. Scape heavily blotched with dull purple. Flowers tubular, spreading to slightly nodding, on very short white pedicels, tepals pale green with darker green or brown apical swellings and keels, stamens shortly exserted. June–July. Singly or in small groups, in stony clay, WM (Hantamsberg). **(ece)**

G.' Leaf solitary

attenuata W.F.Barker ex G.D.Duncan Bulbous geophyte, 65–220 mm tall. Leaf 1, linear, canaliculate, suberect, attenuate, 7–10 mm broad, pale green, clasping base banded with magenta, upper surface plain, lower surface banded with dark green. Scape slender, blotched brownish purple. Flowers oblong-campanulate, nodding, on long white pedicels, tepals pale blue and greenish

yellow with brown apical swellings and keels, stamens included. Aug.–Sept. Singly or in small groups in loamy-clay soil, WM, CCR (Roggeveld Plateau, Little Karoo to southern Cape). **(gce)**

bolusii W.F.Barker Bulbous geophyte, 100–350 mm tall. Leaf 1, narrowly to broadly lanceolate, flat or canaliculate, spreading to suberect, 7–10 mm broad, dark green, upper surface plain, lower surface and clasping base maroon-banded, margins undulate or crisped. Scape slender, with minute maroon spots. Flowers urceolate, nodding, on long white pedicels, tepals pale blue with brownish apical swellings and keels, stamens included. Aug.–Sept. Singly or in small groups on rocky, clay slopes, G, NH, WM, CCR (northern Richtersveld to Olifants River Valley and Roggeveld). **(gce)**

buchubergensis Dinter Dwarf, bulbous geophyte, 60–70 mm tall. Leaf 1, lanceolate, spreading to suberect or falcate, 7–20 mm broad, glaucous, clasping base with deep maroon bands, upper surface unmarked, lower surface with green blotches. Scape slender, suberect with minute spots. Flowers tubular, spreading, on extremely short white pedicels, tepals olive-green to pale bluish grey with purple tips and greenish brown apical swellings, stamens included. May–July. Singly or in small groups on stony hillsides, SN, G (southern Namibia, lower Gariep Valley and Richtersveld). **(ece)**

marlothii W.F.Barker ex G.D.Duncan Bulbous geophyte, 90–160 mm tall. Leaf 1, lanceolate, suberect to spreading, 10–25 mm broad, dark green, leathery, lower surface and clasping base banded with purplish brown and green, upper surface plain. Scape slender, pale green, blotched brownish purple. Flowers oblong-campanulate, spreading, sessile or on short pedicels, strongly sweet-scented, tepals pale blue, white and brownish yellow with darker apical swellings and keels, stamens included. July–Sept. Singly or in small groups on stony clay hillsides, G, NH, WM (Richtersveld, Steinkopf, Bokkeveld and Roggeveld Plateaux). **(ece)**

unifolia Jacq. Bulbous geophyte, 100–350 mm tall. Leaf 1, linear, spreading to suberect, canaliculate, 5–12 mm broad, bright green to glaucous, clasping base banded with dark purple, upper surface plain, lower surface banded with dark green. Scape slender, pale green with purplish mottling. Flowers oblong-campanulate, spreading or nodding, on long or short white pedicels, tepals pale blue and cream with brown or green apical swellings, stamens included. Aug.–Oct. In colonies on deep, sandy flats or stony, clay slopes, NH, KB, KV, WM, CCR (Kamieskroon to southern Cape). **(gce)**

C.' Stamens well exserted by > 2 mm beyond perianth
H. Flowers sessile

splendida Diels Bulbous geophyte, 60–250 mm tall. Leaves 2, lanceolate, spreading to suberect, 15–25 mm broad, bright green, both surfaces and clasping bases unmarked. Scape erect to suberect, inflated in uppermost portion, unmarked. Flowers oblong-campanulate, spreading, sessile, tepals pale blue and lilac with green or brown apical swellings and keels, stamens well exserted, filaments purple in upper half. July–Aug. In large colonies in deep sand or on quartz fields, NH, KV, CCR (Garies to Kliprand through to Klawer). **(gce)**

H.' Flowers on short to long pedicels
I. Leaves > 2

multifolia W.F.Barker Dwarf, bulbous geophyte, 50–200 mm tall. Leaves numerous, filiform terete, suberect to spreading, 1 or 2 mm broad, glaucous, plain. Scape slender, plain. Flowers widely campanulate, spreading, on long white pedicels, spicy-scented, tepals white with green apical swellings and keels, stamens well exserted. Sept.–Oct. Singly or in small groups on rocky hillsides and rock pans, WM, TS (Bokkeveld Plateau, Tanqua Karoo to Karoopoort). **(ece)**

I.' Leaves 1 or 2
J. Leaves covered with simple or stellate hairs

comptonii W.F.Barker Bulbous geophyte, 50–200 mm tall. Leaves 1 or 2, ± dry at flowering, lanceolate, spreading, 10–20 mm broad, upper surface dark green with long simple hairs, lower surface maroon. Scape slender, dull purple. Flowers widely campanulate, spreading, strongly spice-scented, on very short white pedicels, tepals dull white with greenish brown apical swellings and keels, stamens well exserted, filaments magenta in upper half. Sept.–Oct. In colonies on sand or clay flats, TS (Karoopoort through southern Tanqua Karoo and Komsberg to Moordenaars Karoo). **(ece)**

polypodantha Schltr. ex W.F.Barker Bulbous geophyte, 100–150 mm tall. Leaf 1, heart-shaped, spreading, 10–20 mm broad, dark green, clasping base unmarked or flushed with maroon speckles, upper surface densely covered with short stellate hairs. Scape slender. Flowers small, widely campanulate, spreading, on long white pedicels, tepals white with green or brown apical swellings and keels, stamens well exserted, filaments purple above. Aug.–Sept. In colonies in deep, red sand, G, KB (Richtersveld and Kamiesberg Mountains). **(ece)**

J.' Leaves hairless
*K. Leaves 2 (see also **L. glaucophylla, L. unicolor, L. violacea** and **L. xerophila** under K.')*
L. Bulb tunics extended into a hard, fibrous neck

dasybotrya Diels Bulbous geophyte, 60–100 mm tall. Leaves 2, ovate, spreading, 20–30 mm broad, dark green, plain, clasping bases subterranean. Scape sturdy, pale green, plain. Flowers oblong-campanulate, large, spreading, on short white pedicels, tepals white with green or brown apical swellings and keels, stamens shortly exserted. Aug.–Oct. In colonies on red, clay flats, NH, WM (E of Kamiesberg Mountains and Bokkeveld Plateau to around Calvinia). **(ece)**

duncanii W.F.Barker Bulbous geophyte, 150–180 mm tall. Leaves 2, lanceolate, leathery, spreading to suberect, 15–20 mm broad, glaucous, upper surface plain or with purple blotches, margins thickened, crisped and/or undulate. Scape sturdy, dull purple, unmarked. Flowers oblong-campanulate, shortly pedicellate, spreading, tepals cream with green apical swellings and keels; stamens well exserted, magenta in upper half. Aug.–Sept. On flats in stony, clay soil, NH (eastern Namaqualand). **(ece)**

giessii W.F.Barker Dwarf, bulbous geophyte, 60–160 mm tall. Leaves 2, lanceolate, flaccid, spreading to suberect, 10–20 mm broad, glaucous, plain, clasping bases subterranean. Scape slender, suberect, pale green, plain. Flowers widely campanulate, spreading, on long white pedicels, tepals white with green or brown apical swellings and keels, perianth tube short (1.5 mm long), stamens shortly exserted. Aug.–Sept. Singly or in colonies in deep red sand, SN, G (southwestern and southern Namibia to near Aggeneys).

L.' Bulb tunics not extended into a fibrous neck

juncifolia Baker Bulbous geophyte, 70–400 mm tall. Leaves 2, linear, spreading to suberect, 2–7 mm broad, canaliculate below, terete to subterete above, plain green to brownish green, clasping bases subterranean, upper surface plain, lower surface banded with maroon at base. Scape erect to suberect, slender, heavily mottled with brownish maroon. Flowers very variable, oblong-campanulate, nodding, on long white pedicels, tepals white or pink with dark maroon, purple or brownish green apical swellings and keels, stamens well exserted. Aug.–Oct. In large colonies in deep sand, WM, TS, CCR (Calvinia, Cederberg Mountains, Komsberg to southern Cape). **(gce)**

macgregoriorum W.F.Barker Bulbous geophyte, 160–360 mm tall. Leaves 2, dry at flowering, narrowly lanceolate, suberect to spreading, 7–10 mm broad, glaucous, upper surface unmarked, lower surface with small maroon spots towards base. Scape slender, pale green spotted with maroon. Flowers widely campanulate, spreading to suberect, on long maroon pedicels, tepals maroon and white with dark maroon apical swellings and keels, stamens well exserted, filaments maroon in upper portion. Oct.–Nov. In groups in doleritic clay, WM (Bokkeveld Plateau). **(ece)**

nardousbergensis G.D.Duncan Bulbous geophyte, 150–310 mm tall. Leaves 2, broadly lanceolate, prostrate, 25–55 mm broad, upper surface olive-green with dark green, flattened pustules. Scape sturdy, usually inflated above, heavily blotched with brownish purple. Flowers oblong-campanulate, nodding or spreading, on suberect, fairly long brownish green or brownish magenta pedicels, tepals pale to deep magenta with magenta or green keels and apical swellings, stamens well exserted, white in lower portion and deep magenta above. Aug.–Oct. In small groups or colonies on fairly level, high-lying ground, in deep, red or brown sand, WM, CCR (Bokkeveld Plateau to northern Cederberg Mountains). **(gce)**

neilii W.F.Barker ex G.D.Duncan Bulbous geophyte, 120–320 mm tall. Leaves 2, lanceolate, canaliculate, suberect, 7–22 mm broad, pale green or glaucous, plain but clasping bases occasionally with maroon speckles. Scape plain, green. Flowers oblong-campanulate, spreading, on fairly long white pedicels, tepals pale green and blue with green or brown apical swellings, stamens shortly exserted. Sept.–Oct. In colonies on open flats in heavy, doleritic clay, WM (Bokkeveld Plateau). **(ece)**

*K.' Leaf solitary (or 2 in **L. glaucophylla, L. unicolor, L. violacea** and **L. xerophila**)*

anguinea Sweet Bulbous geophyte, 100–450 mm tall. Leaf 1, canaliculate, narrowly lanceolate, suberect to falcate, 10–30 mm broad, lower surface with bright green and maroon horizontal bars. Scape sturdy, usually inflated in upper portion, pale green, unmarked. Flowers campanulate, on long white pedicels, tepals cream with green apical swellings, stamens well exserted. July–Sept. In deep, red sand on flats, G, NS, NH, KV, CCR (Richtersveld, western Namaqualand to Olifants River Valley). **(gce)**

glaucophylla W.F.Barker Bulbous geophyte, 90–250 mm tall. Leaf 1(2), narrow-lanceolate, conduplicate, arcuate, 8–20 mm broad, glaucous, upper surface unmarked, lower surface purple-spotted on lower part and clasping base and green-spotted above. Scape slender, short. Flowers very small, widely campanulate, on fairly long white pedicels, spice-scented, tepals cream with green apical swellings and keels, stamens well exserted. Oct. In colonies in deep, red sand, KB, WM (Kamiesberg Mountains to Roggeveld Plateau). **(ece)**

klinghardtiana Dinter Bulbous geophyte, 60–160 mm tall. Leaf 1, lanceolate, spreading to suberect or falcate, 10–30 mm broad, glaucous, clasping base with or without large magenta spots, upper surface plain or with sporadic brownish purple spots. Scape erect to suberect, inflated above. Flowers oblong-campanulate, spreading to nodding, pedicelled, tepals dull white with brown apical swellings and median keels, stamens well exserted. June–July. In colonies in deep sand on flats and dunes, SN, G (southwestern Namibia and lower Gariep Valley to western Richtersveld). **(ece)**

nordenstamii W.F.Barker Dwarf, bulbous geophyte, 50–120 mm tall. Leaf 1, lanceolate, canaliculate, falcate, 5–10 mm broad, glaucous to dark green, clasping base and lower surface banded with maroon, upper surface plain. Scape very slender. Flowers widely campanulate, nodding, on short white pedicels, tepals brown with maroon keels, stamens well exserted, maroon, capsule obcordate, broadly winged. May–July. Singly or in small groups in sheltered rock cracks, SN, G (southwestern Namibia to northern Richtersveld). **(ece)**

nutans G.D.Duncan Bulbous geophyte, 35–110 mm tall. Leaf 1, broadly lanceolate, erect to suberect, 4–20 mm broad, glaucous or dark green, clasping base subterranean, upper surface unmarked, lower surface banded with green, margins dark maroon. Scape with purplish red mottling. Flowers oblong-campanulate, nodding, on distinct white pedicels, tepals white with large green apical swellings and keels, stamens well exserted. July–Aug. Singly or in colonies on sandy, gravel flats, SN (southwestern Namibia). **(ece)**

unicolor Jacq. Bulbous geophyte, 80–300 mm tall. Leaves 1 or 2, lanceolate, suberect to spreading, weakly canaliculate, dull green, 10–20 mm broad, upper surface slightly to densely pustulate, lower surface and clasping bases plain. Scape plain, green. Flowers oblong-campanulate, nodding, on long mauve or purplish blue pedicels, tepals deep mauve or purplish blue, stamens well exserted, filaments mauve or purplish blue. Sept.–Oct. In colonies on sandy flats, KV, CCR (Vanrhynsdorp to Olifants River Valley). **(gce)**

violacea Jacq. Bulbous geophyte, 100–350 mm tall. Leaves 1 or 2, narrowly to broadly lanceolate, canaliculate, spreading to suberect, 20–50 mm broad, glaucous, clasping bases and both surfaces plain or heavily spotted with brownish purple, margins thickened. Scape sturdy, erect to suberect, plain or with large purple blotches, often inflated above. Flowers oblong-campanulate, nodding, on long white or mauve pedicels, tepals bluish green with magenta or purple tips, stamens well exserted, filaments purple in upper half. July–Sept. Very variable, singly or in colonies on rocky slopes or deep sand near seasonal streams, G, NS, NH, KB, KV, WM, TS, CCR (Richtersveld through Olifants River Valley to Karoopoort, Roggeveld Escarpment and S of Fraserburg). **(gce)**

whitehillensis W.F.Barker Bulbous geophyte, 150–360 mm tall. Leaf 1, narrowly lanceolate, canaliculate, conduplicate, suberect, 10–20 mm broad, clasping base and lower surface banded with maroon, upper surface plain. Scape slender, suberect, spotted with maroon. Flowers oblong-campanulate, spreading, on white pedicels, tepals pale blue and white with brown apical swellings and keels, stamens well exserted. Sept. Singly or in colonies, in deep sand, WM, TS (Komsberg to near Laingsburg). **(ece)**

xerophila Schltr. ex G.D.Duncan Bulbous geophyte, 100–250 mm tall. Leaf 1(2), lanceolate, suberect, canaliculate, 10–20 mm broad, glaucous, plain, clasping base subterranean, margins entire, undulate or crisped. Scape erect to suberect, pale green, inflated above. Flowers oblong-campanulate, nodding to spreading, on short white pedicels, tepals white with large brown apical

swellings and keels, stamens well exserted. July–Sept. In colonies in deep, red, gravelly sand, NS, NH (Holgatrivier, Steinkopf to boundary of western Bushmanland). **(ece)**

zebrina W.F.Barker Bulbous geophyte, 150–300 mm tall. Leaf 1, broadly lanceolate, spreading to suberect, arched, canaliculate, conduplicate, 20–60 mm broad, clasping base and lower surface heavily banded with dark maroon or brown, upper surface glaucous, unmarked. Scape erect to suberect, sturdy, heavily mottled with brown. Flowers oblong-campanulate, nodding, on long white or green pedicels, tepals cream tinged with greenish brown, stamens well exserted. Aug.–Oct. Singly or in colonies in rocky, clay soil, KV, WM, TS (Knersvlakte to near Loeriesfontein, southern Tanqua Karoo to S of Fraserburg). **(ece)**

LEDEBOURIA AFRICAN SQUILL, UNTLOKWANA ± 30 spp., India, Madagascar and sub-Saharan Africa, mainly southern Africa

apertiflora (Baker) Jessop Bulbous geophyte, 100–150 mm tall. Leaves 5–10, spreading, lanceolate, dull green with dark green or purple blotches. Flowers nodding in dense, cylindrical racemes on spreading pedicels longer than the flowers, purple-pink or greenish, tepals recurved, 5–6 mm long, filaments pink, ovary depressed-globose with papillate lower margins. Oct.–Dec.(–Mar.). Gravelly flats and slopes, G, NH (northern and central Namaqualand, eastwards through South Africa).

undulata (Jacq.) Jessop Bulbous geophyte, 100–150 mm tall. Leaves 6–10, dry at flowering, ascending, narrowly oblong to lanceolate, glaucous, margins usually undulate or crisped. Flowers in a dense, cylindrical raceme, on horizontal pedicels ± as long as flowers, whitish and purple-pink or greenish, tepals recurved, 5–6 mm long, filaments white, ovary globose. Nov.–Jan. Stony flats and slopes, NH, WM, TS, CCR (widespread through dry areas of western and central South Africa).

MASSONIA (= *WHITEHEADIA*) BOBBEJAANBOEK, HEDGEHOG LILY, KRIMPVARKIE 9 spp., southern Namibia, South Africa and Lesotho

A. Inflorescence subspicate, pedicels up to 4 mm long; flowers campanulate

bifolia (Jacq.) J.C.Manning & Goldblatt (= *Whiteheadia bifolia* (Jacq.) Baker) PAGODA LILY Bulbous geophyte, 80–200 mm tall. Leaves 2, prostrate; bracts large, lanceolate, succulent. Flowers in a cylindrical, subspicate raceme, overtopped with a coma of large bracts, shortly pedicellate, greenish; tube campanulate, 4–7 mm long, tepals ovate, 10–15 mm long, filaments 7–9 mm long, shortly united below, anthers and pollen yellow, ovary exposed. Capsules subglobose-turbinate, 3-winged, ± 15 mm long, seeds ± 2 mm diam. June–Aug. Sheltered slopes in the lee of rocks, SN, G, NH, WM, CCR (southern Namibia, Bushmanland, through central Namaqualand to Bokkeveld and Pakhuis Mountains).

etesionamibensis (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Whiteheadia etesionamibensis* U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, 40–70 mm tall. Leaves 2, prostrate; bracts small, lanceolate, papillate. Flowers in a conical, subspicate raceme, subsessile; tube campanulate, 2–3 mm long, tepals lanceolate, 9–14 mm long, filaments 4–6.5 mm long, united at base, anthers and pollen yellow, ovary exposed. Capsule obovoid, 3-winged, 18–25 mm long, seeds ± 2 mm diam. (May–)July–Sept. Sheltered slopes in lee of rocks, SN, G (Sperrgebiet and southern Namibian Escarpment). **(ece)**

A.' Inflorescence capitate, pedicels > 4 mm long; flowers tubular
B. Anthers 2–5 mm long, yellow

depressa Houtt. Bulbous geophyte, up to 50 mm tall. Leaves 2, prostrate, smooth or rarely pustulate, plain or spotted; bracts lanceolate, membranous below. Flowers clustered between leaves, greenish to yellow or pinkish, yeast-scented; tube broadly cylindrical, 3–17 mm long, tepals oblong, sigmoid, 6–12 mm long; filaments 8–18 mm long, shortly united below; anthers 2–5 mm long, yellow with yellow pollen. Capsules obovoid, 3-winged, 10–30 mm long, seeds ± 1 mm diam. May–July. Sandy and clay flats, G, NH, KV, WM, TS, CCR (Richtersveld through south-western South Africa).

B.' Anthers 1–2 mm long, blue

echinata L.f. Bulbous geophyte, up to 50 mm tall. Leaves 2, prostrate, glabrous or setose above; bracts lanceolate, membranous below. Flowers clustered between leaves, white, fragrant; tube narrowly cylindrical, 6–15 mm long, tepals reflexed, ± sigmoid, lanceolate, 5–7 mm; filaments 8–11 mm long, shortly united below, anthers 1–2 mm long, blue with mauve or reddish pollen. Capsules obovoid, 3-winged, ± 10 mm long, seeds ± 1.5 mm diam. May–July. Gravelly and clay flats, NH, KB, KV, WM, CCR (Steinkopf to Nuwerus, Bokkeveld and Roggeveld to E Cape).

pygmaea Kunth (= *M. heterandra* (Isaac) Jessop) Bulbous geophyte, up to 50 mm tall. Leaves 2, prostrate, smooth or pustulate-papillate; bracts lanceolate, membranous below. Flowers clustered between leaves, white tinged pink; tube narrowly cylindrical, 7–11 mm long; tepals linear, spreading-erect, ± 7 mm long; filaments alternately long and short, up to 10 mm long, shortly united below, anthers ± 1 mm long, blue with mauve pollen. Capsules obovoid, 3-winged, ± 10 mm long, seeds ± 1.5 mm diam. May–June. Gravelly rock sheets, KB, CCR (Kamiesberg Mountains and Cederberg Mountains to Hopefield). **(gce)**

sessiliflora (Dinter) U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, up to 50 mm tall. Leaves 2, prostrate, smooth or minutely bristly; bracts lanceolate, membranous below. Flowers clustered between leaves, white, fragrant; tube cylindrical, 2–7 mm long; tepals linear, spreading-erect, ± 7 mm long; filaments 7–8 mm long, shortly united below, anthers ± 1 mm long, blue with mauve pollen. Capsules subglobose, ± 5 mm long, seeds ± 1.5 mm diam. Apr.–June. Gravel or sandy flats, SN, G (Sperrgebiet and lower Gariep Valley). **(ece)**

[**Species insufficiently known M. sempervirens** U.Müll.-Doblies, G.Milkuhn & D.Müll.-Doblies]

NAMOPHILA 1 sp., southern Namibia **(ece)**

urotepala U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, up to 50 mm tall, acaulescent. Leaves 2, prostrate, elliptic-ovate. Flowers in a capitate corymb between leaves, pale greenish and white, tepals narrowly-lanceolate, caudate, 12–17 mm long, basally united in a cup-shaped tube 4–6 mm long, stamens basally connate. Aug.–Sept. Shaded rocky slopes, G (southern Namibian Escarpment). **(ece)**

ORNITHOGALUM (=*ELIOKARMOS, NEOPATERSONIA*) CHINCHERINCHEE, TJIENK ± 120 spp., Africa, Mediterranean and Near East, 1 sp. in Madagascar

A. Capsule 3-angled or 3-winged, oblong-globose, leathery, ± exposed from withered
perianth; tepals leathery, whitish to green
B. Tepals 8–15 mm long; filaments free; stigma not trifid

haalenbergense U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, 50–150 mm tall, outer tunics dark and leathery. Leaves 2–4, spreading, lanceolate. Flowers suberect on pedicels up to 30 mm long, subcorymbose, pale green or whitish, tepals elliptical, ± 8 mm long, filaments lanceolate, 6 mm long. Capsules subglobose, 10 mm long, seeds discoid, 8 mm diam. July. Gravelly flats, SN (Sperrgebiet: Lüderitz to Bogenfels). **(ece)**

xanthochlorum Baker Robust, bulbous geophyte, up to 0.6 m tall, outer tunics dark and leathery. Leaves 9–14, partially dry at flowering, spreading in a basal rosette, oblong, glossy green. Flowers suberect on pedicels up to 30 mm long, pale green, tepals ovate-oblong, ± 15 mm long; filaments ovate-acuminate, white, ± 9 mm long. Capsules subglobose, 10 mm long, seeds discoid, ± 6 mm diam. Aug.–Sept. Sandy flats, G, NH, WM, TS (Richtersveld through central Namaqualand to northern Hantam and Tanqua Karoo). **(ece)**

B.' Tepals 3–5 mm long; filaments connate basally; stigma sometimes trifid

falcatum (G.J.Lewis) J.C.Manning & Goldblatt (= *Neopatersonia falcata* G.J.Lewis) Bulbous geophyte, 30–80 mm tall. Leaf 1, falcate-conduplicate, glaucous; bracts lanceolate. Flowers suberect on spreading pedicels 7–12 mm long, scape wiry, pedicels persisting and remaining green and photosynthetic, tepals yellowish flushed purple, ovate, 4 mm long; filaments joined at base, ±

1.5 mm long; style 1.5 mm long, 3-branched. Capsules subglobose, 6 mm long, seeds globose, ± 3 mm diam. May–July. Sandy and gravelly flats, SN, G (southern Namibia and Richtersveld: Alexander Bay). **(ece)**

filicaule J.C.Manning & Goldblatt (= *Neopatersonia namaquensis* G.J.Lewis) Bulbous geophyte, 40–100 mm tall. Leaves 2, spreading, oblong; bracts cordate, remaining green and photosynthetic. Flowers suberect on spreading pedicels 7–12 mm long, lowermost frequently aborted, scape wiry, pedicels persisting and remaining green and photosynthetic, tepals pale green, spreading, ovate, 3–4 mm long; filaments joined at base, ± 1.5 mm long; style 1.5 mm long, 3-branched. Capsules subglobose, 5 mm long, seeds globose, ± 2 mm diam. July–Aug. Stony flats, NH (Springbok to Soebatsfontein and Garies). **(ece)**

rotatum U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, up to 150 mm tall. Leaf 1, drying at flowering, oblong, glaucous. Flowers suberect on pedicels 15–35 mm long, greenish brown, tepals fused for 2–3 mm at base into a campanulate tube, elliptical, 4–5 mm long, filaments inserted at mouth of tube, white, ovate-acuminate, 3 mm long. Capsules ovoid, ± 10 mm long, seeds angled. Oct. Stony and sandy washes, G, WM (Richtersveld and northern Hantam). **(ece)**

A.' Capsule spindle-shaped to ellipsoidal, transparent, ± concealed by dry, closed perianth; tepals thin-textured, white to orange, with or without a dark keel
*C. Leaves several, terete to linear, ± erect; tepals white (see also **O. rupestre** below)*

comptonii F.M.Leight. Dwarf, bulbous geophyte, 50–100 mm tall. Leaves sometimes dry at flowering, short, arcuate, linear and keeled, sclerotic, margins retrorse-ciliate. Flowers suberect in a dense conical raceme on spreading pedicels 6–15 mm long, white with brown midrib, tepals lanceolate, ± 10 mm long, filaments linear-lanceolate. Oct.–July. Shale flats and slopes, TS, CCR (Matjiesfontein to Prince Albert and Little Karoo). **(gce)**

graminifolium Thunb. Bulbous geophyte, 100–300 mm tall, tunics brownish. Leaves often dry at flowering, sheathing below and forming a papery neck, linear, sometimes hairy, margins ciliate. Flowers suberect in a spike-like raceme on pedicels up to 6 mm long, white, dull yellow or pale pink, tepals narrow, 5–10 mm long, filaments linear-lanceolate. Dec.–Mar. Stony flats and slopes, often in moist sites, WM, TS, CCR (Bokkeveld Mountains through the Roggeveld and SW Cape to KwaZulu-Natal).

nannodes F.M.Leight. Bulbous geophyte, up to 150 mm tall, tunics pale brownish, forming a neck. Leaves dry at flowering, suberect, filiform, margins ciliolate. Flowers suberect, ± corymbose on pedicels up to 30 mm long, tepals lanceolate, whitish with brown midribs, 5–7 mm long, filaments lanceolate. Oct.–Dec. Hard stony soil, G, NH, KB, KV, WM, TS, CCR (Richtersveld, northern Karoo and Upper Karoo through Namaqualand and western Karoo to Stellenbosch).

verae U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, 100–200 mm tall, tunics leathery and greyish. Leaves dry at flowering, sheathing below and drying to form a long papery neck, linear, twisted, sclerotic, margins papillate. Flowers suberect in a spike-like raceme on pedicels 5–10 mm long, white, tepals suberect-spreading, narrow, outer often apiculate, 10–15 mm long; filaments linear-lanceolate, 5–7 mm long. Dec.–Jan. Dolerite flats, WM (Roggeveld). **(ece)**

zebrinellum U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, 40–100 mm tall. Leaves 2–5, dry at flowering, linear, margins ciliolate, surrounded at base by a membranous sheath with pale or dark horizontal bands. Flowers delicate, suberect in a lax raceme on pedicels 5–8 mm long, tepals lanceolate, white, 5–7 mm long, filaments lanceolate. (Sept.–)Dec.–Mar. Stony flats and slopes, NH, WM, TS, CCR (central Namaqualand through Bokkeveld and Roggeveld to E Cape).

C.' Leaves few, ovate to narrowly lanceolate, ± spreading, glabrous or hairy, rarely ± linear then tepals yellow
D. Bracts large, lanceolate, entire, firm-textured or petaloid; tepals 10–25 mm long
E. Flowers yellow to orange

maculatum Jacq. ORANJETJIENK Bulbous geophyte, 60–500 mm tall, tunics soft, whitish or grey. Leaves usually suberect, oblong-lanceolate, glaucous, margins smooth. Flowers suberect on pedicels 3–15 mm long, orange to red, outer tepals usually with a dark or transparent blotch api-

cally, tepals ovate, 10–28 mm long, filaments subulate-lanceolate, ovary yellow, style very short. Capsules ovoid, 8–10 mm long, seeds angular, ± 1 mm across. Sept.–Oct. Rocky outcrops and rock pavement, NH, KB, KV, WM, TS, CCR (central Namaqualand, Bokkeveld Plateau through Cederberg Mountains to Tanqua Karoo and Little Karoo). **(gce)**

rupestre L.f. (= *O. multifolium* Baker) KLIPTJIENK Bulbous geophyte, 50–150 mm tall, tunics soft, whitish or grey. Leaves suberect, subterete to linear-canaliculate, glaucous, margins smooth. Flowers suberect on pedicels 2–18 mm long, yellow to orange (rarely whitish in CCR), tepals ovate, 6–12 mm long, filaments subulate-lanceolate, ovary yellowish, style very short. Capsules ovoid, ± 10 mm long, seeds angular, ± 1 mm across. Aug.–Oct. Rock pavement in depressions, G, NS, NH, KB, KV, WM, TS, CCR (Richtersveld through Namaqualand, Bokkeveld and Roggeveld through SW Cape to Little Karoo.) **(gce)**

E.' Flowers white
F. Bulb tunics soft and pale

strictum L.Bolus Bulbous geophyte, 200–800 mm tall, tunics soft, whitish. Leaves sometimes dry at flowering, suberect, lanceolate, margins ciliate. Flowers suberect on pedicels 5–14 mm long, white, rarely with small brownish centre, tepals ovate, 15–25 mm long, filaments filiform-subulate, inner with small basal expansion, ovary yellow or greenish. Capsules ovoid, 10–12 mm long, seeds angular, 1.5–2 mm across. Sept.–Nov. Seasonally moist clay or loam flats, WM, CCR (Bokkeveld Mountains to Ceres and Roggeveld). **(gce)**

thyrsoides Jacq. CHINCHERINCHEE Bulbous geophyte, 150–700 mm tall, bulb tunics soft, whitish. Leaves sometimes dry at flowering, suberect, lanceolate, margins ciliate. Flowers white with small greenish or brownish centre, tepals ovate, 12–27 mm long, filaments triangular, inner with broad membranous wings below, ovary grey or brown. Capsules ovoid, 10–16 mm long, seeds angular, 1.5–2 mm across. Sept.–Nov. Seasonally moist clay or loam flats, NH, KV, CCR (central Namaqualand and Knersvlakte to Bredasdorp). **(gce)**

F.' Bulb tunics firm and dark

corticatum Mart.-Azorín Bulbous geophyte, 200–450 mm tall, bulb tunics hard and dark. Leaves usually dry at flowering, spreading, oblong, puberulous near tips, margins ciliate. Flowers suberect on pedicels 10–15 mm long, white, tepals 7–9 mm long, filaments subulate-triangular, ovary yellow above. Capsules ovoid, 8–11 mm long, seeds angular, 2–2.5 mm across. Nov. Stony flats, WM (Roggeveld). **(ece)**

leeupoortense U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, 60–100 mm tall, bulb tunics leathery and dark. Leaves distichous, falcate, bright green, margins thickened and papillate. Flowers suberect on pedicels 15–30 mm long, white, tepals ovate, 13–20 mm long, filaments subulate-lanceolate, ovary green. Capsules ovoid, 6–7 mm long, seeds angular, 0.5–1 mm across. Aug.–Sept. Quartzite fissures and screes on S-facing slopes, G, NH (Richtersveld and Springbok). **(ece)**

pruinosum F.M.Leight. Bulbous geophyte, 100–600 mm tall, bulb tunics leathery and dark. Leaves suberect or spreading, oblong, glaucous, margins ± smooth. Flowers suberect on pedicels 6–20 mm long, white, sometimes with a small dark centre, tepals ovate, 9–20 mm long, filaments linear-triangular or expanded below, ovary yellow or greenish. Capsules ovoid, 6–10 mm long, seeds angular, 0.5–1 mm across. July–Oct. Stony flats or rocky slopes, G, NH, KB, KV, WM (Richtersveld and Bushmanland through central Namaqualand to Knersvlakte and northern Hantam).

D.' Bracts small, deltoid-aristate, auriculate, denticulate/fimbriate, membranous; tepals usually 5–10 mm long
G. Bulb tunics hard and dark; scapes and pedicels minutely dotted

ciliiferum U.Müll.-Doblies & D.Müll.-Doblies Bulbous geophyte, 100–200 mm tall, bulb tunics hard and dark, scape and pedicels minutely dotted. Leaves 2 or 3, dry at flowering, oblong, sheathing below, margins with two rows of long cilia; bracts long-ciliate. Flowers suberect on pedicels 14–28 mm long, white, tepals lanceolate, 6–8 mm long, filaments subulate, ovary green. Capsules ovoid, ± 3 mm long, seeds angular, ± 0.8 mm across. Nov.–Dec. Rocky slopes, NH, KB, WM, CCR (Grootvlei, Kamiesberg Mountains, Roggeveld and Bokkeveld Mountains to Cederberg Mountains). **(gce)**

pullatum F.M.Leight. Bulbous geophyte, 150–300 mm tall, bulb tunics hard, shiny and black, forming a neck, scape and pedicels minutely dotted. Leaves ± 4, dry at flowering, narrow, sheathing below, margins with two rows of long, soft cilia. Flowers suberect on pedicels 10–20 mm long, white, tepals lanceolate, ± 10 mm long, filaments linear-ovate, ovary yellow above, style ± deflexed. Capsule ovoid, ± 7 mm long, seeds cuneate, minute. Dec. Rocky slopes, NH, WM (central Namaqualand and northern Hantam). **(ece)**

G.' Bulb tunics soft and white or brownish; scape and pedicels smooth
H. Flowers ± nocturnal; filament expansions forming diverging horns with or without additional lobes

bicornutum F.M.Leight. Bulbous geophyte, 50–100 mm tall, bulb tunics soft and brownish. Leaves 2–4, dry at flowering, oblong to lanceolate, sheathing below, margins thickened and with two rows of diverging cilia. Flowers suberect on pedicels 3–5 mm long, white, opening late afternoon, tepals lanceolate, 5–8 mm long, filaments expanded below with diverging horns. Oct.–Nov. Sandy and gravelly flats, NH, WM, CCR (central Namaqualand, Hantam and southern Bokkeveld Mountains). **(gce)**

deltoideum Baker Bulbous geophyte, 70–180 mm tall, bulb tunics soft and brownish. Leaves 2–4, dry at flowering, oblong to lanceolate, sheathing below, margins thickened and with two rows of diverging cilia. Flowers suberect on pedicels 5–20 mm long, white, opening late afternoon, tepals lanceolate, 10–12 mm long, filaments expanded below with diverging horns and/or lobes. Aug.–Oct.(Nov.). Sandy and gravelly flats, SN, G, NH, KV (Sperrgebiet, Richtersveld, Bushmanland and northern Karoo through Namaqualand to Knersvlakte).

H.' Flowers diurnal; filament expansions unlobed or with converging lobes
I. Leaf sheaths not spotted; blades glabrous or sometimes ciliate

decus-montium G.Will. Bulbous geophyte, 50–100 mm tall, bulb tunics brittle, persisting as a firm-papery neck. Leaves 2, linear-lanceolate, sheathing below, glabrous, scape wiry. Flowers suberect on pedicels ± 10 mm long, white, tepals lanceolate, 10 mm long, filaments linear or widened basally, marked with yellow, ovary apex usually glossy dark green. Sept. Rocky slopes, SN, G (W of Gariep and Fish River confluence and Richtersveld). **(ece)**

geniculatum Oberm. Bulbous geophyte, 50–100 mm tall, bulb tunics soft and brownish. Leaves 2–4, oblong, sheathing below, margins with scattered long cilia, scape wiry, with a sharp knee-bend above upper leaf. Flowers suberect on pedicels ± 10 mm long, white, tepals lanceolate, 10 mm long, filaments linear or widened basally. Aug.–Oct. Sheltered slopes in lee of rocks, SN, G, NH (southern Namibia: Witpütz, Richtersveld and central Namaqualand). **(ece)**

naviculum W.F.Barker Bulbous geophyte, 100–150 mm tall, bulb tunics unknown. Leaves 3 or 4, dry at flowering, glaucous, leathery, boat-shaped and concave, sheathing below, margins crisped, glabrous. Flowers suberect on pedicels 10–15 mm long, white with pinkish reverse, tepals lanceolate, 7 mm long, filaments filiform. Dec. Stony flats, KV (Vanrhynsdorp: Holrivier). **(ece)**

pendens Van Jaarsv. Bulbous geophyte, 50–70 mm tall, proliferating vegetatively by bulbils, bulb tunics soft, grey to whitish. Leaves 2, spreading-pendent, lanceolate-attenuate, channelled, margins entire. Flowers corymbose, white, tepals ovate, 7–12 mm long, filaments filiform-subulate, inner with broad membranous wings below, ovary green, style yellowish. Sept. Crevices in quartzite cliffs, NH (Steinkopf to Spektakelberg). **(ece)**

I.' Leaf sheaths usually mottled or spotted; blades ± hispid

hallii Oberm. (including **O. namaquanulum** U.Müll.-Doblies & D.Müll.-Doblies) Bulbous geophyte, 100–200 mm tall, bulb tunics brownish. Leaves usually 4, dry at flowering, lanceolate, ± hispid, sheathing below, margins ciliate, scape ± entirely enclosed by purple-spotted, often hispidulous sheaths. Flowers suberect in a subspicate raceme on pedicels up to 3 mm long, whitish or buff with pinkish reverse, tepals lanceolate, ± 5 mm long, filaments filiform, inner with lobed basal expansion moulded over ovary; style shorter than ovary. Nov. Hard, clay flats, NH, KV (Steinkopf, Concordia and Vanrhynsdorp: Holrivier). **(ece)**

hispidulum U.Müll.-Doblies & D.Müll.-Doblies Like **O. hallii** but leaves 2 or 3 and style longer than ovary. Nov.–Dec. Stony slopes, SN, G (Sperrgebiet and southern Namibian Escarpment). **(ece)**

hispidum Hornem. (= *O. rubescens* F.M.Leight.) GROWWETJIENK Bulbous geophyte, 100–400 mm tall, bulb tunics greyish. Leaves 3–6, dry at flowering, ovate to linear-lanceolate, ± hispid,

sheathing below, sheaths usually green- or purple-spotted, often pubescent, margins ciliate. Flowers suberect on pedicels 10–20 mm long, white to pale yellowish, sometimes with green or reddish reverse, tepals lanceolate, 8–18 mm long, filaments filiform, subulate or inner expanded below, ovary yellow or green, style often deflexed. Aug.–Dec. Clay flats or rock outcrops, SN, G, NH, KB, KV, WM, TS, CCR (southern Namibia to Cape Peninsula to Little Karoo). **(gce)**

puberulum Oberm. (= *O. merxmuelleri* Roessler) Bulbous geophyte, 50–90 mm tall, tunics whitish or brownish. Leaves 2 or 3, suberect, lanceolate, soft-textured, clasping base swollen, margins with long, soft cilia. Flowers suberect on pedicels 10–20 mm long, white, tepals ovate, 6–10 mm long, filaments lanceolate. Capsule ovoid, ± 6 mm long, seeds angular, 1 mm across. Aug.–Sept. Shaded slopes in lee of rocks, SN, G (Sperrgebiet through to Richtersveld: Lekkersing). **(ece)**

[**Species insufficiently known** **O. autumnulum** U.Müll.-Doblies & D.Müll.-Doblies, **O. campanulatum** U.Müll.-Doblies & D.Müll.-Doblies, **O. dolichopharynx** U.Müll.-Doblies & D.Müll.-Doblies, **O. fissurisedentulum** U.Müll.-Doblies & D.Müll.-Doblies, **O. gethylloides** U.Müll.-Doblies & D.Müll.-Doblies, **O. glaucifolium** U.Müll.-Doblies & D.Müll.-Doblies, **O. gregorianum** U.Müll.-Doblies & D.Müll.-Doblies, **O. hesperanthum** U.Müll.-Doblies & D.Müll.-Doblies, **O. knersvlaktense** U.Müll.-Doblies & D.Müll.-Doblies, **O. longicollum** U.Müll.-Doblies & D.Müll.-Doblies, **O. mater-familias** U.Müll.-Doblies & D.Müll.-Doblies, **O. nathoanum** U.Müll.-Doblies & D.Müll.-Doblies, **O. thunbergianulum** U.Müll.-Doblies & D.Müll.-Doblies]

PSEUDOGALTONIA 2 spp., arid W of southern Africa, S tropical Africa

liliiflora J.C.Manning & Goldblatt Bulbous geophyte, up to 1.3 m tall. Leaves suberect, lanceolate; bracts deflexed, lanceolate-attenuate. Flowers in a dense raceme on spreading pedicels, 15–20 mm long, pale greenish white, horizontally spreading but curved up at tip, tube 15–25 mm long, tepals recurved, oblong, 15–17 mm long, filaments triangular, 4 mm long. Apr. Steep, S-facing, rocky slopes, G (Richtersveld: Vandersterrberg and Ploegberg). **(ece)**

VELTHEIMIA SANDLELIE, VELTHEIMIA 2 spp., N Cape, W Cape and E Cape

capensis (L.) DC. Bulbous, deciduous geophyte, 200–400 mm tall. Leaves suberect, glaucous, narrowly oblong to lanceolate, margins undulate or crisped. Flowers in a congested, ovoid raceme, nodding, tubular, pinkish or red, tube 20–35 mm long, tepals ovate, ± 3 mm long. Apr.–July. Sandy flats and rocky slopes, G, NS, NH, WM, TS, CCR (Richtersveld through Namaqualand and Nuweveld Mountains to Little Karoo). **(gce)**

HYPOXIDACEAE

by D.A. Snijman

1. Leaves pleated; flowers with a conspicuous solid neck between the ovary and tepals; ovary often hidden by the leaf sheaths at flowering, completely unilocular; fruit indehiscent, subsucculent. . . . . **Empodium**

1.' Leaves keeled, channelled or subcylindrical, never pleated; flowers without or rarely with a solid neck between the ovary and tepals; ovary usually well exposed or rarely hidden amongst leaf bases at flowering, trilocular or rarely partially unilocular; fruit dehiscent or rarely indehiscent, thin-walled. . . . . **Spiloxene**

EMPODIUM AUTUMN STAR 8 or 9 spp., N and W Cape to Mpumalanga and Swaziland

flexile (Nel) M.F. Thomps. ex Snijman Cormous geophyte, up to ± 100 mm tall, neck coarsely fibrous. Leaves dry or emerging at flowering, narrowly lanceolate, pleated, ribs fringed. Flowers yellow, sweetly scented, tepals slightly spreading near base, otherwise outspread, inserted on a 10–30 mm long neck leading to a mostly subterranean ovary, anthers spreading, tipped with

fleshy, sterile appendages. Apr.–June. Stony flats, NH, KV, WM, TS, CCR (Nababeep to Nieuwoudtville, Worcester and Little Karoo to near Willowmore). **(gce)**

namaquensis (Baker) M.F.Thomps. Cormous geophyte, up to 300 mm tall, basal sheaths membranous, pale with dark tips. Leaves well developed at flowering, broadly lanceolate, pleated, ribs minutely toothed. Flowers yellow, tepals spreading, inserted on a neck up to 20 mm long, ovary exserted from leaf sheaths, anthers ± spreading, without apical appendages. Apr.–June. Rock outcrops, NS, NH, KB, CCR (Nababeep to Graafwater). **(gce)**

plicatum (Thunb.) Garside PLOEGTYDBLOMMETJIE Cormous geophyte, 100–300 mm tall, basal sheaths membranous and pale. Leaves dry or emerging at flowering, narrowly strap-shaped, pleated, ribs hispid. Flowers yellow, rarely scented, tepals outspread, inserted on a solid, 50–100 mm long neck leading to subterranean ovary, anthers suberect, without apical appendages. Apr.–June. Clay or loamy flats, often near rocks, NH, KB, KV, WM, CCR (Kamiesberg Mountains to Roggeveld Escarpment and SW Cape). **(gce)**

SPILOXENE CAPE STAR, STERRETJIE ± 30 spp., southern Namibia, W to E Cape, Lesotho, KwaZulu-Natal and Australia

A. Flowers funnel-shaped with the ovary borne at ground level

sp. A (= *Saniella occidentalis* (Nel) B.L.Burtt, *Spiloxene sp. 2* in Goldblatt & Manning (2000a)) Cormous geophyte, 10–30 mm tall, often clumped, corm with firm, fibrous outer tunics. Leaves suberect, channelled, firm, margins sparsely toothed. Flower 1, tepals united below into a short cup on a 20–70 mm long solid neck above ovary, white with yellow throat and pink reverse; bract solitary, hidden amongst leaves. June–Sept. Seasonally damp depressions in clay soil, WM, CCR (Hantamsberg, Roggeveld Escarpment and Cold Bokkeveld). **(gce)**

A.' Flowers star-shaped with the ovary borne well above ground level
B. Inflorescence 2 or more-flowered

aquatica (L.f.) Fourc. WATERSTERRETJIE Cormous geophyte, 100–300 mm tall, corm mostly without fibrous tunics. Leaves several, erect, firm, subcylindrical. Flowers 2–7, in a spreading cluster, white with green reverse, ovary subcylindrical; bracts as many as flowers, broad and spreading. June–Nov. Pools or marshes, NH, KB, KV, WM, TS, CCR (Steinkopf to Roggeveld Escarpment and SW Cape to Agulhas Plain and Port Elizabeth). **(gce)**

etesionamibensis U.Müll.-Doblies *et al.* Like **S. scullyi** but flowers white to pink, style branches short and broad, ovary broadly top-shaped. June–Sept. In crevices or at base of cool, moist cliffs, G (southern Namibian Escarpment and Richtersveld Mountains). **(ece)**

scullyi (Baker) Garside Cormous geophyte, up to 300 mm tall, corm tunics softly fibrous. Leaves several, spreading, delicate and pale green, V-shaped in cross section. Flowers 2–5, yellow, on a scape ± as long as pedicels, style branches long and narrow, ovary slender, expanding upwards; bracts as many as flowers, leaf-like and spreading. Aug.–Nov. Amongst rocks in seasonally damp, shady habitats, G, NH, KB (Richtersveld Mountains to Kamiesberg Mountains). **(ece)**

sp. B Slender, cormous geophyte, up to 200 mm tall, corm small, tunics softly fibrous. Leaves few, suberect, linear and thin-textured. Flowers 2 or rarely 1, small and yellow, on a scape shorter than pedicels and usually hidden amongst leaf bases, ovary top-shaped; bracts 2, leaf-like, slightly spreading. Sept. Seasonally moist places in loamy soils on S-facing slopes, WM (Klein Roggeveld). **(ece)**

B.' Inflorescence 1-flowered

capensis (L.) Garside Cormous geophyte, 100–300 mm tall, corm capped with short, fine bristles. Leaves several, spreading, linear to lanceolate, V-shaped in section. Flower 1, variable in size, yellow (occasionally white or pink in CCR), often with a dark centre, red-striped on reverse; bract 1, long, leaf-like, wrapped tightly around pedicel. July–Oct. Seasonally wet flats and plateaux, WM, CCR (Roggeveld Escarpment and Clanwilliam to Port Elizabeth). **(gce)**

dielsiana (Nel) Garside Like **S. serrata** but corm covered with twisted, hard roots and usually clumped, leaves entire or rarely with a few, widely spaced teeth towards base, flowers yellow, outer tepals backed with dark green and whitish median stripes and reddish brown on margins.

July–Aug. Clay flats and shady lower S slopes, WM (Hantamsberg and Bloukransberg Mountains). **(ece)**

gracilipes (Schltr.) Garside (including **S. cuspidata** (Nel) Garside) Cormous geophyte, 30–220 mm tall, corm covered with hard, twisted roots. Leaves spreading, linear to broadly lanceolate, channelled, usually with a prominent midrib, pale green. Flower 1, yellow with green reverse; bract 1, inserted at base of pedicel, filiform and inconspicuous. July–Oct. Seasonally wet rocks and depressions, NH, KB, CCR (Kamiesberg Mountains to Cape Peninsula and Hex River Valley). **(gce)**

serrata (Thunb.) Garside (including **S. namaquana** U.Müll.-Doblies *et al.*) Cormous geophyte, 60–200 mm tall, corm tunics finely fibrous. Leaves several, suberect, linear, channelled, margin with a few, minute, recurved teeth. Flower 1, yellow or white (rarely orange in CCR) with green reverse; bracts 2, inserted at base of pedicel, filiform and inconspicuous. May–Oct. Flats and lower slopes, NH, WM, CCR (Steinkopf to Nieuwoudtville and Roggeveld Escarpment to Cape Peninsula and Worcester). **(gce)**

sp. C Cormous geophyte, up to 300 mm tall, corm covered with twisted roots. Leaves suberect, narrowly lanceolate, channelled, dark green. Flower 1, large, orange with reddish brown reverse; bract 1, inserted at base of pedicel, filiform and inconspicuous. Aug.–Sept. Damp places near granite domes, KB (Kamiesberg Mountains). **(ece)**

IRIDACEAE

by P. Goldblatt & J.C. Manning

1. Flowers in umbellate clusters (rhipidia) enclosed by a pair of opposed leafy bracts (spathes), rarely solitary on the peduncles or plants stemless, but then the 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; individual flowers sessile or pedicellate; rootstock a woody caudex, a rhizome or a corm; tepals free, connate below or united in an extended tube:
   2. Style eccentric, apically notched or lobed, the lobes often fringed; flowers deep blue (occasionally lilac, white or pale blue), the tepals shortly connate basally. . . . . **Aristea**
   2.' Style central, usually dividing near the base of the anthers into distinct branches, these either extending between the anthers or appressed against them, sometimes the style exceeding the anthers; flowers variously coloured; tepals free, connate basally or united in a tube:
      3. Leaves usually unifacial or at least the lower, thus oriented edgewise to the stem; corm persisting for some years, the tunics membranous or absent; tepals with crisped edges; style branches terminating in a feathery tuft . . . . . **Ferraria**
      3.' Leaves bifacial or terete; corm usually resorbed annually, the tunics fibrous; tepals with plane to undulate edges; style branches rarely feathery and plumose, but then other characters not as above:
         4. Flowers with a perianth tube; plants stemless; style lobed apically, the lobes entire or fringed, but without crests . . . . . **Moraea: *Galaxia*-group**
         4.' Flowers usually without a perianth tube; style dividing below or opposite the anthers, compressed tangentially, adpressed to the anthers, terminating in paired erect crests:
            5. Style branches filiform either simple or each divided to the base, thus with six branches, the branches extending below, between or above the anthers . . . . . **Moraea: *Hexaglottis*- and *Roggeveldia*-groups**
            5.' Style branches flattened tangentially, as wide as or much wider than the anthers, the branches ascending to upright and opposite the anthers, sometimes concealed by them:
               6. Plants stemless with the flowers crowded basally; flowers either with the ovary borne below or close to ground level or raised above ground on contractile pedicels . . . . . **Moraea: *Moraea*-group**
               6.' Plants with aerial stems; flowers with the ovary borne well above ground level:
                  7. Ovary more-or-less sessile and extended distally in an elongate tubular sterile beak. . . . . **Moraea: *Gynandriris*-group**
                  7.' Ovary borne on long pedicels or occasionally subsessile, but then the tepals united in a tube, without an elongate sterile beak:

8. Flowers with prominent style branches wider than the anthers and terminating in paired erect crests; outer tepals usually larger than the inner and usually with long ascending claws (occasionally tepals subequal and claws much shorter than limbs) ..... **Moraea: *Moraea*-group**

8.' Flowers with the style branches as wide as or narrower than the anthers, often hidden by them, with a short bilobed apex opposite the stigmatic lobe(s); outer tepals only slightly larger than the inner, with long or short claws:

9. Flowers yellow or salmon to pink, the stems never sticky..... **Moraea: *Homeria*-group**

9.' Flowers either blue to purple, or if yellow, then the stems sticky **Moraea: *Moraea*-group**

1.' Flowers in spikes or solitary on the peduncles, sometimes in pseudopanicles, or stemless, the individual flowers always sessile and the style branches filiform, simple or deeply divided; rootstock a corm; tepals united below in a tube:

10. Outer and inner bracts membranous to scarious, usually translucent to transparent with the veins often darkly coloured, occasionally the outer solid below, but then the margins lacerate:

11. Plants stemless; leaves bifacial, usually channelled to adaxially grooved, or cylindrical; bracts tubular below; corm tunics woody; flowers blue to purple:

12. Plants with 2 or more narrow leaves, blades flat or channelled on adaxial surface; corm top-shaped, pointed at base ..... **Syringodea**

12.' Plants with 1 leaf, blade cylindrical; corm fan-shaped, laterally compressed..... **Afrocrocus**

11.' Plants stemless or with aerial stems; leaves unifacial, rarely bifacial, plane or cylindrical but then grooved; bracts with the margins free to the base or united below; corm tunics woody or papery to fibrous; flowers variously coloured:

13. Bracts pale, dry, papery and crinkled, irregularly streaked with dark flecks or veins..... **Sparaxis**

13.' Bracts pale or rust-coloured, membranous or dry but not papery and crinkled, sometimes streaked with dark flecks or veins:

14. Perianth zygomorphic with the stamens unilateral, stems firm and relatively thick, never wiry ..... **Tritonia**

14.' Perianth actinomorphic with the stamens either symmetrically disposed around a central style or unilateral with the anthers drooping and porose; stems often more-or-less wiry ..... **Ixia**

10.' Outer and inner bracts firm to soft-textured, green or leathery and dry, never lacerate, sometimes the inner bracts with broad membranous to scarious margins:

15. Style branches deeply divided, occasionally multifid:

16. Leaves terete with narrow longitudinal grooves, or 4-winged; corm tunics brittle and woody; flowers actinomorphic, solitary on the branches, not arranged in spikes, the plants often stemless..... **Romulea**

16.' Leaves usually plane, but if round in transverse section then without longitudinal grooves; corm tunics leathery to fibrous; flowers zygomorphic or if actinomorphic, then arranged in spikes, the plants never stemless:

17. Flowers solitary on the branches; leaves prostrate ..... **Xenoscapa**

17.' Flowers in spikes; leaves usually erect or falcate:

18. Corms bell-shaped, with a flat base; leaves plane or corrugate ..... **Lapeirousia**

18.' Corms globose to obconic, round or pointed at the base:

19. Spikes inclined to horizontal, the flowers borne on the upper side; bracts green or dry above, then often dark brown at the apices..... **Freesia**

19.' Spikes erect, the flowers distichous or spirally arranged; bracts green or partly to entirely dry, but then never dark brown at the apices ..... **Watsonia**

15.' Style branches undivided or at most notched apically:

20. Style branches dividing at the apex of the perianth tube or within the tube, the branches long, often laxly spreading..... **Hesperantha**

20.' Style branches usually dividing well above the mouth of the perianth tube, the branches relatively short and recurved or laxly spreading:

21. Ovary deeply 3-lobed above; inflorescence slender and arching; floral tube < 1 mm long..... **Melasphaerula**

21.' Ovary subglobose:

22. Floral bracts short, about twice as long as the ovary, firm and leathery, green or dry, about as long as the bracteoles; flowers orange to scarlet or pinkish:

23. Leaves evergreen, subterete and longitudinally grooved; flowers actinomorphic, narrowly funnel-shaped, pinkish..... **Devia**

23.' Leaves deciduous, plane and narrowly lanceolate; flowers strongly zygomorphic, orange:

24. Perianth tube expanding gradually from the base; inflorescence an arching, strongly zigzag spike, horizontal above; seeds brown..... **Crocosmia**

24.' Perianth tube abruptly expanded above a twisted lower portion; inflorescence an erect spike, with 1 or 2 shorter lateral branches; seeds red ..... **Chasmanthe**

22.' Floral bracts softer, green or dry but never firm and leathery; flowers variously coloured:
25. Leaf blades pleated, sometimes more-or-less linear and striate; stems, leaves or bracts hairy; seeds smooth, glossy, pear-shaped, blackish . . . . . **Babiana**
25.' Leaf blades various but never pleated; plants sometimes hairy; seeds never glossy:
26. Flowers usually actinomorphic, if zygomorphic then the tepals subequal and stamens declinate; seeds globose to somewhat angular, matte, brown . . . . **Geissorhiza**
26.' Flowers usually zygomorphic with the tepals unequal and the stamens arcuate, rarely actinomorphic; seeds broadly winged. . . . . **Gladiolus**

AFROCROCUS 1 sp., western South Africa **(gce)**

unifolia (Goldblatt) J.C.Manning & Goldblatt (= *Syringodea unifolia* Goldblatt) Stemless, cormous geophyte, 50–120 mm tall, corm flattened, fan-shaped. Leaf 1, terete, thick and fleshy. Flowers borne singly, violet (rarely white) with pale centre. May–June. Clay flats, WM, CCR (Roggeveld Escarpment to Hex River Mountains). **(gce)**

ARISTEA ARISTEA, BLOUSUURKANOL 50 spp., sub-Saharan Africa and Madagascar

dichotoma (Thunb.) Ker Gawl. VENSTERVRUG Rhizomatous perennial, 150–300 mm tall, forming rounded cushions, stems flattened below, dichotomously 3–5-branched. Leaves linear, narrow, glaucous. Flowers enclosed in translucent spathes with dark keels, blue, stigma lobes fringed. Capsules short, 3-winged. Dec.–Mar. Sandy flats and lower slopes, G, NS, CCR (Namaqualand coast and southern Richtersveld to SW Cape). **(gce)**

BABIANA BABIANA, BOBBEJAANTJIE ± 90 spp., southern Africa and Socotra

A. Dorsal tepal not widely separated from the others and without an obvious claw; ovary hairy or smooth
B. Leaves abruptly truncate and wedge-shaped

cuneata J.C.Manning & Goldblatt Stemless, cormous geophyte, up to 150 mm tall, simple or branched below ground. Leaves crowded basally, abruptly truncate, smooth or sparsely hairy, exceeding the flowers. Flowers mostly 2–5 in a compact, decumbent spike, bilabiate, blue to violet with white nectar guides, perianth tube 40–60 mm long, slender, straight, tepals cupped, subequal, ovary smooth, bracts smooth or finely velvety, inner forked apically. Aug.–Sept. Dolerite and sandstone outcrops, WM, TS, CCR (Bokkeveld Mountains to Karoopoort and Roggeveld to Laingsburg). **(gce)**

flabellifolia Klatt (= *B. truncata* G.J.Lewis) Stemless, cormous geophyte, up to 80 mm tall. Leaves crowded basally, abruptly truncate, pleated, sparsely to rarely densely hairy. Flowers 3 or more in a compact spike, bilabiate, purple with pale yellow nectar guides, strongly scented, perianth tube elongate-cylindrical, 18–36 mm long, slightly exceeding the hooded dorsal tepal, ovary smooth, bracts dry, submembranous, smooth, inner forked apically into slender awns. July–Aug. Clay or gravelly soils, NH, KB, WM (Concordia to Nuwerus, eastern Namaqualand, Bokkeveld Plateau). **(ece)**

lanata Goldblatt & J.C.Manning Cormous geophyte, up to 90 mm tall, stem simple or 1-branched, hairy. Leaves 20–30 mm long, blade wedge-shaped, abruptly truncate, held obliquely to leaf sheaths, lightly pleated, silky hairy. Flowers 3–5 in a decumbent spike, maroon with cream margins, lower tepals pale yellow, maroon in midline, perianth tube funnel-shaped, ± 24 mm long, ovary smooth, bracts green, silky hairy, inner forked apically. July–Aug. Stony flats, NS (coastal plain from southern Richtersveld to near Kleinsee). **(ece)**

praemorsa Goldblatt & J.C.Manning Stemless, cormous geophyte, mostly 80–100 mm tall, stem branched below ground. Leaves crowded basally, abruptly truncate, finely hairy, exceeding the flowers. Flowers 5 or 6 in a dense decumbent spike, violet with white nectar guides, perianth tube elongate, slender, straight, 40–60 mm long, tepals subequal, spreading horizontally, bracts green, minutely hairy, inner forked apically. Aug.–Sept. Dolerite outcrops in clay, WM, TS (Bokkeveld Plateau, Hantamsberg and Elandsberg). **(ece)**

pubescens (Lam.) G.J.Lewis Stemless, cormous geophyte, up to 80 mm tall, stem usually branching below ground. Leaves crowded basally, abruptly truncate, lightly pleated, usually finely hairy, exceeding the flowers. Flowers 6–10 in a decumbent spike, bilabiate, blue to mauve with white

nectar guides, perianth tube elongate-cylindrical, ± 50 mm long, sharply bent near the apex, ovary smooth, bracts smooth or velvety, the inner forked apically. July–Aug. Stony slopes, NH (Komaggas to Garies). **(ece)**

B.' Leaves sword-shaped to lanceolate or ovate, not truncate
C. Perianth tube about as long to 3 times as long as the dorsal tepal
D. Flowers predominantly red or white to pink with red markings on the lower tepals

brachystachys (Baker) G.J.Lewis Cormous geophyte, up to 300 mm tall, stem often very short, usually several-branched. Leaves leathery, linear to terete with longitudinal grooves, glabrous, sheaths ciliate. Flowers in a 5–10-flowered, horizontal spike, beige with red to purple marks on lower tepals, perianth tube elongate, 70–75 mm, cylindrical, ovary smooth, bracts smooth, the inner forked almost to the midline. Sept.–Oct. Coastal sandveld, NS, CCR (Hondeklipbaai to Heerenlogement). **(gce)**

carminea J.C.Manning & Goldblatt Stemless, cormous geophyte, up to 100 mm tall. Leaves crowded at base, lanceolate, pleated, velvety hairy, overtopping the flowers. Flowers borne at ground level, 2–5 in a decumbent spike, bilabiate, dark red with yellow nectar guides, perianth tube elongate, curved and flaring in upper half, 56–60 mm long, dorsal tepal largest, hooded, ovary smooth, bracts finely hairy, with inner forked apically. July–Aug. Limestone outcrops, KV (Knersvlakte). **(ece)**

hirsuta (Lam.) Goldblatt & J.C.Manning (= *Antholyza plicata* L.f., *B. thunbergii* Ker Gawl.) ROOI-HANEKAM Cormous geophyte, 400–700 mm tall, with short, horizontal branches. Leaves lanceolate, pleated, smooth. Flowers many in a dense, horizontal, secund spike, zygomorphic, bright red, perianth tube elongate, 30–35 mm long, wider in the upper half, bracts smooth, the inner forked at the tip. Mainly Sept.–Oct. Coastal sandy flats and dunes, G, NS, CCR (Gariep Mouth to Saldanha). **(gce)**

lapeirousioides Goldblatt & J.C.Manning Cormous geophyte, up to 70 mm tall, stem reaching shortly above ground. Leaves sword-shaped, strongly pleated, sheaths minutely hairy, blades smooth. Flowers 2 or 3 in a compact spike, white with red nectar guides, perianth tube ± 22 mm long, cylindrical, tepals outspread, ovary smooth, bracts smooth, with inner forked apically. Late Sept.–early Oct. Rock outcrops, NH, KB (eastern Kamiesberg Mountains and eastern Namaqualand). **(ece)**

spathacea (L.f.) Ker Gawl. Cormous geophyte, mostly 150–400 mm tall, stem usually branched, smooth. Leaves linear-lanceolate, pleated, velvety. Flowers several in a dense, erect spike, bilabiate, cream to white, flushed lilac outside, odourless, perianth tube elongate-cylindrical, (30–)35–45 mm long, dorsal tepal 20–23 mm long, ovary smooth, bracts dry, translucent pale brown or colourless with brown flecks, attenuate, inner bract divided in the upper two thirds. Sept.–Oct. Stony clay, often in dolerite outcrops, WM (Langberg and Loeriesfontein to Bokkeveld Plateau and Escarpment). **(ece)**

teretifolia Goldblatt & J.C.Manning Like **B. brachystachys** but sheaths not woolly, filaments exserted 9.5 mm (vs. ± 5.5 mm), style branches ± 6 mm long, held above anthers (vs. ± 3 mm and tangled in anthers), and tepals linear, channelled, dorsal tepal ± 30 × 4 mm long. Sept. Sandveld, NS (coast near Koekenaap). **(ece)**

D.' Flowers blue to violet or dull purple

attenuata G.J.Lewis Nearly stemless, cormous geophyte, up to 80 mm tall, stem hispid. Leaves sword-shaped to lanceolate, pleated, hairy, inclined. Flowers 4–9 in a decumbent, secund spike, bilabiate, blue to violet with white nectar guides, sweetly scented, perianth tube cylindrical, 25–35 mm long, bent near the apex, dorsal tepals about as long to longer than the tube, ovary smooth, bracts velvety, the inner forked apically, the tips attenuate. Aug.–Sept.(Oct.). Rocky granitic slopes, NH, KB (Kamiesberg Mountains to Garies). **(ece)**

curviscapa G.J.Lewis (= *B. framesii* subsp. *kamiesbergensis* G.J.Lewis) Cormous geophyte, up to 100 mm tall, often in tufts, stem short, decumbent, hispid. Leaves lanceolate, plicate, velvety hairy, inclined. Flowers several in a decumbent spike, cherry red or violet with white to yellow nectar guides, perianth tube elongate-cylindrical, 36–43 mm long, sharply bent near the apex, ovary smooth, bracts hispid, the inner forked apically. Aug.–Sept. Sandy and stony flats and granite outcrops, NH, KB (Springbok to Bitterfontein). **(ece)**

dregei Baker Cormous geophyte, up to 350 mm tall, stem erect, smooth, branched. Leaves lanceolate, strongly pleated, usually smooth, with prominent veins, margins thickened, tips pungent. Flowers several in a compact spike, bilabiate, violet to purple with white nectar guides, perianth tube elongate-cylindrical, 50–65 mm long, ovary smooth, bracts smooth or hispid, inner forked apically. Aug.–Sept. Granite outcrops, NH, KB (Kamiesberg Mountains and surrounding hills). **(ece)**

framesii L.Bolus Subcaulescent, cormous geophyte, up to 100 mm tall, stem usually branched at ground level. Leaves lanceolate, lightly hairy, pleated, exceeding the flowers. Flowers 4–8 in a dense, decumbent spike, bilabiate, dark blue to purple with red and white markings, tube cylindrical, 60–70 mm long, slightly curved at apex, tepals outspread, ovary smooth, bracts hairy, inner forked apically. Aug.–Sept. Rock outcrops in karroid bush, WM, CCR (Bokkeveld Plateau). **(gce)**

gariepensis Goldblatt & J.C.Manning Cormous geophyte, 120–200 mm tall, stem mainly subterranean, 1- or 2-branched. Leaves broadly lanceolate, held obliquely to sheaths, nearly plane, scabrid on veins, margins plane. Flowers 3–5 in a dense decumbent spike, bilabiate, pale gray-green flushed with mauve, with white nectar guides, sweetly scented, perianth tube 20–24 mm long, dorsal tepal 28–32 mm long, ovary smooth, bracts shortly hairy on veins, inner forked apically. June–July. Rock outcrops, G, NS (near Rosh Pinah to Richtersveld to Groenrivier Mouth). **(ece)**

horizontalis G.J.Lewis Stemless, cormous geophyte, up to 50 mm tall. Leaves lanceolate, horizontal, held at right angles to the sheaths, scarcely pleated, smooth, prominently 3- or 4-ribbed. Flowers 1–5 in a decumbent spike, bilabiate, lilac and yellow, perianth tube ± 25 mm long, about as long as the dorsal tepal, ovary smooth, bracts smooth, the inner forked apically. June–July. Granite outcrops, G, NH (southern Richtersveld to near Spektakelberg). **(ece)**

hypogaea Burch. (= *B. falcata* G.J.Lewis) Stemless, cormous geophyte, 50–150 mm tall, occasionally branched. Leaves linear to falcate or sword-shaped, often inclined to prostrate, lightly pleated, sparsely to finely long hairy, exceeding the flowers. Flowers 2–6 in an underground spike, bilabiate, greenish yellow to buff, flushed brown to mauve outside, sweetly scented, perianth tube emerging from below ground, cylindrical, 30–40 mm long, dorsal tepal 35–42 mm long, ovary smooth, bracts membranous below, green above ground, smooth, inner forked apically, tips attenuate. Mainly June–Sept. Red sand plains, SN, NH (SW Namibia and E of Springbok to Bushmanland).

longicollis Dinter Nearly stemless, cormous geophyte, up to 150 mm tall. Leaves sword-shaped to lanceolate, loosely coiled above, sparsely hairy, pleated, exceeding the flowers. Flowers 3–5 in a dense spike, bilabiate, purple to grey-mauve, sweetly scented, perianth tube (?32–)40–45 mm long, dorsal tepal 20–30 mm long, ovary smooth, bracts green with brown tips, smooth, inner forked apically. June–Aug. Granite outcrops, SN, G (southern Namibia: Klinghardt Mountains to Rosh Pinah). **(ece)**

sambucina (Jacq.) Ker Gawl. Stemless, cormous geophyte, 80–300 mm tall. Leaves lanceolate to linear, occasionally subterete, usually pleated, variously hairy to hispid, exceeding the flowers. Flowers 2–6 in a decumbent spike, violet to blue, with white nectar guides edged blue or red, usually intensely fragrant, perianth tube 35–65 mm long, straight, slightly flaring above, tepals subequal, (20–)30–35 mm long, ovary smooth, bracts green with rusty tips, variously hairy, lowermost outer bract often leaf-like above, inner bract forked at tip. Mainly Aug.–Sept. Mainly sandstone slopes, TS, CCR (Bokkeveld Mountains to Uitenhage). **(gce)**

symmetrantha Goldblatt & J.C.Manning Cormous geophyte, 120–200 mm tall, stem mainly subterranean, 1- or 2-branched. Leaves linear, sparsely long-hairy, margins plane. Flowers 3–5 in a short spike, radially symmetric, blue-violet with white nectar guides outlined purple, sweetly scented, perianth tube 45–75 mm long, tepals subequal, dorsal ± 37 × 6 mm, ovary smooth, bracts shortly hairy on veins, inner forked apically. Aug.–Sept. Dolerite rocks, WM (NW of Loeriesfontein: Langberg). **(ece)**

virginea Goldblatt Stemless, cormous geophyte, mostly 80–150 mm tall, stem occasionally branched at ground level. Leaves lanceolate, hairy, in a basal tuft. Flowers 2–4 in a compact spike, bilabiate, white or flushed pale mauve with pale yellow markings, intensely fragrant, perianth tube elongate cylindrical, 45–65 mm long, ovary smooth, bracts hairy, inner forked apically. Mainly Sept.–Oct. Dolerite outcrops, WM (Roggeveld Escarpment). **(ece)**

sp. A Cormous geophyte, up to 450 mm tall, growing in clumps, often branched from aerial stem, all parts smooth. Leaves linear, straight or arching, shallowly pleated. Flowers blue-mauve, lower tepals with white and dark purple markings, sweetly fragrant, perianth tube funnel-shaped, 42–44 mm long, ovary smooth, bracts smooth, inner forked in upper fourth. Sept.–Oct. Cracks in granite along streams, KB (southern Kamiesberg Mountains). **(ece)**

C.' Perianth tube ⅓ to ⅔ as long as the dorsal tepal

cinnamomea J.C.Manning & Goldblatt Cormous geophyte, up to 60 mm tall, unbranched. Leaves ovate, held at right-angles to sheaths, nearly plane, smooth, margins crisped. Flowers 2–6 in a short decumbent spike, bilabiate, creamy green flushed with mauve, with cream nectar guides, perianth tube 22–25 mm long, dorsal tepal ± 30 mm long, ovary smooth, bracts smooth, inner forked apically. May–June. Rock crevices, mainly on granite, KV, CCR (northern and eastern periphery of Knersvlakte to Koebee Mountains). **(gce)**

confusa (G.J.Lewis) Goldblatt & J.C.Manning Stemless or short-stemmed, cormous geophyte, mostly 40–80 mm tall. Leaves ovate to lanceolate, inclined, lightly twisted in the upper half, subglabrous except on margins. Flowers 2–6 in a subsecund spike, bilabiate, pale blue to almost white with yellow nectar guides, sweet scented, perianth tube 23–30 mm long, dorsal tepal 35–40 mm long, ovary smooth, bracts sparsely hairy, the inner forked apically. June–July. Deep sandy flats, NS, CCR (Hondeklipbaai to Hopefield). **(gce)**

crispa G.J.Lewis Stemless, cormous geophyte, up to 100 mm tall, unbranched. Leaves narrow, undulate and crisped, long-hairy, exceeding the flowers. Flowers 2–4 in a dense, horizontal spike, bilabiate, blue with white nectar guides, perianth tube 14–20 mm long, dorsal tepal 25–30 mm long, ovary smooth, inner bracts forked apically, tips brown, attenuate. May–July. Rocky slopes, NH, WM, CCR (Bitterfontein and Langberg to Bidouw Valley). **(gce)**

grandiflora Goldblatt & J.C.Manning Nearly stemless, cormous geophyte, 80–140 mm tall. Leaves narrowly sword-shaped, velvety, exceeding the flowers. Flowers 2–5 in a short, decumbent spike, bilabiate, blue with white nectar guides, spicy scented, perianth tube 18–20 mm long, dorsal tepal 45–55 mm long, ovary smooth, bracts green, velvety, inner forked apically. Late July–Sept. Sandy flats and dunes, NS (Namaqualand Coast). **(ece)**

minuta G.J.Lewis Stemless, cormous geophyte, mostly 40–60 mm tall. Leaves lanceolate, inclined to nearly prostrate, pleated in the lower half, hairy. Flowers 1–3 in a subsecund spike, bilabiate, red-purple with yellow nectar guides, sweet scented, perianth tube 20–22 mm long, dorsal tepals 25–40 mm long, ovary smooth, bracts hairy above, the inner forked apically, the tips setaceous. Mainly June–July. Shale and rocky sandstone soils, KV, WM, TS, CCR (southern Namaqualand and Calvinia to Karoopoort). **(gce)**

namaquensis Baker Stemless, cormous geophyte, up to 80 mm tall. Leaves linear to narrowly sword-shaped, spirally twisted or loosely coiled, hairy, the midrib and margins thickened, not evidently pleated, exceeding the flowers. Flowers 1–3 in a dense spike, bilabiate, white to pale mauve, sweetly scented, perianth tube 25–28 mm long, dorsal tepal 30–40 mm long, ovary smooth, bracts green with brown tips, smooth, inner forked apically. June–July. Mainly weathered dolomite outcrops, SN, G (southern Namibia to Anenous Pass). **(ece)**

pilosa G.J.Lewis Cormous geophyte, 100–150 mm tall, the stem bearing retrorse hairs above, occasionally branched. Leaves narrowly lanceolate, on long pseudopetioles, scarcely pleated, lightly retrorse-hairy. Flowers 2–5 in an inclined secund spike, bilabiate, magenta-pink with pale yellow nectar guides, perianth tube 15–18 mm long, dorsal tepal 30–34 mm long, ovary smooth or minutely hairy on the ribs, bracts green with rust tips, shortly retrorse hairy, inner forked apically. Aug. Stony hills, NH (hills near Nuwerus). **(ece)**

rubella Goldblatt & J.C.Manning Cormous geophyte, up to 120 mm tall, stem occasionally branched, densely hairy. Leaves lanceolate to ovate, densely long hairy. Flowers 3–6 in an ascending spike, bilabiate, pale pink to purple with pale yellow nectar guides, perianth tube 12–15 mm long, dorsal tepal 28–30 mm long, ovary smooth, bracts green, densely hairy, inner forked apically. Aug.–early Sept. Sandy flats, NS (coastal plain near Kotzesrus). **(ece)**

salteri G.J.Lewis Cormous geophyte, up to 100 mm tall, stem hairy, 1–3-branched. Leaves with a short pseudopetiole, the blade oblong, held at right-angles to sheath, pleated, shortly hairy. Flowers 5–10 in a dense, 2-ranked spike, bilabiate, blue-mauve with yellow nectar guides, perianth tube ± 9 mm long, dorsal tepal ± 23 mm long, ovary densely hairy, bracts hairy, inner divided to base. June–July. Dry stony flats, KV, CCR (flats W of Vanrhyns Pass and Bokkeveld Mountains). **(gce)**

scariosa G.J.Lewis Cormous geophyte, 100–400 mm tall, stem with several short branches. Leaves lanceolate, hairy. Flowers zygomorphic, mauve with pale yellow markings, bracts papery, inner bracts divided to base, ovary smooth. Aug.–Sept. Dry slopes in karroid scrub, WM, CCR (Bokkeveld Mountains to Ganagga Pass, Roggeveld Escarpment, and western Little Karoo). **(gce)**

tanquana J.C.Manning & Goldblatt Cormous geophyte, 60–120 mm tall, stem reaching shortly above ground, occasionally with 1 or 2 branches, smooth. Leaves slightly oblique to sheaths, lanceolate to narrowly ovate, lightly pleated, shortly hairy, exceeding the flowers, margins long

hairy. Flowers 3–6 in a decumbent spike, bilabiate, violet, upper tepals with pale lilac edges, lower laterals pale yellow in distal half, acrid-spicy scented, perianth tube ± 14 mm long, dorsal tepal 25–30 mm long, ovary smooth, bracts lightly striate, green with brown tips, lightly hairy above, inner forked apically. June–July. Dolerite outcrops, TS (Tanqua Karoo). **(ece)**

torta G.J.Lewis Like **B. namaquensis** but leaves lanceolate, broader (8–12 mm vs. 1.5–3.5 mm wide), undulate, twisted above the middle, flowers up to 5 per spike, pale blue-mauve with white nectar guides, bracts lightly hairy, the inner forked above the middle. May to mid-June. Granite outcrops, NH, WM (Springbok to Bitterfontein Hills and Loeriesfontein). **(ece)**

virescens Goldblatt & J.C.Manning Cormous geophyte, 120–200 mm tall, stem subterranean or reaching up to 100 mm above ground, usually unbranched. Leaves oblong to lanceolate, twisted distally, margins thickened, hyaline. Flowers 4–7 in a short spike, radially symmetric, grey-green with yellow nectar guides streaked with purple, spicy scented, perianth tube 18–23 mm long, tepals unequal, dorsal 32–35 × 6.5–8 mm, ovary smooth, bracts velvety, inner forked apically. Late May–June. Sandy ground, NS, NH (Nuwerus to near Koekenaap and Kliprand). **(ece)**

A.' Dorsal tepal narrow, widely separated from the others, with a long narrow claw, arcuate at least at first, later becoming erect; ovary glabrous
E. Leaf bases cobwebby to woolly

fimbriata (Klatt) Baker Cormous geophyte, 120–200 mm tall. Leaves nearly linear, cobwebby at base, pleated, loosely twisted, margins undulate, sparsely hairy. Flowers 5–10 in a dense, suberect spike, bilabiate, mauve marked with violet and cream, rose-scented, perianth tube 10–12 mm long, dorsal tepal 18–25 mm long, ovary smooth, bracts smooth, inner forked in upper third. July–mid Sept. Rocky slopes, NH, KV (just N of Kamieskrooon to Knersvlakte). **(ece)**

planifolia (G.J.Lewis) Goldblatt & J.C.Manning (= *B. striata* var. *planifolia* G.J.Lewis) Cormous geophyte, 120–350 mm tall, stem often 1–few-branched, smooth. Leaves lanceolate to oblong, more-or-less plane, smooth or margins ciliate, sometimes lightly undulate, sheaths cobwebby. Flowers in a 3–10-flowered, secund to spiral spike, bilabiate, mauve with yellow-green nectar guides, perianth tube 8–16 mm long, dorsal tepal 23–28 mm long, ovary smooth, bracts smooth, inner forked to middle. June–July. Rocky slopes, G, NS, NH, KB (Richtersveld to Nuwerus). **(ece)**

sinuata G.J.Lewis Cormous geophyte, 100–250 mm tall, stems 2–6-branched. Leaves narrow, plane with prominent veins, cobwebby at base, loosely twisted, margins crisped and long-hairy. Flowers several in a lax inclined spike, bilabiate, blue with yellow markings, perianth tube 8–9 mm long, dorsal tepal ± 28 mm long, recurving, anthers fused together, ovary smooth, bracts smooth, inner forked to middle. Late Aug.–Sept. Rocky shale slopes, NH, CCR (southern Namaqualand to Clanwilliam). **(gce)**

striata (Jacq.) G.J.Lewis Cormous geophyte, 80–150 mm tall, stem inclined, smooth, occasionally branched. Leaves lanceolate, sheaths cobwebby, blade sword-shaped, undulate with wavy margins, twisted above, midrib prominent, smooth or margins ciliate. Flowers 3–5 in a horizontal secund spike, bilabiate, pale yellow, or flushed mauve, with yellow-green nectar guides, perianth tube ± 7 mm long, dorsal tepal 20–25 mm long, ovary smooth, bracts smooth, inner forked in upper third. June–early Aug. Rocky slopes, G, NS, NH, KV (Richtersveld to northern Knersvlakte). **(ece)**

E.' Leaf bases smooth, not cobwebby to woolly

lewisiana B.Nord. Cormous geophyte, 70–150 mm tall, stem occasionally branched, pilose. Leaves with a short pseudopetiole, blade oblong, held horizontally, ribbed but hardly pleated, more-or-less smooth except in immature plants. Flowers in a 3–8-flowered spike, bilabiate, blue-purple, lower tepals mostly yellow, perianth tube ± 10 mm long, dorsal tepal linear, ± 25 mm long, ovary smooth, bracts green, sparsely hairy, inner forked to middle. July–Aug. Quartzite flats and slopes, KV (Knersvlakte: Holrivier). **(ece)**

lobata G.J.Lewis Cormous geophyte, 120–250 mm tall, stem simple or dichotomously branched. Leaves narrowly sword-shaped, scarcely plicate, smooth, with much thickened veins. Flowers mostly 7–12 in a secund, nearly horizontal spike, bilabiate, blue-mauve with yellow nectar guides, perianth tube 7–8 mm long, dorsal tepal 18–23 mm long, ovary smooth, bracts smooth, inner forked in upper third. July–Aug. Rocky slopes and flats, G (Richtersveld). **(ece)**

spiralis (Klatt) Baker Cormous geophyte, 150–550 mm tall, stem velvety, 2–6-branched. Leaves linear to narrowly sword-shaped, lightly pleated, twisted above, smooth or lightly hairy on margins or veins. Flowers 5–8 in an inclined, secund spike, bilabiate, yellow or pink to blue-mauve

with yellow nectar guides, perianth tube 8–10 mm long, dorsal tepal 18–21 mm long, ovary smooth, bracts obscurely hispid below, inner forked almost to middle. Aug.–Sept. Sandy flats and slopes, NS, NH, CCR (Garies to Klawer). **(gce)**

stenomera Schltr. Cormous geophyte, up to 120 mm tall, stem occasionally 1- or 2-branched, hairy above. Leaves sword-shaped, scarcely plicate, smooth or sparsely hairy on veins and margins. Flowers 5–8 in an erect spike, bilabiate, blue-mauve with yellow nectar guides, perianth tube 12–14 mm long, dorsal tepal 22–24 mm long, ovary smooth, bracts shortly hairy below, forked in upper third. Aug. Granite hills, NH (Kareeberg near Nuwerus). **(ece)**

tritonioides G.J.Lewis Cormous geophyte, mostly up to 150 mm tall, occasionally 1- or 2-branched. Leaves oblong to lanceolate, held at right angles to the sheaths, scarcely plicate, twisted above and erect, smooth. Flowers 7–10 in a horizontal spike, bilabiate, blue-mauve with yellow nectar guides, perianth tube 6–8 mm long, dorsal tepal 23–27 mm long, ovary smooth, bracts smooth, inner forked to about middle. Aug.–Sept. Stony slopes, G, NH (southern Richtersveld to Komaggas). **(ece)**

CHASMANTHE COBRA-LILY, KAPELPYPIE 3 spp., Namaqualand to E Cape

floribunda (Salisb.) N.E.Br. Cormous geophyte, 0.6–1 m tall, with discoid corms with fibrous tunics, stems branched. Leaves sword-shaped. Flowers many in a 2-ranked erect spike, orange-red, perianth tube elongate, trumpet-shaped (rarely yellow). July–Sept. Rocky habitats on granite, sandstone, or dolerite, NS, WM, CCR (coastal central Namaqualand and Bokkeveld Plateau to SW Cape). **(gce)**

CROCOSMIA MONTBRETIA 8 spp., southern and tropical Africa and Madagascar

fucata (Herb.) M.P.de Vos Cormous geophyte, 1.5–2 m tall, forming large clumps, stems 2–4-branched. Leaves sword-shaped, plane with prominent midrib. Flowers many in a spreading to horizontal spike, scarlet, trumpet-shaped, perianth tube elongate, narrow below, wide above, dorsal tepal largest, horizontal. Mainly Nov. Along streams in light bush, KB (northern Kamiesberg Mountains). **(ece)**

DEVIA 1 sp., Roggeveld Escarpment **(ece)**

xeromorpha Goldblatt & J.C.Manning Cormous geophyte, 0.5–0.7 m tall, more-or-less evergreen. Leaves linear, oval in section with 2 longitudinal grooves on each surface, apex pungent. Flowers in a dense, many-flowered spike, actinomorphic, dusty pink, odourless, stamens rotated anticlockwise. Dec.–Jan. Rocky dolerite slopes, WM (southern Roggeveld Escarpment). **(ece)**

FERRARIA SPIDER LILY, SPINNEKOPBLOM 18 spp., Namibia to W Cape through to tropical Africa

A. Anther lobes parallel, at least initially; capsule beaked or not

foliosa G.J.Lewis Cormous geophyte, 0.4–1 m tall, leafy and much branched, the branches rotated in clockwise fashion. Basal leaves (and of immature plants) linear, diamond-shaped in cross section with thickened midline, foliage leaves horizontal, channelled, without a central vein. Flowers maroon, purple or dark brown, usually with darker speckles, putrid smelling, tepals claws broad, forming a wide cup, nectaries prominent, anther lobes parallel. Capsule not beaked. Aug.–Oct. Deep coastal sands and dunes, NS, CCR (Hondeklipbaai to Elandsbaai). **(gce)**

ornata J.C.Manning & Goldblatt Acaulescent, cormous geophyte, up to 80 mm tall. Basal leaves short, more-or-less thick and finger-like, upper leaves short, bifacial, broadly ovate, concave. Flowers white and pale yellow, speckled with brown, tepal claws narrowed in lower third forming a windowed cup, nectaries prominent, in centre of claw, with raised and lobed ridge at distal edge. Capsule not beaked. May–June. Sandy coastal dunes, NS (Namaqualand coast: Groenrivier to near Olifants River Mouth). **(ece)**

ovata (Thunb.) Goldblatt & J.C.Manning Cormous geophyte, up to 100 mm tall, stem exposed below. Basal leaves short, linear, spreading, unifacial distally, upper leaves short, bifacial, broadly

ovate, concave. Flowers yellowish with large brown spots and margins, tepal claws broad, forming a wide cup, nectaries prominent, anther lobes parallel. Capsule not beaked. June–July. Rocky granite slopes, NH (Soebatsfontein to Kliprand). **(ece)**

schaeferi Dinter Cormous geophyte, 200–500 mm tall, branching in the upper axils, branches rotated in clockwise fashion. Leaves with overlapping sheaths, sword-shaped, spirally 2-ranked, arching outward. Flowers yellow with brown spots and margins, sweetly to putrid scented, tepal claws broad, forming a wide cup, nectaries prominent, anther lobes parallel. Capsule beaked. Aug.–Sept. Deep sands mainly along the coast, SN, G, NS (SW Namibia to Port Nolloth). **(ece)**

A.' Anther lobes divergent even in bud; capsule always beaked

brevifolia G.J.Lewis Cormous geophyte, 70–200 mm tall, unbranched or with a few short branches. Leaves overlapping in a tight fan, the sheaths enclosing the stem, blades oblong, obtuse, shorter than the sheaths. Flowers pale to greenish yellow with darker margins, faintly sweet-scented, tepals attenuate and coiled, claws slender, forming a narrow cup, nectaries basal, anther lobes divergent. Capsule beaked. Aug.–Sept. Stony granitic gravel, NH (Bitterfontein to Nuwerus). **(ece)**

divaricata Sweet (= *F. divaricata* subsp. *arenosa* M.P.de Vos, *F. divaricata* subsp. *aurea* M.P.de Vos) Cormous geophyte, 300–450 mm tall, stem reaching well above ground and much branched above. Leaves sword-shaped, crowded basally, usually without a midrib, margins often thickened. Flowers brown to maroon with lighter brown margins or golden-brown with darker margins, claws broad, forming a wide cup, nectaries pale green**,** large, anther lobes divergent. Capsule beaked. Mainly late Sept.–Nov. Deep sands, NS, KV, CCR (Komaggas, Hondeklipbaai to Cape Flats). **(gce)**

ferrariola (Jacq.) Willd. Slender cormous geophyte, 150–600 mm tall, stems partly exposed, sheaths speckled red below. Lower leaves linear. Flowers greenish to blue-grey, with darker markings at limb bases, usually lightly sweet-spicy scented, tepals claws slender, forming a narrow cup, anther lobes later diverging after dehiscence, capsule beaked. June–Aug. Granite and sandstone slopes, G, NS, NH, ?KB, KV, CCR (northern Namaqualand to Clanwilliam). **(gce)**

flava Goldblatt & J.C.Manning Subcaulescent, cormous geophyte, up to 150 mm tall, stems branched at ground level. Basal leaves sword-shaped, leathery, without a central vein, cauline leaves shorter. Flowers yellow with dark spots at base of tepal limbs, limbs with crisped, pale yellow margins, sweetly scented, anther lobes divaricate. Capsule beaked. Late Aug.–Oct. Deep sand in coastal sandveld, NS, CCR (Komaggas to near Klawer). **(gce)**

macrochlamys (Baker) Goldblatt & J.C.Manning (= *F. uncinata* subsp. *macrochlamys* (Baker) M.P.de Vos, *F. kamiesbergensis* M.P.de Vos) Cormous geophyte, 100–150 mm tall, branched close to base. Leaves lanceolate, obtuse, without a midrib, margins plane (subsp. *kamiesbergensis*), thickened, hyaline, crisped (subsp. *macrochlamys*) or soft, blades wavy (subsp. *serpentina*). Flowers pale yellow with darker margins, mildly putrid smelling, tepal tips attenuate and coiled, claws slender, forming a narrow cup, nectaries basal, anther lobes divergent. Capsule beaked. Aug.–Oct. Rock outcrops and gravel slopes and sandy flats and slopes, NS, NH, KB, WM (Steinkopf to near Loeriesfontein and Komaggas to Kotzesrus). **(ece)**

variabilis Goldblatt & J.C.Manning (= *F. divaricata* subsp. *divaricata* sensu M.P.de Vos, *F. divaricata* subsp. *australis* M.P.de Vos) GEEL SPINNEKOPBLOM Cormous geophyte, 60–200 mm tall, often branching close to base. Leaves sword-shaped, crowded basally, without a midrib, margins often lightly thickened, sheaths concealing stem. Flowers dull yellow, yellow-green or light brown, with banded or speckled markings and darker margins, often putrid smelling, claws broad, forming a wide cup, nectaries usually dark, basal, or occasionally large pouches in middle of outer tepal claws, anther lobes diverging. Capsule beaked. Aug.–Nov. Sandy and shale flats and rock outcrops, G, NS, NH, KB, WM, TS, CCR (southern Namibia, Bushmanland and Great Karoo to Clanwilliam and Little Karoo).

FREESIA (= *ANOMATHECA*) FREESIA, KAMMETJIE 16 spp., Namaqualand and W Cape to tropical Africa

occidentalis L.Bolus Cormous geophyte, 90–500 mm tall, with rounded stem. Leaves sword-shaped, obtuse, inclined toward the ground. Flowers several in a horizontal spike, creamy white and yellow, lightly sweet scented, perianth tube wide and tubular above. July–Sept. Stony, mainly sandy soils, WM, TS, CCR (Bokkeveld Plateau to Touwsrivier and Cederberg Mountains). **(gce)**

viridis (Aiton) Goldblatt & J.C.Manning GROENAGRETJIE Cormous geophyte, 100–250 mm tall, with a flattened, winged stem. Leaves sword-shaped, margins often crisped. Flowers few, in an inclined spike, small, green or brownish, scented at night, perianth tube slender, tepals recurved. June–Aug. Stony flats and coastal granite outcrops, SN, G, NS, NH, KV, CCR (southern Namibia to Langebaan). **(gce)**

GEISSORHIZA SATIN FLOWER, SYSIE ± 95 spp., Greater Cape Region but mainly W Cape **(gce)**

*A. Flowers white to pink or yellow (but see **G. heterostyla**)*

corrugata Klatt Cormous geophyte, 30–50 mm tall, tunics woody, imbricate. Leaves subterete, spirally coiled. Flowers few, yellow, tepals lightly cupped. Aug.–Sept. Clay flats in renosterveld, WM (Bokkeveld Plateau near Bloukrans Pass). **(ece)**

demissa Goldblatt & J.C.Manning Delicate cormous geophyte, up to 160 mm tall, corm tunics woody, imbricate, stem puberulous below, rarely branched. Leaves linear-falcate, margins and central vein narrowly winged, smooth. Flowers in a 1- or 2-flowered spike, white, veins tinged blue below, outer tepals flushed blue outside, stamens symmetrical, filaments unequal. Late Aug.–Oct. Seasonally damp sheltered sites on rocky slopes, KB, CCR (Kamiesberg Mountains and Gifberg to Cold Bokkeveld). **(gce)**

exscapa (Thunb.) Goldblatt LANGPYP-SYSIE Cormous geophyte, 180–300 mm tall, tunics woody, concentric, stem shorter than the leaves. Leaves linear, H-shaped in section, viscid on the margins. Flowers in a several-flowered spike, cream, fading pink, perianth tube elongate-cylindrical, stamens and style unilateral. Oct.–Nov. Sandy soils, coastal and montane, NS, CCR (Hondeklipbaai and Bokkeveld Mountains to Melkbos). **(gce)**

spiralis (Burch.) M.P.de Vos ex Goldblatt Cormous geophyte, 50–80 mm tall, tunics woody, imbricate. Leaves terete, loosely spirally coiled. Flowers 1 per stem, pink, tepals lightly cupped. Mainly Sept. Stony dolerite flats, WM (Roggeveld Plateau). **(ece)**

A.' Flowers blue to violet or purple

cantharophila Goldblatt & J.C.Manning Like **G. heterostyla** but flowers held upright, perianth glossy purple with dark purple centre, filaments short, purple, style always dividing below the level of anthers. Aug.–Sept. Clay and gravel slopes in renosterveld, WM (Klein Roggeveld). **(ece)**

heterostyla L.Bolus Cormous geophyte, 120–450 mm tall, tunics woody, imbricate, stem velvety, usually branched. Leaves linear to sword-shaped, margins winged and ciliate. Flowers in an erect spike, blue to purple, occasionally white, tepals often dark at base around pale throat, tepals spreading, stamens usually unequal, arching over lower tepals, style held below stamens, either exceeding anthers or reaching middle or only base of anthers. Aug.–Oct. Mainly on clay slopes in renosterveld, WM, TS, CCR (Langberg and Loeriesfontein to Roggeveld Mountains to Port Elizabeth). **(gce)**

inaequalis L.Bolus Cormous geophyte, 80–150 mm tall, tunics woody, imbricate, stem velvety. Leaves sword-shaped. Flowers blue, tepals spreading, stamens unequal. Aug.–Oct. Heavy clay soils, WM, CCR (Bokkeveld Plateau and Koebee Mountains). **(gce)**

kamiesmontana Goldblatt Cormous geophyte, 150–300 mm tall, tunics woody, imbricate, stem velvety. Leaves sword-shaped, margins and midrib lightly thickened. Flowers in a few-flowered spike, blue-violet, with white at tepal bases and in tube, perianth tube 18–25 mm, slightly longer than the tepals, tepals spreading, stamens usually slightly unequal. Aug.–Sept. Rocky granitic slopes, KB (Kamiesberg Mountains). **(ece)**

karooica Goldblatt Cormous geophyte, up to 60 mm tall, tunics woody, concentric. Leaves firm, narrow, falcate. Flowers 1 per spike, zygomorphic, with horizontal unilateral stamens and style, purple, pale yellow in the centre. Aug.–Sept. Clay flats and slopes, WM, TS (Klein Roggeveld to Matjiesfontein). **(ece)**

namaquensis W.F.Barker NAMAQUA SATIN FLOWER Cormous geophyte, 120–300 mm tall, tunics woody, imbricate, stem velvety. Leaves sword-shaped, margins and midrib lightly thickened. Flowers in a few-flowered, flexuose spike, blue-violet, tepals spreading, longer than the tube, stamens usually slightly unequal. Aug.–Sept. Mostly stony granitic and clay slopes, NH, KB (Steinkopf to Kamiesberg Mountains). **(ece)**

GLADIOLUS AFRIKANER, KALKOENTJIE, PYPIE ± 250 spp., Africa and Madagascar, Eurasia

A. Flowers red to orange

equitans Thunb. NAMAQUA KALKOENTJIE Cormous geophyte, 120–300 mm tall, corm with papery tunics, stem compressed and angled. Leaves broad, falcate, margins heavily thickened. Flowers few in a nodding spike, bilabiate, orange marked yellow to greenish, sweetly scented, upper tepal hooded. Aug.–Sept. Mainly on rocky outcrops, or stony ground, NH, KB (Springbok to Nuwerus). **(ece)**

pulcherrimus (G.J.Lewis) Goldblatt & J.C.Manning PRONKKALKOENTJIE Cormous geophyte, up to 350 mm tall, corm with papery tunics. Leaves narrowly sword-shaped, glaucous, leathery with midrib thickened. Flowers in a few-flowered spike, bilabiate, orange marked yellow-green on the lower tepals, sweetly scented, dorsal tepal erect. Sept.–Oct. Deep sandy soils, NS, CCR (Groenrivier to Piketberg). **(gce)**

saccatus (Klatt) Goldblatt & M.P.de Vos NAMAQUA SUIKER-KANNETJIE Cormous geophyte, 250–800 mm tall, corm tunics fibrous, stem base mottled purple and white. Leaves sword-shaped, leathery. Flowers in an arching, many-flowered spike, bright red, dorsal tepal elongate and spoon-shaped, lower tepals reduced to tiny scales. June–Aug. Dry shale slopes, SN, G, NS, NH, KB, KV, CCR (northern Namibia to Pakhuis Mountains).

splendens (Sweet) Herb. SUIKERKANNETJIE, LEPELBLOM Cormous geophyte, 200–450 mm tall, stoloniferous, corm tunics papery. Leaves sword-shaped, plane. Flowers 6–14 in an inclined 2-ranked spike, tubular, upper tepal elongate and spoon-shaped, bright red, lower tepals small, green. Sept.–Oct. Stony slopes in clay, WM (Bokkeveld Plateau to Klein Roggeveld). **(ece)**

A.' Flowers white, yellow, pink, shades of blue to mauve, brown or green
*B. Leaves terete and 4-grooved or cross-shaped in transverse section (see also **G. virescens**)*

ceresianus L.Bolus Cormous geophyte, 80–150 mm tall, tunics fibrous. Leaves overlapping, terete, 4-grooved. Flowers few in an inclined spike, bilabiate, dull purple to brownish with dark veining, lower tepals banded with yellow and purple, intensely fragrant, dorsal tepal erect, with recurved margins. Aug.–Oct. Sandstone and dolerite slopes, KV, WM, TS, CCR (Knersvlakte and Roggeveld to Cold Bokkeveld and Witteberg Mountains). **(gce)**

kamiesbergensis G.J.Lewis Cormous geophyte, up to 500 mm tall, corm with fibrous tunics. Leaves terete, narrowly 4-grooved. Flowers several in an erect, secund spike, bilabiate, pale blue, minutely speckled with dark mauve and yellow markings on lower tepals. Sept.–Nov. Rocky slopes, KB (Kamiesberg Mountains). **(ece)**

marlothii G.J.Lewis Cormous geophyte, 450–600 mm tall, with fibrous corm tunics. Leaves linear, cross-shaped in section, hairy, 3–4 mm wide. Flowers 3–5 in a secund spike, bell-like, pale blue, darkly speckled and with yellow nectar guides, dorsal tepal largest, hooded over stamens, lower tepals narrow, directed downward. Mainly Oct. Stony slopes in clay, WM (Roggeveld Escarpment and Komsberg). **(ece)**

pritzelii Diels Cormous geophyte, 300–500 mm tall, with fibrous corm tunics. Leaves linear, scabrid to pilose, with thickened veins. Flowers few in a secund spike, bell-like, yellow with white and red-brown markings on lower tepals, fragrant. Aug.–Oct. Rocky sandstone and dolerite slopes, 800–2000 m, WM, CCR (Hantamsberg and Roggeveld Escarpment to Cold Bokkeveld). **(gce)**

tristis L. MARSH AFRIKANER, TROMPETTERS Cormous geophyte, 400–1500 mm tall, tunics fibrous. Leaves slender, cross-shaped in section. Flowers long-tubed, cream with brown shading, fragrant in evening. Aug.–Dec. Usually marshy sites or streambanks on sandstone, clay, or limestone soils, TS, CCR (northern foothills of Swartberg Mountains, Bokkeveld Mountains to Port Elizabeth). **(gce)**

B.' Leaves plane or ribbed or solidly terete

arcuatus Klatt Cormous geophyte, mostly 150–300 mm tall, corm with woody tunics. Leaves linear to falcate. Flowers few in an inclined spike, bilabiate, dull yellow to brown, lower tepals banded with yellow and purple to brown, sweetly scented, dorsal tepal arching over stamens. July–Sept. Clay and granitic slopes, NH, KB, CCR (Steinkopf to Clanwilliam). **(gce)**

carinatus Aiton BLUE AFRIKANER Cormous geophyte, 300–600 mm tall, corm with fibrous tunics, stem base mottled. Leaves linear, midrib prominently and margins lightly thickened. Flowers few in an inclined spike, bilabiate, blue to dark violet (yellow, occasionally pink elsewhere), lower tepals marked with yellow, intensely fragrant. Aug.–Sept. Sandstone slopes or deep coastal sands, NS, CCR (Namaqualand coast to Knysna). **(gce)**

caryophyllaceus (Burm.f.) Poir. SANDPYPIE, PIENK-AFRIKANER Cormous geophyte, 180–750 mm tall, corm with fibrous tunics. Leaves sword-shaped, hairy, with thickened margins. Flowers several in an erect spike, bilabiate, large, pink to mauve, speckled or streaked with darker colour, strongly fragrant. Aug.–Oct. Sandy flats and slopes, NS, NH, CCR (Komaggas and southern Namaqualand to Mamre and Swartberg Mountains). **(gce)**

deserticola Goldblatt Cormous geophyte, 150–250 mm tall, corm with gnarled, woody tunics. Leaves linear to sword-shaped. Flowers few in a scalloped, inclined spike, salver-shaped, blue, lower tepals with white and dark blue markings, tepals subequal, spreading. Aug.–Sept. Stony clay banks and slopes, G (Stinkfontein Mountains). **(ece)**

hyalinus Jacq. SMALL BROWN AFRIKANER Cormous geophyte, up to 500 mm tall, corm with woody, clawed tunics. Leaves linear with thickened margins and midrib. Flowers few in a secund spike, bilabiate, brown to cream with dark speckles, occasionally fragrant, perianth tube elongate-cylindrical, dorsal tepal arching, the lower tepals smaller, diverging. June–Sept. Shale, granite and sandstone slopes, fynbos or renosterveld, NH, KB, CCR (Steinkopf, Springbok, Kamiesberg and Bokkeveld Mountains to Port Alfred).

karooicus Goldblatt & J.C.Manning Like **G. permeabilis** but flowers bright yellow, upper lateral tepals arching over dorsal tepal, lower lateral tepals narrowed below into a spur-like tube. Mainly Sept. Rocky damp gullies in clay, WM, CCR (Klein Roggeveld and Witteberg foothills). **(gce)**

lapeirousioides Goldblatt Cormous geophyte, 80–140 mm tall, corm tunics more-or-less woody. Leaves linear to falcate, thicker in the midline, mostly 3–5 mm wide. Flowers 5–12 in a nearly horizontal spike, salver-shaped, creamy white, with red and yellow nectar guides, perianth tube elongate-cylindrical, 35–40 mm long, dorsal tepal largest, erect or recurving, 20–22 mm long. Late Aug.–early Oct. Stony shale slopes, WM (near Loeriesfontein). **(ece)**

orchidiflorus Andrews GROENKALKOENTJIE Cormous geophyte, 300–800 mm tall, corm with papery to coarsely fibrous tunics. Leaves linear to sword-shaped, plane with thick margins. Flowers several in an inclined, secund spike, bilabiate, windowed in profile, greenish to purple with dark purple markings, intensely fragrant, dorsal tepal narrow, arching in a semi-circle. Aug.–Oct. Clay and sandstone soils, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to Free State and Cape Flats).

permeabilis D.Delaroche Cormous geophyte, 200–400 mm tall, with wiry corm tunics. Leaves linear to terete, 1–3 mm wide. Flowers several in a secund spike, bilabiate, windowed in profile, mauve to dull purple or cream, often with yellowish markings, usually intensely fragrant, dorsal tepal largest, arching over stamens, lower tepals narrow. Aug.–Oct. Mainly shale slopes in renosterveld, TS, CCR (Prince Alfred and Caledon northeastwards to Zimbabwe).

salteri G.J.Lewis Cormous geophyte, 120–250 mm tall, corm with gnarled, woody tunics. Leaves lanceolate to falcate, plane. Flowers few in a flexuose inclined spike, creamy pink, lower tepals with pink and white markings, lightly scented, dorsal tepal narrow and arching. Aug.–Sept. Rocky granitic hills, NH (hills E of Springbok). **(ece)**

scullyi Baker Cormous geophyte, 200–600 mm tall, corm with gnarled woody tunics. Leaves sword-shaped to falcate, plane. Flowers 5–8 in a flexuose, inclined spike, bilabiate, brown to yellowish, lower tepals banded yellow and purple, windowed in profile, sweetly scented, dorsal tepal arching, lower tepals pinched together below. Aug.–Oct. Rocky granitic and clay slopes, G, NH, KB, KV, WM, TS (Richtersveld to Bokkeveld Plateau to Calvinia and Tanqua Karoo). **(ece)**

undulatus L. WHITE LADY Cormous geophyte, 600–800 mm tall, corm with papery tunics. Leaves sword-shaped, glaucous. Flowers in a few-flowered, erect spike, bilabiate, white to cream, often with pink to red markings on lower tepals, perianth tube elongate-cylindrical, tepals attenuate, with undulate margins. Nov.–Dec. Streambanks and marshes, KB, CCR (Kamiesberg and Bokkeveld Mountains to Stellenbosch). **(gce)**

uysiae L.Bolus ex G.J.Lewis Cormous geophyte, 70–150 mm tall, corm discoid, tunics papery, with slender stolons. Leaves linear-falcate, plane, 3–8 mm wide. Flowers 1–3 in a secund spike, bilabiate, brownish purple with dark veining, fragrant, perianth tube funnel-shaped, 10–12 mm long, dorsal tepal largest, erect, with recurved margins, lower tepals narrow, arching downward. Aug.–Sept. Clay slopes in renosterveld, 600–1 000 m, WM, TS, CCR (Bokkeveld Plateau and Roggeveld to Ceres). **(gce)**

venustus G.J.Lewis Cormous geophyte, 120–350 mm tall, corm tunics more-or-less woody. Leaves linear to falcate, thicker in the midline, mostly 2–5 mm wide. Flowers in a 5–8-flowered, flexuose

spike, bilabiate, purple to pink with yellow markings on the lower tepals, fragrant, perianth tube funnel-shaped, 12–17 mm long, dorsal tepal largest, 30–37 mm long, inclined over stamens, upper lateral tepals curving back, lower tepals pinched and geniculate below, narrow. Aug.–Oct. Clay and sandstone slopes, WM, TS, CCR (Bokkeveld Plateau to Swellendam). **(gce)**

viridiflorus G.J.Lewis GROENPYPIE Cormous geophyte, up to 200 mm tall, stem base mottled purple and white, corm with woody tunics. Leaves sword-shaped, loosely twisted above. Flowers on a flexuose, few-flowered spike, bilabiate, greenish, lower tepals with purple banding, intensely fragrant, dorsal tepal arching. May–July. Rocky sandstone slopes, G, NS, NH, CCR (Gariep to Clanwilliam). **(gce)**

HESPERANTHA AANDBLOM, HESPERANTHA ± 82 spp., sub-Saharan Africa

A. Flowers pink to purple

ciliolata Goldblatt Cormous geophyte, 80–250 mm tall, corm ovoid. Leaves terete to linear, with longitudinal grooves lined with short rough hairs. Flowers in a few-flowered spike, pink to violet, tepals spreading, exceeding perianth tube, open in the morning, musk-scented or odourless. Aug.–Sept. Clay and sandy soils, WM, CCR (Roggeveld Escarpment to Touwsrivier: Voetpadsberg). **(gce)**

glabrescens Goldblatt Cormous geophyte, up to 50 mm tall, corm globose, tunics concentric. Leaves 3, lower 2 falcate, uppermost sheathing the stem, sparsely hairy on margins and veins. Flowers 1–3 per spike, bright magenta, tepals spreading, exceeding perianth tube, open mornings, unscented. Sept.–Oct. Wet stony clay, WM (southern Roggeveld Escarpment). **(ece)**

humilis Baker Stemless, cormous geophyte, 30–80 mm tall, corm rounded, with overlapping tunics. Leaves falcate, glaucous. Flowers 1–3 in a congested spike, long-tubed, pink to reddish, darker in throat. July–Sept. Sandstone and shale slopes, WM, TS, CCR (Roggeveld Plateau to Witteberg and Hex River Mountains). **(gce)**

latifolia (Klatt) M.P.de Vos Cormous geophyte, mostly 50–100 mm tall, corm flat-based with spiny margins, stem often very short. Leaves sword-shaped to linear. Flowers in a few-flowered spike, red-purple, perianth tube elongate, 18–25 mm long, tepals spreading, open in the day and unscented. Aug.–Sept. Seasonally wet, sandy soils, and rock flushes, KB (Kamiesberg Mountains). **(ece)**

longistyla J.C.Manning & Goldblatt Acaulescent, cormous geophyte, mostly up to 30 mm tall, corm bell-shaped, flat-based with spiny margins. Leaves 3, falcate. Flowers 1 or 2 per spike, apparently purple with yellow throat, perianth tube 20–25 mm long, tepals spreading horizontally. Aug.–Sept. Rock crevices at high elevations, G (southern Namibia: near Rosh Pinah). **(ece)**

oligantha (Diels) Goldblatt Cormous geophyte, 80–100 mm tall, corm ovoid, tunics concentric. Leaves linear. Flowers 1–3 per spike, purple, perianth tube elongate, 25–35 mm long, tepals spreading, open in the day, unscented. Mainly Sept. Seasonally wet, sandy soils, WM (Hantamsberg). **(ece)**

pauciflora (Baker) G.J.Lewis Cormous geophyte, 80–240 mm tall, corm with a flat base, margins spiny. Leaves sword-shaped. Flowers 2–4 per spike, pink to purple, pale in throat (rarely yellow), tepals spreading, exceeding perianth tube, open in the afternoon, usually unscented. Aug.–Sept. Seasonally wet, sandy soils, NH, KB, CCR (Grootvlei to Bokkeveld Mountains). **(gce)**

pilosa (L.f.) Ker Gawl. Cormous geophyte, 100–300 mm tall, corm ovoid, tunics concentric. Leaves sword-shaped to linear, uppermost leaf sheathing the stem, hairy. Flowers 3–8 per spike, pink to purple [or white elsewhere], tepals spreading, exceeding perianth tube, open in the morning and unscented. Aug.–Sept. Seasonally wet, sandy soils, WM, ?TS, CCR (Bokkeveld Mountains and Roggeveld Escarpment to SW Cape). **(gce)**

purpurea Goldblatt Cormous geophyte, 80–250 mm tall, corm ovoid, tunics overlapping. Leaves sword-shaped. Flowers 1–3 per spike, purple with dark central markings, tepals spreading, shorter than elongate perianth tube, open in the day and unscented. Aug.–Sept. Rocky clay soils, WM (Bokkeveld Plateau). **(ece)**

A.' Flowers white or cream to yellow
B. Bract margins united below around the stem; corm with an obliquely flat base

decipiens Goldblatt Cormous geophyte, 80–150 mm tall, corm with oblique flat base. Leaves linear, thickened in midline. Flowers 3–6 in a flexuous spike, nodding, white to cream, brown or red

outside, open at night, then fragrant, perianth tube curving downward, tepals weakly recurving, bract margins united in lower half around the spike axis. Aug–Sept. Rock flushes, KB, KV (Kamiesberg Mountains to Knersvlakte). **(ece)**

marlothii R.C.Foster Cormous geophyte, 40–150 mm tall, corm with a flat base, with spiny margins. Leaves linear or falcate, thickened in midline. Flowers 3–6 per spike, nodding, white to cream, brown or red outside, open at night, then fragrant, perianth tube curving downward, tepals weakly recurving, bract margins united near base around spike axis. Aug–Sept. Rocky pavement, WM, ?TS, CCR (Roggeveld and Bokkeveld Mountains to Gydouw Pass). **(gce)**

radiata (Jacq.) Ker Gawl. Cormous geophyte, 200–400 mm tall, corm with oblique flat base. Leaves short, linear, fleshy, thickened in midline. Flowers several in a straight, secund spike, nodding, white to pale yellow, red to brown outside, open at night, then fragrant, perianth tube curving downward, tepals reflexed, bract margins united below around spike axis. Aug.–Oct. Sandstone granite and clay soils, fynbos and renosterveld, NH, KB, WM, CCR (Springbok to Swaziland).

B.' Bract margins free; corm rounded below
*C. Flowers yellow (see also **H. acuta**)*

flava G.J.Lewis Stemless, cormous geophyte, 40–60 mm tall, corm globose, with oblique flat side, tunics overlapping. Leaves falcate, broad and obtuse. Flowers 1 or 2 per spike, yellow, brown outside, open and fragrant at night, tepals spreading, perianth tube elongate-cylindrical, 18–28 mm long. July–Aug. Stony clay slopes, NH, WM, TS (Steinkopf and Kliprand to Matjiesfontein). **(ece)**

karooica Goldblatt Like **H. vaginata** but plants 60–120(–160) mm tall, flowers 1 or 2 per spike, uniformly pale yellow, perianth tube 6–7 mm long and tepals ± 20 mm long (vs. 30–35 mm). Aug.–Sept. Heavy doleritic red clay flats, WM (Bokkeveld Plateau: Calvinia to Klipwerf). **(ece)**

vaginata (Sweet) Goldblatt PERDEBLOM Cormous geophyte, mostly 120–180 mm tall, corm globose, tunics overlapping. Leaves 4 or 5, sword-shaped, glaucous. Flowers 2–4 per spike, cup-shaped, yellow usually with dark brown markings, tepals much exceeding perianth tube, unscented. Aug.–Sept. Mainly heavy clay soil, WM, CCR (Bokkeveld Plateau and Escarpment to Loeriesfontein). **(gce)**

C.' Flowers white

acuta (Licht. ex Roem. & Schult.) Ker Gawl. Cormous geophyte, 100–250 mm tall, corm ovoid, tunics concentric. Leaves nearly linear or falcate, upper leaf sheathing the stem. Flowers 3–6 per spike, white or yellow, red to brown outside, open and fragrant at night, tepals spreading, exceeding perianth tube. July–Sept. Sandy slopes and rock flushes, NH, KV, WM, TS, CCR (Namaqualand and Roggeveld to Worcester and southern Cape). **(gce)**

bachmannii Baker WITROKKIE Cormous geophyte, 150–300 mm tall, corm globose, tunics overlapping. Leaves linear to sword-shaped. Flowers 3–6 per spike, white, red outside, nodding on a recurved tube, tepals reflexed, open and sweetly scented in late afternoon and evening. July–Sept. Mostly clay slopes in renosterveld, G, NH, KB, KV, WM, TS, CCR (Richtersveld to East London).

cucullata Klatt Cormous geophyte, 150–300 mm tall, corm rounded, tunics overlapping. Leaves sword-shaped. Flowers 3–8 per spike, white, red to brown outside, tepals spreading, exceeding perianth tube, opening in late afternoon, then fragrant. July–Sept. Sandy and shale slopes in renosterveld, WM, TS, CCR (Bokkeveld Plateau and Bidouw Valley to Klein Roggeveld). **(gce)**

flexuosa Klatt Cormous geophyte, 100–200 mm tall, corm globose, tunics concentric. Leaves linear, fleshy. Flowers few in a lax spike, white, open and fragrant at night, tepals spreading, exceeding perianth tube. Mainly Aug.–Sept. Granitic slopes and pavement, NH, KB (Springbok to Garies). **(ece)**

hantamensis Schltr. ex R.C.Foster Stemless, cormous geophyte, 30–80 mm tall, corm globose, with overlapping tunics. Leaves falcate, glaucous. Flowers 1–3 in a congested spike, white, lightly scented, perianth tube 14–20 mm long, exceeding spreading tepals. July–Aug. Shale flats in karroid bush, WM (Bokkeveld Plateau). **(ece)**

luticola Goldblatt Stemless, cormous geophyte, 80–120 mm tall, corm with a flat base, with spiny margins. Leaves sword-shaped. Flowers 1 or 2 per spike, white with dark markings at base of tepals, perianth tube elongate, 30–45 mm long, tepals spreading, open in the day, unscented. July–early Aug. Seasonally wet places, WM (Hantamsberg and Roggeveld Escarpment). **(ece)**

minima (Baker) R.C.Foster Cormous geophyte, up to 50 mm tall, corm globose, tunics concentric. Leaves linear-filiform. Flowers in a 1–3-flowered spike, tiny, white, open and fragrant at night, tepals spreading. July–Sept. Mossy rock flushes, KB (Kamiesberg Mountains). **(ece)**

namaquana Goldblatt Cormous geophyte, up to 150 mm tall, corm globose, with an oblique flat side, tunics overlapping. Leaves lanceolate-falcate. Flowers in a few-flowered spike, white, outer tepals red-brown on the outside, open and fragrant at night, tepals spreading. July–Aug. Gravelly slopes along streams, NH (Bitterfontein Hills). **(ece)**

pseudopilosa Goldblatt Like **H. pilosa** but lower 2 leaves lanceolate to oblong, bearing a short, scale-like leaf below the spike, flowers white to cream, greenish to brown on reverse. Aug.–Sept. Clay soils in renosterveld, WM, TS, CCR (Bokkeveld Plateau to Klein Swartberg Mountains). **(gce)**

quadrangula Goldblatt Cormous geophyte, 100–300 mm tall, corm globose, tunics concentric. Leaves 3, lower 2 oblong, obtuse, uppermost one inflated, 4-angled, sheathing. Flowers 2–7 per spike, small, white, open in late afternoon, then scented, tepals spreading. July–Aug. Stony clay slopes, WM (Hantamsberg and Roggeveld Escarpment). **(ece)**

rivulicola Goldblatt Cormous geophyte, 100–300 mm tall, corm globose, tunics overlapping. Leaves subterete and hollow. Flowers 2–5 in a flexuose spike, white, brown on reverse, tepals spreading, twice as long as perianth tube, open and scented in late afternoon. Sept. Streambanks and seeps, WM, CCR (Bokkeveld Plateau and Escarpment). **(gce)**

rupicola Goldblatt Cormous geophyte, 30–50 mm tall, corm globose, tunics concentric. Leaves 3, linear to falcate, usually exceeding the stem. Flowers 1–3 per spike, white, dull purple to red outside, tepals spreading, about as long as perianth tube, open in the late afternoon and evening and scented. Aug. Rock outcrops, NH (eastern Namaqualand and Bushmanland).

teretifolia Goldblatt Cormous geophyte, 300–600 mm tall, corm globose, tunics overlapping. Leaves 3, terete, hollow, with fine longitudinal grooves, scabrid on the edges. Flowers 2–5 per spike, cream, light mauve outside, tepals spreading, exceeding perianth tube, open in the late afternoon and evening, then sweet scented. Aug.–Sept. Rocky slopes, WM (Roggeveld Escarpment). **(ece)**

IXIA IXIA, KALOSSIE ± 70 spp., Namaqualand to E Cape

A. Perianth tube filiform (not hollow) for most of its length; filaments inserted at tepal bases and style branches extending between the filaments

brevituba G.J.Lewis (including **I. amethystina** J.C.Manning & Goldblatt) Cormous geophyte, 200–300 mm tall, simple or with 1 or 2 short, distally spreading branchlets, nodding in bud. Leaves linear to sword-shaped, margins thickened. Flowers 4–7 in a lax spike, fewer on branchlets, light purple with a dark purple centre, style branches short, 2–2.5 mm long, perianth tube filiform, 2–2.5 mm long, tepals spreading, 12–13 mm long, stamens fully exserted. Sept.–Oct. Rocky flats and slopes, WM (central Roggeveld Escarpment). **(ece)**

calendulacea Goldblatt & J.C.Manning (= *I. maculata* var. *intermedia* G.J.Lewis) Cormous geophyte, up to 500 mm tall. Leaves sword-shaped, often twisted above, 10–20 mm wide. Flowers 4–many in a dense spike, orange with brown eye, bracts papery, 8–15 mm long, pale below, rust-brown distally, perianth tube filiform, 5–10(–20) mm long, tepals slightly cupped, 8–12(–20) mm, stamens fully exserted, filaments usually partially to fully united. Sept.–Oct. Deep sands and gravel flats, NS, CCR (coastal Namaqualand to Cape Peninsula, Olifants River Mountains to Porterville). **(gce)**

curvata G.J.Lewis Cormous geophyte, 120–200 mm tall, sometimes with 1 or 2 short branchlets. Leaves linear to falcate, rigid, up to 4 mm wide. Flowers 6–10 in a 2-ranked spike, deep pink, perianth tube filiform, 3–5 mm long, tepals spreading, 9–14 mm long, stamens unilateral, fully exserted. July–Sept. Rocky slopes, WM (Hantamsberg slopes to Roggeveld at Middelpos). **(ece)**

scillaris L. AGRETJIE Cormous geophyte, 250–500 mm tall, often with 1–3 short branchlets. Leaves sword-shaped, the margins sometimes undulate. Flowers 7–20 in a fairly lax spike, pale or deep pink, perianth tube filiform, 3–4 mm long, tepals more-or-less vertical, spreading, 8–16 mm long, stamens fully exserted, unilateral, anthers nodding. Sept.–Nov. Stony granite, sandstone, clay flats and slopes, NH, CCR (Spektakelberg and Bokkeveld Mountains to Somerset West). **(gce)**

trifolia G.J.Lewis Cormous geophyte, 150–300 mm tall, often with 1–3 short, spreading branchlets, nodding in bud. Leaves sword-shaped to falcate, with thickened margins. Flowers 5–9 in a lax spike, deep pink, whitish in the throat, tube filiform, 3–4 mm long, tepals spreading, 14–20

mm long, stamens fully exserted. Sept.–Oct. Rocky slopes, WM, TS, CCR (Roggeveld Escarpment, Klein Roggeveld and W Cape). **(gce)**

sp. A (= *I. brevituba* G.J.Lewis [excluding type]) Cormous geophyte, 250–500 mm tall, usually with 2 or more nearly erect branches. Leaves linear to sword-shaped, prominently veined and margins thickened. Flowers 5–10 in a dense spike, pale pink or mauve, perianth tube filiform, 1.5–2 mm long, tepals spreading, 10–12 mm long, stamens fully exserted. July–Sept. Red clay among dolerite rocks, WM (southern Roggeveld Escarpment). **(ece)**

A.' Perianth tube hollow, not filiform; filaments inserted within the tube and style branches extending between or above the anthers
B. Plants acaulescent and flowers yellow

acaulis Goldblatt & J.C.Manning Stemless, cormous geophyte, up to 50 mm tall. Leaves linear-falcate, spreading on the ground. Flowers borne singly, yellow, sweetly scented, perianth tube elongate-cylindrical, 15–20 mm long, tepals spreading. May–June. Limestone outcrops, KV (Knersvlakte). **(ece)**

B.' Plants with aerial stem and flowers pink, blue, mauve or white
C. Filaments included and anthers partly included in tube

lacerata Goldblatt & J.C.Manning Cormous geophyte, 0.6–0.9 m tall, corm with firm, wiry tunics, stem with short suberect branchlets. Leaves usually 3, lower 2 sword-shaped, uppermost leaf sheathing the stem. Flowers few in a wiry spike, half nodding, blue-mauve with yellow throat, sweetly scented, perianth tube funnel-shaped, ± 10 mm long, shorter than tepals, filaments included in tube; bracts with attenuate tips, often torn. Mainly Aug.–Sept. Stony slopes, WM (Klein Roggeveld). **(ece)**

namaquana L.Bolus (= *I. rapunculoides* var. *namaquana* (L.Bolus) G.J.Lewis) BLOU-KALOSSIE Cormous geophyte, 150–700 mm tall, stem with short lateral branchlets. Leaves sword-shaped to falcate, uppermost leaf sheathing the stem. Flowers few in a straight spike, half nodding, pink or white to pale mauve, usually sweetly scented, perianth tube funnel-shaped, 13–16 mm long, shorter than tepals, filaments included in tube. Aug.–Sept. Granitic gravel or sandy ground, G, NH, KB, CCR (southern Richtersveld to Cederberg Mountains). **(gce)**

rapunculoides Delile BLOUKALOSSIE Cormous geophyte, 150–700 mm tall, stem usually with short lateral branches. Leaves usually 3, lower 2 sword-shaped to falcate, uppermost leaf sheathing the stem. Flowers few in a wiry spike, half nodding, faintly scented, blue-mauve or pink, perianth tube funnel-shaped, 6–9 mm long, shorter than tepals, filaments included in tube. Aug.–Sept. Mostly clay soils in renosterveld, WM, TS, CCR (Langberg, Loeriesfontein and Bokkeveld Plateau to Roggeveld). **(gce)**

rivulicola Goldblatt & J.C.Manning Cormous geophyte, 0.45–0.8 m tall, corm with soft tunics, stem with short suberect branchlets. Leaves usually 3, linear, uppermost leaf sheathing the stem. Flowers few in a wiry spike, half nodding, white, nodding, sweetly scented, perianth tube funnel-shaped, shorter than tepals, filaments included in tube. Mainly Oct.–Nov. Rocky streambeds in reeds, WM (Roggeveld Escarpment). **(ece)**

robusta (G.J. Lewis) Goldblatt & J.C.Manning (= *I. rapunculoides* var. *robusta* G.J. Lewis) Like **I. rapunculoides** but mostly 0.5–1.1 m tall, leaves 4 or 5, lower 3 or 4 leathery, lanceolate. Flowers pink, acrid scented, perianth tube 8–9 mm long. Late Aug.–Sept. Dolerite rocks, WM (slopes N and E of the Hantamsberg). **(ece)**

sobolifera Goldblatt & J.C.Manning Cormous geophyte, (150–)400–700 mm tall, corm with soft tunics and producing stolons, stem usually with short nodding branchlets. Leaves usually 3, lower 2 linear, uppermost leaf sheathing the stem. Flowers few in a wiry spike, nodding, pink, slate blue or white, sweetly scented, perianth tube funnel-shaped, 8–10 mm long, shorter than tepals, filaments included in tube. Aug.–Sept. Mostly clay soils in renosterveld, WM, CCR (Langberg and Loeriesfontein to Little Karoo). **(gce)**

C.' Filaments partly exserted from tube

alata Goldblatt & J.C.Manning Like **I. thomasiae** but flowers mostly 4–6 per spike, pale pink with white or yellow cup, perianth tube 8–10 mm long, bracts mostly 9–12 mm long, anthers 4–5 mm long (vs. ± 6 mm). Sept.–early Oct. Rocky, mostly dolerite slopes, WM (northern edge of Roggeveld Escarpment). **(ece)**

latifolia D.Delaroche Cormous geophyte, up to 450 mm tall, stem with slightly twisted branches. Leaves 3, basal 2 broad, falcate to lanceolate, upper leaf sheathing stem. Flowers 3–7 in a suberect spike, large, pink, pale in centre, stamens well exserted. Aug.–Sept. Rocky flats, TS, CCR (south-western Tanqua basin to Worcester and Little Karoo). **(gce)**

linearifolia Goldblatt & J.C.Manning Cormous geophyte, 45–90 mm tall, with up to 5 short branchlets. Leaves 3, lower 2 linear, with thickened margins, upper leaf sheathing stem. Flowers mostly 2–4 per spike, facing to side, white suffused with palest blue, tube widely funnel-shaped, up to 5 mm long, tepals spreading; anthers well exserted from tube. Aug.–Sept. Local on rocky ridges, WM (Klein Roggeveld). **(ece)**

marginifolia Salisb. ex G.J.Lewis Cormous geophyte, up to 0.5 m tall, stem with several short, spreading branchlets. Leaves at base sword-shaped to falcate, margins and midrib strongly thickened. Flowers mostly 2 or 3 in a lax spike, pale blue-mauve, pink or white, perianth tube widely funnel-shaped, 2.5–4 mm long, tepals 10–14 mm long, filaments well exserted. Mainly Sept.–Oct. Mostly in renosterveld on stony slopes, WM, TS, CCR (Loeriesfontein to Sutherland, interior W Cape and Upper Karoo Mountains).

parva Goldblatt & J.C.Manning (= *I. latifolia* var. *parviflora* G.J.Lewis) Cormous geophyte, up to 150 mm tall, with short, twisted branchlets, Leaves 3, upper one sheathing the stem, lower 2 falcate. Flowers pink-purple, yellow in centre, sweetly scented, stamens well exserted. Mainly Aug. Shale slopes and flats, TS (Laingsburg to Matjiesfontein). **(ece)**

pavonia Goldblatt & J.C.Manning Like **I. marginifolia** but flowers always blue-mauve with dark blackish centre edged with red, filaments and style branches blackish, filaments 4 mm long (vs. 5–6 mm). Sept. Shale slopes and flats, WM (Escarpment S of Calvinia). **(ece)**

ramulosa Goldblatt & J.C.Manning (= *I. latifolia* var. *ramulosa* G.J.Lewis) Cormous geophyte, 200–500 mm tall, stem with short lateral branchlets. Leaves broad, lanceolate or falcate. Flowers few in an erect, wiry spike, half nodding, dark purple, blue-mauve or white, perianth tube narrowly funnel-shaped, filaments partly exserted. Sept.–Nov. Granitic soils, NH, KB, CCR (central Namaqualand to Bokkeveld Mountains and Koebee Mountains). **(gce)**

thomasiae Goldblatt Cormous geophyte, 0.5–0.8 m tall, stem with short, drooping branchlets. Leaves 3, uppermost sheathing stem, linear, 3–5 mm wide, midrib thickened and margins raised at right angles to blade. Flowers mostly 6–10 in a nodding spike, blue-mauve, perianth tube funnel-shaped, 7 mm long, tepals spreading, 20–25 mm long, filaments partly exserted. Sept.–Oct. Stony clay flats and slopes, WM (Roggeveld Escarpment). **(ece)**

LAPEIROUSIA LAPEIROUSIA, CABONG 40 spp., sub-Saharan Africa, mainly SW southern Africa

A. Corm margins thickened, straight to crenate

anceps (L.f.) Ker Gawl. Cormous geophyte, 100–300 mm tall, stem branching above ground, corm tunics brown, margins scalloped. Leaves linear, ribbed. Flowers several per spike, cream to pink with red markings on lower tepals, perianth tube elongate-cylindrical, tepals narrow, spreading, bracts fairly short. Sept.–Nov. Mainly in deep sand, NS, KV, CCR (Wallekraal to Mossel Bay). **(gce)**

exilis Goldblatt Stemless, cormous geophyte, 100–150 mm tall, corm tunics brown, margins scalloped. Leaves linear, ribbed. Flowers several in a basal tuft, pale blue with white markings, tepals equal but anthers unilateral, bracts short, keeled. July–Aug. Rocky quartzitic slopes, NH, WM (Steinkopf to northern Bokkeveld Escarpment). **(ece)**

littoralis Baker Cormous geophyte, 100–150 mm tall, branching at base, corm tunics brown, margins scalloped. Leaves linear to sword-shaped, ribbed. Flowers in a short to long spike, cream, sweetly fragrant, perianth tube elongate-cylindrical, tepals linear, spreading, bracts short. July–Aug. Sandy flats, NH (coastal Angola to E of Springbok, Bushmanland and Mozambique).

montana Klatt Stemless, cormous geophyte, 50–100 mm tall, corm tunics brown, margins scalloped. Leaf blades ribbed, falcate, in a basal tuft. Flowers in a basal tuft, actinomorphic, blue to whitish, sweetly scented, perianth tube up to 40 mm, tepals spreading. Aug.–Sept. Clay and loam soils, WM, TS (Roggeveld Escarpment and Klein Roggeveld). **(ece)**

oreogena Schltr. ex Goldblatt Stemless, cormous geophyte, 50–100 mm tall. Leaf blades ribbed, in a basal tuft. Flowers actinomorphic, long-tubed, violet with cream and blackish markings. Aug.–Sept. Mainly clay soils, WM, CCR (Bokkeveld Mountains and Plateau to Agterhantam). **(gce)**

plicata (Jacq.) Diels Stemless, cormous geophyte, 100–150 mm tall, corm tunics brown, margins scalloped. Leaves linear, ribbed. Flowers several to many in a basal tuft, actinomorphic, pale blue to whitish, tepals spreading, perianth tube cylindrical, bracts large and leafy, undulate or crisped. July–Aug. Sandy flats, G, NH, KV, WM, TS, CCR (southern Namibia to eastern Namaqualand, Bushmanland, Roggeveld, Little Karoo and Great Karoo).

pyramidalis (Lam.) Goldblatt Cormous geophyte, 50–100 mm tall, branching at base, corm tunics brown, margins scalloped. Leaves linear, ribbed. Flowers several in short, often dense spikes, perianth tube cylindrical, cream to bluish, sweetly scented (or dark purplish to magenta and scentless in Olifants River Valley), bracts spreading, broad and retuse above. July–Sept. Clay slopes and flats, KV, CCR (Knersvlakte to Worcester and Little Karoo). **(gce)**

silenoides (Jacq.) Ker Gawl. Cormous geophyte, 80–150 mm tall, branching at base, corm tunics brown, margins scalloped. Leaves sword-shaped, ribbed, occasionally lightly hairy. Flowers several in a short to long spike, cherry red with cream and dark red markings on the lower tepals, perianth tube elongate-cylindrical, bracts keeled, curved upward at the tip. Aug.–Sept. Granite outcrops and sandy slopes, NH, KB (Steinkopf to Bitterfontein). **(ece)**

verecunda Goldblatt Cormous geophyte, 100–150 mm tall, branching at base, corm tunics brown, margins scalloped. Leaves linear to sword-shaped, ribbed. Flowers several in a lax spike, white with red markings on the lower tepals, perianth tube elongate, cylindrical, bracts keeled, curved upward at the tip. Aug.–Sept. Dry clay slopes, NH (Spektakelberg). **(ece)**

A.' Corm margins toothed to spiny
B. Flowers blue to purple with pale nectar guides

dolomitica Dinter Cormous geophyte, up to 100 mm tall, corm tunics dark brown, with prominent basal teeth. Leaves sword-shaped, ribbed. Flowers several in a lax spike, pale blue to violet or purple with white and dark blue to red markings on the lower tepals, perianth tube elongate-cylindrical, bracts large, inflated, barely or not keeled. July–Aug. Stony, often shale soils, SN, G, NH, KB (southern Namibia to Nuwerus). **(ece)**

jacquinii N.E.Br. Cormous geophyte, 80–120 mm tall, branching from base, corm tunics brown, margins with short, down-pointed teeth. Leaves linear, ribbed. Flowers few in a lax spike, dark purple with cream and red streaks on lower tepals, perianth tube elongate-cylindrical, bracts 2-keeled below, broadly obtuse. Aug.–Sept. Sandstone soils, NH, KV, CCR (Garies to Worcester). **(gce)**

sp. A (= *L. purpurea* Goldblatt & J.C.Manning *ms*) Cormous geophyte, 80–180 mm tall, simple or branched from base, corm tunics brown, margins spined. Leaves sword-shaped, ribbed. Flowers several in a short to long spike, purple with cream and black markings on lower tepals, median tepal with a hook-like callus at base, perianth tube elongate-cylindrical, bracts keeled, boat-shaped. Aug.–Sept. Rocky sands, TS (Tanqua: foothills of Swartruggens). **(ece)**

B.' Flowers cream to pink with nectar guides usually red to purple

arenicola Schltr. More-or-less tufted, cormous geophyte, 80–100 mm tall, branching at base, corm tunics brown, margins with minute, down-pointed teeth, stem compressed. Leaves linear, ribbed. Flowers in a dense, few-flowered spike, whitish with red markings on the lower tepals, brownish on the outside, perianth tube cylindrical, bracts large, with red, minutely serrate keels. July–Aug. Sandy flats, G, NS, KV (Anenous flats to the Olifants River). **(ece)**

barklyi Baker Cormous geophyte, 100–150 mm tall, corm tunics dark brown, margins with short, down-pointed teeth. Leaves sword-shaped, ribbed. Flowers in few-flowered, dense spikes, deep lilac to purple, perianth tube funnel-shaped, tepals clawed below and cupped, bracts short, narrow. July–Aug. Sandy flats, SN, G (southern Namibia to Richtersveld). **(ece)**

fabricii (D.Delaroche) Ker Gawl. CABONG, CHABI Cormous geophyte, 150–250 mm tall, stem often many-branched, corm tunics dark brown, margins with minute to prominent spines. Leaves linear-sword-shaped, ribbed. Flowers in a few-flowered spike, large, cream to pink with red markings on the lower tepals, perianth tube elongate-funnel-shaped, lower tepals each with a median, claw-like tooth, bracts often serrated on keels. Sept.–Oct. Granite rocks and stony slopes, NS, NH, KB, KV, TS, CCR (Steinkopf to Bokkeveld Mountains, Karoopoort and Malmesbury). **(gce)**

macrospatha Baker Cormous geophyte, 100–150 mm tall, branching from base, corm tunics brown, margins with short, down-pointed teeth. Leaves linear, ribbed. Flowers in a few-flowered

spike, creamy pink, darker on outside, with red markings on lower tepals, perianth tube elongate-cylindrical, tepals spreading horizontally, bracts large, keeled. Aug.–Sept. Sandy plains, G, NS (Gariep to Kleinsee). **(ece)**

simulans Goldblatt & J.C.Manning Cormous geophyte, 100–180 mm tall, branching from base, corm tunics brown, margins with short, down-pointed teeth, deeply buried, with cormlets at underground nodes, stem compressed and minutely serrate on wings. Leaves linear, ribbed. Flowers in a lax, few-flowered spike, white with red markings on lower tepals, red-brown on outside, perianth tube elongate-cylindrical, tepals narrow, spreading. Late Aug.–Sept. Sandy flats, NS, KV (coast N of Olifants River Mouth and Knersvlakte). **(ece)**

spinosa (Goldblatt) Goldblatt & J.C.Manning Cormous geophyte, mostly 50–90 mm tall, stems simple or branching from base, corm tunics blackish, margins with horizontal spines. Leaves linear to sword-shaped, ribbed. Flowers in a few-flowered spike, cream, fragrant, lower tepals each with a median tooth, bracts short, keeled. Aug.–Sept. Sandy flats, G (Richtersveld). **(ece)**

tenuis (Goldblatt) Goldblatt & J.C.Manning Cormous geophyte, 70–250 mm tall, stems simple or branching above, corm tunics blackish, margins with horizontal spines. Leaves sword-shaped, ribbed. Flowers in a lax, few-flowered spike, lilac to mauve, fragrant, perianth tube cylindrical, the lower tepals each with a filiform cusp near base, bracts short, curving upward. July–early Sept. Stony gravel slopes, NS, NH (Richtersveld to Wallekraal). **(ece)**

sp. B (= *L. kamiesmontana* Goldblatt & J.C.Manning *ms*) Like **L. dolomitica** but flowers many in a fairly dense spike, white with red markings on the lower tepals. Sept.–Oct. Stony, granitic ground, KB (southern Kamiesberg Mountains). **(ece)**

MELASPHAERULA BAARDMANNETJIE, FAIRY-BELL, FEEKLOKKIE 1 sp., southern Namibia to W Cape **(gce)**

ramosa (L.) N.E.Br. Cormous geophyte, 300–600 mm tall, stem wiry, diffusely branched. Flowers in lax, wiry spikes, small, bilabiate, cream to pale yellow, lower tepals streaked with red-brown in midline, sour-smelling, perianth tube short. July–Sept. Mostly sheltered sites on sandstone or limestone slopes, SN, G, NH, KB, TS, CCR (southern Namibia to Agulhas, Little Karoo to Baviaanskloof Mountains). **(gce)**

MORAEA (= *GALAXIA, GYNANDRIRIS, HEXAGLOTTIS, HOMERIA, ROGGEVELDIA*) UINTJIE ± 200 spp., sub-Saharan Africa and Mediterranean to Middle East

Galaxia group CLOCK-FLOWER, HORLOSIEBLOM

A. Flowers pink, mauve or purple, sometimes reddish

fenestralis (Goldblatt & E.G.H.Oliver) Goldblatt (= *Galaxia fenestralis* Goldblatt & E.G.H.Oliver) Stemless, cormous geophyte, up to 25 mm tall. Leaves 3 or 4, terete, falcate, transparent on the upper surface. Flowers in a basal tuft, pale pink to lilac with a yellow cup, tubular below, tepals cupped, filaments united in a column, style lobes entire, undulate. June–July. Shallow soil on granite outcrops, NH, KB (Springbok, eastern Kamiesberg Mountains to Kliprand). **(ece)**

kamiesmontana (Goldblatt) Goldblatt (= *Galaxia kamiesmontana* Goldblatt) Stemless, cormous geophyte, 20–50 mm tall. Leaves 3 or 4, slender and terete, falcate, flattened on the upper surface. Flowers in a basal tuft, pink with yellow cup, tubular below, tepals cupped, filaments in a column, style exceeding anthers, style lobes entire. May–June. Rock flushes on granite outcrops, KB (Kamiesberg Mountains). **(ece)**

A.' Flowers yellow or white

fugacissima (L.f.) Goldblatt (= *Galaxia fugacissima* (L.f.) Druce) Stemless, cormous geophyte, 30–60 mm tall. Leaves linear to terete, more-or-less erect. Flowers in a basal tuft, yellow, tubular below, tepals cupped, filaments united in a column, style exceeding anthers, style lobes fringed. July–Sept. Wet sand and clay flats, NH, KB, CCR (Kamieskroon to Humansdorp). **(gce)**

kamiesensis Goldblatt (= *Galaxia grandiflora* Andrews) Stemless, cormous geophyte, up to 50 mm tall. Leaves ovate-oblong, spreading to prostrate, margins much thickened. Flowers in a basal tuft, yellow, tubular below, tepals cupped, filaments united in a column, style exceeding the anthers, style lobes fringed. July–Aug. Sandy slopes, KB (Kamiesberg Mountains). **(ece)**

pilifolia Goldblatt (= *Galaxia ciliata* Pers.) Stemless, cormous geophyte, up to 40 mm tall. Leaves ovate-oblong, spreading to prostrate, margins thickened, densely velvety. Flowers in a basal tuft, yellow, tubular below, tepals cupped, filaments united in a column, style exceeding the anthers, style lobes fringed. June–July. Stony slopes, NH, KV, CCR (northern Namaqualand to Gifberg). **(gce)**

stagnalis (Goldblatt) Goldblatt (= *Galaxia stagnalis* Goldblatt) Stemless, cormous geophyte, 20–40 mm tall. Leaves linear to lanceolate. Flowers in a basal tuft, yellow, tepals cupped, filaments united in a column, style reaching anther apices, style lobes fringed. June–Aug. Wet sites on sandstone soils, 400–800 m, NH, CCR (Garies and Bokkeveld Mountains to Pakhuis Pass). **(gce)**

Gynandriris group PAPIERUINTJIE

contorta Goldblatt (= *Gynandriris anomala* Goldblatt) Cormous geophyte, 200–300 mm tall. Leaves single, linear, channelled, trailing above. Flowers enclosed in translucent spathes, blue-violet, nectar guides orange and white, tepals subequal, lightly spreading. Sept.–Oct. Sandy and gravelly flats and slopes, WM (Hantamsberg to Ganagga Pass). **(ece)**

herrei (L.Bolus) Goldblatt (= *Barnardiella spiralis* (N.E.Br.) Goldblatt) Cormous geophyte, up to 100 mm tall, stem with lateral flower clusters sessile. Leaf 1, terete, loosely spiraled or straight and falcate, erect. Flowers enclosed by firm green spathes, blue, nectar guides yellow, tepals subequal, spreading, claws short, including lower half of filament column, anthers parallel, concealing the style branches. Sept.–Oct. Rocky slopes and flats, G, NH, KB (Richtersveld to Garies). **(ece)**

hesperantha (Goldblatt) Goldblatt (= *Gynandriris hesperantha* Goldblatt) Cormous geophyte, 400–600 mm tall. Leaves 2, linear, trailing, margins inrolled. Flowers enclosed by translucent spathes, dark blue, inner tepals lightly reflexed, opening in the late afternoon. Oct.–Nov. Heavy clay slopes, WM, CCR (Loeriesfontein to Nieuwoudtville). **(gce)**

pritzeliana Diels (= *Gynandriris pritzeliana* (Diels) Goldblatt KURKTREKKERUINTJIE Cormous geophyte, 100–250 mm tall. Leaves 2, spirally coiled, surface plane, translucent along midline. Flowers enclosed by translucent spathes, blue, nectar guides cream and yellow, tepals lightly reflexed. Sept.–Oct. Sandstone and clay soils, mainly in renosterveld, WM, TS, CCR (Bokkeveld Mountains and Loeriesfontein to Klein Roggeveld). **(gce)**

setifolia (L.f.) Druce (= *Gynandriris setifolia* (L.f.) R.C.Foster) BOKUINTJIE, PAPIERUINTJIE Cormous geophyte, 50–200 mm tall. Leaves 1 or 2, linear, channelled, trailing. Flowers enclosed by translucent spathes, small, pale mauve, tepals subequal, bearing orange and white nectar guides, tepals lightly reflexed. Sept.–Nov. Sandy and gravelly flats and slopes, KB, KV, WM, CCR (Kamiesberg Mountains to Grahamstown).

simulans Baker (= *Gynandriris simulans* (Baker) R.C.Foster) Cormous geophyte, 150–400 mm tall. Leaves 1 or 2, linear, channelled. Flowers enclosed by translucent spathes, pale mauve, speckled with darker mauve, with yellow nectar guides on the outer tepals, inner tepals small, laxly spreading. Oct.–Nov. Stony flats along the Gariep Valley, G (Richtersveld and Karoo to Free State and Gauteng).

Hexaglottis group and **Roggeveldia group** THREAD STAR, VOLSTRUISUINTJIE

A. Flowers blue to violet; style branches undivided

fistulosa (Goldblatt) Goldblatt (= *Roggeveldia fistulosa* Goldblatt) Plants 150–250 mm tall, with 1 or 2 branches. Leaf 1, terete, erect, hollow. Flowers enclosed by green to partly dry spathes, blue, tepals with short claws forming a narrow cup, limbs spreading, stamens free, diverging, style with 3 filiform branches extending between the anthers. Nov.–Dec. Stony slopes, WM (northern Roggeveld Plateau). **(ece)**

marginata J.C.Manning & Goldblatt Like **M. fistulosa** but shorter, up to 150 mm tall, leaf channelled, trailing, with prominent, thick white margins, and flowers smaller, tepals 9–13 mm long. Nov. Stony flat ground, WM (Roggeveld Plateau). **(ece)**.

monticola Goldblatt (= *Roggeveldia montana* Goldblatt) Cormous geophyte, 100–150 mm tall, 1- or 2-branched. Leaf single, terete, often trailing. Flowers enclosed in green spathes, blue or

white, with yellow nectar guides, tepals subequal, with short claws forming a narrow cup, limbs spreading, stamens free, diverging, style with 3 filiform branches extending between the stamens. Oct.–Dec. Rocky slopes, KB, CCR (Kamiesberg and Swartberg Mountains). **(gce)**

A.' Flowers yellow; style branches divided to base

brevituba (Goldblatt) Goldblatt (= *Hexaglottis brevituba* Goldblatt) Cormous geophyte, 400–600 mm tall, with lateral flower clusters sessile. Leaves 2–4, linear, channelled, trailing above. Flowers enclosed by green to partly dry spathes, yellow, tepals forming a short tube, ovary shortly stalked, style with 6 filiform arms extending between stamens. Capsules enclosed in the spathes. Sept.–Nov. Stony lower slopes, G (southern Namibia and Richtersveld). **(ece)**

lewisiae (Goldblatt) Goldblatt (= *Hexaglottis lewisiae* Goldblatt) Cormous geophyte, 200–900 mm tall, usually 2- or 3-branched, with lateral flower clusters sessile. Leaves 1–3, linear, channelled, trailing above. Flowers enclosed by green to partly dry spathes, yellow, tepals spreading, style with 6 filiform arms extending between the stamens. Oct.–Dec. Dry rocky slopes and flats, NH, KB, WM, CCR (Spektakelberg to Humansdorp). **(gce)**

namaquana (Goldblatt) Goldblatt (= *Hexaglottis namaquana* Goldblatt) Cormous geophyte, 150–300 mm tall, stem branched and all flower clusters stalked. Leaves 2 or 3, linear, channelled to flat, trailing, lightly twisted, margins undulate to crisped. Flowers enclosed in green attenuate spathes, pale yellow, style with 6 filiform arms extending between the stamens. Mainly Sept. Shale slopes in quartzite patches, NH (Spektakelberg). **(ece)**

nana (L.Bolus) Goldblatt & J.C.Manning (= *Rheome nana* (L.Bolus) Goldblatt) Cormous geophyte, 100–300 mm tall, stem with short branches crowded above the leaves. Leaves 2 or more, clustered above ground, channelled. Flowers enclosed by leathery, obtuse spathes, pale yellow to salmon, style with 6 filiform arms extending between the stamens. Sept.–Nov. Rocky granite slopes, NH, KB, KV, CCR (Spektakelberg to Citrusdal). **(gce)**

virgata Jacq. (= *Hexaglottis virgata* (Jacq.) Sweet) PYPIEVOLSTRUISUINTJIE Cormous geophyte, 200–850 mm tall. Leaves 2 or 3, linear, channelled, trailing above. Flowers pale to deep yellow, tepals forming a tube below and ovary subsessile. Capsules enclosed in the spathes. Mainly Sept.–Nov. Shale and granite soils, rarely sandstone, NH, WM, CCR (southern Namaqualand and Roggeveld Escarpment to Port Elizabeth). **(gce)**

sp. A Cormous geophyte, up to 100 mm tall with slender, drooping stem. Leaves linear, soft-textured, trailing, blades undulate or lightly crisped. Flowers small, yellow, style with 6 filiform arms extending between the stamens. Sept. Crevices in rocks on shady S-facing slopes, SN (Aurus Mountains, Karas). **(ece)**

Homeria group CAPE TULIP, TULP

*A. Leaves two or more (see also **M. karooica**)*
B. Filament column bulbous below

fenestrata (Goldblatt) Goldblatt (= *Homeria fenestrata* Goldblatt) Cormous geophyte, 100–300 mm tall, stem branched, flexed above leaf sheaths. Leaves 3, linear, channelled. Flowers enclosed in green spathes, salmon with yellow nectar guides, occasionally yellow, tepals subequal, claws short, narrow at base, limbs spreading, filaments united in a slightly bulbous column, anthers coherent, concealing the style branches, crests vestigial. Aug.–Sept. Clay flats, TS (Tanqua Karoo and lower slopes of Roggeveld Mountains). **(ece)**

miniata Andrews (= *Homeria miniata* (Andrews) Sweet) PRONKTULP Cormous geophyte, 150–600 mm tall, stem branched. Leaves 2 or 3, linear, trailing above. Flowers enclosed in green spathes, salmon, yellow, occasionally white, minutely speckled in the centre, tepals with short, clasping claws, limbs spreading, filaments united, column bulbous below, style branches concealed by the anthers. Aug.–Sept. Mainly clay and granitic slopes, G, NS, NH, KB, KV, WM, TS, CCR (northern Namaqualand to Riversdale and Great Karoo).

pendula (Goldblatt) Goldblatt (= *Homeria pendula* Goldblatt) Cormous geophyte, up to 900 mm tall, stem branched. Leaves 3 or more, linear, channelled, trailing above. Flowers enclosed in green spathes, salmon or yellow, minutely speckled in centre, nodding, anthers bright red, tepals with short, clasping claws, limbs fully recurved, filament column bulbous below, style branches concealed by the anthers. Aug.–Oct.(Nov.). Seasonally wet places, KB (Kamiesberg Mountains). **(ece)**

B.' Filament column uniformly cylindrical

graniticola Goldblatt Cormous geophyte, up to 50 mm tall, stem reaching up to 15 mm above ground, usually branched. Leaves usually 3, widely channelled, spreading. Flowers enclosed in green spathes, tubular below, blue, tepals with short, ascending claws, limbs spreading, outer with yellow mark at base, filaments united in a slender column, anthers spreading, short, forked style branches without crests. Sept.–early Oct. Rocky flats, G (southwestern Namibia). **(ece)**

knersvlaktensis Goldblatt (= *Homeria ramosissima* Schltr.) Cormous geophyte, up to 350 mm tall, with numerous branches crowded in a rounded cluster. Leaves few, linear-lanceolate, margins undulate to crisped. Flowers enclosed in green spathes, pale yellow, greenish grey in centre, tepals with short clasping claws, limbs spreading, twisted, filaments in a slender column, style branches with short crests. July–Aug. Quartzitic flats and slopes, KV (Knersvlakte). **(ece)**

louisabolusiae Goldblatt (= *Homeria bolusiae* Goldblatt) Cormous geophyte, 120–350 mm tall, stem flexed above the leaf sheaths. Leaves few (occasionally 1). Flowers enclosed in green spathes, yellow or salmon, tepals with short, cupped claws, limbs spreading, filaments in a slender column, style branches with short, erect crests. Aug.–Sept. Rock outcrops, KB, CCR (Kamiesberg Mountains and Nardousberg). **(gce)**

schlechteri (L.Bolus) Goldblatt (= *Homeria schlechteri* L.Bolus) Cormous geophyte, 150–400 mm tall, mostly branching above. Leaves 3 or more, linear, channelled, glaucous. Flowers enclosed in green spathes, pale yellow, tepals with short, clasping claws, limbs spreading, filaments in a slender column, style branches with short, erect crests. Mostly Aug.–Sept. Granite slopes, NH, KB (Steinkopf to Bitterfontein). **(ece)**

serratostyla (Goldblatt) Goldblatt (= *Homeria serratostyla* Goldblatt) Cormous geophyte, up to 250 mm tall, stem flexed above the leaf sheaths. Leaves 2 or 3, linear, channelled, trailing above. Flowers enclosed in green spathes, yellow or salmon, tepals with short, cupped claws, limbs spreading, filaments in a slender column, style branches shorter than anthers, with serrated margins, crests erect, also serrated. July–Aug. Stony flats and slopes, G (Richtersveld). **(ece)**

A.' Leaves single

bifida (L.Bolus) Goldblatt (= *Homeria bifida* L.Bolus) Cormous geophyte, up to 500 mm tall. Leaf 1, broad below, clasping lower half of stem. Flowers enclosed in green spathes, yellow or pink, speckled in the centre, tepals with short, clasping claws, limbs spreading, filament column bulbous below, style branches concealed by the anthers. Aug.–Sept. Clay soils in renosterveld, KB, WM, CCR (eastern Kamiesberg Mountains and Roggeveld to Pakhuis Pass). **(gce)**

cookii (L.Bolus) Goldblatt (= *Homeria cookii* L.Bolus) Cormous geophyte, 300–600 mm tall. Leaf 1, sheathing lower stem, channelled, trailing above. Flowers enclosed in green spathes, yellow with darker yellow-speckled centre, tepal claws short, filament column thick, anthers diverging. Aug.–Sept. Rocky dolerite and sandstone slopes, WM, TS, CCR (Bokkeveld Plateau and Cederberg Mountains to Karoo and Lesotho).

fragrans Goldblatt (= *Homeria odorata* L.Bolus) Like **M. bifida** but flowers pale yellow and tepal claws forming a deep cup including the stamens, sweetly fragrant. Aug.–Sept. Mainly heavy clay soils, WM, TS (Bokkeveld Plateau and Tanqua Karoo). **(ece)**

karooica Goldblatt (= *Homeria tricolor* G.J.Lewis) Cormous geophyte, 150–300 mm tall. Leaf usually 1, occasionally 2, usually clasping stem below. Flowers enclosed in green spathes, salmon with a yellow centre, tepal claws forming a shallow cup, anthers exserted on a slender filament column. Sept.–Oct. Clay soils in renosterveld, WM, TS, CCR (Roggeveld to Ceres and Little Karoo to Great Karoo).

marlothii (L.Bolus) Goldblatt (= *Homeria marlothii* L.Bolus) Cormous geophyte, up to 750 mm tall. Leaf 1, clasping lower half of stem, channelled, trailing above. Flowers enclosed in green spathes, yellow, occasionally salmon-pink, darkly speckled in centre, tepal claws short and clasping, anthers exserted on a thick filament column. Aug.–Oct. Sandstone rocks or heavy clay soils, WM, CCR (Bokkeveld Plateau and Roggeveld to Cederberg Mountains). **(gce)**

reflexa Goldblatt (= *Homeria hantamensis* Goldblatt & J.C.Manning) Cormous geophyte, up to 1 m tall, branching above. Leaf 1, clasping the stem below, channelled and trailing above. Flowers enclosed in green spathes, yellow, nodding, with tepals reflexed, filaments united in a thickened column, anthers diverging, exceeding the style branches. Sept.–Oct. Rocky dolerite flats, WM (Hantamsberg Summit Plateau). **(ece)**

Moraea-group MORAEA, UINTJIE

A. Plants stemless

ciliata (L.f.) Ker Gawl. Stemless, cormous geophyte, 50–100(–200) mm tall. Leaves 3–5, sparsely to densely hairy, usually grey. Flowers enclosed in large, lightly hairy spathes, blue or yellow, occasionally white, spicy-fragrant, outer tepals large, with spreading limbs, inner tepals sometimes erect, style branches diverging, crests large, erect. July–Sept. Sandy and clay slopes, G, NH, KB, KV, WM, TS, CCR (Richtersveld to southern Cape and Great Karoo).

falcifolia Klatt Stemless, cormous geophyte, up to 50 mm tall. Leaves several, spreading, channelled, twisted. Flowers enclosed in green, acute spathes, white with yellow nectar guides on outer tepals and purple on inner tepals, tepal claws short, limbs lightly reflexed, style branches diverging, crests prominent. May–Aug. On open stony or clay flats, G, NH, WM, TS, CCR (southern Namibia to Clanwilliam and Bokkeveld Plateau to Alexandria).

longiflora Ker Gawl. Stemless, cormous geophyte, up to 50 mm tall. Leaves several, in a basal tuft, rigid, linear, channelled. Flowers enclosed in green, truncate spathes, deep yellow, outer tepals with black speckles in the centre, tepals united in a long perianth tube, unequal, the outer larger, both inner and outer tepals with lightly reflexed limbs, crests prominent, ovary concealed in the spathes. Sept. Sandy slopes, KB (Kamiesberg Mountains). **(ece)**

A.' Plants with aerial stems
*B. Stems with two or more foliage leaves (see also **M. crispa, M. fugax** and **M. gawleri**)*
C. Stems sticky below the nodes

bubalina Goldblatt Cormous geophyte, 300–450 mm tall, stems sticky, branched. Leaves 2–5, linear, channelled, trailing above. Flowers enclosed in obtuse spathes, brownish with green and cream markings, tepals cupped below, limbs outspread, filaments free, contiguous, style crests short. Oct.–Nov. Rocky sandstone slopes, KV, WM, CCR (Loeriesfontein to Bokkeveld Plateau and Gifberg). **(gce)**

inconspicua Goldblatt TAAI-UINTJIE Cormous geophyte, 200–450 mm tall, stems sticky, branched. Leaves 2 or 3, linear, channelled and trailing or loosely coiled. Flowers enclosed in obtuse spathes, tiny, yellow to brown or cream, tepal limbs strongly reflexed, filaments free, contiguous, style branches narrow, diverging, crests erect. Sept.–Nov. Sandy and clay slopes, NH, KB, KV, CCR (Springbok to Port Elizabeth). **(gce)**

vespertina Goldblatt & J.C.Manning Cormous geophyte, mostly 0.5–1.2 m tall, stems sticky, branched. Leaves 4–6, linear, channelled, trailing above. Flowers enclosed in fibrous, acute spathes, white to pale slate blue, fragrant, opening in the late afternoon, outer tepals larger, limbs laxly spreading, filaments free, contiguous, style branches narrow, diverging crests erect. Sept.–Dec. Among dolerite boulders, often seasonally waterlogged, WM, TS (Bokkeveld Plateau and Tankwa National Park). **(ece)**

C.' Stems not sticky

bipartita L.Bolus Cormous geophyte, 150–450 mm tall, much branched. Leaves 2–4, linear, channelled. Flowers enclosed in green spathes, blue with yellow markings, tepals subequal, limbs lightly reflexed, filaments united in lower half, style branches narrow, crests erect. June–Oct. Stony clay flats, TS, CCR (Ladismith through to Prince Albert, southern Karoo and Grahamstown).

deserticola Goldblatt Cormous geophyte, up to 450 mm tall. Leaves 2 or 3, linear, channelled, often trailing above. Flowers enclosed in dry spathes, pale blue-mauve with a cream cup including the stamens, with yellow nectar guides, tepals subequal, often half nodding, claws forming a cup ± 12 mm deep, limbs spreading, anthers cohering, partly concealing minute style branches, style crests vestigial, ovary veined red. Mostly June–Aug. Stony, limestone or clay flats, KV (Knersvlakte). **(ece)**

flexicaulis Goldblatt Cormous geophyte, up to 150 mm tall, branched. Leaves 2 or 3, linear, fairly short, channelled. Flowers enclosed in green spathes, yellow, tepal claws long, limbs shorter, outspread, filaments united in a slender column, style branches narrow, diverging, crests short, erect. June–July. Stony and sandy slopes and flats, G (southern Richtersveld). **(ece)**

garipensis Goldblatt Cormous geophyte, up to 650 mm tall, several-branched. Leaves several, linear, channelled, margins lightly undulate. Flowers enclosed in pale green or partly dry, obtuse

spathes, yellow, tepal claws long, erect, outer tepal limbs laxly spreading, inner erect, filaments united in lower half, anthers red, style branches broad, crests erect. June–July. Rock outcrops, G (southern Namibia and northern Richtersveld along the Gariep Valley). **(ece)**

indecora Goldblatt Cormous geophyte, 150–300 mm tall, stem branched, minutely hairy. Leaves several, linear, channelled, trailing above. Flowers enclosed in green, obtuse spathes, pale yellow, tepal claws short, limbs spreading, filaments united in lower third, pollen red, style branches diverging, crests prominent, erect. Sept.–Oct. Gravel slopes, NH (Nababeep to Goegab). **(ece)**

intermedia Goldblatt & J.C.Manning Cormous geophyte, up to 150 mm tall, with branched stem. Leaves linear, channelled, all crowded at first aerial node, well above ground level. Flowers pale yellow with deep yellow nectar guides speckled with green at bases of all tepal limbs, tepal limbs spreading, claws very short, filaments united in a thickened column much exceeding tepal claws, anthers and pollen red, ± 5 mm long prominently displayed. Sept. Granitic gravel slopes, NH (mountains W of Springbok). **(ece)**

longipes Goldblatt & J.C.Manning Like **M. ciliata** but leaves borne on stems held well above ground, cataphylls forming a fibrous collar around base, flowers pale yellow or translucent white with tepal margins and reverse coppery red. May–July. Sandy or gravel slopes, NH, KV (Springbok to Vanrhynsdorp flats). **(ece)**

margaretae Goldblatt Cormous geophyte, up to 150 mm tall, branches crowded at base. Leaves several, linear, channelled, twisted above, inserted at base. Flowers enclosed in green obtuse spathes, yellow with darker yellow nectar guides, tepal limbs lightly reflexed, filaments united in lower half, pollen red, style branches broad, crests prominent. Late Aug.–Sept. Granitic sands, G, NH (southern Richtersveld to Kamieskroon). **(ece)**

namaquamontana Goldblatt Cormous geophyte, up to 300 mm tall, several-branched. Leaves several, linear, channelled. Flowers enclosed in pale green spathes, yellow, inner and outer tepals with laxly spreading limbs, filaments united in lower half, style branches broad, crests prominent. Aug.–Sept. Rocky slopes, G (Stinkfontein Mountains). **(ece)**

polystachya (Thunb.) Ker Gawl. Cormous geophyte, 500–800 mm tall, much-branched. Leaves several, channelled, trailing above. Flowers enclosed in red-flushed spathes, blue with yellow nectar guides, tepal limbs lightly reflexed, occasionally inner tepals erect, style branches broad, crests erect. Mainly Mar.–June. Dry karroid slopes, TS, CCR (Ladismith to Oudtshoorn, Prince Albert and Great Karoo).

serpentina Baker SLANGUINTJIE Cormous geophyte, 50–150 mm tall, few-branched. Leaves 2 or 3, linear, margins inrolled, twisted or coiled, sometimes hairy. Flowers enclosed in green to partly dry spathes, white and yellow, style branches and crests often flushed violet, prominent, outer tepals with yellow nectar guides, limbs spreading, inner tepals erect, broadest above, crests erect. Sept.–Oct. Dry stony flats, G, NH, KB, KV, WM, CCR (Richtersveld to Olifants River Valley, near Loeriesfontein and Upper Karoo).

speciosa (L.Bolus) Goldblatt (= *Homeria speciosa* L.Bolus) Cormous geophyte, up to 0.7 m tall, often much branched. Leaves several, channelled, trailing above. Flowers enclosed in green spathes, pale blue with a cream cup, with yellow nectar guides, tepals deeply cupped, spreading above, filaments in a slender column, anthers partly concealing narrow style branches, style crests vestigial. Mostly July–Aug. Rocky flats and slopes, TS, CCR (Cederberg Mountains and Tanqua Karoo to Prince Albert). **(gce)**

tanquana J.C.Manning & Goldblatt. Like **M. deserticola** but leaves on flowering stem with long blades, flower with a shallow cup ± 9 mm deep (vs. 12 mm), smaller anthers ± 5 mm long at anthesis and exserted beyond cup on a filament column ± 10 mm long, ovary pale green without reddish veins. Aug. Dolerite slopes, TS (Tankwa National Park: Leeuberg). **(ece)**

tortilis Goldblatt Cormous geophyte, 100–150 mm tall, usually 1- or 2-branched. Leaves 2 or 3, terete, coiled like a corkscrew. Flowers enclosed in green to partly dry spathes, blue to white, the outer tepals with yellow nectar guides, inner and outer tepal limbs lightly reflexed, style branches diverging, crests prominent, erect. Aug.–Sept. Gravel and quartzite slopes and flats, G, NH, KV (southern Richtersveld to Knersvlakte). **(ece)**

*B.' Stems with 1 foliage leaf (rarely more in **M. crispa, M. fugax** and **M. gawleri**)*
D. Inner tepals filiform, tricuspidate, or with a short attenuate limb, flowers lasting 2 or 3 days

amabilis Diels BLOU-UINTJIE Cormous geophyte, 200–450 mm tall. Leaf 1, linear, widely channelled or plane distally, often hairy beneath. Flowers enclosed in green spathes, blue to violet,

inner tepals reduced to short linear cusps, filaments ± free, style crests prominent. Aug.–early Oct. Mainly tillite and clay soils, up to 1 200 m, WM, TS, CCR (Loeriesfontein: Langberg to Klein Roggeveld, Gifberg and Olifants River Valley). **(gce)**

rivulicola Goldblatt & J.C.Manning Cormous geophyte, 300–600 mm tall. Leaf 1, linear, channelled, trailing above. Flowers enclosed in green spathes, cream to greenish, outer tepal limbs spreading, inner tepals 3-lobed with a long central cusp, filaments united below, style branches narrow, crests short. Sept.–Nov. Rocky granitic slopes near streams, G, NH, KB (southern Richtersveld to Bitterfontein Hills). **(ece)**

unguiculata Ker Gawl. Cormous geophyte, 200–400 mm tall. Leaf 1, narrow, channelled. Flowers enclosed in green spathes, white to cream (brownish or violet elsewhere), outer tepal limbs spreading, inner tepals 3-lobed with inrolled or straight central cusp, filaments united below, style branches narrow, crests short. Sept.–Nov. Rocky shale and granite slopes, NH, KB, WM, CCR (northern Namaqualand to Roggeveld Escarpment to Port Elizabeth and Karoo Mountains). **(gce)**

sp. B (allied to **M. tripetala** (L.f.) Ker Gawl. from CCR) Cormous geophyte, 200–450 mm tall, corms with tunics of tough, thickened, pale fibres. Leaf 1, linear, narrowly channelled with leaf halves often folded together. Flowers enclosed in green spathes, blue to violet, inner tepals linear, up to 16 mm long, arching outward in upper half, filaments united basally. Mainly Sept.–Oct. Mainly sandy soils, up to 1 200 m, WM, TS, CCR (Roggeveld and Klein Roggeveld to Witteberg and Swartberg Mountains). **(gce)**

sp. C (allied to **M. tripetala** (L.f.) Ker Gawl. from CCR) Cormous geophyte, 200–300 mm tall. Leaf 1, linear, channelled. Flowers enclosed in green spathes, blue-violet with yellow nectar guides, inner tepals short, 3-lobed at apex, filaments united for ± 4 mm, style crests prominent. Aug.–Sept. Moist seeps, ± 950 m, KB (Kamiesberg Mountains). **(ece)**

D.' Inner tepals lanceolate or oblanceolate to sword-shaped, flowers lasting 1 day

bolusii Baker Cormous geophyte, 120–800 mm tall. Leaf 1, linear, shallowly channelled, spreading over the ground, margins undulate, often crisped. Flowers enclosed in green spathes often dry above, yellow, tepals limbs lightly reflexed, the inner slightly smaller, style branches broad, crests prominent. Aug.–Sept. Rocky, dry slopes, G, NH (northern Namaqualand). **(ece)**

crispa Thunb. (= *Homeria rogersii* L.Bolus) Cormous geophyte, 80–200 mm tall. Leaf usually single, linear, channelled, often lightly twisted, margins rarely crisped. Flowers enclosed in green spathes, blue-mauve with yellow to orange markings, tepals subequal, claws short, clasping, limbs spreading, style branches reduced, crests vestigial. Oct.–Nov. Mainly clay slopes in renosterveld, WM, TS, CCR (Hantamsberg to Laingsburg and CCR and Karoo).

filicaulis Baker Like **M. fugax** but plants smaller, stem slender, leaves usually ± filiform, flowers small, blue, violet, or white, opening early afternoon. Mostly Aug.–Sept. Rocky granitic soils, NH, KB, KV, CCR (northern Namaqualand to Saldanha). **(gce)**

fugax (D.Delaroche) Jacq. HOTTENTOT-UINTJIE Cormous geophyte, 120–800 mm tall, branches often crowded. Leaves 1 or 2, inserted well above ground, linear, channelled, trailing above. Flowers enclosed partly by dry spathes, blue, white or yellow, fragrant, tepal limbs lightly reflexed, the inner smaller, style branches broad, crests prominent, ovary and capsules beaked. Aug.–Nov. Deep sands and rocky sandstone and granitic soils, G, NS, NH, KB, KV, WM, CCR (northern Namaqualand to Swellendam). **(gce)**

gawleri Spreng. Cormous geophyte, 150–450 mm tall, several-branched. Leaves 1 or 2 (or 3 elsewhere), margins often crisped. Flowers enclosed in green, obtuse spathes, yellow, cream or red, occasionally bicoloured, tepal limbs lightly reflexed, filaments united in lower half, pollen red, style branches diverging, crests erect. July–Oct. Sandy or clay slopes, NH, ?KV, CCR (Spektakelberg to Humansdorp). **(gce)**

macgregorii Goldblatt Cormous geophyte, up to 250 mm tall, stem few-branched. Leaf solitary, linear, channelled, inserted shortly above ground. Flowers pale blue-lilac, outer tepals with bright orange marks near limb bases, tepals unequal, with long, narrow ascending claws, inner much smaller, limbs slightly reflexed, filaments in a long, slender column, style crests well developed, opening late afternoon, lasting until late evening. Mainly Oct. Gravelly, clay slopes, KV (foot of Bokkeveld Mountains). **(ece)**

namibensis Goldblatt Cormous geophyte, 120–350 mm tall. Leaf 1, linear, inserted shortly above the ground, channelled, margins inrolled, suberect or trailing above. Flowers enclosed by firm,

partly dry spathes, white to pale blue, tepal limbs lightly reflexed, the inner slightly smaller, style branches broad, crests prominent. Sept. Sandy flats and dunes, G, NS (southern Namibia to Port Nolloth). **(ece)**

pseudospicata Goldblatt Cormous geophyte, 250–500 mm tall, often branched, lateral flower clusters sessile. Leaf 1, terete, often dry at flowering. Flowers enclosed in dry spathes, blue-mauve, tepals subequal, claws short, forming a shallow cup, limbs spreading, style branches reduced, hidden by the anthers. Dec.–Mar. Clay and gravel slopes, WM, CCR (Bokkeveld Escarpment and Plateau and Hantamsberg). **(gce)**

rigidifolia Goldblatt Cormous geophyte, 250–500 mm tall, often branched, lateral flower clusters sessile. Leaf 1, terete, rigid. Flowers enclosed in dry spathes, blue-mauve, tepals subequal, claws short, forming a shallow cup, limbs spreading, style branches reduced, hidden by the anthers. Aug.–Sept. Stony flats in sand, G (southwestern Namibia: Zebrafontein). **(ece)**

saxicola Goldblatt Cormous geophyte, 120–800 mm tall. Leaf 1, linear, channelled, often trailing, margins often undulate, occasionally crisped (juvenile leaves terete and coiled distally). Flowers enclosed in partly dry spathes, white to pale blue-mauve, tepal limbs lightly reflexed, the inner slightly smaller, style branches broad, crests prominent. Mostly Sept. Rocky slopes, G, NH, KB, KV (northern Namaqualand to Knersvlakte). **(ece)**

ROMULEA FROETANG, KNIKKERTJIE, ROMULEA ± 97 spp., southern Africa to S Europe and Near East, mainly western Karoo and W Cape

A. Corms with a crescent-shaped basal ridge or laterally compressed and fan-shaped
*B. Flowers white to pale blue with a yellow or white cup (see also **R. multisulcata**)*

flexuosa Klatt Cormous geophyte, up to 250 mm tall, corm with a crescent-shaped basal ridge. Leaves 3–5, only 2 basal, ± terete. Flowers white, streaked with pale blue-lilac, anthers with white, attenuate connectives extending up to 6 mm beyond thecae; outer bracts with narrow and inner with wide membranous margins. May–July. Granite rocks, NH, CCR (mountains W of Bitterfontein to Hottentots Holland Mountains). **(gce)**

maculata J.C.Manning & Goldblatt Cormous geophyte, 150–300 mm tall, corms with a crescent-shaped basal ridge of fine parallel fibrils, tunics drawn upward into prominent fibres; sheathing cataphylls purple, lightly speckled with white above ground. Basal leaves 4. Flowers white with a yellow cup; bracts green with broad hyaline margins speckled with brown. Aug. Granite outcrops, NH (Springbok and Nuwerus). **(ece)**

minutiflora Klatt Cormous geophyte, 30–60 mm tall, corm with a spathulate basal projection. Basal leaves several. Flowers tiny, up to 15 mm long, pale blue-mauve with yellowish cup, anthers ± 2 mm long, exserted from cup, inner bracts conspicuously spotted with brown. July–Sept. Granitic sands, KB, CCR (widespread, Kamiesberg and Bokkeveld Mountains to Grahamstown).

rupestris J.C.Manning & Goldblatt Cormous geophyte, 150–300 mm tall, corm unknown, stem branching well above the ground. Leaves 3, only 1 basal, oval in section and narrowly 4-grooved. Flowers white with a yellow cup, streaked with dark green outside; outer bract green with narrow hyaline margins, inner bract with narrow green centre and broad hyaline margins, sparsely streaked with brown. June–July. Rocky mountain slopes, G, KB (Richtersveld and Kamiesberg Mountains). **(ece)**

tabularis Eckl. ex Bég. Cormous geophyte, up to 100 mm tall, corm with a crescent-shaped basal ridge, stem branching above the ground. Basal leaves 1 or 2, narrowly 4-grooved. Flowers white (or mostly pale blue elsewhere), with a yellow cup, sometimes fragrant; outer bract green, inner bract hyaline with a narrow green or red keel. July–Oct. Moist sandy or limestone flats, NS, CCR (northern Namaqualand to Agulhas). **(gce)**

B.' Flowers purple, mauve or pink to coppery salmon with a white to yellow cup

kamisensis M.P.de Vos Cormous geophyte, rarely exceeding 80 mm tall, corm with a crescent-shaped basal ridge, stem usually branching below the ground. Leaves several, filiform, narrowly 4-grooved. Flowers dark purple to magenta with darker veins, perianth tube long, cylindrical,

streaked pale inside; bracts green, inner with broad, whitish, papery margins. July–Aug. Granite outcrops, NH, KB (Kamiesberg Mountains and surrounding hills). **(ece)**

namaquensis M.P.de Vos Cormous geophyte, up to 200 mm tall, corm with a crescent-shaped basal ridge, stem usually branching shortly above the ground. Basal leaves 2 or 3, filiform, narrowly 4-grooved. Flowers pink to coppery salmon; bracts green, inner with broad, hyaline margins. July–Sept. Sandy slopes and flats, NH, KB (Steinkopf to Kamiesberg Mountains). **(ece)**

speciosa (Ker Gawl.) Baker (= *R. neglecta* (Schult.) M.P.de Vos, *R. oliveri* M.P.de Vos) Cormous geophyte, 150–300 mm tall, corm with a crescent-shaped basal ridge, stem branching below the ground. Leaves 2 or more, filiform, narrowly 4-grooved, recurved. Flowers magenta with yellow cup striped with purple; bracts green, outer with narrow and inner with broad brown-streaked hyaline margins. Aug.–Sept. Granitic slopes, KB (Kamiesberg Mountains). **(ece)**

tetragona M.P.de Vos Cormous geophyte, stem 50–100 mm tall, corm with an oblique basal ridge. Leaves several, hairy, 4-winged (H-shaped in cross section). Flowers on hairy peduncles, rose to lilac or pink with dark bands at edge of yellow cup; fruiting peduncles curved, later straight; bracts green, outer hairy below with hyaline margins and tip, inner with wide hyaline margins. Aug.–Sept. Clay soils, WM, TS, CCR (Bokkeveld Plateau to Matjiesfontein and Cold Bokkeveld). **(gce)**

B." Flowers predominantly yellow

austinii E.Phillips Cormous geophyte, 60–100 mm tall, corm with a wide, fan-like oblique basal ridge. Basal leaves several, channelled to apex. Flowers yellow, usually with brown markings, honey-scented; outer bract with narrow hyaline margins, inner bract with wide, brown-flecked hyaline margins; fruiting peduncles curved. May–July. Moist stony flats, WM, TS, CCR (Roggeveld Escarpment to Montagu and Uniondale). **(gce)**

citrina Baker Cormous geophyte, mostly 80–120 mm tall, corm with a crescent-shaped basal ridge, stem usually branching just above ground. Leaves 3 or 4, filiform, compressed-cylindrical, curving outward. Flowers yellow to pale orange; bracts green with narrow hyaline margins, inner bract margins broader and streaked with brown. Aug.–Sept. Granitic slopes and flats, often in seasonal pools, NH, KB (Grootvlei to Kamiesberg Mountains). **(ece)**

flava (Lam.) M.P.de Vos Cormous geophyte, mostly 50–150 mm tall, stem underground or reaching 150 mm above ground; corm with a crescent-shaped basal ridge. Leaves 3 or 4, often wider and clasping below. Flowers white or yellow (occasionally blue or pink with yellow cup), outer tepals uniformly green outside, sometimes scented; outer bract green with narrow hyaline margins, inner bract ± membranous, often brown-streaked. June–Sept. Sandy and clay flats and slopes, G, NH, CCR (Richtersveld to Humansdorp). **(gce)**

lutea J.C.Manning & Goldblatt Cormous geophyte, up to 100 mm tall, corm subglobose with a crescent-shaped basal ridge. Leaves 3, only the lowermost basal, narrowly 4-grooved. Flowers golden-yellow, green on reverse, deeply cup-shaped; bracts green or flushed purple, outer with narrow and inner with broad translucent margins. Aug. Wet depressions in coastal sandveld, NS (southern Namaqualand coast). **(ece)**

multisulcata M.P.de Vos Cormous geophyte, stem 60–250 mm tall, corm with an oblique basal ridge. Leaves 3 or 4, lowermost 2 basal, narrowly 6–8-grooved, 1–2 mm diam. Flowers yellow or white with yellow cup and lower part of tepals, tepals obovate; bracts green, outer with narrow hyaline margins, inner with wide hyaline margins; fruiting peduncles widely spreading. Aug.–Sept. Seasonal pools, KV, CCR (Bokkeveld Mountains and Gifberg flats). **(gce)**

pearsonii M.P.de Vos Cormous geophyte, mostly up to 100 mm tall, corm with a crescent-shaped basal ridge, stem branching below the ground. Leaves several, filiform, narrowly 4-grooved. Flowers pale yellow often fading cream; bracts green with narrow, brown-streaked hyaline margins. Aug.–Sept. Granitic slopes and flats, NH, KB (Grootvlei to Kamiesberg Mountains). **(ece)**

quartzicola J.C.Manning & Goldblatt Cormous geophyte, 50–80 mm tall, corm with a crescent-shaped basal ridge. Leaves 1(2), basal, cylindrical-subclavate, narrowly 4-grooved. Flowers bright chrome-yellow or rarely peach-coloured; bracts green, with narrow translucent or sometimes purplish tinted membranous margins. June–July. Below crest of quartzite outcrops on S- and SW-facing slopes, KV (southwestern Knersvlakte). **(ece)**

setifolia N.E.Br. Cormous geophyte, 50–250 mm tall, stem occasionally elongated, corm with an oblique basal ridge of fibril clusters. Leaves 3–6, mostly basal, narrowly 4-grooved. Flowers yellow to apricot, sometimes with dark marks at rim of cup; bracts green, outer with narrow hyaline margins, inner with broader hyaline margins occasionally brown-edged; fruiting peduncles suberect. July–Sept. Sandy flats, WM, CCR (Bokkeveld Plateau to CCR). **(gce)**

tortuosa (Licht. ex Roem. & Schult.) Baker Cormous geophyte, mostly up to 50 mm tall, corm laterally compressed and fan-shaped, stem branched below the ground. Leaves several, twisted to coiled, narrowly 4-grooved. Flowers yellow, usually with brown markings, lightly scented; bracts submembranous, greenish at tips. June–Sept. Sandstone and clay soils, KB, WM, CCR (Kamiesberg Mountains and Bokkeveld Plateau, Roggeveld to Worcester). **(gce)**

tubulosa J.C.Manning & Goldblatt Cormous geophyte, 300–400 mm tall, corm subglobose with a crescent-shaped basal ridge. Leaves 3–5, arched or sinuous, narrowly 4-grooved. Flowers salver-shaped, pale yellow, tepals with a dark median streak in lower half, tube ± cylindric, 13–14 mm long; bracts short, green with broad, translucent, brown-flecked margins and tips, outer obtuse, inner notched apically. Oct. Renosterveld on gravel flats and slopes, KB (Kamiesberg Mountains: Leliefontein). **(ece)**

A.' Corms rounded or pointed at base or symmetrical and bell-shaped
C. Flowers salver-shaped with a long, cylindrical tube

albiflora J.C.Manning & Goldblatt Cormous geophyte, 120–200 mm tall, often in clumps, corm rounded at base, with curved acuminate teeth. Leaves ± 5, basal, filiform, narrowly 4-grooved, softly hairy. Flowers white, tube elongate and cylindrical, 20–33 mm long, tepals spreading; bract green, outer with narrow and inner with broad hyaline margins. Sept.–Oct. Damp clay flats, WM (Roggeveld: near Middelpos). **(ece)**

hantamensis (Diels) Goldblatt Cormous geophyte, 70–150 mm tall, corm pointed at base, with straight acuminate teeth. Leaves several, narrowly 4-grooved. Flowers salver-shaped, magenta with purple veins, perianth tube elongate, cylindrical, 35–70 mm long; bracts green, outer with narrow and inner with wider hyaline margins; fruiting peduncles suberect. Flowering Aug.–Sept. Damp dolerite flats, WM (Hantamsberg Summit Plateau). **(ece)**

syringodeoflora M.P.de Vos Cormous geophyte, 80–120 mm tall, corm round at base, with curved acuminate teeth. Leaves several, curved, sparsely hairy, narrowly 4-grooved. Flowers pink to purple, tepals darker at base, tube cylindrical, 15–20 mm long; bracts green, outer with narrow and inner with broad white hyaline margins. Sept.–Oct. Damp shale flats and slopes, WM (southern Roggeveld Escarpment). **(ece)**

C.' Flowers funnel-shaped
D. Flowers yellow or white with a yellow cup

collina J.C.Manning & Goldblatt Cormous geophyte, 50–10 mm tall, growing in tufts, corm rounded at base, with curved acuminate teeth. Leaves several, narrowly 4-grooved. Flowers pale yellow with brown markings at edge of deep yellow cup, tepals subequal; bracts membranous with green veins and broad translucent, brown flecked margins; fruiting peduncles curved, later erect. Late June–July. Moist dolerite clay, WM (Hantamsberg summit Plateau). **(ece)**

diversiformis M.P.de Vos Cormous geophyte, 80–200 mm tall, corm rounded at base, with curved acuminate teeth. Leaves several, narrowly 4-grooved. Flowers yellow, tepals dimorphic, the outer broader; outer bract with membranous margins and tip and inner bract with wide membranous margins; fruiting peduncles curved. Aug.–Sept. Moist or waterlogged dolerite and clay, WM (Hantamsberg Summit Plateau and Roggeveld Escarpment). **(ece)**

eburnea J.C.Manning & Goldblatt Cormous geophyte, 100–150 mm tall, corm rounded at base, with curved acuminate teeth. Leaves 2–4, narrowly 4-grooved. Flowers enclosed by reddish bracts with broad, brown-flecked membranous margins and tip, deep yellow with distal third of tepal limbs apricot-yellow, tepals subequal; fruiting peduncles coiled. Late Aug to early Sept. Alluvial washes along streams, WM (Klein Roggeveld). **(ece)**

hirta Schltr. Cormous geophyte, 50–150 mm tall, corms rounded at base with curved acuminate teeth. Leaves several, 4-winged (H-shaped in cross section), wing edges hairy. Flowers pale yellow, sometimes with brownish markings; bracts green, outer with narrow, usually brown-spotted, hyaline margins, inner with dry brownish margins; fruiting peduncles recurved or suberect. July–Sept. Damp dolerite or sandy soils, WM, CCR (Bokkeveld Plateau and Roggeveld to Cederberg Mountains). **(gce)**

luteoflora (M.P.de Vos) M.P.de Vos Like **R. atrandra** but flowers yellow with brown streaks or blotches around the cup. July–Sept. Loamy soils, KB, WM, CCR (Kamiesberg Mountains and Roggeveld Escarpment to SW Cape and Lesotho).

membranacea M.P.de Vos Cormous geophyte, 70–120 mm tall, corm pointed at base, with straight acuminate teeth. Leaves several, narrowly 4-grooved. Flowers deep yellow with darkly lined cup;

bracts mostly membranous, inner bracts spotted with brown; fruiting peduncles strongly recurved. July–Aug. Sandy flats, WM, CCR (Bokkeveld Plateau and Escarpment, Gifberg). **(gce)**

D.' Flowers blue, pink, orange or red with a white or yellow cup

atrandra G.J.Lewis Cormous geophyte, 80–150 mm tall, corms rounded at base with curved acuminate teeth. Leaves several, occasionally minutely hairy. Flowers magenta to pale pink or white with dark veins and dark blotches at edge of yellow, streaked cup; outer bract with brown dry margins and tip, inner bracts with wide dry margins; fruiting peduncles recurved and later coiled. July–Oct. Clay soils, WM, TS, CCR (Roggeveld and Gifberg to E Cape).

hallii M.P.de Vos Cormous geophyte, 80–130 mm tall, corm rounded at base, with curved acuminate teeth. Leaves 3–5, somewhat swollen, narrowly 4-grooved. Flowers pale wisteria blue with violet and black blotches around yellow cup; outer bract with a triangular green lower half and wide, brown-speckled, hyaline margins and tips, inner bract with wide hyaline margins; fruiting peduncles strongly recurved or later flexuose. May–July. Clay flats, WM (Roggeveld: Sutherland). **(ece)**

komsbergensis M.P.de Vos Cormous geophyte, mostly 80–120 mm tall, corm round at base with curved acuminate teeth. Leaves several, narrowly 4-grooved. Flowers magenta with a narrow blue band around the yellow cup, brown at base, pollen brown; outer bract submembranous below with wide hyaline margins and tips, inner bract with wide hyaline margins; fruiting peduncles recurved, later coiled. Aug.–Sept. Damp clay flats, WM (Roggeveld Escarpment). **(ece)**

monadelpha (Sweet) Baker Cormous geophyte, mostly 50–100 mm tall, corm round at base, with curved acuminate teeth. Leaves 3–5, with 4 grooves, narrowly 4-grooved. Flowers dark red with black blotches at the edge of a creamy cup, filaments joined in a column; outer bracts keeled with narrow, dry, usually brown margins, inner bract 2-keeled, with dry brown margins; fruiting peduncles curved. Aug.–Sept. Damp clay flats and dolerite outcrops, WM (Bokkeveld Escarpment to Roggeveld). **(ece)**

multifida M.P.de Vos Cormous geophyte, 100–200 mm tall, corm round at base, with curved acuminate teeth. Leaves 2 or 3, narrowly 4-grooved. Flowers magenta with a narrow blue band and dark blotches around the yellow cup; outer bract submembranous with wide hyaline margins and tips, inner bract with wide hyaline margins; fruiting peduncles recurved and later coiled. Aug. Clay flats, WM (Roggeveld: Sutherland). **(ece)**

rosea (L.) Eckl. ROOIKNIKKERTJIE Cormous geophyte, 100–400 mm tall, corms round at base. Basal leaves several, narrowly 4-grooved. Flowers pink to purple, sometimes white, with yellow cup. Ripe capsules erect. July–Oct. Sandy and clay slopes and flats, WM, CCR (Bokkeveld Plateau and Roggeveld to Port Elizabeth). **(gce)**

subfistulosa M.P.de Vos Cormous geophyte, 80–120 mm tall, corm round at base, with curved acuminate teeth. Leaves several, curved, fleshy, broadly 4-grooved. Flowers pink with dark blotches at edges of yellow cup; outer bract keeled above with narrow hyaline margins, inner bract 2-keeled, with colourless or speckled dry margins; fruiting peduncles first recurved, later suberect. Aug.–Oct. Dolerite flats, WM (Hantam and Roggeveld Escarpment). **(ece)**

unifolia M.P.de Vos Cormous geophyte, 80–150 mm tall, corm round at base, with curved acuminate teeth. Leaf 1(2), slender, broadly 4-grooved. Flowers orange-red with black and yellow blotches at the edge of the cup; outer bract keeled with dry, narrow, white margins, inner bract 2-keeled with hyaline margins; fruiting peduncles straight. Aug.–Sept. Dolerite flats in heavy clay, WM (Hantam and Roggeveld Escarpment). **(ece)**

SPARAXIS CAPE BUTTERCUP, FLUWEELTJIE, SPARAXIS 15 spp., W Cape to western Karoo **(gce)**

galeata Ker Gawl. Cormous geophyte, 120–350 mm tall. Leaves lanceolate, obtuse, often prostrate, speckled on sheaths. Flowers zygomorphic, cream and yellow with purplish markings, dorsal tepals erect or reflexed, usually fragrant, stamens and style unilateral. July–Sept. Dry clay slopes in renosterveld, KV, WM, CCR (Knersvlakte: Mauwerskop, Bokkeveld Mountains and Plateau to Clanwilliam). **(gce)**

pillansii L.Bolus Cormous geophyte, up to 400 mm tall. Leaves sword-shaped. Flowers actinomorphic, stamens and style central, pink with yellow centre edged with dark pink, stamens and style central, symmetrically arranged. Sept.–Oct. Streams and pools in clay around dolerite boulders, WM (Bokkeveld Plateau). **(ece)**

SYRINGODEA CAPE CROCUS 8 spp., W Cape to Vaal River

longituba (Klatt) Kuntze Stemless, cormous geophyte, 40–60 mm tall, corm top-shaped. Leaves several, filiform, in a basal tuft, often twisted, smooth or lightly hairy. Flowers borne singly, blue to violet with a white or yellow centre. Apr.–June. Sandstone and shale soils, NH, WM, TS, CCR (Steinkopf to Springbok, Bokkeveld Escarpment to Mossel Bay). **(gce)**

TRITONIA BASTERKALKOENTJIE, TRITONIA 28 spp., Namaqualand and southern Cape to S tropical Africa

A. Perianth tube funnel-shaped

florentiae (Marloth) Goldblatt Cormous geophyte, 100–180 mm tall, stem mostly subterranean or concealed by the bracts. Leaves lightly falcate, in a tight fan. Flowers few in a crowded spike, bilabiate, bright yellow, perianth tube 15–24 mm, lower tepals each with a large tooth-like ridge. June–July. Dry stony clay flats, TS (Tanqua Karoo to Prince Albert and Beaufort West).

kamiesbergensis Klatt Cormous geophyte, 400–600 mm tall. Leaves wiry, terete or subterete. Flowers several, in a secund spike, bilabiate with a hooded dorsal tepal, pink to purple with dark veins, perianth tube 16–20 mm, funnel-shaped, exceeding the tepals. Aug.–Nov. Rocky slopes, KB (Kamiesberg Mountains). **(ece)**

karooica M.P.de Vos Cormous geophyte, up to 150 mm tall. Leaves lanceolate-falcate, in a dense fan. Flowers few, in a weakly 2-ranked spike, bilabiate, yellow flushed with orange, the tepals darkly veined, heavily scented, perianth tube 25–32 mm, exceeding the tepals, the lower 3 each with a thickened median ridge. Aug.–Sept. Dry stony flats, NH, WM (Namaqualand and Roggeveld to Great Karoo).

A.' Perianth tube largely cylindrical

delpierrei M.P.de Vos Cormous geophyte, 150–350 mm tall. Leaves linear-falcate. Flowers in a slender, subsecund spike, bilabiate, pale yellow, perianth tube slender, cylindrical, 10–20 mm long and not more than twice as long as the tepals, lower tepals each with a large, tooth-like yellow callus, lightly fragrant. Aug.–Sept. Sandy slopes and flats, G (southern Richtersveld). **(ece)**

marlothii M.P.de Vos Cormous geophyte, up to 350 mm tall. Leaves linear-falcate. Flowers in a slender, subsecund spike, bilabiate, cream, the lower tepals marked with purple and yellow, odourless, perianth tube slender, 30–40 mm long, 4–5 times as long as the tepals. Aug.–Sept. Stony slopes and flats, G (Richtersveld and Bushmanland Inselbergs).

pallida Ker Gawl. Cormous geophyte, 200–400 mm tall. Leaves sword-shaped. Flowers several in a subsecund spike, perianth tube 25–65 mm long, cream or pink to pale lilac, lower tepals each usually with a yellowish green tooth, bracts fairly short, acute. Sept.–Oct. Sandstone and clay slopes, ?TS, CCR (northern foothills of the Witteberg and Swartberg Mountains, Robertson to Oudtshoorn). **(gce)**

tugwelliae L.Bolus Cormous geophyte, up to 300 mm tall. Leaves falcate, with undulate to crisped margins. Flowers several in a horizontal, secund spike, bilabiate, white with red lines in the throat, perianth tube 20–30 mm long, much exceeding the tepals, lower tepals without tooth-like ridges. Sept. Stony and shale flats, TS (Laingsburg to Prince Albert and southern Great Karoo).

WATSONIA KANOLPYPIE, WATSONIA 51 spp., Namaqualand to N Province, mainly W Cape

meriana (L.) Mill. WASPYPIE Cormous geophyte, 0.6–1.5 m tall, sometimes with cormlets at the nodes. Leaves sword-shaped, with thickened margins. Flowers several, in a 2-ranked spike, red, pink or mauve, perianth tube elongate, broad and horizontal in the upper half. Capsules oblong in outline. Sept.–Nov. Sandy or granitic, often marshy soils and streambanks, NH, KB, CCR (Komaggas and central Namaqualand to Bredasdorp). **(gce)**

rourkei Goldblatt Cormous geophyte, 1.5–2 m tall. Leaves lanceolate, grey-glaucous, with thickened, hyaline margins. Flowers in a many-flowered, 2-ranked spike, pale mauve, perianth tube elongate, broad and horizontal in upper half. Capsules unknown. Oct.–Nov. High rocky slopes, KB (Kamiesberg Mountains: Rooiberg). **(ece)**

XENOSCAPA FAIRY PIPE 3 spp., southern Namibia to SW Cape, western Karoo to Baviaanskloof Mountains **(gce)**

fistulosa (Spreng. ex Klatt) Goldblatt & J.C.Manning Cormous geophyte, 30–200 mm tall, usually branched, corm tunics of fine fibres. Leaves ovate, prostrate, soft-textured. Flowers 1 per branch, small, white, sweetly scented, perianth tube cylindrical, (10–)15–25 mm long, dorsal tepal hooded over stamens, boat-shaped. Aug.–Oct. Damp clay or granite soils, G, NH, KB, KV, WM, TS, CCR (southern Namibia and western Karoo to Cape Peninsula and Little Karoo to Baviaanskloof Mountains). **(gce)**

uliginosa Goldblatt & J.C.Manning Cormous geophyte, 30–50 mm tall, corm tunics of fine fibres. Leaves ovate, prostrate, soft-textured. Flowers 1 per branch, small, light purple, unscented, perianth tube elongate-cylindrical, 23–28 mm long, tepals spreading, the lower 3 with dark red and white markings. Aug.–Oct. Damp mossy pockets on granite domes, KB (Kamiesberg Mountains). **(ece)**

JUNCACEAE

by D.A. Snijman

JUNCUS ± 250 spp., cosmopolitan

A. Annuals

***bufonius** L. TOADRUSH Soft annual, 150–300 mm tall. Leaves linear. Flowers in leafy, branched spikes, green. Oct.–Jan. Disturbed areas, G, NH, KB, KV, WM, CCR (cosmopolitan).

cephalotes Thunb. (= *J. parvulus* E.Mey. & Buchenau, *J. pictus* Steud., *J. polytrichus* E.Mey. & Buchenau) Tufted annual, 60–150 mm tall. Leaves linear. Flowers in solitary capitula, pale or red-brown, streaked with black or brown. Sept.–Jan. Damp flats, NH, KB, CCR (Springbok, Kamiesberg Mountains and Cold Bokkeveld to Swellendam). **(gce)**

rupestris Kunth Tufted annual, up to 180 mm tall, usually appearing brown. Leaves very short, reaching less than half way up the stem. Flowers in 2–6 heads, brown. Sept.–Nov. Damp, sandy places, KB, CCR (Kamiesberg Mountains and Nieuwoudtville to Cape Peninsula). **(gce)**

A.' Perennials

acutus L. Hard, tufted perennial, up to 2 m tall. Leaves as long as stems, cylindrical in cross section, pungent. Flowers in pseudolateral panicles, with subtending bract continuous with stem, chestnut brown. Sept.–Jan. Brackish marshes and beds of seasonal rivers, G, NS, KV, TS, CCR (pantemperate).

capensis Thunb. Tufted perennial, 60–600 mm tall. Leaves filiform to linear, grass-like. Flowers in cymes, pale with dark keels. Nov.–Apr. Damp flats and lower slopes, TS, CCR (Clanwilliam to E Cape).

exsertus Buchenau BIESIE Tufted perennial with soft stems, 0.2–0.8 m tall. Leaves cylindrical, septate. Flowers in round capitula in pseudolateral panicles, brown, capsule cylindrical and exserted from perianth. Nov. Streamsides or marshes, G, TS, CCR (lower Gariep Valley and Malmesbury to Great Karoo and S tropical Africa).

punctorius L.f. Hard, tufted, pale green perennial, up to 1.5 m tall. Leaf solitary per flowering stem, cylindrical, septate with thick, transverse bands. Flowers in round capitula in pseudolateral panicles, brown. Oct.–Feb. Freshwater marshes, G, KV, WM, CCR (central Namibia to Hantamsberg, Roggeveld Escarpment, Vanrhynsdorp, Cape Peninsula to N Province, also N Africa, Eurasia).

rigidus Desf. Hard, tufted perennial, up to 1.5 m tall. Leaves as long as stems, cylindrical in cross section, pungent. Flowers in a somewhat lateral cluster, subtending bract continuous with stem, usually straw-coloured. Dec. In vleis and riverbeds, SN, G, NH (widespread in Africa and the Mediterranean to Pakistan).

JUNCAGINACEAE

by D.A. Snijman

TRIGLOCHIN ± 25–35 spp., cosmopolitan

A. Base of stems with bulb-like corms, densely covered with fibres

bulbosa L. Tufted, bulbous perennial, 50–500 mm tall, with brown to dark brown fibrous tunics at base. Leaves green at flowering, narrowly cylindrical to filiform, ± as long as inflorescence. Flowers 4–50, in a dense or lax spike, green. Fruit narrowly ovoid, 4–10 mm long, without basal outgrowths. July–Nov. Loamy soils in temporary pools or dry places, sometimes on quartz fields, limestones or granite, KV, CCR (southwestern Knersvlakte and Bokkeveld Mountains to Stilbaai). **(gce)**

compacta Adamson Tufted, bulbous perennial, 10–500 mm tall, with ± soft, brown, fibrous tunics at base. Leaves emerging at flowering, narrowly strap-shaped, finally ± half as long as inflorescence. Flowers (6–)10–50, in a dense spike, green. Fruit narrowly ovoid, 6–10 mm long, often with 3 basal outgrowths. Feb.–May. In deep sands, NS, CCR (Komaggas and Bokkeveld Mountains to near Sedgefield). **(gce)**

A.' Base of stems with elongate, slender rhizomes, sparsely fibrous

elongata Buchenau Tufted rhizomatous perennial, 150–900 mm tall, base slender with few long beige fibres. Leaves as long or longer than inflorescence, narrowly strap-shaped. Flowers 10–100, in dense or lax spikes, green. Fruit narrowly ovoid to ovoid, 5–9 mm long. Coastal salt marshes and rocks and inland on riverbanks and on edges of pans, NS, CCR (Kleinsee and Hondeklipbaai to near Durban).

striata Ruiz & Pav. Like **T. elongata** but flowers in dense spiral whorls and fruit globose, 2 mm long. Mostly July–Dec. Marshes and seeps, SN, G, NS, CCR (lower Gariep Valley, Brand-se-Baai, Clanwilliam to E Cape, ± cosmopolitan).

ORCHIDACEAE

by H. Kurzweil

1. Lip with a single spur; sepals not spurred; anther usually erect:
   2. Leaves normally 2; flowers few to many, small ..... **Holothrix**
   2.' Leaf 1; flowers normally solitary, large; lip deeply lacerated. ..... **Bartholina**
1.' Lip either with 2 spurs or without spurs; sepals sometimes spurred; anther reflexed to a horizontal or pendent position:
   3. Lip galeate with two spurs; flowers nonresupinate (lip uppermost); petals and sepals similar **Satyrium**
   3.' Lip without spurs; flowers resupinate or not (lip uppermost or lowermost); median sepal sometimes spurred:
      4. Petals free from the median sepal; lip not adpressed to the gynostemium, strap-shaped or spathulate and without an appendage ..... **Disa**
      4.' Petals adnate to the median sepal to form a hood; lip erect at the base and adpressed to the gynostemium, mostly fused with it; lip appendage present:
         5. Lateral sepals spurred or saccate ..... **Disperis**
         5.' Lateral sepals not spurred or saccate:
            6. Median sepal and petals forming a deeply globose or semi-globose hood; lip appendage a shield on top of the gynostemium, with lateral processes ..... **Pterygodium: *Corycium*-group**
            6.' Median sepal and petals forming a shallow hood; lip appendage elongate, solid or funnel-shaped ..... **Pterygodium: *Pterygodium*-group**

BARTHOLINA SPIDER ORCHID 2 spp., southern Namibia to E Cape

etheliae Bolus Slender, tuberous geophyte, up to 300 mm tall, scape hairy. Leaf single, basal, ovate, prostrate, hairy. Flower usually solitary, white and lilac-blue, lip much divided with its segments

clavate at tips, lip spur 8–14 mm long. (July–)Oct.–Dec. Sandy slopes and flats, G, WM, TS, CCR (southern Namibia: Namusberg Mountains, Richtersveld and Steinkopf to Sutherland and Laingsburg, widespread in W and E Cape).

DISA (= *HERSCHELIA, MONADENIA*) ± 167 spp., sub-Saharan Africa, Madagascar and Reunion

karooica S.D.Johnson & H.P.Linder Slender or robust, tuberous geophyte, up to 0.6 m tall. Leaves dry at flowering, basal, strap-shaped to linear. Flowers few to many in a lax raceme, cream with purple markings, spur 35–55 mm long, sepals 15–25 mm long, petals strap-shaped, included in the median sepal galea. Oct.–Nov. On granite and shaley soils, NH, KB, WM (Kamiesberg Mountains and Roggeveld around Middelpos and Sutherland). **(ece)**

macrostachya (Lindl.) Bolus Tuberous geophyte, up to 300 mm tall. Leaves 4–8, strap-shaped, clustered at the stem base. Flowers several in lax raceme, sepals red on the outside, petals and lip yellow; sepals 7–8 mm, spur 6–8 mm long. Sept. Localised in damp soil near perennial stream, KB (Kamiesberg Mountains). **(ece)**

salteri G.J.Lewis Slender, grass-like, tuberous geophyte, up to 600 mm tall. Leaves dry at flowering, basal, linear. Flowers 4–20, in a slender raceme, dull brownish, spur 20–30 mm long, slender, usually ascending, lateral sepals lanceolate, 2–4 mm long. Apr.–June, usually after fire. On granite, sandstone or shale, KB, CCR (Kamiesberg and Cederberg Mountains to Cape Peninsula to George). **(gce)**

spathulata (L.f.) Sw. (= *Herschelia spathulata* (L.f.) Rolfe) OUPA-MET-SY-PYP Slender, tuberous geophyte, up to 300 mm tall. Leaves green at flowering, narrow. Flowers few in a lax raceme, maroon to pale lime or green and blue, spur clavate, 1.5–3 mm long, lateral sepals ovate, 6–16 mm long, lip spathulate with slender claw, limb sagittate to trifid. Sept.–Oct. Sandstone and shale, NH, CCR (Springbok, Nieuwoudtville to Caledon, Uniondale). **(gce)**

DISPERIS WITCH ORCHID 74 spp., mostly S and tropical Africa and Madagascar, ranging into tropical Asia

purpurata Rchb.f. Tuberous geophyte, with shortly hairy stem, up to 200 mm tall. Leaves 2 or 3, cauline, ovate. Flower 1, magenta to white. Aug.–Oct. Clay and granite slopes, G, NH, WM, TS, CCR (Richtersveld, Steinkopf, Springbok, Loeriesfontein, Calvinia-Nieuwoudtville Plateau, Roggeveld, Witteberg Mountains, Laingsburg, Uniondale, Humansdorp). **(gce)**

HOLOTHRIX WOLLIE, TRYPHIA ± 55 spp., Africa, Arabia and Madagascar

A. Scape with bracts

schlechteriana Schltr. ex Kraenzl. Slender, tuberous geophyte, up to 270 mm tall, scape thinly hairy. Leaves 2, basal, ovate, glabrous. Flowers many in a dense raceme, sepals green, petals and lip green or yellow, petals with 4–9 filiform lobes, lip spurred and divided into 5–11 filiform lobes. Oct.–Feb. Among rocks and shrubs, NH, TS, CCR (Springbok, Laingsburg, widespread but scattered in the CCR). **(gce)**

A.' Scape without bracts
B. Petals lobed

filicornis Immelman & Schelpe Slender, tuberous geophyte, up to 260 mm tall, scape glabrous. Leaves 2, basal, ovate, glabrous. Flowers many in a dense raceme, sepals green, petals and lip greenish white, petals trilobed, lip with 5 lobes and spur up to 11 mm long. May–July. In rock crevices and on rocky slopes, SN, G, NS, NH (Rooiberg and Sonberg in southern Namibia to Springbok and Hondeklipbaai). **(ece)**

B.' Petals entire

aspera (Lindl.) Rchb.f. Slender, tuberous geophyte, up to 250 mm tall, scape thinly hairy. Leaves 2, basal, ovate, glabrous. Flowers many in a dense raceme, sepals green, petals and lip white with

maroon or purple stripes, petals entire, lip spurred and with 7 unequal, rounded lobes. June–Oct. Sandy slopes or rock crevices, NH, WM, TS, CCR (Springbok and Roggeveld to Swellendam). **(gce)**

cernua (Burm.f.) Schelpe Slender, tuberous geophyte, up to 240 mm tall, scape stiffly deflexed-hairy. Leaves 2, basal, ovate, stiffly hairy or scaly. Flowers many in a dense raceme, green, petals entire, lip spurred and with 3–5(–7) narrow lobes. July–Jan., mostly after fire. Sandstone slopes and flats, NH, CCR (Spektakelberg near Springbok, widespread in CCR). **(gce)**

secunda (Thunb.) Rchb.f. Slender, tuberous geophyte, up to 300 mm tall, scape thinly hairy. Leaves 2, basal, ovate, fleshy, glabrous. Flowers many in a lax raceme, sepals green, petals and lip cream, petals entire and fleshy, lip spurred with 5 linear lobes. June–Oct. Dry rocky slopes and rock ledges, G, NH, KB, KV, WM, TS, CCR (widespread in the western part of N Cape, from Richtersveld to western part of Great Karoo, Ceres, Breede River Valley and Little Karoo). **(gce)**

villosa Lindl. WOLLIE Slender, tuberous geophyte, up to 360 mm tall, scape silky hairy. Leaves 2, basal, ovate, hairy. Flowers many in a dense raceme, green, petals entire, lip spurred, with 3 lobes. Oct.–Dec. Sandstone and granite slopes and rock-crevices, G, NH, KB, WM, TS, CCR (Richtersveld, Springbok, Bokkeveld and Roggeveld to W and E Cape). **(gce)**

PTERYGODIUM (= *ANOCHILUS, CORYCIUM*) BONNET ORCHID, MOEDERKAPPIE, MONKSHOOD ORCHID 32 spp., mostly southern Africa, extending into tropical Africa

Corycium group

crispum (Thunb.) Schlecht. (= *Corycium crispum* (Thunb.) Sw.) Robust, tuberous geophyte, up to 400 mm tall. Leaves many, lanceolate, margins crisped. Flowers many in a fairly dense raceme, ± 20 × 5 mm, yellow with a green lip appendage, lateral sepals fused for ¾ of their length, lip with 2 broad apical lobes, appendage with 2 deflexed lobes. Sept.–Oct. Sandy flats, G, NH, KB, KV, WM, CCR (Steinkopf, Kamiesberg Mountains, Knersvlakte and Roggeveld to Albertinia). **(gce)**

deflexum Bolus (= *Corycium deflexum* (Bolus) Rolfe) Robust, tuberous geophyte, up to 250 mm tall. Leaves many, lanceolate, sometimes withered at flowering. Flowers 6–many in a lax to dense raceme, ± 12 × 6 mm, yellow with green lip appendage, lateral sepals fused to about halfway, lip broadened and 2-lobed apically, appendage shield-like, with 2 strongly deflexed lobes. Mainly Oct. Dry scrub, WM, TS, CCR (Kubiskouberg, Hantamsberg, Roggeveld and E Cederberg Mountains). **(gce)**

Pterygodium group

A. Lip uppermost (flowers hyperresupinate)

hallii (Schelpe) Kurzweil & H.P.Linder (= *Anochilus hallii* Schelpe) Robust, tuberous geophyte, up to 0.5 m tall. Leaves cauline, imbricate, lanceolate. Flowers many in a dense raceme, green, sepals 7–13 mm, lip appendage undivided. Sept.–Oct. Short dry scrub, G, NH, KB, WM, CCR (Steinkopf, Kamiesberg Mountains, Bokkeveld Escarpment, Roggeveld and Komsberg to Langebaan and Malmesbury). **(gce)**

A.' Lip lowermost (flowers resupinate)

pentherianum Schltr. Slender, tuberous geophyte, up to 200 mm tall. Leaves cauline, ovate-lanceolate. Flowers few in a lax raceme, 25 × 15 mm, pale green, lip with 2 broad lobes, appendage erect and rather stout. Aug.–Sept. Clay flats in renosterbos, WM, TS, CCR (Matsikammaberg and Klein Roggeveld to Clanwilliam, eastern Cederberg Mountains and Cold Bokkeveld). **(gce)**

schelpei H.P.Linder Slender, tuberous geophyte, up to 300 mm tall. Leaves 2 or 3, cauline, ovate-oblong. Flowers few in a lax to dense raceme with deflexed bracts, white, rarely pale yellow, sepals ± 5–7 mm long, lip 3-lobed. Sept.–Oct. Damp clay flats and slopes, G, WM, CCR (Richtersveld, Nieuwoudtville and Klein Roggeveld Escarpment to Worcester and Stellenbosch). **(gce)**

SATYRIUM (= *SATYRIDIUM*) TREWWA ± 88 spp., Africa, Madagascar, extending to Asia

A. Spurs saccate

pumilum Thunb. AASBLOM Tuberous, mostly acaulescent geophyte, up to 50 mm tall. Leaves 3–5, lanceolate. Flowers mostly 2–4, relatively large, dull green outside, lip inside dull greenish yellow marked with transverse bars of dark maroon, sepals and petals fused for most of their length, 8–11 mm long, spurs saccate. Sept.–Dec. Damp flats and rock ledges, clay or sand, KB, WM, CCR (Kamiesberg Mountains, Bokkeveld Plateau to Riversdale). **(gce)**

A.' Spurs slender
B. Spurs shorter than ovary

erectum Sw. EWWA TREWWA Stout, tuberous geophyte, up to 0.56 m tall. Leaves 2, adpressed to the ground, ovate-elliptic, bracts deflexed. Flowers many in a dense raceme, pale to deep pink with darker tinges and spots on petals, lip spurs 4–12 mm long. July–Oct. Dry sandstone and clay flats, NH, KB, WM, CCR (Springbok, Kamiesberg Mountains, Nieuwoudtville, widespread in drier parts of CCR to Baviaanskloof Mountains, E Cape). **(gce)**

ligulatum Lindl. Slender or stout, tuberous geophyte, up to 0.55 m tall. Leaves 1–4, cauline but clustered near stem base, ovate to narrowly ovate, bracts deflexed. Flowers many in a slender raceme, yellowish green to dull creamy white, often with pink or purplish tinge, tepals attenuate and soon drying at the tips, sepals 5–10 mm long, spurs 5–10 mm long. Sept.–Dec. Scrub, forest and grassland, KB, WM, CCR (Kamiesberg Mountains, Nieuwoudtville, widespread from W and E Cape to Free State and KwaZulu-Natal Drakensberg Mountains).

B.' Spurs longer than ovary

bicorne (L.) Thunb. EWWA TREWWA Stout, tuberous geophyte, up to 0.6 m tall, stem with conspicuous tubular sheaths. Leaves usually 2, adpressed to the ground, ovate to rotund, bracts deflexed. Flowers many in a dense to lax raceme, pale greenish yellow, sepals 6–9 mm long, spurs 10–22 mm long. Sept.–Oct., especially after fire. Scrub, KB, CCR (Kamiesberg Mountains, widespread in W Cape to Knysna). **(gce)**

pulchrum S.D.Johnson & Kurzweil Tuberous geophyte, up to 400 mm tall. Leaves 2, basal, adpressed to the ground. Flowers deep pink, lip spurs 18–22 mm long. Aug.–Sept. KV (Knersvlakte). **(ece)**

POACEAE

by L. Fish, with **Key** by J.C. Manning, and **Ehrharta** by G.A. Verboom

1. Spikelets 2-flowered, lower floret male or sterile (exceptionally bisexual) and upper floret bisexual; lower lemma not dorsally awned; spikelets often falling entire at maturity, but if breaking up, usually the lower floret and glumes persistent (reduction or suppression of the lower floret, or rarely the upper, sometimes results in the spikelets being apparently 1-flowered, such spikelets may usually be distinguished from truly 1-flowered spikelets by being dorsally compressed or not laterally compressed and by falling entire at maturity):
   2. Glumes usually membranous, rarely one or both indurated, often unequal (the lower usually shorter); lower lemma like the glumes in texture, upper lemma usually firmer, harder and more rigid; spikelets solitary, in pairs, threes or clusters, and more-or-less alike in form:
      3. Spikelets surrounded by bristles that fall with them at maturity; inflorescence a spike-like panicle:
         4. Bristles flattened below, often spiny, some or all joined together below. . . . . **Cenchrus**
         4.' Bristles neither flattened nor spiny, free. . . . . **Pennisetum**
      3.' Spikelets not subtended by bristles or if so, these persistent, the spikelets falling without them at maturity:
         5. Upper glume and lower lemma lobed or notched at the apex, shortly awned from between the lobes; lower glume almost equally wide throughout; spikelets densely or loosely hairy . . . . . **Tricholaena**

5.' Upper glume and lower lemma entire at the apex, awnless or with a terminal awn; lower glume, if developed, wider at the base and more-or-less surrounding the spikelet there or, if not, then inflorescence not an open or contracted panicle:
6. Spikelets, or some of them, subtended by 1–many bristles; inflorescence frequently spike-like, dense and cylindrical ..... **Setaria**
6.' Spikelets not subtended by bristles, the pedicels or rhachis sometimes hairy but the inflorescence not spike-like, dense and cylindrical:
7. Inflorescence of 2 racemes at the apex of the culm ..... **Paspalum**
7.' Inflorescence an open or contracted panicle, sometimes spike-like and cylindrical, the branches sometimes reduced to racemes, but then not dense and conspicuously 1-sided:
8. Lower glume equalling or ± longer than the rest of the spikelet; upper glume and lower lemma with transverse fringes or tufts of long white hairs in the middle ..... **Leucophrys**
8.' Lower glume absent, small or well developed, but shorter than the spikelet, except rarely in *Panicum*; upper glume and lower lemma glabrous or hairy, hairs not in fringes or tufts:
9. Upper lemma with flat, translucent margins that are thinner in texture than the surface, covering much or most of the palea. ..... **Digitaria**
9.' Upper lemma with narrowly inrolled margins of the same texture as the surface, exposing much of the palea ..... **Panicum**

2.' Glumes of the bisexual or all spikelets usually indurated and equal or almost equal, enclosing the florets; lower lemma like the upper in texture, both thinly membranous and usually transparent or the upper reduced to a stalk-like scale at the base of a stout awn; spikelets often in pairs with one of each pair sessile, the other pedicelled, those of each pair often dissimilar in sex, shape and form, rarely the pedicelled spikelet completely suppressed and represented by an empty pedicel:
10. Inflorescence a panicle, open, contracted or spike-like, racemes usually numerous, occasionally longer than the central axis, but not supported by spathes ..... **Sorghum**
10.' Inflorescence various, if paniculate, then with the racemes either longer than the central axis, or else supported by spathes individually, in pairs or in groups:
11. Racemes solitary at the end of the culm and each flowering branch, branches, if present, sometimes numerous, so that the inflorescence consists of many solitary racemes; spikelets awned or awnless. ..... **Hemarthria**
11.' Racemes paired, or 3–many arranged subdigitately or on a central axis shorter than the racemes, the inflorescence consisting of 1–many such units; sessile or all spikelets with a bent and twisted awn:
12. Raceme pairs or groups not supported by spathes, or the spathes inconspicuous and the racemes far exserted from them. ..... **Dichanthium**
12.' Raceme pairs or groups supported by and often partly enclosed in spathes:
13. Lower glume of the awned sessile spikelets with the sides rounded, or keeled only towards the apex; awn from the upper lemma hairy on the lower part; plants not aromatic. ..... **Hyparrhenia**
13.' Lower glume of the awned sessile spikelets sharply keeled near the margins throughout; awn from the upper lemma glabrous; plants usually aromatic. ..... **Cymbopogon**

1.' Spikelets 1–many-flowered, when more than 1-flowered, the lowest floret usually bisexual and more rarely male, sterile or greatly reduced, and then spikelet either more than 2-flowered or the lower lemma awned from low down on the back; spikelets often laterally compressed, breaking up at maturity (the floret/s deciduous, the glumes persistent):
14. Spikelets strictly 1-flowered, without reduced florets or rudiments above or below:
15. Inflorescence a spike or spike-like raceme, or of 2–many 1-sided spikes, or spike-like racemes variously arranged:
16. Spikelets arranged in 1 or 2 rows on one side of the rhachis of 1–many variously arranged spikes or spike-like racemes:
17. Fertile lemma 1-nerved; spikelets falling entire at maturity ..... **Spartina**
17.' Fertile lemma 3-nerved, occasionally with 2–4 additional short nerves (rarely nerveless); glumes often persistent at maturity; inflorescence of 2–many spikes arranged digitately or subdigitately ..... **Cynodon**
16.' Spikelets arranged on opposite sides or all round the rhachis of a solitary spike or spike-like raceme (rarely a panicle):
18. Lemma 1–3-nerved; spikelets pressed flat against the rhachis of the spike, awnless, sessile, glabrous ..... **Parapholis**
18.' Lemma 5-nerved, becoming rigid and firmer in texture than the glumes ..... **Hordeum**
15.' Inflorescence a panicle, open, contracted, or spike-like and sometimes dense:

19. Lemma hardened and rigid at maturity, usually cylindrical and tightly rolled, with 1 or 3 awns from the entire or minutely 2-lobed apex:
20. Lemma 1-awned. . . . **Stipa**
20.' Lemma 3-awned:
21. At least central awn plumose . . . **Stipagrostis**
21.' Awn glabrous or scabrid . . . **Aristida**
19.' Lemma membranous, frequently translucent, often laterally compressed, awnless or awned, the awn usually dorsal, more rarely terminal or from between 2 short lobes:
22. Lemma 1–3-nerved, awnless; glumes often shorter than the floret; similar to the lemma in texture . . . **Sporobolus**
22.' Lemma 3–7-nerved or almost nerveless, often awned; glumes as long as or longer than the floret:
23. Ligule a fringe of hairs or a short membrane fringed with hairs. . . . **Pentameris**
23.' Ligule a membrane:
24. Glumes awnless or minutely awned, the awn much shorter than the glumes, gaping in fruit, . . . **Agrostis**
24.' Glumes awned, the awn 2–many times the length of the glumes, the spike-like panicle bristly from the awns . . . **Polypogon**
14.' Spikelets 2–many-flowered, sometimes with only 1 bisexual floret and 1 or more male or sterile florets or rudiments above or below it:
25. Spikelets 3-flowered, the 2 lower florets usually sterile (more rarely male), either well-developed or reduced to inconspicuous lemmas, uppermost floret bisexual:
26. Lower florets represented by 2 well-developed lemmas (rarely the lower small and inconspicuous), one or both often transversely ridged, awnless or with a terminal awn, the upper sometimes with appendages at the base; inflorescence various, but not a cylindrical, spike-like, dense panicle of numerous spikelets . . . **Ehrharta**
26.' Lower florets reduced to 2 small inconspicuous awnless lemmas (both shorter than the bisexual floret), neither transversely ridged nor with appendages; inflorescence a spike-like, usually dense more-or-less cylindrical panicle of numerous spikelets, rarely reduced to a scanty raceme . . . **Phalaris**
25.' Spikelets 2–many-flowered, the lowest floret typically bisexual, but if not, then spikelet with > 1 bisexual floret, or with 1 or more reduced florets above the bisexual floret, or with only 1 male floret below it:
27. Florets enveloped by long, silky hairs from the rhachilla or lower part of the lemmas; lemmas awnless or with a terminal awn; tall reed-like grasses with showy, plumose panicles:
28. Spikelets with the lowest floret male or sterile; fertile lemmas glabrous, but enveloped by long hairs from the callus . . . **Phragmites**
28.' Spikelets with the lowest floret bisexual; fertile lemmas with long hairs on the back in the lower part, the callus shortly hairy . . . **Arundo**
27.' Florets not usually enveloped by long, silky hairs; the lemmas sometimes conspicuously hairy, but then plants either not reed-like with showy, plumose panicles, or lemmas with a bent and twisted awn from between 2 lobes:
29. Lemmas 5- or 9-awned:
30. Fertile lemmas 5-awned; awns scabrid not plumose . . . **Schmidtia**
30.' Fertile lemmas 9-awned; awns scabrid or plumose . . . **Enneapogon**
29.' Lemmas awnless or 1–3-awned:
31. Lemmas 1–3-nerved (occasionally with 1–4 additional shorter nerves):
32. Spikelets with 2–many bisexual florets (rarely 1, but then spikelets not arranged in 1-sided spikes or spike-like racemes and the sterile florets smaller, but not different in form from the bisexual):
33. Lemmas glabrous or with tubercle-based hairs on the side nerves:
34. Inflorescence of 1-sided spikes arranged digitately . . . **Eleusine**
34.' Inflorescence paniculate, sometimes contracted:
35. Leaves rigid and pungent; rhachis spinescent. . . . **Cladoraphis**
35.' Leaves softer; rhachis slender. . . . **Eragrostis**
33.' Lemmas hairy on the side or all nerves, the hairs not tubercle-based:
36. Lemmas 3-awned, lobed; awns straight . . . **Triraphis**
36.' Lemmas 1-awned or awnless:
37. Leaves rigid, pungent, cauline . . . **Odyssea**
37.' Leaves not pungent and cauline:
38. Inflorescence of spike-like racemes scattered along central axis; stamens 3 . . . **Leptochloa**
38.' Inflorescence a panicle, dense, divaricately branched; stamens 2 . . . **Diandrochloa**

32.' Spikelets with 1 bisexual floret, exceptionally with 2 (in *Chloris* and *Cynodon*, rarely); spikelets arranged in 1 or 2 rows on one side of the rhachis of 1–many spikes or spike-like racemes (except in **Fingerhuthia**); reduced florets often different from the bisexual in size and form:
39. Inflorescence a spike-like panicle, the spikelets densely clustered on short branches and falling entire at maturity ..... **Fingerhuthia**
39.' Inflorescence of 1–many 1-sided spikes or spike-like racemes variously arranged on a central axis; glumes persistent at maturity:
40. Spikelets usually 1-flowered; lemmas awnless ..... **Chloris**
40.' Spikelets 2-flowered; lemmas awned ..... **Cynodon**
31.' Lemmas 5–11-nerved (rarely 3-nerved):
41. Ligule a fringe of hairs or a short membrane fringed with hairs:
42. Glumes shorter than the spikelet (rarely longer); lemmas awnless or awned from the apex, the awn not bent or twisted ..... **Tribolium**
42.' Glumes as long as or longer than the rest of the spikelet, rarely slightly shorter; lemmas often with a bent and twisted awn from between 2 lobes:
43. Spikelets (1)2-flowered, both florets bisexual (the rhachilla often produced and occasionally bearing the rudiment of another floret) ..... **Pentameris**
43.' Spikelets 3–10-flowered, sometimes only the 2 lowest florets bisexual, the upper or uppermost sterile and reduced:
44. Lemmas notched or with 2 minute awnless lobes, with or without a short, straight, rounded awn from between them; spikelets 4–7 mm long ..... **Schismus**
44.' Lemmas with 2 awned or awnless lobes, the central awn usually bent and twisted and flattened in the lower part; spikelets 7–55 mm long excluding awns:
45. Pedicels articulated, bearded with long hairs at and above the joint; lowest lemma usually differing from the others; hairs on lemma, if present, not in tufts or fringes ..... **Chaetobromus**
45.' Pedicels not articulated; lowest lemma like the others; hairs on lemma often in tufts or fringes:
46. Glumes prominently 7–11-nerved; callus pungent ..... **Centropodia**
46.' Glumes 1–5(–7)-nerved; callus rounded or long, narrowly obtuse:
47. Hilum linear; embryo mark < 2/5 of caryopsis; plants forming robust clumps, at least 0.5 m tall ..... **Ellisochloa**
47.' Hilum punctiform; embryo mark > 2/5 of caryopsis; plants very often small, tufted:
48. Perennials > 0.25 m tall ..... **Tenaxia**
48.' Perennials < 0.25 m tall ..... **Dregeochloa**
41.' Ligule a membrane not fringed with hairs:
49. Inflorescence a spike or spike-like raceme; both glumes developed, sometimes almost reduced to bristles:
50. Lemmas awnless, conspicuously hairy with long, silky hairs; uppermost 2 or 3 florets reduced to lemmas, usually tightly enclosing each other and forming a club-shaped or oblong body; inflorescence a spike-like, often 1-sided raceme, the spikelets solitary, frequently drooping; ovary glabrous ..... **Melica**
50.' Lemmas awnless or awned, not conspicuously hairy with long, silky hairs; uppermost 2 or 3 florets not reduced to lemmas; inflorescence a spike or spike-like raceme, the spikelets solitary or in clusters, not drooping; ovary minutely hairy at the top or with a hairy appendage:
51. Glumes 3–7-nerved; spikelets 5–18-flowered ..... **Brachypodium**
51.' Glumes 1–5-nerved; spikelets 1–3-flowered:
52. Spikelets in clusters of 3, of which usually only the middle one has a bisexual floret, the lateral ones male, sterile and greatly reduced, sometimes to awns ..... **Hordeum**
52.' Spikelets solitary on the rhachis ..... **Secale**
49.' Inflorescence a panicle, open, contracted or spike-like (rarely a spike, but then with the lower glume absent, except in the terminal spikelet):
53. Glumes shorter than the spikelet (upper glume sometimes longer); lemmas awnless, or awned from the apex or from between 2 short lobes, the awn not bent and twisted:
54. Ovary with a conspicuous, hairy terminal appendage, the styles arising laterally below it ..... **Bromus**
54.' Ovary glabrous or hairy above, but without a hairy terminal appendage, the styles terminal, but sometimes rather far apart on the top of the ovary:
55. Spikelets mixed, fertile and sterile, rigidly awned ..... **Cynosurus**
55.' Spikelets alike in sex and structure:

56. Lemmas about as wide as long, cordate at the base, closely imbricate, spreading horizontally. . . . . **Briza**
56.' Lemmas longer than wide, erect or spreading obliquely:
57. Spikelets sessile and solitary on opposite sides of the rhachis of a spike (rarely the inflorescence scantily branched in the lower half); lower glume absent in all but the terminal spikelet. . . . . **Lolium**
57.' Spikelets pedicelled in open or contracted panicles; all spikelets with 2 glumes (rarely not):
58. Lemmas tapering into a straight awn longer than the body of the lemma; plants annual. . . . . **Vulpia**
58.' Lemmas awnless, or the awn shorter than the body of the lemma and the plants perennial:
59. Plants perennial; lemmas awned or awnless:
60. Lemmas acute or awned. . . . . **Festuca**
60.' Lemmas obtuse, awnless . . . . . **Puccinellia**
59.' Plants annual; lemmas awnless:
61. Upper glume 1-nerved, lower without nerves . . . . . **Sphenopus**
61.' Upper glume 2- or 3-nerved, lower 1–3-nerved. . . . . **Poa**
53.' Glumes (at least the upper) usually as long as or longer than the lowest floret, often longer than the rest of the spikelet; lemmas awnless or awned from the back (rarely from the apex or from between 2 lobes), the awn often bent and twisted:
62. Lemmas awnless, conspicuously hairy with long, silky hairs; uppermost 2 or 3 florets reduced to lemmas, usually tightly enclosing each other and forming a club-shaped or oblong body . . . . . **Melica**
62.' Lemmas awned (rarely awnless and then glabrous or minutely hairy); uppermost 2 or 3 florets not reduced to lemmas:
63. Spikelets falling entire at maturity, 2-flowered; glumes not shining; lower lemma awnless, upper with a short, hooked awn from the back near the apex . . . . . **Holcus**
63.' Spikelets breaking up at maturity, 2–6-flowered; glumes shining, at least towards the margins; lemmas usually awned, but not as above, or awnless:
64. Panicle contracted, usually spike-like and dense; lemmas awned from the uppermost quarter or third of the back or from between 2 short lobes; awn short, straight or slightly bent:
65. Plants perennial, lemmas 3-nerved, entire, awnless or minutely awned from the apex . . . . . **Koeleria**
65.' Plants annual; lemmas 5-nerved, awned from the apex or from the back just below the apex, this splitting readily into 2 short lobes as far as the awn insertion. . . . . **Lophochloa**
64.' Panicle open, rarely contracted; lemmas awned from near the base or middle of the back, awn usually bent and twisted:
66. Spikelets 2–8 mm long; lemmas 3–5-nerved; ovary glabrous . . . . . **Aira**
66.' Spikelets 7–35 mm long; lemmas 5–11-nerved; ovary hairy:
67. Plants perennial; spikelets (2)3–5(–6)-flowered; glumes 1–3-nerved, shorter than the rest of the spikelet . . . . . **Helictotrichon**
67.' Plants annual; spikelets 2- or 3-flowered; glumes 7–11-nerved, usually longer than the rest of the spikelet . . . . . **Avena**

Distinctive characteristics found only within some genera:

Plants covered partially with glands **Enneapogon, Eragrostis, Pentameris, Schmidtia, Stipagrostis.**

Leaves spine-tipped **Aristida, Centropodia, Cladoraphis, Dregeochloa, Ellisochloa, Eragrostis, Odyssea, Panicum, Pentameris, Sporobolus, Stipagrostis.**

AGROSTIS 150–220 spp., mainly temperate and tropical mountains

lachnantha Nees VINK-AGROSTIS Annual or short-lived perennial, up to 0.9 m tall. Leaves linear; ligule a long, unfringed membrane. Inflorescence a narrow, dense, sinuous panicle, branches

suberect. Spikelets many, 1.5–2.5(–3) mm long, green or flushed purple to straw-coloured, usually gaping, 1-flowered, disarticulating above glumes; glumes subequal, as long as the spikelet, awnless; lemma long hairy, rarely glabrous, occasionally shortly awned, awn 0.5 mm long. Oct.–Mar. Damp sites, SN, KB, WM, CCR (Oranjemund, Kamiesberg Mountains, Roggeveld Escarpment, Nuweveld Mountains, through southern Africa to tropical Africa).

*AIRA ± 8 spp., Old World, mainly Mediterranean, widespread weeds

***cupaniana** Guss. Delicate annual, up to 300 mm tall, often reddish. Leaves linear; ligule an unfringed membrane. Inflorescence an open panicle. Spikelets 2–3 mm long, red to green to straw-coloured, 2-flowered; glumes ± equal, longer than spikelet (excluding awns), upper glume glabrous; lemmas awned from below middle, lower lemma occasionally awnless. Sept.–Dec. Flats and slopes, KB, WM, CCR (Kamiesberg Mountains, Calvinia, W Cape to Free State, Lesotho and KwaZulu-Natal, [European weed]).

ARISTIDA STEEKGRAS 290 spp., mainly tropical and subtropical

A. Column absent between the apex of the lemma and the branching point of the awns

adscensionis L. Annual, up to 1 m tall. Leaves linear, sparse; ligule a fringe of hairs. Inflorescence a narrow, dense panicle often spike-like. Spikelets 10–40 mm long (including awns), often flushed purple; 1-flowered; glumes unequal, shorter than or equalling spikelet (excluding awns); lemma 3-awned, column and articulation absent. Dec.–Sept. Stony slopes and flats, often disturbed areas, SN, G, NH, KB, TS, CCR (widespread in southern Africa and other warm and hot regions of Old and New Worlds).

A.' Column present between the apex of the lemma and the branching point of the awns
B. Lemma 1-awned

parvula (Nees) De Winter Annual, up to 400(–600) mm tall, usually purple; culms unbranched to much branched in upper nodes, older plants wiry. Leaves linear, sparse; ligule a fringe of hairs (if ligule a fringed membrane see *Stipa capensis*). Inflorescence an open panicle. Spikelets 18–22 mm long (including awns), 1-flowered; glumes unequal; lemma 1-awned, awn up to 20 mm long, bent, column present, glabrous (if long hairs present at base of column see *Stipagrostis anomala)*, articulation between lemma apex and column base. Aug.–Oct. Sandy, stony or gravel soils on gravel plains, rocky hills, along watercourses and in disturbed areas, SN, G (along Gariep Valley and northwards into western Namibia to Damaraland).

B.' Lemma 3-awned

congesta Roem. & Schult. KATSTERTSTEEKGRAS Slender perennial or annual, up to 0.9 m tall, densely tufted. Leaves linear; ligule a fringe of hairs. Inflorescence a congested panicle, spike-like but often with 2 or 3 branches below. Spikelets densely packed in clusters at end of branches, 25–30 mm long (including awns), 1-flowered; glumes unequal; lemma 3-awned, column present, articulation between apex of column and base of awns. Dec.–May. Stony, mostly clay slopes, also disturbed areas, NH, KV, WM, TS, CCR (widespread from southern Africa to tropical Africa).

dasydesmis (Pilg.) Mez Perennial, up to 0.8 mm tall, densely tufted; culms much branched in upper nodes. Leaves linear, folded, straight, rigid, quill-like, pungent, often as long as or overtopping inflorescence; ligule a fringe of hairs. Inflorescence a panicle, contracted when young, becoming more open with age. Spikelets 25–30 mm long (including awns), 1-flowered; glumes unequal; lemma 3-awned, column present, articulation between lemma apex and column base or absent. Aug.–Sept. Granite slopes, NH, KV (around Springbok to Garies and Vanrhynsdorp). **(ece)**

diffusa Trin. BESEMSTEEKGRAS Perennial, up to 1 m tall; lower internodes of culms glabrous. Leaves linear; ligule a fringe of hairs. Inflorescence an open panicle. Spikelets 25–45 mm long (including awns), yellow-brown to purple, 1-flowered; glumes unequal; lemma 3-awned, column present, articulation between lemma apex and column base or absent. Oct.–Apr. Rocky slopes, G, NS, NH, KV, WM, TS, CCR (southern Africa, northwards to Zimbabwe).

engleri Mez Perennial, up to 0.9 m tall; culms not to much branched. Leaves linear, narrow, expanded or rolled; ligule a fringe of hairs. Inflorescence a narrow to open panicle. Spikelets 20–35 mm long (including awns), 1-flowered, glumes unequal; lemma 3-awned, column present, articulation between lemma apex and column base, callus bifid. Jan.–Aug. Rocky slopes, SN, G, NH (Namibia to northeastern Namaqualand and northern Karoo).

vestita Thunb. Perennial, up to 0.85 m tall; lower internodes of culms woolly hairy. Leaves linear; ligule a fringe of hairs. Spikelets 30–50 mm long (including awns), 1-flowered; glumes unequal; lemma 3-awned, column present, articulation between lemma apex and column base. Nov.–May. Dry stony slopes, G, WM, TS (Richtersveld Mountains, Calvinia, Roggeveld Escarpment, southern Great Karoo and northwards to Tanzania).

*ARUNDO REED 3 spp., Mediterranean to China

*__donax__ L. SPAANSRIET Perennial, up to 6 m tall, spreading by means of dense horizontal rootstock. Leaves linear to lanceolate, with large 'ear lobes' at base, tips not pungent; ligule a fringed membrane. Inflorescence a large, 300–600 mm long, silky plumose panicle, branches erect/ascending (if leaf 'ear lobes' small and inflorescence branches drooping see *Phragmites*). Spikelets 8–15 mm long; 2–many-flowered; glumes ± equal; lemma long hairy, shortly awned. Year-round. Usually along watercourses, G, NH, WM, CCR (widespread, declared weed in southern Africa).

*AVENA OATS ± 25 spp., Mediterranean to central Asia, widely introduced as weeds and crop plants

*__barbata__ Pott ex Link WILD OATS, WILDEBAARDHAWER Annual, up to 1.3 m tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence an open panicle. Spikelets 18–26 mm long, 2–6-flowered; glumes ± as long as spikelet; lemma hairy in lower half, lobed, awns on lobes 4–8 mm long; central awn 30–60 mm long, bent, basal column usually twisted. Aug.–Dec. Common in disturbed areas, WM, CCR (Roggeveld Escarpment and W Cape, [Asian weed]).

*__fatua__ L. COMMON WILD OATS, GEWONE WILDEHAWER Annual, up to 0.7 m tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence an open panicle. Spikelets 18–32 mm long, pendulous; 2- or 3-flowered; glumes ± as long as spikelet; lemma hairy in lower half, with 2–4 awnless lobes, central awn 25–40 mm long, bent, basal column usually twisted. Aug.–Nov. In disturbed areas, KV, WM, CCR (Vanrhynsdorp, Nieuwoudtville and W Cape to Gauteng, [European weed])

*__sativa__ L. OATS, HAWER Annual, up to 1.5 m tall. Leaves linear, flat. Inflorescence an open, nodding panicle. Spikelets 17–35 mm long (excluding awns), 2- or 3-flowered; glumes ± equal, nerves many and distinct; only lowest lemma glabrous; lemma central, awn bent, up to 80 mm long, basal column usually twisted, sometimes awnless. Sept.–Nov. In disturbed areas, NH, CCR (widespread, cultivated cereal introduced from Europe).

BRACHYPODIUM FALSE BROME ± 16 spp., temperate and tropical mountains

bolusii Stapf Perennial, 450–700 mm tall, densely tufted. Leaves lanceolate; ligule a minutely fringed membrane. Inflorescence of 1–4 semi-sessile spikelets. Spikelets up to 30 mm long, many-flowered; glumes unequal, shorter than spikelet; lemma awn 4–8 mm long; anthers 2–3 mm long. Nov.–Mar. On mountains, WM (Hantamsberg, E Cape and Drakensberg Mountains). [Broadly delimited here to include the populations from N Cape]

*__distachyon__ (L.) P.Beauv. Annual, up to 450 mm tall. Leaves linear; ligule a minutely fringed membrane. Inflorescence of 2–6 semi-sessile spikelets. Spikelets 10–35(–40) mm long, many-flowered; glumes unequal, shorter than spikelet; lemma awn 10–25 mm long; anthers 0.3–1 mm long. Sept.–Jan. Disturbed areas, KV, WM, TS, CCR (near Vanrhynsdorp, Calvinia–Loeriesfontein**,** Matjiesfontein to SW Cape [Mediterranean weed]).

*BRIZA QUAKING GRASS 20 spp., N temperate Old World and S America

*__minor__ L. KLEINBEWERTJIE, LESSER QUAKING GRASS Annual, up to 0.7 m tall. Leaves linear; ligule an unfringed membrane, obtuse at the apex. Inflorescence an open panicle, branches finely

divided with > 20 nodding spikelets. Spikelets 2.5–5 × 3–5 mm, wedge-shaped, about as wide as long, many-flowered, awnless, glabrous; lemmas with broad membranous margins. Sept.–Dec. Widespread in disturbed areas, KV, CCR (European weed from near Vanrhynsdorp to SW Cape and northwards to Mpumalanga).

BROMUS BROME ± 150 spp., pantemperate

A. Lemma awn ≤ 20 mm long
*B. Lower glume 1-nerved, see also **B. pectinatus** (1–3-nerved) under B.'*

***tectorum** L. Tufted annual, up to 250 mm tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence a panicle, branches flexuous, drooping sideways, spikelets ± 1-sided. Spikelets 8–25 mm long, many-flowered; lower glume 1-nerved, upper glume 3-nerved, shorter than spikelet; lemma awn 8–20 mm long, basally not twisted; ovary with a conspicuous, villous appendage at apex. Aug.–Oct. Sandy soils on roadsides, NH, WM (European weed, scattered in W Cape and NW Cape).

B.' Lower glume 3–7-nerved

***catharticus** Vahl Short-lived perennial or annual, up to 1 m tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence a lax panicle. Spikelets ovoid, 20–35 × 5–8 mm, glabrous, many-flowered; lower glume 3–7-nerved, upper glume 5–9-nerved; lemma awnless or with awn up to 3 mm long from below apex, basally not twisted; ovary with a conspicuous, villous appendage at apex. Oct.–Apr. Moist, disturbed areas, KV, CCR (S American weed, widespread in southern Africa and planted worldwide).

***commutatus** Schrad. Tufted annual, up to 400 mm tall. Leaves linear, rough; ligule an unfringed membrane. Inflorescence a lax panicle, some pedicels longer than spikelets. Spikelets 10–25 mm long, many-flowered; lower glume 3–5-nerved, upper glume 5–7-nerved, shorter than spikelet; lemma awned from below apex, awn 3–8 mm long, basally not twisted; ovary with a conspicuous, villous appendage at apex. Sept.–Dec. Disturbed, wet places, NH, CCR (European weed from near Bitterfontein, SW Cape to Drakensberg Mountains).

***hordeaceus** L. SOFT BROME Tufted annual, up to 0.6 m tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence a dense panicle, all pedicels shorter than spikelets. Spikelets 7–15 mm long, densely hairy, many-flowered; lower glume 3–7-nerved, upper glume 5–9-nerved, shorter than spikelet; lemma awned from below apex, awn 3–7 mm long, basally not twisted; ovary with a conspicuous, villous appendage at apex. Oct.–Feb. Disturbed areas, NH, CCR (European weed, mainly from Cape Peninsula to Knysna and occasional in E Cape through to KwaZulu-Natal just into Mpumalanga).

***pectinatus** Thunb. JAPANESE BROME, HOOIGRAS Annual, up to 0.8 m tall. Leaves linear, hairy; ligule an unfringed membrane. Inflorescence an open panicle, pedicels longer than spikelets, flexuous. Spikelets 10–30 mm long; lower glume 1–3-nerved, upper glume 5–7-nerved, shorter than spikelet; lemma awned from below apex, awn 6–18 mm long, basally not twisted; ovary with a conspicuous, villous appendage at apex. July–Nov. Disturbed areas on richer soils, G, NS, NH, KB, KV, WM, TS, CCR (Asian weed from Richtersveld southwards, common throughout W Cape, scattered elsewhere).

A.' Lemma awn > 30 mm long

***diandrus** Roth LANGNAALDBROMUS Annual, up to 1 m tall. Leaves linear, hairy; ligule an unfringed membrane. Inflorescence a lax panicle, branches long, spreading laterally, spikelets clustered at apex. Spikelets 30–90 mm long, many-flowered; lower glume 1–3-nerved, upper glume 3–5-nerved, shorter than spikelet; lemma awned from below apex, awn stiff and straight, 30–70 mm long, basally not twisted; ovary with a conspicuous, villous appendage at apex. Sept.–Jan. Roadsides, NH, WM, TS, CCR (European weed, mainly in W Cape, scattered in E Cape, Free State and KwaZulu-Natal).

***rigidus** Roth RIPGUT BROME Annual, up to 0.7 m tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence a dense panicle, branches short, erect. Spikelets 15–25 mm long, many-flowered; lower glume 1-nerved, upper glume 3-nerved, shorter than spikelet; lemma awned from below apex (here apex is tip of lobes), awn 30–50 mm long, basally not twisted; ovary with

a conspicuous, villous appendage at apex. Often hybridising with **B. diandrus**. Sept.–Oct. Disturbed areas, TS, CCR (European weed, mainly along coast from Velddrif to Port Elizabeth and scattered inland in W Cape).

CENCHRUS SANDBURR 22 spp., tropical and warm temperate

ciliaris L. BUFFELSGRAS Perennial, up to 1 m tall, almost woody; culms often much branched, nodes swollen. Leaves linear, flat; ligule a fringed membrane. Inflorescence spike-like, purple; spikelets subtended by stiff, slender bristles joined at base to form a disc, usually straw-coloured below and purple above, inner bristles sparsely to densely ciliate, one longer and stouter than rest, falling with spikelet as in *Pennisetum*, (if bristles remain on the inflorescence see *Setaria*). Spikelets 4–5 mm long, 2-flowered, lower male or sterile; upper lemma similar in texture to rest of spikelet. Aug.–Apr. Sandy soils, SN, G, CCR (widespread in Africa, through Arabia to India).

CENTROPODIA 4 spp., subtropical

glauca (Nees) Cope GHAGRAS Woody, rhizomatous perennial or soft annual, up to 0.75 m tall, base densely and coarsely hairy. Leaves mainly cauline, rigid, densely hairy or glabrous, lower blades reduced, tips often pungent; ligule a fringe of hairs. Inflorescence a contracted panicle, 30–120 mm long, base usually enclosed in uppermost leaf. Spikelets 7.5–10 mm long, 3–6-flowered, lower fertile; glumes as long as spikelet, 5–11-nerved; lemma deeply lobed, glabrous or hairs along nerves ending in tufts of long hairs near apex, central awn 3–5 mm long, bent and lower part twisted; callus thin, long and pungent. Sept.–May. Favours deep, loose, sandy soils, SN, G (widespread in arid areas of southern Africa).

CHAETOBROMUS GHAGRAS 1 sp., southern Namibia to W Cape

involucratus (Schrad.) Nees Stoloniferous or tufted perennial, up to 0.6 m tall. Leaves linear-lanceolate; ligule a fringe of hairs. Inflorescence a panicle, sometimes with only a few spikelets; distinctly tufted with hairs at base of each spikelet at point of articulation with pedicel. Spikelets 9–21 mm long (excluding awns), 2–4-flowered, lower fertile; glumes equal, as long as to longer than spikelet, lower glume 5–11-nerved, upper 3–5-nerved; lemma lobes sometimes awned, central awn 9–24 mm long, twisted below. Sept.–Nov. Sandy slopes, SN, G, NS, NH, KB, KV, WM, CCR (southern Namibia and Karoo to Cape Peninsula).

CHLORIS 55 spp., pantropical and warm temperate

*__virgata__ Sw. FEATHERED CHLORIS, KLOSSIEGRAS Annual, sometimes perennial, up to 0.75 m tall; base strongly keeled to fan-shaped. Leaves linear, flat or folded, tapering to a fine point; ligule a fringed membrane. Inflorescence silky feathery, with up to 12 digitate racemes. Spikelets 3–3.5 mm long, laterally compressed, (2)3-flowered, lowest floret fertile; glumes unequal, glabrous; lemma with an apical tuft of stiff hairs, awn 6–12 mm long. Dec.–June. Disturbed places, NH, TS, CCR (cosmopolitan weed).

CLADORAPHIS 2 spp., extreme western southern Africa

cyperoides (Thunb.) S.M.Phillips STEEKRIET Spiny, woody perennial, up to 0.8 m tall. Leaves lanceolate, pungent; ligule a fringe of hairs. Inflorescence with alternate primary branches usually more than twice their own length apart, occasionally ending in a spine. Spikelets 4–8 mm long, densely clustered, almost entirely hiding the branches, many-flowered; glumes equal, shorter than spikelet; lemma glabrous or with short hairs, awnless. Aug.–May. Deep, loose sand particularly coastal dunes, SN, G, NS, CCR (Angola to Cape Peninsula).

spinosa (L.f.) S.M.Phillips VOLSTRUISDORING Spiny, woody perennial, up to 0.6 m tall. Leaves lanceolate, rolled, rigid, pungent; ligule a fringe of hairs. Inflorescence a rigid, angular central axis with alternate primary branches less than their own length apart, ending in a spine. Spikelets 6–18 mm long, loosely arranged and almost perpendicular to the branches, many-flowered; glumes equal, shorter than spikelet; lemma glabrous or with short hairs, awnless. Aug.–May. Sandy flats, mostly coastal, SN, G, NS, NH, KV, WM, CCR (Namibia to Agulhas).

CYMBOPOGON TURPENTINE GRASS ± 40 spp., tropical and subtropical Africa, Asia

dieterleniae Stapf ex E.Phillips Perennial, up to 0.85 m tall; fresh shoots aromatic. Leaves linear, up to 2 mm wide; ligule an unfringed membrane up to 12 mm long. Inflorescence a complex leafy panicle, racemes paired, short, (10–)15–20(–28) mm long, and often reflexed, rhachis and pedicels with long hairs on margins only; spikelets paired in a sessile and pedicellate combination of dissimilar spikelets. Sessile spikelet 5–6 mm long, lower glume winged; lemma awn 11 mm long, glabrous. Nov.–Apr. Open veld and rocky hillsides, NH (central Namaqualand and the southern African interior).

marginatus (Steud.) Stapf ex Burtt Davy MOTWORTELTERPENTYNGRAS Aromatic perennial, up to 0.8 m tall. Leaves linear, 3–6 mm wide; ligule an unfringed membrane. Inflorescence a complex leafy panicle, racemes paired, short, (10–)15–20(–28) mm long, rhachis and pedicels densely covered with long hairs; spikelets paired in a sessile and pedicellate combination of dissimilar spikelets. Sessile spikelet 5–6.5 mm long, lower glume winged; lemma awn 15 mm long, glabrous. Oct.–May. Rocky lower slopes, KB, CCR (Kamiesberg and Bokkeveld Mountains to SW Cape and E Cape).

pospischilii (K.Schum.) C.E.Hubb BITTER TURPENTINE GRASS Perennial, up to 1 m tall; fresh shoots aromatic. Leaves linear, usually folded and thin, 2–4 mm wide. Inflorescence a complex leafy panicle, racemes paired, short, (10–)15–20(–28) mm long, rhachis and pedicels with long hairs on margins only; spikelets paired in a sessile and pedicellate combination of dissimilar spikelets. Sessile spikelet 5–6 mm long, lower glume deeply concave, wingless or very narrowly winged; lemma awn 10–16 mm long, glabrous. Oct.–May. Rocky areas, NH, CCR (throughout southern and tropical Africa).

CYNODON QUICK GRASS ± 10 spp., pantropics and subtropics

dactylon (L.) Pers. Mat-forming perennial, up to 400 mm tall. Leaves linear; ligule a fringed membrane. Inflorescence digitate, with 2–4(–6) one-sided racemes. Spikelets 2–2.5 mm, 1-flowered, awnless; glumes to ¾ the length of spikelet; lemma keel wingless, hairy. Sept.–May. Mountains and flats often in disturbed ground, SN, G, NS, NH, KB, WM, TS, CCR (widespread and worldwide in tropical regions).

*CYNOSURUS 8 spp., Europe, Middle East

*__coloratus__ Lehm. ex Nees Annual, up to 200 mm tall. Leaves linear, flat, rough above; ligule an unfringed membrane. Inflorescence a congested, 1-sided, obtriangular, softly bristly panicle, spikelets sexually dimorphic, fertile spikelets concealed by sterile ones. Sterile spikelets consist of awned glumes and lemmas, awns up to 18 mm long. Fertile spikelets up to 20 mm long, 1-flowered; glumes as long as the spikelet (excluding awns); lemma 3.5–4.5 mm long, awn up to 18 mm long, not basally twisted. Sept.–Oct. Sandy clay, stony soils, WM, CCR (Mediterranean (although type is from South Africa), Roggeveld Escarpment near Sutherland and coastal areas around Stilbaai and Bredasdorp).

*__echinatus__ L. DOG'S TAIL Like **C. coloratus** but plants up to 0.6 m tall, sterile spikelets 2–5-flowered, lemmas 5–7 mm long and awns 6–16 mm long. July–Jan. On rocks and disturbed places, often in shade, ?TS, CCR (Mediterranean weed, mainly coastal from Cape Peninsula to Knysna and scattered inland in W Cape and near N Cape border).

DIANDROCHLOA ± 7 spp., tropics and subtropics

namaquensis (Nees) De Winter Robust annual, up to 1.5 m tall, plant often red. Leaves linear; ligule an unfringed, fimbriate membrane. Inflorescence a contracted or open linear to lanceolate panicle, pedicels straight to slightly thickened. Spikelets many, 2–3 × ± 1 mm, many-flowered, awnless, with fragile rhachilla, breaking up easily; glumes subequal, shorter than spikelet; lower glume 1-nerved, 0.4–0.6 mm long. Mainly May–June. Always in moist places, SN, G (widespread in Africa, Arabia, China and Japan).

DICHANTHIUM ± 20 spp., Old World tropics

annulatum (Forssk.) Stapf Densely tufted perennial, up to 1 m tall, nodes with a ring of spreading hairs. Leaves linear-lanceolate, ligule membranous. Inflorescence of 2–many digitate or subdigi-

tate racemes (30–)60–80 mm long, spikelets paired in a sessile and pedicellate combination of dissimilar spikelets. Sessile spikelets 2.5–5 mm long, with long hairs, dorsiventrally compressed; lower glume obtuse to truncate, subapical fringe of long hairs present; lemma awn 8–25 mm long, curved, column (basal part of awn) twisted. Pedicellate spikelets awnless. Oct.–July. Disturbed places, G (South Africa to Ethiopia).

DIGITARIA FINGER GRASS ± 230 spp., pantropics and subtropics

argyrograpta (Nees) Stapf SILVER FINGER GRASS Perennial, up to 0.6 m tall; rhizome knotty. Leaves linear; ligule an unfringed membrane. Inflorescence digitate, racemes 2 or 3, erect, adhering together by tangled hairs; rhachis scarcely winged. Spikelets 3.5–3.8 mm long, finely appressed hairy, hairs long and dense; upper glume shorter and narrower, not covering spikelet; 2-flowered, lower sterile, awnless, spaces between nerves on lower lemma narrowest next to midrib; upper lemma of 'digitaria' type. Nov.–Mar. Flats and slopes, TS, CCR (Nuweveld Mountains, Riviersonderend, Prince Albert to Mozambique).

***sanguinalis** (L.) Scop. CRAB GRASS, KRUISGRAS Spreading annual, up to 0.5 m tall, often rooting at nodes. Leaves linear; ligule an unfringed membrane. Inflorescence of 3–12 digitately or subdigitately arranged racemes, rhachis broadly winged. Spikelets 2.3–3.1 mm long, appressed hairy, hairs long and dense; upper glume shorter than spikelet; 2-flowered, lower sterile, awnless; nerves of lemma scabrid (often very difficult to see); upper lemma of 'digitaria' type. Nov.–May. Disturbed areas, NH, KV, CCR (widespread European weed).

DREGEOCHLOA 2 spp., arid western region of southern Africa

calviniensis Conert Rhizomatous perennial, up to 250 mm tall; swollen base covered by old leaf sheaths. Leaves linear, pungent; ligule a fringe of hairs. Inflorescence a contracted panicle. Spikelets 12–15 mm long, many-flowered; glumes as long as to longer than spikelet, rounded or flat but 2-keeled at least below, 3–5-nerved; lemma glabrous except for 3 tufts of hairs in a row on either side of central awn, lobes shortly awned, central awn 8–10 mm long, bent, twisted below; callus rounded to obtuse. Oct. Limestone outcrops, WM (rarely collected: Loeriesfontein District eastwards to near Vosberg).

pumila (Nees) Conert Perennial, up to 100 mm tall; base covered in broad scales. Leaves apparently succulent, strongly sickle shaped and recurved backwards, tip rounded with a minute spine; ligule a fringe of hairs. Inflorescence a raceme, rarely a panicle. Spikelets 10–15 mm long, many-flowered; glumes longer than spikelet, rounded, flat, but 2-keeled at least below, 5–7-nerved; lemma hairy all over, plus 2 small tufts of hairs on either side of central awn and large tufts on margins; lobes awnless, rarely a tiny awn present, central awn 4–7 mm long, bent, twisted below; callus rounded to obtuse. Aug.–Jan. Rocky areas and loose sand, restricted to narrow coastal belt subject to sea mists, SN, G, NS (Lüderitz to just N of Port Nolloth). **(ece)**

EHRHARTA ± 36 spp., Africa, Mascarene Islands, SE Asia, Australasia

A. Annuals or weak (facultative) perennials

brevifolia Schrad. Tufted annual, up to 0.5 m tall. Leaf blades flat; ligule an unfringed membrane. Inflorescence a raceme-like, verticillate panicle. Spikelets 2.5–4.5 mm long, green, sometimes washed with purple, glumes as long as or longer than spikelet, sterile lemmas smooth, villous, truncate to mucronate, the second with a pair of ear-like, basal appendages. Aug.–Nov. Sandy flats, especially along the coast, G, NS, NH, KV, CCR (Alexander Bay to Agulhas). **(gce)**

delicatula (Nees) Stapf Tufted annual, up to 450 mm tall. Leaf blades flat, margins undulate; ligule an unfringed membrane. Inflorescence a delicate, verticillate panicle. Spikelets 2–3 mm long, small, green, sometimes tinged with purple, glumes shorter than spikelet, sterile lemmas corrugate, glabrous, blunt, the second with a pair of granular basal appendages. July–Nov. Shady habitats, often under bushes, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to Swellendam). **(gce)**

erecta Lam. Tufted, herbaceous perennial or annual, up to 0.8 m tall. Leaf blades flat, often broad, margins undulate; ligule an unfringed membrane. Inflorescence a lax, open panicle. Spikelets 3–5 mm long, green, glumes shorter than spikelet, sterile lemmas corrugate, glabrous, blunt to slightly mucronate. Mainly Sept.–Jan. Shady habitats, often weedy, TS, CCR (Cape Peninsula to E Africa).

longiflora Sm. Tufted annual, up to 0.9 m tall. Leaf blades flat, broad, margins undulate; ligule a fringed membrane. Inflorescence a lax, verticillate panicle. Spikelets 10–25 mm long (including awns), green, sometimes tinged with purple, glumes shorter than spikelet, sterile lemmas smooth to corrugate, glabrous, tapering into a straight awn. July–Nov. Damp or shady habitats, often weedy, G, NS, NH, KB, KV, WM, TS, CCR (Alexander Bay to De Rust). **(gce)**

pusilla Nees ex Trin. Tufted annual, up to 400 mm tall. Leaf blades flat; ligule a fringed membrane. Inflorescence a contracted, spike-like panicle. Spikelets 6–8.5 mm long, green, glumes as long as or longer than spikelet, sterile lemmas smooth, villous, aristate, the second with a pair of ear-like, basal appendages. Aug.–Dec. Sandy areas, especially dry streambeds, SN, G, NS, NH, KB (southern Namibia to Garies). **(ece)**

triandra Nees ex Trin. BOKHORINGGRAS Tufted annual, up to 450 mm tall. Leaf blades flat, margins undulate; ligule an unfringed membrane. Inflorescence a delicate, verticillate panicle. Spikelets 6–14 mm long (including awns), green, sometimes tinged with purple, glumes shorter than spikelet, sterile lemmas corrugate, glabrous, apically tapering and bending outwards to resemble springbok horns. July–Oct. Shady habitats, often among rocks, SN, G, NS, NH, KB, KV, WM, CCR (southern Namibia to Vredendal). **(gce)**

A.' Obligate perennials

barbinodis Nees ex Trin. Shrub-like perennial, up to 1 m tall, rhizomes well-developed, culms branching, culm nodes villous. Leaf blades flat; ligule a fringe of hairs or a short fringed membrane. Inflorescence a raceme-like, verticillate panicle. Spikelets 9–13 mm long, green or straw-coloured, sometimes tinged with purple, glumes shorter than spikelet, sterile lemmas corrugated near apex, keel and margins villous, mucronate to aristate. Aug.–Nov. Flats and slopes, often among rocks, G, NS, NH, KB, KV (Steinkopf to Nuwerus). **(ece)**

calycina Sm. ROOIGRAS, POLGRAS Robust or weakly tufted perennial (rarely annual), up to 1 m tall. Leaf blades flat or rolled, margins often undulate; ligule an unfringed to a minutely fringed membrane. Inflorescence a lax, open panicle. Spikelets 4–8.5 mm long, green, usually tinged with pink, glumes shorter than to as long as spikelet, sterile lemmas smooth, villous, mucronate to aristate, the second with a pair of basal ear-like appendages. Mainly July–Dec. Flats and slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (Sperrgebiet to KwaZulu-Natal).

eburnea Gibbs Russ. Spreading perennial, up to 300 mm tall, culms with swollen, white bases. Leaf blades flat, margins undulate; ligule a fringed membrane. Inflorescence a raceme-like, verticillate panicle. Spikelets 9–13 mm long, green, tinged with purple, glumes shorter than spikelet, sterile lemmas smooth, glabrous to shortly villous, keel long-bristly, mucronate. Sept.–Nov. Rocky slopes, WM, TS, CCR (Nieuwoudtville to Laingsburg and Witteberg Mountains). **(gce)**

melicoides Thunb. Tufted perennial, up to 0.8 m tall. Leaf blades flat or rolled; ligule an unfringed to fringed membrane. Inflorescence an open panicle. Spikelets 3–4 mm long, small, green or straw-coloured, glumes as long as to slightly longer than spikelet, sterile lemmas smooth, glabrous, blunt, the second with a pair of ear-like basal appendages. Sept.–Nov. Rocky slopes, NH, KB, WM, CCR (Kamiesberg Mountains to Ceres). **(gce)**

thunbergii Gibbs Russ. Spreading perennial, up to 1.5 m tall, rhizomes well-developed, enclosed by hairy scales, culms branched. Leaf blades flat to somewhat rolled; ligule a fringed membrane to a fringe of hairs. Inflorescence a raceme-like, verticillate panicle. Spikelets 8–10 mm long, green or straw-coloured, tinged with purple, glumes shorter than to as long as spikelet, sterile lemmas smooth, villous, mucronate to aristate. Sept.–Dec. Flats and slopes, SN, TS, CCR (Klinghardt Mountains, Nieuwoudtville to Oudtshoorn). **(gce)**

villosa Schult.f. Spreading perennial, up to 1.5 m tall, rhizomes elongate, with naked internodes, culms branched. Leaf blades flat; ligule a fringed membrane to a fringe of hairs. Inflorescence a raceme-like, verticillate panicle. Spikelets 10–18 mm long, green or straw-coloured, sometimes tinged with purple, glumes shorter than to as long as spikelet, sterile lemmas smooth, villous, truncate to aristate. Sept.–Dec. Coastal sands, NS, CCR (Vredendal to Algoa Bay). **(gce)**

ELEUSINE FINGER MILLET 10 spp., Africa and S America, cosmopolitan as weeds

coracana (L.) Gaertn. (including **E. africana** Kenn.-O'Byrne) Tough, shiny annual, up to 0.62 m tall. Leaves linear, usually folded; ligule a fringed membrane. Inflorescence of 3–13 one-sided racemes digitately-or subdigitately arranged. Spikelets 4.6–7.8 mm long, laterally compressed,

many-flowered, glabrous, awnless; glumes unequal, shorter than spikelet. Oct.–May. Disturbed places, NS, KV, CCR (southern Africa to Arabia).

ELLISOCHLOA 2 spp., southern Africa

rangei (Pilg.) P.M.Peterson & N.P.Barker (= *Merxmuellera rangei* (Pilg.) Conert) Spiny, tufted perennial, up to 300 mm tall. Leaves cylindrical, pungent, densely woolly at sheath mouth; ligule a fringe of hairs. Inflorescence a contracted panicle, partially enclosed by uppermost leaf sheath. Spikelets 11–14 mm long (including awns), 2-flowered; glumes equal to unequal, at least upper longer than spikelet (excluding awns), 1–3-nerved, 1-keeled near base; lemmas lobed, 3 tufts of white hairs on either side of central awn, central awn 9–10 mm long, bent, twisted below; callus thick, obliquely pointed at base. Aug.–Oct. Dry sandy areas between hills, SN (Namibia: inland from Lüderitz to Aus and S to Gariep Valley). **(ece)**

ENNEAPOGON SUURGRAS 30 spp., pantropics and subtropics

cenchroides (Roem. & Schult.) C.E.Hubb. Short-lived perennial or annual, up to 1 m tall, tufted, plant densely glandular hairy (may feel cold to touch). Leaves linear, tapering to a fine point; ligule a fringe of hairs. Inflorescence a densely contracted spike-like panicle, usually grey. Spikelets 3–5 mm long, usually 3-flowered; glumes slightly unequal, nerves distinct; lemma long hairy, 9-awned, awns plumose, extending beyond glumes; anthers 1–1.5 mm long. Year-round, peaking in rainy season. Disturbed areas, TS (northwards through Africa to Arabia and India, not common in more mesic areas).

desvauxii P.Beauv. Glandular hairy perennial or annual, up to 300 mm tall, culms branched, geniculate. Leaves linear to filiform, tapering to a very fine point; ligule a fringe of hairs. Inflorescence a dense spike-like panicle, light to dark grey. Spikelets 3–5.5 mm long, usually 3-flowered; glumes subequal; lemma long hairy, 9-awned, awns plumose, extending beyond glumes. Mostly Nov.–Mar. Sandy or rocky areas often in dolerite, limestone pans, and disturbed areas, SN, G, NH, WM, TS, CCR (semi-arid areas of southern Africa to tropical Africa).

scaber Lehm. KLIPGRAS Glandular hairy annual or short-lived perennial, up to 300 mm tall, with a strong, unpleasant smell when fresh. Leaves linear; ligule a fringe of hairs. Inflorescence an open panicle, green to dark grey. Spikelets 3–5 mm long, usually 3-flowered, green to almost black; glumes slightly unequal, nerves distinct; lemma very long hairy, 9-awned, awns glabrous to scabrid, awns as long as or extending beyond glumes; anthers 0.8–1 mm long. Sept.–Mar. Stony upper slopes, SN, G, NH, KB, KV, WM, TS, CCR (Namibia, N Cape to dry, karroid regions of W Cape).

ERAGROSTIS LOVE GRASS 300 spp., cosmopolitan

A. Plants annual

brizantha Nees Tufted annual, up to 0.5 m tall. Leaves linear; ligule a fringe of hairs. Inflorescence a panicle, lowest branches not whorled. Spikelets densely crowded, up to 5 × 2–4.5 mm, many-flowered, pallid, green to purplish, rhachilla fragile, breaking from apex downwards, awnless; glumes subequal; lateral nerves of lemma with small glandular dots; anthers 1–1.2 mm long. Feb.–May and July–Nov. Sandy and calcareous soils along rivers and in disturbed areas, SN (Namibia, Gariep Valley, northern Karoo and adjoining southern Botswana).

homomalla Nees Loosely tufted annual, up to 0.5 m tall. Leaves linear; ligule a fringe of hairs. Inflorescence a panicle, lowest branches not whorled. Spikelets on stout pedicels, irregularly and densely arranged on primary branches, 2–7 × 0.7–1 mm, many-flowered, green and red to deep red, rhachilla ± persistent, awnless; glumes unequal, shorter than spikelet; lateral nerves of lemma distinct, glandular; anthers 0.3 mm long. Jan.–May. Depressions and around seasonally wet areas, TS, CCR (southern Tanqua Karoo, Little Karoo and southern African interior).

procumbens Nees Tufted annual, up to 0.5 m tall, often procumbent or geniculate. Leaves linear, flat or involute; ligule a fringe of hairs. Inflorescence a contracted panicle with branches adpressed to main axis, lowermost branches not whorled. Spikelets dense, 5–7 × 1.7–2.5 mm, green to grey to straw-coloured, rhachilla persistent but fragile above, awnless; glumes subequal, shorter than spikelet, lateral nerves of lemma distinct; anthers 0.2–0.3 mm long. Oct.–June. Disturbed areas, WM, TS (low rainfall areas of the southern African interior and Namibia).

A.' Plants perennial

bicolor Nees Tufted, glandular perennial, up to 0.6 m tall, rhizomes short, oblique. Leaves linear; ligule a fringe of hairs. Inflorescence a panicle, usually open, lowest branches not whorled. Spikelets up to 8 × 1–2 mm, many-flowered, rhachilla persistent, awnless; glumes subequal, shorter than spikelet; lemma bicoloured, usually deep purple with yellow apex, lateral nerves distinct; anthers 0.8–1.2 mm long. Oct.–May. In water or moist places around seasonal pans and dams, WM (low rainfall areas of the southern African interior, Zimbabwe and Mozambique).

curvula (Schrad.) Nees BERG-SOETGRAS, BLOUSAADGRAS Variable, densely tufted perennial, up to 1 m tall. Basal sheaths hard, nerves forming prominent ridges, densely hairy between nerves. Leaves linear, with long, tapering, filiform tips; ligule a fringe of hairs. Inflorescence a much-branched open or contracted panicle, lowermost branches whorled or not. Spikelets 4–10 × 1–1.5 mm, many-flowered, dark greyish green, awnless, rhachilla persistent or fragile above only; glumes unequal, shorter than spikelet; anthers 0.6–1 mm long. Jan.–Dec. Disturbed sites and grassland, NS, NH, KV, WM, CCR (throughout southern and tropical Africa).

nindensis Ficalho & Hiern Densely tufted, eglandular perennial, up to 0.9 m tall. Leaves linear, often filiform; ligule a fringe of hairs. Inflorescence a panicle, lower branches not whorled. Spikelets in clusters on short, often stiffly spreading side branches, 3–19 × 1.5–4 mm, strongly laterally compressed, sides jagged, many-flowered, yellowish green, rhachilla fragile, breaking from apex downwards, awnless; glumes subequal, shorter than spikelet; lateral nerves of lemma indistinct; anthers 1–1.4 mm long. Oct.–June. Rocky outcrops and bare exposed areas, G (widespread; South Africa, Namibia and northwards to Tanzania).

obtusa Munro ex Ficalho & Hiern KWAGGAKWEEK Perennial, up to 450 mm tall. Leaves linear; ligule a fringe of hairs. Inflorescence an open to contracted panicle, lowest branches not whorled. Spikelets 3–5 × 3–4 mm, rotund, sides rounded, rhachilla very fragile and breaking from apex downwards, glumes blunt, boat-shaped, subequal; lemma obtuse, lateral nerves distinct, glandless; anthers 0.8–1.3 mm long. July–May. Sandy or limestone soils often in disturbed areas, WM, TS, CCR (southern Africa).

sarmentosa (Thunb.) Trin. Mat-forming perennial, up to 400 mm tall. Leaves mainly cauline; ligule a fringe of hairs. Inflorescence a densely contracted panicle with spikelet groups often distant on thick pedicels, lowermost branches not whorled. Spikelets 3–7 × 1.5–1.7 mm, many-flowered, greyish green to purple, awnless; glumes unequal, lower lemma 1.5 mm long; anthers 0.2–0.3 mm long. July–May. Sandy soils in wet places, SN, G, KB, KV, CCR (Gariep Valley to Cape Peninsula to tropical Africa).

walteri Pilg. Perennial, tufted or occasionally floating in water to over 1 m long, culms either straggling and matted or erect and sometimes bent. Leaves mainly cauline, linear, often short and pungent; ligule a fringe of hairs. Inflorescence a narrow, sparsely branched panicle, up to 120(–140) mm long, lowermost branches not whorled. Spikelets up to 7 × 1.5–3 mm, many-flowered, light green to purple, rhachilla ± persistent, fragile in upper part, apices of glumes and lemmas awned; glumes unequal to ± equal, shorter than spikelet; lemma awn up to 0.5 mm long, nerves distinct; anthers 0.6–1 mm long. Year-round. In damp, brackish soils around seepage areas or in running water, G (northern Namibia to southern Namibian Escarpment).

FESTUCA FESCUE 450 spp., pantemperate, subtropical and tropical mountains

scabra Vahl MUNNIKSGRAS Perennial, up to 0.9 m tall, culms with swollen bases; basal leaf sheaths velvety below, fibrous with age. Leaves linear, often rolled; ligule an unfringed membrane. Inflorescence a narrow, contracted panicle, occasionally spike-like. Spikelets 7–15 × 3–5 mm, elliptic, green and straw-coloured, occasionally flushed purple, many-flowered, minutely awned or awnless, awn not twisted; glumes unequal to ± equal; lemma scabrid, not hairy, lateral nerves obvious; anthers 2.2–2.5 mm long. Sept.–Dec. Dry flats and slopes, NH, KB, WM, TS, CCR (Kamiesberg Mountains to Cape Peninsula through to moist southern and eastern South Africa and Limpopo Province).

FINGERHUTHIA VINGERHOEDGRAS 2 spp., tropical and southern Africa

africana Lehm. KALKVINGERHOEDGRAS Perennial, rarely annual, up to 0.8 m tall. Leaves linear; ligule a fringe of hairs. Inflorescence a dense, cylindrical, spike-like panicle. Spikelets 4–5.5 mm

long; strongly laterally compressed, falling entirely, silvery often purple, 2–4-flowered, awned, awns not twisted below; glumes ± equal, as long as spikelet (including awn), densely hairy on keels, 1-nerved; lemmas 4–7 mm long (excluding awns). Sept.–Dec. Well-drained soils often with limestone, SN, G, NS, NH, KV, WM, CCR (widespread in southern and S tropical Africa and in Arabia, Afghanistan and Pakistan).

HELICTOTRICHON 90 spp., pantemperate, including tropical mountains

barbatum (Nees) Schweick. Densely tufted perennial, up to 0.8 m tall, basal sheath splitting into fibres with age. Leaves linear, flat; ligule an unfringed membrane. Inflorescence an open panicle. Spikelets 14–20 mm long (excluding awns), many-flowered, pallid but flushed purple, awned; glumes unequal, shorter than spikelet; lemma nerves distinct, lobes long-awned, central awn 27 mm long, bent, basally twisted. Nov. Lower slopes of mountains, rare, KB, WM (Kamiesberg Mountains and Hantamsberg). **(ece)**

namaquense Schweick. Densely tufted perennial, up to 450 mm tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence an open panicle, lower branches sometimes spreading. Spikelets 10–17 mm long (excluding awns), many-flowered, flushed purple, awned; glumes unequal, as long as spikelet but some awns exerted, lemma lobes awned, central awn 20 mm long, basally twisted. Sept. Rare on sandy plains, KB, WM (Kamiesberg Mountains and Hantamsberg). **(ece)**

roggeveldense Mashau, L.Fish & A.E.van Wyk Like **H. namaquense** but panicle open, branch axils with purple pulvini, inflorescence with up to 10 spikelets (vs. 15–18), and anthers 4.5 mm (vs. 1.7–2.6 mm) long. Sept. In sandy to clayey soils in renosterveld, WM (Roggeveld Escarpment: S and SW of Sutherland). **(ece)**

HEMARTHRIA ± 12 spp., Africa, Madagascar, tropical Asia

altissima (Poir.) Stapf & C.E.Hubb. PERDEGRAS Erect or sprawling perennial to over 1 m tall, rooting at lower nodes. Leaves linear, flat; ligule a fringed membrane. Inflorescence often difficult to distinguish from rest of plant, leafy with many single racemes or a solitary raceme subtended by the uppermost leaf. Spikelets 5–7 mm long, paired in a sessile and pedicellate combination of dissimilar spikelets, the sessile spikelets embedded in the axis and the pedicellate ones not-sunken, dorsally compressed, awnless, 2-flowered; glumes as long as spikelet. Oct.–June. Marshes and streambanks, SN, CCR (Gariep Valley and widespread from southern Africa to tropical Africa).

HOLCUS 8 spp., Mediterranean, Asia, South Africa

setiger Nees Annual, up to 300 mm tall. Leaves linear, shortly hairy; ligule a fringed membrane covered with hairs. Inflorescence a contracted, dense panicle. Spikelets 3–4 mm long, 2-flowered, pale green sometimes flushed purple; glumes longer than spikelet, hairy on keel and margins, awn of upper glume 2–6 mm; lower floret fertile, usually firm and shiny; upper floret sterile, lemma awned, awn stout and bent; anthers ± 0.5 mm long. Oct.–Dec. Damp lower slopes, NH, KB, CCR (Kamiesberg Mountains to George). **(gce)**

HORDEUM BARLEY 20 spp., temperate

capense Thunb. CAPE WILD BARLEY Perennial, up to 0.7 m tall. Leaves linear, rigid, without auricles, becoming fibrous below; ligule an unfringed membrane. Inflorescence a 2-ranked, dense, false spike. Spikelets grouped and falling in threes, middle fertile, laterals often reduced to awns up to 20 mm long; glumes of lateral spikelets scabrid. Fertile spikelet 1-flowered. Nov.–Dec. Wet areas or roadsides, NH, WM, TS, CCR (Kamiesberg Mountains to Free State and Lesotho).

***geniculatum** All. MEDITERRANEAN BARLEY Loosely tufted annual, up to 400 mm tall. Leaves linear, flat, soft, with auricles, apex acuminate, margins scabrid; ligule an unfringed membrane. Inflorescence a 2-ranked, dense, false spike. Spikelets grouped and falling in threes, middle fertile, 1-flowerd; laterals often reduced to awn-like scales up to 20 mm long; glumes of lateral spikelets scabrid. Fertile spikelet 1-flowered. Sept.–Nov. Roadsides and moist disturbed places, NS, NH, KB, WM (Mediterranean weed).

***murinum** L. FALSE BARLEY Annual, up to 0.5 m tall. Leaves linear, soft, with auricles; ligule an unfringed membrane. Inflorescence a 2-ranked dense false spike. Spikelets grouped and falling

in threes, with the middle one fertile, green and purple; laterals long-awned, up to 50 mm long; glumes long-ciliate at base. Fertile spikelet 1-flowered. Oct.–Dec. Disturbed places, NS, NH, KV, WM, TS, CCR (European weed).

HYPARRHENIA 53 spp., mainly Africa and Mediterranean, also tropical America and Asia

hirta (L.) Stapf THATCH GRASS Perennial, up to 2 m tall. Leaves linear, 1–2 mm wide; ligule an unfringed membrane. Inflorescence a leafy false panicle of paired, white hairy racemes 20–40 mm long, never deflexed, subtended by spathes, raceme pairs with 8–14 awns, spikelets paired in sessile and pedicellate combination of dissimilar spikelets. Sessile spikelets 4–6.5 mm long; awn 10–30 mm long, hairy. Pedicelled spikelets 3–7 mm long, sterile, awnless. Nov.–May. Disturbed areas and grassland, G, NH, CCR (widespread through Africa and Mediterranean).

KOELERIA ± 60 spp., temperate regions

capensis (Steud.) Nees POLGRAS, STRANDGRAS Variable perennial, up to 0.7 m tall. Leaves linear; ligule an unfringed membrane, very fimbriate and appearing fringed, or occasionally ciliolate. Inflorescence a dense cylindrical, spike-like, often silvery panicle, sometimes interrupted at base. Spikelets 3.5–4 × 1–2.5 mm, 2–many-flowered, glumes ± equal to longer than spikelet, margins hyaline, sometimes mucronate, 1–3-nerved; lemma apex entire, keeled, acute, not lobed, glabrous or hairy, hairs up to 1.5 mm long, awnless, mucronate or minutely awned. Nov.–Feb. Coastal sands and mountain slopes, WM, CCR (southern and eastern regions of southern Africa northwards to Ethiopia and Cameroon).

LEPTOCHLOA ± 30 spp., pantropics and subtropics

fusca (L.) Kunth. SWAMP GRASS Perennial, up to 1.5 m tall, erect or branching, often rooting at lower nodes. Leaves linear; ligule a pointed unfringed membrane. Inflorescence of several racemes on an elongated central axis. Spikelets 6–14 mm long, olive green, many-flowered, glumes unequal, shorter than spikelet, upper 1-nerved; lemmas soft, hairy on nerves below, lobed, 3-nerved, mucronate to shortly awned, awn not basally twisted. Oct.–May. Damp to wet areas, NS, NH, KB, WM, CCR (throughout Africa and Old World Tropics).

LEUCOPHRYS 1 sp., arid areas of N Cape and Namibia into Angola

mesocoma (Nees) Rendle Woody, much-branched perennial, up to 1 m tall, nodes swollen. Leaves flat or rolled, spiny; ligule a fringe of hairs. Inflorescence a contracted panicle. Spikelets 6–8 mm long, awnless; glumes equal, as long as to longer than spikelet, upper glume apex awn-like, with long hairs in transverse fringes or tufted from middle to apex; 2-flowered, lower male, lemma with long hairs in tufts or transverse fringe just above the middle; upper lemma hard. Feb.–May. Sandy riverbeds, SN, G (central and southern Namibia into northern Karoo).

*LOLIUM RYE 12 spp., temperate Eurasia

*__temulentum__ L. Annual to 1 m tall. Leaves linear; ligule an unfringed membrane. Inflorescence a simple, true spike; 100–300 mm long. Spikelets 8–28 mm long, laterally compressed, glabrous, awnless, sunk and lying edgeways in partial cavities on main axis, separated by ± own length, one edge against rhachis, green, many-flowered; glumes usually 1, with 2 only in terminal spikelets, as long as spikelet; lemmas rounded, swollen at maturity, awnless or with awn up to 20 mm long. Sept.–Feb. Disturbed areas, NS, KV, CCR (widespread European weed).

*LOPHOCHLOA ± 85 spp., temperate regions

*__pumila__ (Desf.) Bor. Tufted annual, up to 400 mm tall. Leaves linear; ligule an unfringed membrane. Inflorescence a contracted spike-like panicle. Spikelets 2.5–4 mm long, 2–many-flowered; glumes shorter than to nearly as long as spikelet, upper glume densely pubescent, awnless; lem-

ma awn 1.5–4 mm long, straight, not basally twisted, inserted just below apex. Sept.–Jan. Dry or rocky places, G, NS, NH, KV, TS, CCR (European weed from Gariep Mouth southwards to Laingsburg and Swellendam).

MELICA ± 80 spp., N and S temperate regions, excluding Australia

decumbens Thunb. Tufted perennial, up to 0.5 m tall. Leaves linear, usually rolled, strongly scabrous; ligule an unfringed membrane. Inflorescence a contracted panicle. Spikelets 10–15 mm long, awnless, many-flowered but only lower 2 bisexual; glumes as long as to longer than spikelet; lemma long hairy on back and margins, hairs 3–6 mm long. Oct.–Apr. Rocky areas on mountain slopes, WM (central South Africa and Lesotho).

racemosa Thunb. HAAKGRAS, DRONKGRAS Perennial, up to 1 m tall. Leaves linear, often scabrous; ligule an unfringed membrane. Inflorescence a silvery raceme or contracted panicle. Spikelets 5–9(–11) mm long, awnless, many-flowered but only lower 2 bisexual; glumes equal to spikelet; lemma long hairy on margins only, hairs 3–6 mm long. Oct.–Mar. Slopes and flats, TS, CCR (Bokkeveld Mountains and southern Karoo to KwaZulu-Natal and Lesotho).

MERXMUELLERA see **ELLISOCHLOA**

ODYSSEA 2 spp., Africa and Arabia

paucinervis (Nees) Stapf Spiny, mat-forming perennial, up to 0.75 m tall. Leaves needle-like, rigid and pungent; ligule a fringe of hairs. Inflorescence a contracted, spike-like panicle. Spikelets 4–12 mm long, often flushed purple, many-flowered; glumes unequal, shorter than spikelets, 1-nerved; lemmas long hairy, mucronate or with awn < 0.5 mm long. Oct.–May. Salt marshes and seasonal pans, SN, G, NS, KV, CCR (widely scattered in southern Africa to tropical Africa).

PANICUM PANIC GRASS ± 470 spp., pantropical and warm temperate regions

maximum Jacq. GUINEA GRASS Perennial, sometimes annual, up to 2 m tall. Leaves lanceolate; ligule a fringed membrane. Inflorescence an open panicle. Spikelets 2.5–5 mm long, awnless; glumes unequal, lower up to half as long as spikelet, upper 5-nerved; 2-flowered, lower floret male or rarely sterile, soft; upper floret fertile, lemma hard and transversely wrinkled. Jan.–May. Shady places and along roadsides, KV, CCR (Vredendal and Cape Peninsula to tropical Africa).

repens L. COUCH PANICUM, KRUIPGRAS Rhizomatous perennial, up to 1 m tall. Leaves linear, mostly cauline, often pungent; ligule a fringe of hairs or a fringed membrane. Inflorescence an open, narrowly oblong panicle; branches erect. Spikelets 2–3 mm long, awnless; glumes unequal, lower a third as long as spikelet, upper 7–9-nerved; 2-flowered, lower floret male, soft; upper floret fertile, lemma hard, pale, smooth and glossy. Oct.–June. Wet, sandy soils, KV, CCR (Namaqualand to Cape Peninsula, George to tropical Africa).

*PARAPHOLIS 6 spp., Mediterranean and Middle East

***incurva** (L.) C.E.Hubb. Annual, up to 300 mm tall. Leaves linear; ligule an unfringed membrane. Inflorescence a simple cylindrical, usually curved spike, 10–80 mm long, difficult to distinguish from rest of culm at first glance. Spikelets 4–7 mm long, laterally compressed, 1-flowered, awnless, alternate and embedded on a straight, hollowed and jointed rhachis, falling with the joints; glumes as long as spikelet, placed side by side on rhachis. Aug.–Oct. Infrequent roadside weed, NS, NH, KB, KV, TS, CCR (European weed from Kamieskroon southwards and along coast to Port Elizabeth, with scattered inland records).

PASPALUM ± 300 spp., mainly neotropics and subtropics

***dilatatum** Poir. DALLIS GRASS Rhizomatous perennial, up to 2 m tall; base hairy. Leaves linear; ligule an unfringed membrane. Inflorescence of 4–9, 1-sided racemes scattered up central axis. Spikelets in 2–4 rows, 3–4 mm long, green, ovate, margins fringed with white hairs, awnless;

glumes unequal, lower occasionally absent; 2-flowered; lower floret sterile, soft; upper lemma hard, pallid. Oct.–May. Disturbed, damp places, KV, CCR (S American weed, widespread except in dry areas of semi-arid regions).

*__distichum__ L. BANKROTKWEEK Creeping, hydrophytic perennial, up to 300 mm tall. Leaves linear; ligule an unfringed membrane. Inflorescence digitate with 2 or 3, 1-sided racemes. Spikelets in 2 rows, 2.5–3.5 mm long, green, ovate, minutely hairy all over, hairs short, awnless; 2-flowered; upper glume as long as to longer than and covering spikelet; lower floret sterile, soft; upper lemma hard, pallid. Nov.–May. Near fresh or brackish water, SN, CCR (Gariep Mouth and W Cape, widespread elsewhere except in dry parts of semi-arid regions, weed from S America).

PENNISETUM 70 spp., warm regions

*__macrourum__ Trin. BEDDINGGRAS Perennial, up to 1.7 m tall. Leaves linear; ligule a fringe of hairs. Inflorescence a long, spike-like, cylindrical panicle, 120–250 mm long, involucral bristles glabrous and scabrid, mostly as long as spikelets, free at base, falling with spikelets (in *Setaria* bristles remain on axis). Spikelets 4–6 mm, straw-coloured; glumes unequal, upper reaching up to a quarter as long as spikelet; 2-flowered, lower floret male or sterile; upper floret similar in texture to rest of spikelet. Nov.–May. Marshes, WM, CCR (Bokkeveld Mountains to tropical Africa).

PENTAMERIS (= *PENTASCHISTIS*, *PRIONANTHIUM*) 84 spp., N and W Cape to Ethiopia, Cameroon and Madagascar

A. Spikelets up to 5 mm long
B. Spikelets awned

__airoides__ Nees Annual, up to 350 mm tall, with glandular leaves, pedicels and glumes. Leaves linear, villous above; ligule a fringe of hairs. Inflorescence an open, hemispherical panicle, 20–60 mm long. Spikelets 2.5–5 mm long, 2-flowered, both bisexual; glumes ± equal, as long as spikelet (excluding awns), 1-nerved; lemmas glabrous to hairy, lobed, central awn 5–8 mm long, basally twisted, awns well exserted; anthers 0.3–1 mm long. Aug.–Oct. Light shade on lower slopes, SN, G, NS, NH, KB, WM, CCR (Namaqualand through Karoo to Drakensberg Mountains).

__aristifolia__ (Schweick.) Galley & H.P.Linder (= *Pentaschistis aristifolia* Schweick.) Annual, up to 250 mm tall, eglandular. Leaves linear, villous, apex with long slender setae; sheath mouth ringed with bristles; ligule a fringe of hairs. Inflorescence an open panicle, 60–100 mm long. Spikelets 2.5–3 mm long, 2-flowered, both bisexual; glumes ± equal, as long as spikelet (excluding awns), 1-nerved; lemmas hairy, awned and lobed, central awn 5–7 mm long, basally twisted, awns well exserted; anthers 0.6 mm long. Sept.–Oct. Heavy soils derived from Karoo sediments, WM (Nieuwoudtville to Sutherland). **(ece)**

__patula__ (Nees) Steud (= *Pentaschistis patula* (Nees) Stapf) Annual, up to 300 mm tall, with glandular or eglandular leaves and pedicels. Leaves linear, usually hairy, sheath mouth ringed with bristles; ligule a fringe of hairs. Inflorescence an open panicle, 50–100 mm long. Spikelets 3.3–5 mm long, green or yellow and purple, 2-flowered, both bisexual; glumes ± equal, as long as spikelet (excluding awns), 1-nerved; lemma hairy, lobe awns not exserted, central awn 4–12 mm long, basally twisted; anthers 1.9–2.5 mm long. Sept.–Oct. Sandstone slopes and flats, NS, NH, KB, KV, WM, CCR (through Namaqualand to Elandskloof Mountains and Worcester). **(gce)**

__tomentella__ (Stapf) Galley & H.P.Linder (= *Pentaschistis tomentella* Stapf) Perennial, up to 300 mm tall, with glandular leaf sheaths, pedicels and glumes. Leaves linear, puberulous or villous; ligule a fringe of hairs. Inflorescence a contracted panicle, 30–50 mm long. Spikelets 4–5 mm long, straw-coloured, 2-flowered, both bisexual; glumes ± equal, as long as spikelet (excluding awns), 1-nerved; lemma hairy, lobe awns not exserted, central awn 3–5 mm long, basally twisted; anthers 2 mm long. Sept.–Oct. Dry slopes and flats, NS, NH, KB, WM, CCR (throughout Namaqualand to Clanwilliam). **(gce)**

B.' Spikelets awnless

__capillaris__ (Thunb.) Galley & H.P.Linder (= *Pentaschistis capillaris* (Thunb.) McClean) Annual, up to 400 mm tall, with glandular leaves and pedicels. Leaves linear, villous beneath; ligule a fringe of hairs. Inflorescence an open panicle, 40–100 mm long. Spikelets 3 mm long, glabrous, awnless;

glumes ± equal, as long as spikelet, 2-flowered, both bisexual; 1-nerved; lemma glabrous; anthers 1.5–2 mm long. Sept.–Oct. Sandy flats and lower slopes, G, NS, NH, KB, CCR (Richtersveld through Namaqualand to Saldanha). **(gce)**

malouinensis (Steud.) Galley & H.P.Linder (= *Pentaschistis malouinensis* (Steud.) Clayton) Perennial, up to 300 mm tall, eglandular. Leaves linear, often rolled; ligule a fringe of hairs. Inflorescence a lax open or contracted panicle, 20–80 mm long. Spikelets 3.4–4.5 mm long, yellow or green, apex brown, hairy, awnless, 2-flowered, both bisexual; glumes ± equal, as long as spikelet, 1-nerved; lemma hairy; anthers 2–2.2 mm long. Nov.–Jan. Dry sandstone slopes, often on rocks and ledges, ?KB, CCR (?Kamiesberg Mountains and from Cederberg Mountains to Humansdorp). **(gce)**

A.' Spikelets > 5.5 mm long

eriostoma (Nees) Steud. (= *Pentaschistis eriostoma* (Nees) Stapf) Perennial, up to 0.9 m tall, in dense tussocks, eglandular. Leaves linear, rigid, usually rolled, sheath and sheath mouth woolly; ligule a fringe of hairs. Inflorescence an open panicle, 50–100 mm long. Spikelets 8–12 mm long, 2-flowered, both bisexual; glumes ± equal, as long as spikelet (excluding awns), 1-nerved; lemma hairy, lobe awns not exserted, central awn 10–17 mm long, basally twisted; anthers 2.7–3.5 mm long. Sept.–Nov. Sandstone and clay slopes and flats, NS, NH, KB, WM, CCR (Namaqualand to E Cape).

horrida (Galley) Galley & H.P.Linder (= *Pentaschistis horrida* Galley) Cushion-forming perennial, 150–400 mm tall, forming 'fairy rings' at maturity, without glands. Leaves placed on stem, 40–200 mm long, rolled, rigid, with pungent apex; ligule a fringe of hairs. Inflorescence 70–90 mm long; pedicels mostly erect, glabrous, but nodes hairy. Spikelets up to 7.5 mm long, 2-flowered, both bisexual; glumes ± equal, longer than spikelet (excluding awns), 1-nerved, glabrous; lemma with scattered hairs, awns of lobes not exserted; central awn 8 mm long, basally twisted; anthers 2.1–2.8 mm long. Oct.–Nov. Dry slopes in open areas, WM, CCR (Roggeveld Escarpment and Cederberg to Kouga Mountains). **(gce)**

lima (Nees) Steud. (= *Pentaschistis lima* (Nees) Stapf) Tufted, stoloniferous perennial, up to 450 mm tall, with glandular pedicels and glumes. Leaves linear, rolled, occasionally pungent; ligule a fringe of hairs. Inflorescence a contracted panicle, 80–120 mm long. Spikelets 6–7 mm long; glumes ± equal, as long as spikelet (excluding awns), 1-nerved; 2-flowered, both bisexual; lemma glabrous, lobe awns not exserted, central awn 6 mm long; anthers 3 mm long. Nov.–Dec. On granitic soils, KB (Kamiesberg Mountains). **(ece)**

pallida (Thunb.) Galley & H.P.Linder (= *Pentaschistis pallida* (Thunb.) H.P.Linder) Loosely tufted to almost matted, variable perennial, up to 400 mm tall, eglandular or with glandular leaves, pedicels and glumes. Leaves linear, sometimes rolled; ligule a fringe of hairs. Inflorescence a contracted panicle, 20–80 mm long. Spikelets 6–7 mm long, straw- to purple- coloured, 2-flowered, both bisexual; glumes ± equal, as long as spikelet (excluding awns), 1-nerved; lemma hairy, awns of lobes well exserted, central awn 6–7 mm long, basally twisted; anthers 1.5–2 mm long. Sept.–Oct. Slopes and flats, NH, KB, KV, WM, TS, CCR (Namaqualand to E Cape).

rigidissima (H.P.Linder) Galley & H.P.Linder (= *Pentaschistis rigidissima* Pilg. ex H.P.Linder) Cushion-forming perennial, 150–200 mm tall, forming small tufts, eglandular. Leaves linear, rolled, apices sometimes pungent; ligule a fringe of hairs. Inflorescence a contracted panicle almost spike-like panicle, 20–60 mm long, with villous nodes. Spikelets 6–8 mm long, 2-flowered, both bisexual, greenish; glumes ± equal, longer than spikelet (excluding awns), 1-nerved, glabrous; lemma 7–9-nerved, hairy; lateral awns not exserted, central awn 8–12 mm long; anthers 1.4–1.8 mm long. Oct.–Feb. In crevices and beside rocks in cool moist shaded sites, KB, CCR (Kamiesberg and Cederberg Mountains to Great Winterhoek Mountains). **(gce)**

*PHALARIS 15 spp., N and S temperate regions

***minor** Retz. SMALL CANARY GRASS, KANARIEGRAS Annual, up to 1 m tall, loosely tufted. Leaves linear; ligule an unfringed membrane. Inflorescence a spike-like, cylindrical panicle. Spikelets 4–6 mm long, awnless; glume keels narrowly but conspicuously winged; lowest floret sterile and minute; upper floret fertile. Sept.–Jan. Disturbed ground, G, NS, NH, KV, WM, CCR (Mediterranean weed, widespread but mainly in W Cape and along E Cape coast with sporadic records elsewhere).

PHRAGMITES COMMON REED, FLUITJIESRIET 3 spp., cosmopolitan

australis (Cav.) Trin. ex Steud. Robust, reed-like perennial, up to 4 m tall. Ligule a fringe of hairs (unlike *Arundo donax* with a fringed membranous ligule). Leaves cauline, lanceolate, deciduous at base of blade. Inflorescence a plumose panicle, brown and white, 300–500 mm long, branches dropping at maturity. Spikelets 10–18 mm long; awned or awnless, long-acuminate, many-flowered; rhachilla hairs 5–10 mm long; lemma glabrous. Feb.–May. Marshes, streams and seeps, SN, G, NS, NH, KB, WM, TS, CCR (widespread and worldwide).

POA ± 300 spp., cosmopolitan

*__annua__ L. ANNUAL WINTER GRASS Soft, bright green annual, sometimes biennial, up to 300 mm tall. Leaves linear-oblong, flaccid; ligule an unfringed membrane. Inflorescence a pyramidal panicle. Spikelets 4–6 × 1.3–2.3 mm, awnless, 3–many-flowered; glumes shorter than spikelet, lower glume 1.5–3 mm long, 1-nerved; rhachilla not or only tardily breaking up; lemmas glabrous or hairy, keeled, 5-nerved. Jan.–Dec. Disturbed areas, KV, CCR (European weed, widespread except in semi-arid region).

*__bulbosa__ L. Perennial, up to 300 mm tall, culms swollen below ground. Leaves linear-filiform, mostly basal; ligule an unfringed membrane. Inflorescence a panicle, usually extending well above basal leaves. Spikelets 4–6 mm long, awnless; lower glume 1-nerved, upper 3-nerved; 2–many-flowered; producing plantlets in the spikelets, rarely making functional flowers, lower bracts soft and short, followed by a number of hard bracts, long drawn out like horns. Aug.–Oct. Sandstone slopes in richer soils, often in renosterveld, NH, KB, KV, WM, TS, CCR (Mediterranean weed).

POLYPOGON BAARDGRAS 15 spp., pantropical and warm temperate regions

*__monspeliensis__ (L.) Desf. BRAKBAARDGRAS Annual, up to 0.5 m tall. Leaves linear; ligule an unfringed membrane. Inflorescence an ovoid, contracted, bristly panicle. Spikelets 2–3 mm long, disarticulating as an entire unit; glume awn 4–10 mm long. Sept.–Apr. Damp lower slopes, SN, G, NS, NH, KV, WM, CCR (widespread cosmopolitan weed).

*__viridis__ (Gouan) Breistr. Annual or perennial, up to 0.6 m tall. Leaves linear-lanceolate; ligule an unfringed membrane. Inflorescence an open panicle. Spikelets 1.5–2 mm long, disarticulating as an entire unit, awnless; lemmas glabrous, shiny. Sept.–Jan. Damp lower slopes, SN, G, NS, NH, TS, CCR (widespread European weed).

PUCCINELLIA BRAKGRAS 100 spp., N temperate and southern African regions

__acroxantha__ C.A.Sm. & C.E.Hubb. Loosely tufted perennial, up to 0.6 m tall. Leaves linear; ligule an unfringed membrane. Inflorescence a panicle. Spikelet 3–5 × 1–2 mm, many-flowered, awnless; glumes shorter than spikelet; lower glume 1-nerved, upper 3-nerved; lemma rounded, glabrous or hairs present at base, 5-nerved. Jan. Wet habitats in soils of varying salinity, WM (Loeriesfontein and Roggeveld Escarpment eastwards to Free State).

__angusta__ (Nees) C.A.Sm. & C.E.Hubb. Densely tufted perennial, up to 0.6 m tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence a linear panicle, with slender branches appressed to main axis. Spikelets 4–5.5 × 1–2 mm, awnless; glumes shorter than spikelet; lower glume 1-nerved, upper 3-nerved; many-flowered; lemmas rounded, glabrous or hairs present at base, 5-nerved. Aug.–Oct. Disturbed areas in moist, strongly saline soils, WM, CCR (scattered from W Cape to Free State).

*__distans__ (L.) Parl. Tufted perennial, up to 0.65 m tall. Leaves linear, flat; ligule an unfringed membrane. Inflorescence a pyramidal or elongated panicle, branches spreading, often horizontally or deflexed. Spikelets 4–8 × 1–1.5 mm, congregated on the upper half of panicle branches with lower part free of spikelets, awnless, many-flowered; glumes shorter than spikelet; lower glume 1-nerved, upper 3-nerved; lemma rounded, glabrous or hairs present at base, 5-nerved. Apr., June, July, and Oct. Wet, often very saline habitats, G, KB, CCR (cosmopolitan weed).

*__fasciculata__ (Torr.) Bickn. Tufted perennial, up to 400 mm tall. Leaves linear; ligule an unfringed membrane. Inflorescence a compact panicle with stiff branches bearing spikelets to base. Spikelets

4–7 × 1–1.5 mm, awnless, many-flowered; glumes shorter than spikelet; lower glume 1-nerved; upper 3-nerved; lemmas rounded, glabrous or long hairs present at base, 5-nerved. Sept.–Jan. Wet habitats, often saline and disturbed, SN, NH, WM, CCR (European weed).

SCHISMUS 5 spp., Africa, Mediterranean to India

barbatus (Loefl. ex L.) Thell. WINTERHAASGRAS Annual, up to 250 mm tall. Leaves linear, rolled; ligule a fringed membrane or a fimbriate, unfringed membrane. Inflorescence a compact panicle. Spikelets 4–7 mm; long, narrowly lanceolate, 5–10-flowered; glumes ± equal, scabrid, shorter to longer than spikelet, 5–7-nerved; lemmas rounded, lobed or shallowly notched, backs pubescent with club-shaped hairs, hairs 0.2–0.5 mm long, mucro up to 1 mm long present or absent, 7–9-nerved; anthers 0.2–0.4 mm long. June–Dec. Sandy slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (widespread from Namibia, SW Cape and Karoo to Free State and Lesotho).

inermis (Stapf) C.E.Hubb. Perennial, up to 400 mm tall. Leaves linear; ligule a fringe of hairs or a fringed membrane. Inflorescence a compact panicle. Spikelets 4.5–7 mm long, 4–6-flowered; glumes ± equal, scabrid, shorter to longer than spikelet, 5–7-nerved; lemmas rounded, lobed or shallowly notched, densely pubescent, hairs up to 1.5 mm long, mucro up to 1 mm long or absent, 7–9-nerved; anthers 0.8–1.2 mm long. June–Feb. Dry slopes, NH, KB, KV, WM, CCR (widespread from southern Namibia to Upper Karoo, W Cape and E Cape).

scaberrimus Nees Tufted perennial, up to 450 mm tall. Leaves linear; ligule a fringe of hairs or a fimbriate, unfringed membrane. Inflorescence a panicle. Spikelets 5–7 mm long, many-flowered; glumes ± equal, scabrid, shorter to longer than spikelet, 5–7-nerved; lemmas rounded, lobed or shallowly notched, sparsely hairy across back, often densely hairy on margins, hairs up to 1.5 mm long, mucronate or mucro absent, 7–9-nerved; anthers 0.8–1.2 mm long. Sept.–Oct. Sandy areas, NH, KB, KV, WM, TS, CCR (Namaqualand and western Karoo to Cape Peninsula). **(gce)**

schismoides (Stapf ex Conert) Verboom & H.P.Linder (= *Karroochloa schismoides* (Stapf ex Conert) Conert & Türpe) Tufted annual, up to 150 mm tall. Leaves linear, flat or rolled, never hispid; ligule a fringe of hairs. Inflorescence a contracted panicle. Spikelets 4.5–6 mm, often flushed purple, many-flowered; glumes longer than spikelet (excluding awns), 3–7-nerved; lemma fringed with long hairs across middle and on margins, lobes shortly awned, central awn 3–4.5 mm long, lower part or column twisted. Resembles species of *Schismus* but here lemma's central awn is not twisted in the column or lower part. Usually July–Oct. Dry mountains, SN, G, NS, NH, KB, KV (Namibia to Vanrhynsdorp).

SCHMIDTIA 2 spp., Africa and Pakistan

kalahariensis Stent Annual, up to 1 m tall, densely glandular hairy. Leaves linear to lanceolate; ligule a fringe of hairs. Inflorescence a spike-like panicle. Spikelets 6–17 mm long, many-flowered; glumes unequal, ± as long as spikelet, dark grey to greyish green, prominently 7-nerved; lemmas long, white hairy, 5-awned, lobes alternating with awns. Peaking in mid-summer. Poor sandy soils, SN, G, NS, NH, KV (Namibia to northern Namaqualand, Botswana and northern Karoo).

SECALE ± 5 spp., Mediterranean, E Europe to central Asia and South Africa

strictum (C.Presl.) C.Presl. WILD RYE, WILDEROG Perennial, up to 1 m tall. Leaves linear; ligule an unfringed membrane. Inflorescence a dense distichous spike, breaking up at maturity. Spikelets 10–15 mm long (excluding awns), strongly compressed laterally, 2- or 3-flowered; glumes unequal, upper as long as lemma (excluding awn); lemma keel scabrid, awn up to 20 mm long, scabrid. Dec. Deep alluvial soils mainly along riverbanks, WM (Roggeveld Escarpment near Sutherland). **(ece)**

SETARIA BRISTLE GRASS 110 spp., pantropical and warm temperate regions

pumila (Poir.) Roem. & Schult. Annual, up to 0.9 m tall, culm nodes glabrous. Leaves linear; ligule a fringed membrane. Inflorescence a spike-like panicle. Spikelets 2–2.8 mm long, subtended by 6–10 long, slender, stiff bristles, not falling with spikelets at maturity (see *Pennisetum*), awnless, 2-flowered; lower floret male or sterile; upper lemma hard, corrugated to rugose. Dec.–Apr. Dis-

turbed and weedy places, NH, KV (widespread, mostly in moister regions of southern Africa, and tropics worldwide).

SORGHUM ± 24 spp., southern Africa, tropical and subtropical regions of the Old World and Mexico, widely cultivated

bicolor (L.) Moench (including **S. arundinaceum** (Desv.) Stapf) COMMON WILD SORGHUM Tufted annual or short-lived perennial, up to 3 m tall. Leaves broad, flat; ligule a fringed membrane. Inflorescence a panicle 600 mm long with spreading branches. Spikelets many, dissimilar, these paired in a sessile-pedicelled combination. Sessile spikelets 5–7 mm long, 2-flowered, usually short hairy; awn up to 20 mm long or rarely awnless. Year-round but mainly Dec.–Mar. Moist, disturbed places and old farmland, G (throughout Africa, cultivated in America and India).

*SPARTINA ± 16 spp., coasts of Africa, temperate America and Europe

*__maritima__ (Curtis) Fernald STRANDKWEEK Perennial, up to 0.8 m tall, with rhizomes or stolons. Leaves rigid, spiny; ligule a fringed membrane. Inflorescence of 2 or 3, 1-sided, subdigitate spike-like racemes. Spikelets 12–15 mm long, strongly compressed laterally, hairy, awnless, 1-flowered; glumes very unequal. Nov.–Apr. Intertidal mud flats, estuaries or submerged in lagoons, SN, CCR (Lüderitz, Velddrif and along coast to Keiskamma River Mouth, European coast).

*SPHENOPUS 2 spp., Mediterranean to western Asia

*__divaricatus__ (Gouan) Rchb. Delicate annual, up to 200 mm tall. Leaves linear, rolled, thread-like; ligule a long unfringed membrane. Inflorescence a delicate, open panicle; pedicels club-shaped. Spikelets 2–3 × up to 1.5 mm, many-flowered, glumes and lemmas awnless, minutely awned or mucronate; glumes unequal, shorter than spikelet, lower glume 0.1–0.4 mm long, nerveless; lemmas glabrous, occasionally minutely scabrous. Aug.–Oct. Coastal mud flats and dune hollows, NS, NH, CCR (European weed, Springbok, Lokenburg and Elandsbaai to Yzerfontein).

SPOROBOLUS DROPSEED 150 spp., pantropical and warm temperate regions

fimbriatus (Trin.) Nees Perennial, up to 1.6 m tall. Leaves linear; ligule a fringe of hairs. Inflorescence an open panicle, branches spread at ± 60 degrees, lowest branches not whorled. Spikelets 1.4–2.2 mm long, awnless, glabrous, 1-flowered; glumes unequal; upper ⅔ as long as spikelet. Dec.–May. Disturbed areas, WM, CCR (Nuweveld Mountains and from Cape Peninsula to tropical Africa).

ioclados (Trin) Nees Perennial, up to 1 m tall; mat-forming with stolons, sometimes rhizomes present. Leaves linear; ligule a fringe of hairs. Inflorescence an open panicle, lowest branches whorled. Spikelets 1.5–2.5 mm long, awnless, glabrous, 1-flowered; glumes unequal, the upper from ⅔ to as long as the spikelet. Jan.–Apr. Saline flats, pans and floodplains, NH, WM (widespread from southern Africa to tropical Africa and India).

*__virginicus__ (L.) Kunth BRAKGRAS, SEA RUSH GRASS Creeping, stoloniferous and rhizomatous perennial, up to 300 mm tall. Leaves linear, rolled, pungent; ligule a fringe of hairs. Inflorescence a dense, spike-like panicle, lower branches not whorled. Spikelets 1.7–2.5 mm long, awnless, glabrous, 1-flowered; glumes unequal, upper as long as spikelet. Oct.–Apr. Dunes, beaches and coastal marshes, SN, NS, CCR (Kunene River along coast to Maputo with a number of records inland, worldwide).

STIPA BOESMANGRAS 300 spp., mainly temperate to subtropical regions

capensis Thunb. Annual, up to 0.5 m tall. Leaves linear, often rolled; ligule a fringed membrane, hairs minute (ligule in *Stipagrostis anomala* a fringe of hairs). Inflorescence a contracted panicle. Spikelets 12–15 mm long (excluding awn), 1-flowered; glumes ± 15 mm long, longer than lemma (excluding awns), almost transparent; lemma 1-awned, awn 50–80 mm long, bent and twisted. Aug.–Nov. Open slopes, often in disturbed areas, NH, KV, WM, CCR (Namaqualand to Mossel Bay, also in N Africa and Eurasia).

STIPAGROSTIS BOESMANGRAS ± 50 spp., Eurasia and Africa

A. Lemma of spikelet 1-awned

anomala De Winter Weak perennial or annual, up to 0.6 m tall. Leaves linear, rolled, thread-like, often curved, scabrid; ligule a fringe of hairs (ligule in *Stipa capensis* a fringed membrane). Inflorescence a narrow, interrupted panicle. Spikelets 9–12 mm long (excluding awns), 1-flowered; glumes unequal; lemma awn solitary, up to 20 mm long, bent, not plumose but with long stiff hairs at base of twisted column, with articulation between apex of lemma and base of column. Jan.–June. Sandy soils and gravel flats, SN, G, CCR (central Namibia through southern Namibian Escarpment and Upper Karoo to Little Karoo).

A.' Lemma of spikelet 3-awned
B. Plants annual

hermannii (Mez) De Winter Laxly tufted annual, up to 150 mm tall. Leaves linear; ligule a fringe of hairs. Inflorescence a narrow contracted panicle, main axis not visible, base enclosed by upper leaf sheath. Spikelets 9–14 mm long (excluding awns), 1-flowered; lemma 3-awned, only the central awn plumose, up to 40 mm long, with articulation at base of hairy column. Jan.–Aug. Sandy areas on hills and plains, SN (Skeleton Coast from northern Namibia to Pomona, S of Lüderitz).

subacaulis (Nees) De Winter Dwarf, cushion-like annual, up to 100 mm tall, appearing to consist mostly of long plumose awns. Leaves basal; ligule a fringe of hairs. Inflorescence a dense panicle, main axis not visible. Spikelets 15–16 mm long (excluding awns), 1-flowered; glumes acuminate; lemma 3-awned, only the central awn plumose, up to 45 mm long, with articulation at base of very long column. Jan.–Nov. Stony hillsides or depressions on plains, often in gypsum soils, SN, G (southern Angola to Richtersveld).

B.' Plants perennial
*C. All awns plumose (see also **S. dregeana**)*

lutescens (Nees) De Winter Shrub, up to 1.5 m tall, rhizomatous; culm branched in lower parts. Leaves cauline, rigid, pungent; ligule a fringe of hairs. Inflorescence an open panicle. Spikelets 12–14 mm long; 1-flowered; lemma 3-awned, all 3 awns or central only plumose, with articulation between apex of lemma and base of column. Year-round. Sandy soils, SN, G (central Namib to Sperrgebiet and Richtersveld).

namaquensis (Nees) De Winter Spiny, densely sprawling or erect, robust perennial, up to 2 m tall; culm internodes often dark. Leaf blades thin, pungent, breaking off early; ligule a fringe of hairs. Inflorescence a narrow, interrupted panicle. Spikelets 10–14 mm long (excluding awns), clustered, 1-flowered; lemma 3-awned, all 3 awns plumose, with articulation at ± centre of lemma, with only a short twisted beak and no column. Feb.–May, July–Dec. River courses and loose gravels, SN, G, NS, NH, KV, WM, TS (widespread from central Namibia to Great Karoo).

sabulicola (Pilg.) De Winter Robust, rhizomatous, stiff perennial, up to 2 m tall. Leaves rigid, pungent, overtopping inflorescence; ligule a fringe of hairs. Inflorescence a dense, spike-like panicle. Spikelets 8–14 mm (excluding awns), 1-flowered; glumes straw-coloured; lemma 3-awned, all 3 awns plumose, with articulation at base of short, stout column. Dec.–Jan. Dune tops, sandy gullies and riverbeds, SN (central Namib to Sperrgebiet).

zeyheri (Nees) De Winter CAPE BUSHMAN GRASS Robust perennial, up to 1 m tall. Leaves linear, thin; ligule a fringe of hairs. Inflorescence an open panicle. Spikelets 17–18 mm long (excluding awns), 1-flowered; glumes usually dark; lemma 3-awned, all 3 awns distinctly plumose, silvery, dirty white to golden, with articulation at base of column. Oct.–Apr. Sandy flats, NS, NH, KB, KV, CCR (Springbok to Cape Peninsula to Mpumalanga).

C.' Only central awn plumose
D. Articulation about middle of lemma

ciliata (Desf.) De Winter LANGBEENBOESMANGRAS Densely or laxly tufted perennial, up to 1 m tall; culm nodes with a collar of stiff hairs. Leaves mainly basal, linear, rolled; ligule a fringe of hairs. Inflorescence an open or contracted panicle. Spikelets 6.2–15 mm long (excluding awns), often purple at base, 1-flowered; glumes obtuse to truncate; lemma 3-awned, only central awn

plumose; articulation about middle of lemma. Aug.–Oct. Sandstone slopes, SN, G, NS, NH, KV, WM, TS, CCR (widespread from Namibia to Swartberg Mountains, Karoo, and Free State).

schaeferi (Mez) De Winter Like **S. ciliata,** a perennial but up to 0.7 m tall, base usually woolly and culm node glabrous. Leaves basal; ligule a fringe of hairs. Inflorescence an open or narrow panicle. Spikelets 12–15 mm long (excluding awns), 1-flowered; glumes obtuse or truncate; lemma 3-awned, only central awn plumose, with articulation near middle of lemma, column present. Aug–Nov., Mar.–June. Rocky outcrops and gravel plains, SN, G (central Namib to Gariep Mouth).

D.' Articulation between apex of lemma and base of column

brevifolia (Nees) De Winter Spiny dwarf shrub, up to 1 m tall, rhizomatous, with raised round glands on culms, sheaths and leaves; culm nodes and sheath mouth woolly. Leaves mainly cauline, pungent when reduced; ligule a fringe of hairs. Inflorescence a narrow panicle, branches adpressed to main axis. Spikelets 12–15 mm long (excluding awns), 1-flowered; glumes unequal, long acuminate; lemma 3-awned, only central awn plumose, with articulation between apex of lemma and base of column. Sept.–May. Sand over rocks and along drainage lines, SN, G, NH, KV, TS (southern Namibia, Bushmanland, eastern Namaqualand, and southern Tanqua Karoo to Prince Albert).

dregeana Nees Perennial, up to 300 mm tall. Leaves mainly basal; ligule a fringe of hairs. Inflorescence an open panicle. Spikelets 12–14 mm long (excluding awns), 1-flowered; glumes light brown; lemma 3-awned, all 3 or only central awn plumose, with articulation between apex of lemma and base of long column. Aug. and Apr. Sandy soil between rocks or in roadside depressions, SN, G, NS (Lüderitz to Port Nolloth and lower Gariep Valley). **(ece)**

garubensis (Pilg.) De Winter Shrub, up to 0.6 m tall; lower parts robust and woody, young upper parts slender. Leaves flexuous and pungent; ligule a fringe of hairs. Inflorescence a lax or contracted panicle. Spikelets 12–14 mm long (excluding awns), 1-flowered; glumes often dark at base; lemma 3-awned, only central awn plumose, with articulation between apex of lemma and base of column. June, July and Sept. Between rocks on hillsides and in riverbeds, SN (southern Namib and Lüderitz).

geminifolia Nees Dwarf shrub, up to 250 mm tall. Leaves mainly cauline, short and rigid; ligule a fringe of hairs. Inflorescence a panicle, at most only slightly exserted from uppermost leaf sheath. Spikelets in densely clustered ovate to oblong fascicles, 10–14 mm long; lemma 3-awned, only central awn plumose, hairs usually golden, with articulation between apex of lemma and base of short column. Aug.–Oct. Watercourses and gravel plains, SN, G (Sperrgebiet, lower Gariep Valley and central Richtersveld). **(ece)**

gonatostachys (Pilg.) De Winter Densely tufted, dwarf perennial, up to 200 mm tall, densely scabrid; culm well exserted above leaves, culm usually bent at node below inflorescence. Leaves mainly basal; ligule a fringe of hairs. Inflorescence a spike-like panicle, ± 1-sided, base usually covered by upper leaf. Spikelets 8–10 mm long (excluding awns), 1-flowered; lemma 3-awned, only central awn plumose, with articulation between apex of lemma and base of column. Sept.–Dec. Sand on mountain slopes and in depressions on plains, SN (central Namib to Kovisberg, E of Lüderitz).

obtusa (Delile) Nees (including **S. lanipes** (Mez) De Winter) KORTBEENBOESMANGRAS Compact, densely tufted perennial, up to 0.6 m tall. Leaves basal, linear, rolled, often curved; ligule a fringe of hairs. Inflorescence an interrupted panicle. Spikelets 11–12 mm long (excluding awns), 1-flowered; lemma 3-awned, only central awn plumose, with articulation between apex of lemma and base of column. July–May. Dry sandy slopes and flats, SN, G, NS, NH, KV, WM, TS, CCR (widespread in semi-arid areas of southern Africa).

TENAXIA 8 spp, Afromontane and Afroalpine regions, reaching the Himalaya

dura (Stapf) N.P.Barker & H.P.Linder (= *Merxmuellera dura* (Stapf) Conert Perennial, up to 0.9 m tall. Leaves linear; ligule a fringe of hairs. Inflorescence a loosely contracted panicle, slightly nodding. Spikelets 20–25 mm long, many-flowered; glumes equal, longer than spikelet (excluding awns), 3–5-nerved, 1-keeled near base; lemmas with tufts of hairs on margins at base and below central awn, lobes shortly awned, central awn 10–15 mm long, bent, twisted below; callus thick, truncate to rounded. July–Nov. Stony or sandy soils, WM (from Nieuwoudtville along mountains to Carnavon and Fraserburg).

stricta (Schrad.) N.P.Barker & H.P.Linder (=*Merxmuellera stricta* (Schrad.) Conert BOKBAARDGRAS Perennial, up to 0.8 m tall. Leaves linear; ligule a fringe of hairs. Inflorescence an interrupted panicle. Spikelets 11–23 mm long (including awns), straw-coloured and purple, many-flowered; glumes ± equal, as long as to longer than spikelet, 3–7-nerved, 1-keeled near base; lemmas with 4 or more tufts of marginal hairs, central awn 6–12(–17) mm long, bent, twisted below; callus thick, truncate to rounded. Sept.–Dec. Middle to upper slopes, KB, WM, TS, CCR (Kamiesberg Mountains through to W Cape, E Cape and Drakensberg Mountains, with a single locality in central Namibia).

TRIBOLIUM (= *KARROOCHLOA, LASIOCHLOA, PLAGIOCHLOA, UROCHLAENA*) 14 spp., Namibia to SW Cape and Drakensberg Mountains

A. Perennials

acutiflorum (Nees) Renvoize Perennial, up to 300 mm tall. Leaves linear, glabrous or hairy; ligule a fringed membrane. Inflorescence a sparse contracted panicle, terminal and axillary. Spikelets 4–6.5 mm long, many-flowered; glumes shorter than spikelet; lemmas entire, acute to acuminate, with club-shaped hairs on keel and margins, minutely awned, awn up to 0.5 mm long, 3–7-nerved; anthers 0.4–0.8 mm long. Sept.–Dec. Mostly clay slopes, NS, NH, CCR (S of Bitterfontein through Cape Peninsula to western Little Karoo). **(gce)**

hispidum (Thunb.) Desv. Perennial, up to 400 mm tall. Leaves linear, glabrous or hairy; ligule a fringe of hairs. Inflorescence a sparse contracted panicle. Spikelets 3–5 mm long, 2- or 3-flowered; glumes usually longer than spikelet, densely covered with long, bristly, tubercle-based hairs, minutely scabrid, 3–7-nerved; lemmas entire, acute to acuminate, with 2 submarginal tufts of hair, rarely hairs scattered on the back; anthers 1.5–2 mm long. Sept.–Dec. Flats and slopes, NH, KB, KV, WM, TS, CCR (Springbok through W Cape to E Cape).

purpurea (L.f.) Verboom & H.P.Linder (= *Karroochloa purpurea* (L.f.) Conert & Türpe) QUAGGAGRAS Perennial, up to 200 mm tall; fresh shoots not aromatic. Leaves linear, rolled, sparsely hispid; ligule a fringe of hairs. Inflorescence a contracted panicle. Spikelets 5–7 mm long, often flushed purple, many-flowered; glumes longer than spikelet (excluding awns), 3–7-nerved; lemma lobes truncate, hair tufts ± 2 mm long, central awn 3–4 mm long, bent, lower part or column twisted. July–Mar. Mountainous areas, NH, WM, TS, CCR (Springbok to SW Cape and along mountains to Drakensberg Mountains and Lesotho).

A.' Annuals

echinatum (Thunb.) Renvoize Annual, up to 300 mm tall. Leaves linear, usually hairy; ligule a fringe of hairs. Inflorescence a terminal, contracted panicle, often partly enclosed by upper leaf. Spikelets 3.5–5 mm long, awnless or minutely awned to mucronate, 2- or 3-flowered; glumes longer than spikelet (including apex/awn), long acuminate appearing awned, with glassy, tuberculate hairs, 3–7-nerved; lemmas entire, acute to acuminate, with submarginal tufts of hairs; anthers 0.8–2 mm long. Sept.–Oct. Flats and lower slopes, often on richer soils, NS, NH, KV, WM, CCR (Springbok through Cape Peninsula to Mossel Bay). **(gce)**

pusillum (Nees) H.P.Linder & Davidse Annual, up to 250 mm tall. Leaves linear, hairy; ligule a fringed membrane. Inflorescence a dense, subglobose, spike-like panicle, partly enclosed by uppermost leaf, disarticulating below this as a unit. Spikelets 5–6 mm long, 2–many-flowered; glumes long acuminate, awned, as long as spikelet (including awn), 3–7-nerved; lemmas entire, acute to acuminate, with club-shaped hairs at base, long-awned; anthers 1.7 mm long. Aug.–Sept. Dry slopes, KV, CCR (Vanrhynsdorp, Nieuwoudtville to Botterkloof and Bidouw Mountains). **(gce)**

tenella (Nees) Verboom & H.P.Linder (= *Karroochloa tenella* (Nees) Conert & Türpe) Dwarf annual, up to 150 mm tall. Leaves linear, rolled, sparsely hispid; ligule a fringe of hairs. Inflorescence a contracted panicle. Spikelets 4–7 mm long, often flushed purple, many-flowered; glumes longer than spikelet (excluding awns), 3–7-nerved; lemmas with hairs in tufts 0.5–2 mm long, lobes awnless, central awn 3–4 mm long, lower part twisted. Aug.–Oct. Rocky sandstone slopes and disturbed areas, NH, KB, KV, WM, TS, CCR (Namaqualand and Roggeveld Escarpment to Witteberg Mountains). **(gce)**

utriculosum (Nees) Renvoize Annual, up to 120 mm tall. Leaves linear, hairy; ligule a fringed membrane. Inflorescence a sparse contracted panicle. Spikelets 4–5 mm long, many-flowered,

awned; glumes longer than spikelet, long acuminate and appearing awned, with tubercle-based, inflated hairs, 3–7-nerved; lemmas entire, acute to acuminate, with club-shaped hairs on margins and straight hairs scattered on backs; anthers 1–1.5 mm long. Sept.–Oct. Stony slopes, G, NH, KV, WM (Richtersveld to around Vanrhynsdorp with outliers in Roggeveld Mountains). **(ece)**

TRICHOLAENA 4 spp., mainly Africa, also the Canaries, Mediterranean and Madagascar

capensis (Licht. ex Roem. & Schult.) Nees Perennial, up to 0.6 m tall, usually greyish; culms branching from lower nodes. Leaves linear, often rolled; ligule a fringe of hairs. Inflorescence an open panicle. Spikelets 2–3 mm long, 2-flowered, sparsely to densely hairy; glumes distinctly unequal, lower up to half as long as spikelet, nerve absent or 1-nerved; upper glume as long as spikelet, 5-nerved; lower floret male, soft, lower lemma awn up to 0.2 mm long; upper floret fertile, hard, shiny and smooth, awnless or rarely mucronate. Jan.–June. Dry, sandy areas, G, NS, NH (Namibia, Richtersveld and Bushmanland through Kamieskroon to Great Karoo).

TRIRAPHIS 7 spp., tropical and southern Africa, Arabia and Australia

pumilio R.Br. Annual, up to 220 mm tall. Leaves linear; ligule a fringed membrane or fringe of hairs. Inflorescence a dense, ovoid panicle, 5–30 mm long. Spikelets 2–4 mm long, 3–11-flowered; glumes shorter than spikelet (but as florets disarticulate easily may appear that at least upper is longer than spikelet), 1-nerved; lemmas up to 2.5 mm long (excluding awns), long hairy, deeply 3-lobed, lobes awned, central awn 1.5–2.5 mm long, about as long as lemma, straight not twisted below. Jan.–May. Moist sandy depressions and riverbeds, ?SN (Namibia: arid W from Kunene to Walvis Bay, ?with a few scattered records in the S).

*VULPIA ± 25 spp., pantemperate

*__bromoides__ (L.) Gray SQUIRREL-TAIL FESCUE Annual, up to 0.7 m tall. Leaves linear; ligule an unfringed membrane. Inflorescence a panicle, exserted from upper leaf sheaths. Spikelets 7–14 mm long (excluding awns), many-flowered; glumes unequal, shorter than spikelet, lower glume up to ¾ as long as upper glume; lemmas tapering into an awn as long as lemma, straight, awn not basally twisted. Aug.–Jan. Disturbed areas, NH, KB, KV, WM, TS, CCR (cosmopolitan weed scattered in South Africa).

*__muralis__ (Kunth) Nees Annual, up to 0.7 m tall. Leaves linear; ligule an unfringed membrane. Inflorescence a panicle, well exserted from uppermost leaves. Spikelets 5–10 mm long (excluding awns), many-flowered; glumes unequal, shorter than spikelet, lower glume up to half as long as upper glume; lemmas tapering into awn 4–15 mm long, straight, not basally twisted. Sept.–Dec. Disturbed areas, KB, CCR (European weed, mainly in W Cape, with a few records in E Cape and Free State).

*__myuros__ (L.) C.C.Gmel. RAT'S-TAIL FESCUE, LANGBAARD-SWENKGRAS Annual, up to 0.7 m tall. Leaves linear; ligule an unfringed membrane. Inflorescence a panicle, not fully exserted from uppermost leaf. Spikelets 6–10 mm long (excluding awns), many-flowered; glumes unequal, shorter than spikelet, lower less than half as long as upper glume; lemmas tapering into awn 1–2 times as long, straight, not basally twisted. Sept.–Nov. Disturbed areas, NH, KB, KV, WM, CCR (American weed found in W Cape, E Cape, Free State and KwaZulu-Natal).

POTAMOGETONACEAE (= *ZANNICHELLIACEAE*)

by D.A. Snijman from Cook (2004)

1. Flowers in pedunculate spikes, bisexual; stamens 4; fruit buoyant with aerenchymatous pericarp . . . . . **Potamogeton**
1.' Flowers solitary, unisexual; stamens 1–3:
2. Anther 1-locular; leaves crowded above, setaceous; fruit straight, smooth . . . . . **Althenia**
2.' Anther 2–4-locular; leaves opposite or alternate, linear; fruit curved, with a spiny or warty ridge or wing on one or both sides . . . . . **Zannichellia**

ALTHENIA 1 polymorphic sp., Namibia to Cape, Mediterranean, Asia Minor, Siberia

filiformis Petit Small, creeping, submerged, annual aquatic with very fine stems (± like horse hair) up to 150 mm long and terminating in 1 or more leafy inflorescences. Leaves alternate, rarely opposite, sheathing base with ear-like lobes, blade filiform. Flowers green, inconspicuous. Oct. Brackish pools near the sea, SN, NS, CCR (near Lüderitz, Hondeklipbaai, SW Cape to Port Elizabeth, Mediterranean, Asia Minor, Siberia).

POTAMOGETON FONTEINGRAS, FONTEINKRUID ± 69 spp., ± 40 hybrids, cosmopolitan

pectinatus L. Submerged, aquatic perennial, with slender, cylindrical, much-branched stems 0.1–1(–4) m long. Leaves with a sheathing base united to stipule and giving a jointed appearance, blade linear to filiform, tapering to a fine point, often clustered above. Flowers green, in spikes of up to 5 pairs of whorls, detached and floating, inconspicuous. Persisting through dry periods as bulb-like tubers. Oct.–Jan. Fresh or brackish water in rivers, pans or pools, SN, G, NS, CCR (Namibia to Port Elizabeth, cosmopolitan).

ZANNICHELLIA 1 polymorphic sp., cosmopolitan

palustris L. HORNED PONDWEED Aquatic, mat-forming, brittle annual or perennial, up to 0.5 m long, forming submerged grass-like turf. Leaves opposite or upper ones ternate, linear. Flowers inconspicuous. Nov. Fresh or brackish pools, G, WM, CCR (northern, central and southeastern Namibia, Eksteenfontein, Calvinia, Cape Peninsula to Port Elizabeth through to Free State and Gauteng, ± cosmopolitan).

RESTIONACEAE

by H.P. Linder & D.A. Snijman

1. Fruit a nut, often with an elaiosome; female tepals membranous-transparent, often shorter than nut; female spikelets single-flowered:
   2. Male flowers aggregated into spikelets; male tepals lorate to ovate . . . . . **Hypodiscus**
   2.' Male flowers racemose, not aggregated into spikelets; male tepals linear-membranous . **Willdenowia**
1.' Fruit a capsule or a nut; female tepals never membranous-transparent, usually longer than ovary or nut; female spikelets generally several-flowered, even if fruit is a nut:
   3. Ovary dehiscent; diaspore a seed . . . . . **Restio**
   3.' Ovary indehiscent; diaspore a nut enclosed in a persistent, papery to cartilaginous perianth . . . . . **Thamnochortus**

HYPODISCUS 15 spp., Namaqualand to SW Cape

striatus (Kunth) Mast. Dioecious, tufted perennial, 0.2–0.6 m tall, often forming widely spreading clumps. Fertile culms blue-green, unbranched, longitudinally grooved, sheaths tightly rolled around culm, green, brown, red-brown or grey. Male spikelets 2 or more, ± globose. Female spikelet solitary, rarely paired, elliptical. Nut torpedo-shaped with truncate bases. Jan.–July. On well-drained soils derived from granite, sandstone or silcrete, in renosterveld, KB, CCR (Kamiesberg and Cederberg Mountains to near Grahamstown).

RESTIO (= *CALOPSIS, ISCHYROLEPIS*) ± 167 spp., S and S tropical Africa, Madagascar

cymosus (Mast.) Pillans Dioecious, tufted perennial, 0.3–1.2 m tall. Fertile culms sparsely branched, smooth or finely warty, sheaths tightly rolled around culm, shiny brown, with an awl- or needle-shaped point. Male and female spikelets numerous, elliptical, apical margins of bract with honey-combed epidermal cells. Sept. Stony soils on granite or sandstone, KB, CCR (Kamiesberg and Bokkeveld Mountains to Cold Bokkeveld). **(gce)**

distractus Mast. (= *Ischyrolepis distracta* (Mast.) H.P.Linder) Dioecious, mat-forming or tangled perennial, 200–400 mm tall. Fertile culms branched, finely warty, with small tufts of hair in axils, sheaths tightly rolled around culm, orange to reddish brown, ± glossy, with ± membranous apical margins and a narrow, erect point. Male spikelets elliptical. Female spikelets elliptical or obovate, style base smooth. Oct.–Dec. In renosterveld at high altitudes, WM, CCR (Cederberg Mountains and Roggeveld Escarpment through to E Cape Mountains).

gossypinus Mast. (= *Ischyrolepis gossypina* (Mast.) H.P.Linder) Dioecious, tufted or tangled perennial, 200–400 mm tall. Fertile culms sparingly branched, with tufts of woolly hair in axils, slender, smooth or roughly warty, sheaths tightly rolled around culm, orange or reddish brown, often with a coppery sheen. Male and female spikelets elliptical, style base ± villous. Sept.–Dec. Light seeps and moist slopes in renosterveld, KB, WM, CCR (Kamiesberg Mountains, Hantamsberg and Roggeveld Escarpment through to SW Cape and Swartberg Mountains). **(gce)**

macer Kunth (=*Ischyrolepis macer* (Kunth) H.P.Linder) Dioecious, tufted perennial, 0.08–0.5 m tall. Fertile culms ± branched, without woolly hair in axils, slender, smooth or roughly warty, sheaths tightly rolled around culm, greenish tan to reddish or orange-brown, ending abruptly in membranous lobes and a pencil-like point. Male and female spikelets elliptical, at least some of males curved. Aug.–Nov. Deep sandy soils, NS, CCR (between Wallekraal and Kotzesrus to Bredasdorp). **(gce)**

monanthos Mast. (= *Ischyrolepis monanthos* (Mast.) H.P.Linder) Dioecious, tufted perennial, 0.17–0.7 m tall. Fertile culms branched, without woolly hair in axils, smooth or finely warty, sheaths tightly rolled around culm, maroon or light brown, often glossy. Male spikelets elliptical. Female spikelets obovate, mostly 1-flowered with a long stylar peg. Aug.–Oct. Coastal and inland flats and slopes in seasonally moist sands, KB, CCR (Kamiesberg and Bokkeveld Mountains along W Coast through to Bredasdorp Mountains). **(gce)**

ocreatus Kunth (= *Ischyrolepis ocreata* (Kunth) H.P.Linder) Dioecious, tufted perennial, 0.3–1 m tall. Fertile culms sparingly branched, without woolly hair in axils, smooth or finely warty, sheaths loosely rolled around culm and spreading, reddish brown with tan speckles. Male spikelets densely clustered. Female spikelet usually 1, many-flowered, floral bracts long-acuminate, recurved. Nov.–Feb. Dry rocky slopes in renosterveld, G, NH, ?KB, CCR (Richtersveld, Steinkopf to SW Cape and Swartberg Mountains). **(gce)**

rottboellioides Kunth (= *Ischyrolepis rottboellioides* (Kunth) H.P.Linder) Dioecious, tufted perennial, 150–450 mm tall. Fertile culms branched, without woolly hair in axils, roughly warty, sheaths tightly rolled around culm, orange brown to brown, occasionally with tan speckles. Male and female spikelets held tightly close to culms and scarcely wider than culms. Aug. Loamy sand in seasonal seepages, KB, CCR (Kamiesberg Mountains to Piketberg). **(gce)**

rudolfii (Pillans) H.P.Linder & C.R.Hardy (= *Calopsis marlothii* (Pillans) H.P.Linder Like **R. vimineus** but plants 0.4–0.7 m tall and without stolons, and mostly from higher altitudes. Apr.–June. On well-drained, exposed, rocky slopes in renosterveld, NS, KB, CCR (Kamiesberg Mountains and Brand-se-Baai to Cederberg Mountains to Little Karoo and Langeberg Mountains). **(gce)**

sieberi Kunth (= *Ischyrolepis sieberi* (Kunth) H.P.Linder) BESEMRIET Dioecious, clumped, tufted, or sometimes tangled perennial, 0.2–1 m tall. Fertile culms branched, rarely with a tuft of woolly hairs in axils, smooth or finely warty, sheaths tightly rolled around culm, orange to reddish brown with very fine tan speckles. Male spikelets narrowly elliptical, ± curved. Female spikelets elliptical, ovate or obovate, style base smooth. Used for brooms. Dec.–May. Well-drained, quartz or sandstone slopes and flats, G, NS, NH, KB, WM, CCR (Richtersveld: Stinkfontein Mountains to E Cape).

vilis Kunth (=*Ischyrolepis vilis* (Kunth) H.P.Linder) Dioecious, ± hemispherical-shaped, tufted perennial, 0.45–1 m tall. Fertile culms sparingly branched, often with a tuft of woolly hairs in axils, roughly warty, sheaths tightly rolled around culm, orange to reddish brown, with membranous margins and an erect, hair-like point. Male spikelets slender, ± cylindrical. Female spikelets awl-shaped. July–Aug. Seepages in valleys between granite domes, KB (Kamiesberg Mountains). **(ece)**

vimineus Rottb. (= *Calopsis viminea* (Rottb.) H.P.Linder) Dioecious, tufted, mat-forming or tangled, stoloniferous perennial, 0.3–1 m tall. Fertile culms branched, smooth or finely wrinkled, sheaths loosely rolled around culm or free standing, pale brown. Male spikelets ± ovate. Female spikelets elliptical. Apr.–Oct. In exposed, well-drained sites on granite, sandstone, limestone or silcrete derived soils and in well-leached coastal sand, KB, CCR (Kamiesberg Mountains and NW to SW Cape to Port Elizabeth). **(gce)**

THAMNOCHORTUS 32 spp., Namaqualand to KwaZulu-Natal

bachmannii Mast. STEENBOKSRIET Dioecious, tufted perennial, 0.5–1 m tall. Fertile culms unbranched, finely wrinkled, becoming longitudinally grooved when dry, sheaths long, tightly rolled around culm, apically papery and eventually decaying. Male spikelets nodding, elliptical. Female spikelets erect, ± obovate, fruit winged. Used for thatching. June–Sept. Well-drained, sandy plains and flats, NS, NH, KB, CCR (Komaggas and Kamiesberg Mountains through to Malmesbury and Worcester). **(gce)**

WILLDENOWIA 12 spp., Namaqualand to W Cape **(gce)**

arescens Kunth Dioecious, tufted or tangled perennial, 0.3–1 m tall. Fertile culms unbranched or sparsely branched, smooth, sheath loosely rolled around culm, brown or grey with the upper half membranous. Male flowers not aggregated into spikelets. Female spikelet 1-flowered, perianth shortly stalked, tepals spathulate, narrowing towards base, styles fused into a long stylopodium. Nut smooth above, otherwise pitted. Aug.–Nov. Well-drained, sandy plains, inland and along the coast, NS, KB, CCR (Kamiesberg and Bokkeveld Mountains through Brand-se-Baai to Malmesbury and Worcester). **(gce)**

incurvata (Thunb.) H.P.Linder SONKWASRIET Dioecious, clumped or tufted perennial, 0.5–1.5 m tall, culms branched, longitudinally grooved, sheaths loosely rolled around culm, brown with the upper half membranous. Male flowers not aggregated into spikelets. Female spikelet 1-flowered, perianth sessile. Nut bearing a short, compact style, walls pitted. Used for brooms. Apr.–June. On inland sandy plains and along coast in deep, well-leached sands, G, NS, NH, CCR (Richtersveld, Springbok and Hondeklipbaai to Cape Peninsula and Witteberg Mountains). **(gce)**

RUPPIACEAE

by D.A. Snijman from Cook (2004)

RUPPIA 4–10 spp., almost cosmopolitan

cirrhosa (Petagna) Grande (= *R. spiralis* L. ex Dumort.) SPIRAL TASSELWEED Similar to **R. maritima** but leaf tips blunt or rounded and flowers on long, slender, spirally coiled peduncles, and usually found in more saline, deeper water. Mostly Dec.–Feb. Brackish, lagoons and coastal pools of moderate salinity, SN, G, CCR (near Gariep Mouth, SW Cape to Port Elizabeth, cosmopolitan).

maritima L. BEAKED TASSELWEED Submerged, green or brownish, grass-like aquatic perennial with slender, cylindrical, branched stems. Leaves linear to filiform, gradually narrowed to a fine point. Flowers in a small spike on short, slender, straight peduncles. Sept.–Mar. In pools, springs or ephemeral rivers of low salinity, G, NS, CCR (Namibian coast, Gariep Mouth, Spoegrivier, Lambert's Bay to Port Elizabeth, cosmopolitan).

RUSCACEAE (= *CONVALLARIACEAE*, *DRACAENACEAE*, *ERIOSPERMACEAE*)

by D.A. Snijman from Perry (1994)

ERIOSPERMUM COTTONSEED ± 102 spp., sub-Saharan Africa, especially Namaqualand to W Cape

A. Tepals equal or subequal
B. Filaments oblong to ovate

bayeri P.L.Perry Tuberous geophyte, up to 450 mm tall. Leaf drying before flowering, erect, blade sword-shaped, margins wavy. Flowers in a dense raceme, star-shaped, nearly sessile, pale green-

ish, filaments oblong. Mar.–May. shale slopes, KV, WM, TS, CCR (Vanrhynsdorp, Calvinia, northern and western Tanqua Karoo to Robertson). **(gce)**

bifidum R.A.Dyer Tuberous geophyte, up to 300 mm tall. Leaf drying before flowering, erect, blade sword- to heart-shaped, leathery. Flowers in a broadly cylindrical raceme, star-shaped, yellowish, on long pedicels, filaments erect, oblong-bifid. Jan.–Apr. Shale flats, TS, CCR (Pofadder and Prince Albert to Grahamstown and Karoo).

descendens Marloth ex P.L.Perry Tuberous geophyte, up to 150 mm tall, forming compact clumps. Leaf drying before flowering, prostrate, blade deeply heart-shaped with lobes occasionally overlapping, somewhat fleshy, margin red. Flowers many, in a cylindrical raceme, star-shaped, cream with pale green midrib, filaments oblong with narrow tips. Feb.–Apr. In light sandy and granite-derived soils, NH, KB, KV (Springbok to Vanrhynsdorp). **(ece)**

halenbergense Dinter Tuberous geophyte, up to 130 mm tall. Leaf drying before flowering, suberect, petiole covered with straight hairs, blade orbicular to heart-shaped, fleshy, upper surface covered with long, straight white hairs, lower surface sparsely hairy. Flowers in a lax, conical raceme, cup-shaped, whitish with green midribs, filaments triangular. Dec.–Feb. On NW hillsides amongst stones, SN (near Haalenberg). **(ece)**

namaquanum Marloth ex P.L.Perry Tuberous geophyte, up to 120 mm tall. Leaf drying before flowering, blade suberect, ovate, fleshy to leathery, smooth, green, veins usually conspicuous when dry. Flowers in a lax, conical raceme, star-shaped, white with green midribs, filaments narrowly sword-shaped. Feb.–Mar. On sandy plains often at base of gneiss rocks, SN, G, KV (lower Gariep Valley, Richtersveld National Park and Vanrhynsdorp). **(ece)**

B.' Filaments subulate (narrow at base tapering to a fine point)

aphyllum Marloth Small, tuberous geophyte, up to 80 mm tall. Leaf drying before flowering, erect, blade filiform. Flowers in a broadly cylindrical raceme, with stout, persistent pedicels, star-shaped, whitish to pink, filaments subulate. Mar.–Apr. In well-drained stony soil, NH, KV, TS, CCR (Spektakel Pass to Nardousberg and southwestern Tanqua Karoo). **(gce)**

arenosum P.L.Perry Tuberous geophyte, up to 200 mm tall. Leaf drying before flowering, erect, blade heart-shaped. Flowers in a lax raceme with long pedicels, star-shaped, white, filaments subulate. Mar.–Apr. Coastal sands and inland windblown sand deposits, NS, KV, CCR (Groenrivier near Nariep to Aurora). **(gce)**

dielsianum Schltr. ex Poelln. Tuberous geophyte, up to 250 mm tall. Leaf drying before flowering, erect, blade sword- to heart-shaped, petiole and blade hairy. Flowers in a lax raceme, star-shaped, white, filaments filiform. Jan.–Apr. Mostly sandstone soils, WM, TS, CCR (Komsberg Pass to Cold Bokkeveld and Port Elizabeth). **(gce)**

fragile P.L.Perry Tuberous geophyte, up to 150 mm tall. Leaf drying before flowering, suberect, blade broadly sword- to heart-shaped, thin and somewhat flaccid. Flowers in a lax raceme, deeply cup-shaped, pale to deep yellow with green midribs, filaments filiform. Mar.–Apr. On flats in hard soils, ?NH, KV (?Steinkopf area and southeastern Knersvlakte). **(ece)**

macgregoriorum P.L.Perry Tuberous geophyte, up to 120 mm tall, forming colonies from spreading rhizomes. Leaf drying before flowering, erect, blade narrowly elliptic, rarely heart-shaped, bright green, lighter green underneath, margin occasionally minutely crisped. Flowers in a subcorymbose raceme, bright yellow with green midribs, filaments filiform. Feb.–Mar. On plateaux in red, dolerite-derived soils, WM (Nieuwoudtville to Calvinia). **(ece)**

paradoxum (Jacq.) Ker Gawl. Tuberous geophyte, up to 100 mm tall. Leaf drying before flowering, blade small, upper surface bearing a prominent, woolly, much-branched, green enation (extension). Flowers in a dense, cylindrical raceme, large, star-shaped, white, fragrant, filaments subulate. Apr.–May. Sandy and clay soils, G, NS, NH, KV, WM, TS, CCR (Richtersveld National Park to SW Cape and Grahamstown).

parvifolium Jacq. Tuberous geophyte, up to 300 mm tall. Leaf drying before flowering, erect, blade elliptic-ovate, leathery. Flowers in a neat, cylindrical raceme, small, star-shaped, white, filaments subulate. Mar.–Apr. Stony clay soils, G, NH, KB, KV, WM, CCR (Eksteenfontein to Bokkeveld Escarpment). **(gce)**

parvulum P.L.Perry Small, tuberous geophyte, up to 40 mm tall. Leaf drying before flowering, prostrate, blade delicate, orbicular to heart-shaped, light green, smooth, lobes often overlapping. Flowers few, in a very short raceme, cup-shaped, white with dark green to maroon midribs, filaments filiform. Mar. In coarse sand amongst granite boulders, G (Doornpoort). **(ece)**

patentiflorum Schltr. Tuberous geophyte, up to 400 mm tall. Leaf drying before flowering, erect, blade ovate to sword-shaped, minutely white-pilose, petiole swollen, red, persisting as loosely sheathing, thick collars. Flowers in a lax raceme with long pedicels, star-shaped, white, filaments filiform. Mar. Stony slopes or sandy flats, KV, CCR (Vanrhynsdorp to Olifants River Valley). **(gce)**

pumilum T.M.Salter Tuberous geophyte, ± 100 mm tall. Leaf drying before flowering, erect, blade elliptic, petiole hairy, margins red. Flowers in a narrowly conical raceme, star-shaped, white, filaments filiform. Mar.–Apr. In seasonally damp places in sandy or clay soils, NH, TS, CCR (Kamieskroon and southern Tanqua Karoo to False Bay). **(gce)**

spirale C.H.Bergius ex Schult. Tiny, tuberous geophyte, up to 60 mm tall. Leaf drying before flowering, blade terete. Flowers in a narrowly conical raceme on a wiry, coiled scape bearing stout, persistent pedicels, star-shaped, white to yellow, filaments filiform. Apr.–June. Sandstone flats and granite outcrops, KV, CCR (Vanrhynsdorp to False Bay). **(gce)**

A.' Tepals dimorphic
*C. Leaves with enations i.e. prominent leaf-like extensions from the upper surface (see also **E. paradoxum**)*

alcicorne Baker Small, tuberous geophyte, up to 80 mm tall. Leaf drying before flowering, blade small, ovate, occasionally hairy, upper surface often bearing several, simple or branched, flat enations. Flowers in a conical raceme, white, inner tepals erect. Jan.–Apr. Clay and sandstone soils, NH, WM, TS, CCR (Steinkopf, Springbok, Loeriesfontein, Nieuwoudtville, Calvinia, Roggeveld Escarpment, southern Tanqua Karoo and Willowmore). **(gce)**

armianum P.L.Perry Tuberous geophyte, up to 100 mm tall. Leaf drying before flowering, erect, blade small, ovate to heart-shaped, hairless, greyish green, base of upper surface bearing terete, fleshy, rarely branched enations. Flowers in a lax, subcorymbose raceme, white with green midribs, inner tepals erect to spreading. Mar. In shade on cliff edges, NH (near Springbok). **(ece)**

cervicorne Marloth Tuberous geophyte, up to 120 mm tall. Leaf drying before flowering, suberect to spreading, petiole occasionally hairy, blade narrowly to broadly ovate to heart-shaped, upper surface dark green with few to many, somewhat terete enations covered with curly white hairs. Flowers in a cylindrical raceme with pointed apex, white with dark green midrib, inner tepals erect. Mar.–Apr. Loamy soil usually amongst granite rocks, G, NH, KB, TS (Eksteenfontein to Bitterfontein and central Tanqua Karoo). **(ece)**

flabellatum P.L.Perry Small, tuberous geophyte, up to 80 mm tall. Leaf drying before flowering, blade minute, orbicular to heart-shaped, bearing a prominent tuft of branched, dark green, terete enations. Flowers in a narrowly conical raceme, white with green midribs, inner tepals erect. Mar.–Apr. Shale slopes, TS, CCR (Laingsburg to Barrydale). **(gce)**

folioliferum Andrews Tuberous geophyte, up to 400 mm tall. Leaf drying before flowering, spreading, blade ovate to heart-shaped, covered with unbranched, slightly twisted enations bearing white hairs. Flowers in a subspicate or lax raceme, white with green midribs, inner tepals erect. Dec.–Jan. In stony, well-drained soils, NH, KB, KV (Steinkopf to Nuwerus). **(ece)**

multifidum Marloth Tuberous geophyte, up to 150 mm tall. Leaf drying before flowering, erect, blade small, orbicular to broadly heart-shaped, upper surface covered with many, long, hairless, occasionally branched enations in a large, bright green, mop-like head. Flowers many, in a cylindrical raceme, white with blue-green midribs, inner tepals erect. Feb.–Mar. In sandy and stony habitats, NH (Springbok to Kamieskroon). **(ece)**

proliferum Baker Tuberous geophyte, up to 300 mm tall, occasionally forming clumps. Leaf drying before flowering, petiole hairy, blade small, ovate, bearing a prominent tuft of thin enations covered with short hairs. Flowers in a lax raceme with long pedicels, white, inner tepals erect. Feb.–Mar. Clay and sand, G, KV, WM, TS, CCR (Richtersveld National Park to Stellenbosch and to Baviaanskloof Mountains). **(gce)**

ramosum P.L.Perry Tuberous geophyte, up to 140 mm tall. Leaf drying before flowering, erect, petiole covered with fine, white, curly hairs, blade small, orbicular to heart-shaped, upper surface bearing a long, much-branched, bright green, hairless enation. Flowers in a compact raceme, pale green with darker green midribs, inner tepals erect. Mar. W slopes in granite-derived soil, NS, NH (Soutfontein and E of Kamieskroon). **(ece)**

sabulosum P.L.Perry Small, tuberous geophyte, up to 70 mm tall. Leaf drying before flowering, erect, petiole shiny, almost black, blade small, orbicular to heart-shaped, hairless, upper surface bearing a few, 2–4-branched, terete enations with acute tips. Flowers in a short, compact raceme,

white with green midribs, inner tepals erect. Mar. In coarse sand near granite outcrops, NH (near Kamieskroon). **(ece)**

C.' Leaves without enations

algiferum Marloth ex A.V.Duthie Small, tuberous geophyte. Leaf drying before flowering, prostrate, blade heart-shaped, upper surface bearing scattered, white, two-branched hairs. Flowers few, in a subcorymbose raceme, white with green midrib. Mar. On quartzite hills, TS (E of Karoopoort). **(ece)**

arachnoideum P.L.Perry Small, tuberous geophyte, up to 50 mm tall. Leaf drying before flowering, prostrate, blade ovate to heart-shaped, upper surface covered with cobweb-like hairs borne on raised pustules, lower surface smooth, margin transparent. Flowers in a compact, few-flowered raceme, white with dark green midribs, inner tepals erect. Mar.–Apr. In crevices of dolomite outcrops, KV (central Knersvlakte). **(ece)**

aribesense P.L.Perry Small, tuberous geophyte, up to 70 mm tall. Leaf drying before flowering, prostrate to spreading, blade orbicular to heart-shaped, greyish green, leathery, slightly wrinkled by pronounced veins, margin thick and minutely crisped. Flowers in a compact raceme on a short scape, large, white with green midribs, inner tepals erect. Feb. Slopes in well-drained stony soil, NH (Aribisberge, N of Steinkopf). **(ece)**

attenuatum Marloth ex P.L.Perry Small, tuberous geophyte, up to 80 mm tall. Leaf drying before flowering, erect, blade elliptic to orbicular, slightly folded near base, thick, leathery, both surfaces covered with very short, bristle-like hairs, margin raised. Flowers in a compact raceme, white with green midribs, inner tepals suberect. Mar. On granitic loams, NH, KV (Garies to northern Knersvlakte). **(ece)**

calcareum P.L.Perry Small, tuberous geophyte, up to 90 mm tall. Leaf drying before flowering, prostrate, blade orbicular to heart-shaped, upper surface dark green, somewhat leathery, smooth or with a few hairs near edges, margin thick and brown, minutely scalloped. Flowers in a fairly compact raceme, white with green midribs, inner tepals erect. Feb.–Mar. On limestone outcrops, occasionally in red sand deposits, KV (central and eastern Knersvlakte). **(ece)**

capense (L.) Thunb. Tuberous geophyte, up to 0.5 m tall, occasionally in clumps. Leaf drying before flowering, spreading, blade heart-shaped, often with red ridges, margin occasionally ciliate. Flowers in a lax raceme on a long scape, yellowish, inner tepals erect. Nov.–Mar. Mainly clay soils, NH, KB, KV, WM, TS, CCR (Kamiesberg Mountains to Sutherland, through to SW Cape to Grahamstown).

coactum P.L.Perry Tuberous geophyte, up to 140 mm tall. Leaf drying before flowering, tiny, spreading to erect, blade ovate to heart-shaped, upper surface dark green, sparsely hairy or smooth, under surface light green, with a dense, felt-like covering of curly, whitish hairs. Flowers in a lax raceme on a wiry scape and pedicels, white with green midribs, inner tepals erect. Mar. In arid habitats, NH, KB (Steinkopf to Springbok, and Kamiesberg Mountains). **(ece)**

deserticolum Marloth ex P.L.Perry Tuberous geophyte, up to 300 mm tall, forming colonies from spreading stolons. Leaf drying before flowering, erect, petiole covered with white hairs, blade heart-shaped to broadly sword-shaped, smooth or sparsely hairy, margin slightly undulate. Flowers in a one-sided, lax raceme, urn-shaped, dull white with faint green midribs. Feb.–Mar. On granite slopes or sandy, gravelly soils in shade, G, NH (Eksteenfontein to Nuwerus). **(ece)**

eriophorum Marloth ex P.L.Perry Tuberous geophyte, up to 300 mm tall. Leaf drying before flowering, erect, entirely covered with soft, whitish hairs, blade narrowly sword-shaped, midrib raised, twisted towards tip, margin undulate. Flowers in a narrow, compact raceme, pale cream with green midribs, inner tepals erect. Nov. Rocky W slopes in clay soil, KV (just S of Vanrhynsdorp). **(ece)**

exile P.L.Perry Tuberous geophyte, up to 300 mm tall. Leaf drying before flowering, erect, blade long, narrowly sword-shaped. Flowers in a raceme with very short pedicels, pale yellow to white, inner tepals erect. Jan.–Mar. On quartzite and shale slopes in shade, TS, CCR (Karoopoort and Little Karoo). **(gce)**

filicaule Marloth ex P.L.Perry Tuberous geophyte, up to 220 mm tall. Leaf drying before flowering, erect, petiole shortly hairy at base, blade sword-shaped, smooth, thin-textured. Flowers in a lax, flexuose raceme on a wiry scape and long pedicels, small, white with green midribs, inner tepals erect. Mar. On flat, stony ground amongst small shrubs, G, NH (Cornellskop and Steinkopf). **(ece)**

lanimarginatum Marloth ex P.L.Perry Tuberous geophyte, up to 250 mm tall. Leaf drying before flowering, pressed to ground, blade orbicular to heart-shaped, fleshy, upper surface bordered by

white curly hairs, otherwise smooth. Flowers in a lax raceme, tepals fused into a short tube, white with pale green midribs, inner tepals erect. Mar. On plateaux in dolerite-derived, clay soils, WM (from near Nieuwoudtville to Calvinia and towards Fraserburg). **(ece)**

laxiracemosum P.L.Perry Tuberous geophyte, up to 300 mm tall. Leaf drying before flowering, erect, blade sword-shaped. Flowers in a very lax raceme with long pedicels, white, inner tepals erect. Feb.–Apr. Sandy flats or rocky sandstone slopes, KV, CCR (Vanrhynsdorp to Pakhuis Mountains). **(gce)**

marginatum Marloth ex P.L.Perry Tuberous geophyte, up to 250 mm tall. Leaf drying before flowering, prostrate, blade heart-shaped, leathery, margin minutely scalloped, fringed with clusters of short hairs. Flowers in a lax raceme with long pedicels, white, inner tepals erect. Jan.–Mar. Flat areas in clay soils amongst low shrubs, WM, TS, CCR (NW of Loeriesfontein to Roggeveld Escarpment, Klein Roggeveld and Barrydale). **(gce)**

minutiflorum Marloth ex P.L.Perry Tuberous geophyte, up to 200 mm tall. Leaf drying before flowering, erect, blade ovate to elliptic, somewhat leathery, smooth. Flowers in a slender raceme, pedicels thickening slightly towards ovary, small, white with dark green midribs. Mar.–May. On hills and flats in clay soils, NH, KB (Kamiesberg Mountains and Grootvlei to Nuwerus). **(ece)**

papilliferum A.V.Duthie Tuberous geophyte, up to 350 mm tall. Leaf drying before flowering, suberect, petiole sparsely hairy, blade ovate, upper surface covered with scattered papillae each bearing a cluster of long and short hairs, under surface smooth, margin fringed with short, hairy papillae. Mar. ?Habitat, NH (Steinkopf). **(ece)**

pusillum P.L.Perry Small, tuberous geophyte, up to 80 mm tall. Leaf drying before flowering, minute, blade orbicular to heart-shaped, smooth, green with prominent longitudinal ridges. Flowers few, in a lax raceme, white with green midribs, inner tepals erect. Dec.–Feb. In seasonally moist places, shaded by rocks and low shrubs, NH (Springbok). **(ece)**

pustulatum Marloth ex A.V.Duthie Tuberous geophyte, up to 400 mm tall. Leaf drying before flowering, prostrate, blade heart-shaped, upper surface covered with pustules bearing golden bristles, under surface silvery white. Flowers in a lax raceme with long pedicels, white, inner tepals erect. Nov.–Dec. On dry, stony hills in clay soils, WM, CCR (Nardousberg to Roggeveld Escarpment to Nuweveld Mountains and Karoo).

ratelpoortianum P.L.Perry Tuberous geophyte, up to 200 mm tall. Leaf drying before flowering, rigid, erect, petiole minutely hispid, blade broadly elliptic to ovate, grey-green, softly leathery with prominent veins. Flowers in a delicate, lax raceme with wiry pedicels, white with a dark midrib, inner tepals erect. Feb. N-facing slopes amongst quartzite rocks, NH (Steinkopf to Springbok). **(ece)**

subincanum P.L.Perry Tuberous geophyte, up to 250 mm tall. Leaf drying before flowering, prostrate, petiole with dense, short, white hairs, blade heart-shaped, upper surface shiny green, under surface densely white-woolly, margin minutely undulate and red. Flowers in a lax raceme with long pedicels, small, yellowish green, inner tepals erect. Feb.–Mar. Rocky outcrops and sandy flats, KV, CCR (Vanrhynsdorp to Bidouw Valley). **(gce)**

subtile P.L.Perry Tuberous geophyte, up to 200 mm tall. Leaf drying before flowering, erect, blade ovate to somewhat heart-shaped, thin, smooth, upper surface translucent green. Flowers in a lax raceme, with wiry pedicels, white with green midribs, inner tepals erect. Mar.–Apr. WM, CCR (Cederberg Mountains and Ouberg Pass, Roggeveld Escarpment). **(gce)**

titanopsoides P.L.Perry Dwarf, tuberous geophyte, up to 30 mm tall. Leaf drying before flowering, prostrate, blade minute, ovate, somewhat fleshy, both surfaces covered with translucent tubercles, margin raised, deeply crisped and folded inwards. Flowers in a lax raceme, white with pale green midribs, inner tepals erect. Apr.–May. On koppies between quartz pebbles, KV (northern and southern Knersvlakte). **(ece)**

tuberculatum P.L.Perry Dwarf, tuberous geophyte, up to 30 mm tall. Leaf drying before flowering, prostrate, blade small, orbicular to heart-shaped, dark green, upper surface rough with small round tubercles, collecting sand. Flowers in a tiny, compact raceme, white with green midribs. Feb.–Mar. On sandy flats near granite rocks, NH (between Kamieskroon and Garies). **(ece)**

undulatum P.L.Perry Tuberous geophyte, up to 300 mm tall. Leaf drying before flowering, prostrate, blade orbicular to heart-shaped, finely hairy, upper surface dark green, lined with white-dotted striations, under surface whitish green, obscurely banded with green, margin undulate, fringed. Flowers in a lax raceme, yellowish white with green midribs, inner tepals erect. Dec.–Feb. In stony or sandy soils on exposed S slopes or flats, NH (Steinkopf to Karkams). **(ece)**

villosum Baker Tuberous geophyte, up to 300 mm tall. Leaf drying before flowering, erect, blade strap-shaped, grey, densely hairy. Flowers in a subspicate to lax raceme, white, inner tepals erect.

Dec.–Feb. Between granite or shale rocks, G, NH, KV, CCR (Kalkfontein and Steinkopf to Piketberg). **(gce)**

viscosum P.L.Perry Tuberous geophyte, up to 150 mm tall. Leaf drying before flowering, erect, petiole shiny and viscid, blade elliptic to broadly ovate, dark green, somewhat shiny, corrugated by numerous prominent veins, margin red, usually viscid and collecting sand. Flowers in a lax raceme, small, globose, pale green with darker green midribs, inner tepals erect. Jan.–Feb. In shaley soils, NH (Steinkopf). **(ece)**

[**Species insufficiently known E. buchubergense** Dinter]

TECOPHILAEACEAE

by J.C. Manning

1. Plants tufted, leaves mostly basal; flowers in simple or branched racemes, zygomorphic; stamens ± dimorphic; corm tunics fibrous . . . . . **Cyanella**
1.' Plants erect or climbing, prickly, leaves carried along stem; flowers axillary, actinomorphic; stamens monomorphic; corm tunics lacking . . . . . **Walleria**

CYANELLA LADY'S-HAND, RAAPTOL 9 spp., southern Africa

A. Stamens 3 + 3
B. Leaves linear, 2–8 mm wide; capsule subglobose, 7–10 mm long

ramosissima (Engl. & K.Krause) Engl. & K.Krause Cormous geophyte, 100–200 mm tall. Leaves linear. Flowers on suberect pedicels, pink to mauve, fragrant, tepals 10–18 mm; anthers yellow, 3 upper and 3 lower, upper median anther larger than upper laterals, filaments partially fused basally; style much longer than lower stamens. Capsule subglobose, 7–10 mm long. July–Sept. Stony flats, SN, G, (southern Namibia to Richtersveld: Eksteenfontein). **(ece)**

marlothii J.C.Manning & Goldblatt Cormous geophyte, 200–350 mm tall. Leaves linear. Flowers on suberect pedicels, pink to mauve, fragrant, tepals 10–12 mm; anthers bicoloured yellow and grey, 3 upper and 3 lower, filaments connate ± halfway into a tube; style ± as long as lower stamens. Capsule subglobose, 7–10 mm long. Aug. Stony flats, G (Richtersveld: Khubus). **(ece)**

B.' Leaves lanceolate, 10–30 mm wide; capsule ellipsoid, 10–25 mm long

cygnea G.Scott Like **C. orchidiformis** but flowers smaller and upper three anthers ± equal on slender filaments longer than anthers. July–Sept. Rocky flats and lower slopes, often along washes or watercourses, G, NH (Richtersveld to Komaggas). **(ece)**

orchidiformis Jacq. Cormous geophyte, 300–400 mm tall. Leaves lanceolate, often undulate. Flowers on suberect pedicels, mauve with purple markings, fragrant, tepals 10–18 mm; anthers bicoloured yellow and grey, 3 upper and 3 lower, upper median anther larger than upper laterals, filaments partially connate basally. Capsule ovoid-ellipsoid, 10–25 mm long. July–Sept. Rocky flats and lower slopes, often along washes or watercourses, NH, NS, WM, CCR (Steinkopf through central Namaqualand to Hantam and Olifants River Valley). **(gce)**

A.' Stamens 5 + 1
C. Pedicels suberect; upper filaments ± free; style flexed sideways opposite lower anther (i.e. flowers strongly enantiostylous)

alba L.f. TOE-TOE-UINTJIE Cormous geophyte, 120–250 mm tall. Leaves filiform-terete. Flowers in a contracted raceme on long, suberect pedicels up to ± 200 mm long, white or yellow to pale pink, fragrant, tepals 12–20 mm; anthers yellow, with or without dark spot, 5 upper and 1 larger lower, filaments free; strongly enantiostylous. Aug.–Oct. Stony clay flats, TS, CCR (Bokkeveld Mountains to Cederberg Mountains and southern Tanqua Karoo). **(gce)**

lutea L.f. GEELRAAPTOL Cormous geophyte, 120–250 mm tall. Leaves lanceolate. Flowers on suberect pedicels, pink or yellow, fragrant, tepals 12–18 mm; anthers yellow, usually darkly spotted, 5 upper and 1 larger lower, filaments free; strongly enantiostylous. Sept.–Oct. Mostly clay, or

limestone flats, NH, WM, TS, CCR (southern Namibia to Springbok, through Bushmanland and northern Karoo, Bokkeveld Mountains and Roggeveld through SW Cape to E Cape).

C.' Pedicels ± horizontal; upper filaments connate ± halfway; style median

aquatica Oberm. ex G.Scott Cormous geophyte, 250–400 mm tall. Leaves linear-lanceolate, glabrous. Flowers on ± horizontally spreading pedicels in a lax raceme, bracteoles always ± basal, orange, zygomorphic, fragrant, tepals 8–10 mm; anthers yellow, 5 upper and 1 larger lower, filaments connate ± halfway. Oct.–Nov. Seasonally waterlogged dolerite among rocks, WM (Nieuwoudtville to Calvinia). **(ece)**

hyacinthoides L. BLOURAAPTOL, RAAP Cormous geophyte, 250–400 mm tall. Leaves linear to lanceolate, glabrous to finely pubescent. Flowers on ± horizontally spreading pedicels in a dense raceme, blue or mauve, rarely white, zygomorphic, fragrant, tepals 8–10 mm; anthers yellow, 5 upper and 1 larger lower, filaments connate ± halfway, sometimes with minute inter-staminodal teeth. Aug.–Nov. Clay and granite slopes and flats, NS, NH, KB, KV, WM, TS, CCR (Steinkopf through central Namaqualand, Bokkeveld Mountains and Hantam to Riversdale). **(gce)**

pentheri Zahlbr. Like **C. hyacinthoides** but leaves linear and fringed basally with 2–3 mm long whiskers, also upper cataphyll which is maroon-reticulate. Aug.–Oct. Rocky and stony flats, KV, CCR (Bokkeveld and Gifberg flats to Olifants River Valley). **(gce)**

WALLERIA POTATO-LILY 3 spp., N Cape and W Cape to tropical Africa

gracilis (Salisb.) S.Carter Slender, scrambling, cormous geophyte, up to 300 mm tall, with prickly stems. Leaves narrowly lanceolate, ending in a tendril, midribs prickly beneath. Flowers axillary, nodding, white with purple centre, fragrant, tepals recurved, 10–15 mm; anthers connate in a cone, yellow with purple tips. June–July. Sandy soils among rocks, G, CCR (Richtersveld, Gifberg to Pakhuis Mountains). **(gce)**

EUDICOTS

ACANTHACEAE

by D.A. Snijman

1. Corolla 1-lipped, stamens exserted and filaments thick and bony:
   2. Leaves opposite ..... **Acanthopsis**
   2.' Leaves in pseudo-whorls (rarely clustered on dwarf shoots or towards branch ends) ..... **Blepharis**
1.' Corolla 2-lipped:
   3. Style not carried in a distinct channel in upper lip; seeds with hygroscopic hairs:
      4. Calyx lobes 4, lateral lobes smaller than abaxial and adaxial lobes ..... **Barleria**
      4.' Calyx of 5 equal lobes or of 4 lobes with adaxial one bilobed or 2-toothed and lateral ones smaller ..... **Petalidium**
   3.' Style carried in a distinct median channel in upper lip; seeds without hygroscopic hairs:
      5. Seeds single in each locule, smooth and shiny ..... **Monechma**
      5.' Seeds paired in each locule, rough and often tuberculate (sometimes a single, smooth, shiny seed is borne in an indehiscent capsule) ..... **Justicia**

ACANTHOPSIS 7 spp., southern Africa

A. Plants shrubby with leaves scattered along woody stems

horrida Nees Spiny shrub, up to 300 mm tall, branches woody, covered with minute down-turned grey hairs. Leaves coarsely sinuate-toothed, minutely hairy, margins strongly spinous. Flowers among bracts in ± thickly cylindrical spikes, blue; bracts 5-fid at apex, bearing compound, softly hairy spines. Aug.–Sept. Rocky soils, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

spathularis (E.Mey.) Schinz Like **A. horridus** but stems silky-hoary, leaves velvety, spikes globose and central spine of upper bracts leaf-like, NH (eastern Namaqualand). **(ece)**

A.' Plants stemless with leaves in basal rosette

carduifolia (L.f.) Schinz Prickly, stemless, shortly hairy perennial, up to 200 mm tall, from a woody base. Leaves narrowly lanceolate, acutely lobed, lobes tipped with straw-coloured spines. Flowers among bracts in prickly, ± slender cylindrical spikes, white, mauve or blue; bracts wedge-shaped, shortly hairy, apex ± truncate or shallowly lobed, with 5 simple or rarely ± compound, long, rigid spines, outspread in fruit. July–Oct. Stony slopes, G, NS, NH, KB, WM (Richtersveld to central Namaqualand and Hantam). **(ece)**

disperma Nees Spiny, stemless, perennial herb, up to 100 mm tall. Leaves rosulate, broadly oblanceolate, incised and spinescent, appressed hairy. Flowers among bracts in dense, ± short columnar spikes, blue, occasionally white; bracts tipped with several compound rigid spines, spines softly hairy, reflexing in fruit. Mar.–Oct. Stony slopes and flats, SN, G, CCR (Namibia, Richtersveld, Bushmanland and Karoo to Little Karoo).

scullyi (S.Moore) Oberm. Spiny, stemless, annual or short-lived perennial, ± 100 mm tall, forming a long slender taproot. Leaves rosulate, narrowly oblanceolate, with acute spine-tipped lobes. Flowers among bracts in dense cylindrical spikes, ?colour; bracts oblong-obovate, hairy, apex 5-lobed with middle 3 prominently spine-tipped, spines outspread in fruit. ?Flowering time. Lower slopes, G, NH (Richtersveld to central Namaqualand). **(ece)**

[**Species insufficiently known A. glauca** (E.Mey.) Schinz, possibly conspecific with **A. carduifolia**]

BARLERIA 250 spp., pantropical, with only 1 sp. in Americas

rigida Nees Pungent, subwoody shrub, up to 300 mm tall. Leaves narrowly lanceolate, leathery, with sinuate white, often spine-toothed margins. Flowers in short axillary inflorescences with prominent white spine-toothed and spine-tipped bracts, mauve to blue. Feb.–May. Slopes or flats in shale, granite or calcareous soils, SN (Namibia through to Upper Karoo).

stimulans E.Mey. ex Nees SKERPIOENBOS Pungent, subwoody shrub, up to 500 mm tall. Leaves obovate, shortly hairy, with smooth margins. Flowers in short axillary inflorescences with prominent spine-tipped bracts, whitish. May. Flats and slopes, WM, TS (Laingsburg through to Prince Albert, Nuweveld Mountains and Great Karoo).

BLEPHARIS 80 spp., Africa to East Indies and Mediterranean

A. Stems bearing spines just below the leaf whorls

meyeri Vollesen Cushion-shaped shrub, ± 150 mm tall, stems bearing 2 rigid spines near base of some leaf whorls. Leaves petiolate, elliptic, with conspicuously thickened white edges and midrib, margin with scattered triangular-based short spines. Flowers 2–6 per compact, shortly pedunculate spike, yellow; bracts spiny, 3-nerved at base. Sept. Quartzite hills, SN (Klinghardt Mountains). **(ece)**

spinifex Merxm. Like **B. meyeri** but very spiny, with spines occurring more regularly on stems just below petioles, spines up to 16 mm long (vs. spines up to 5 mm long), and flowers creamy white. June–July. Dolomite ridges, SN (central to southwestern Namibia).

A.' Stems not bearing spines just below the leaf whorls

capensis (L.f.) Pers. Stiffly erect to procumbent, very spiny shrub, mostly up to 1.5 m tall. Leaves appearing dimorphic, oblanceolate, margins rolled back and spiny, tufted in axils of hard, spreading spines. Flowers (2–)4–18, clustered in terminal spikes, whitish; bracts stiff, obovate, sharply toothed and spine-tipped, with whitish veins. Mainly Dec.–Apr. Dry slopes on sand or clay, TS, CCR (Riversdale to E Cape and Karoo).

furcata (L.f.) Pers. Very spiny, prostrate or cushion-shaped shrub, up to 300(–500) mm tall. Leaves often greyish, margins strongly recurved, smooth or with a few long teeth. Flowers 2–4(–6), in spikes, creamy white to pale blue or pale purple, with brownish or purple veins; bracts distinctively constricted below the first pair of lateral spines. Capsules small (6–8 mm). Rocky places, May–Mar. SN, G, NH, KV (central Namibia through to Knersvlakte and Gordonia).

macra (Nees) Vollesen Like **B. furcata** but the narrow 3-veined bracts not covering the flowers, and lower sterile bracts reduced to terete spines without a lamina. May–Jan. G, NH (southern Namibia through to northern Namaqualand and Gordonia).

mitrata C.B.Clarke Dense, spiny, prostrate, cushion-shaped shrubby herb, up to 200 mm tall. Leaves subpetiolate, ovate to obovate, often greyish, margin bristle-toothed or occasionally entire. Flowers 2–16, in subsessile or pedunculate spikes white to pale or bright blue or mauve to violet with darker veins; bracts greenish to whitish, becoming brownish, often with long scattered hairs on veins. Capsules 7–11 mm long. Often in rock crevices or in sandy to gravelly or clayey soils, SN, TS (central Namibia through to Gordonia, Upper Karoo, Great and southern Karoo).

JUSTICIA ± 420 spp., cosmopolitan in warm and tropical areas

cuneata Vahl BLOUBOS Twiggy shrublet, up to 1.6 m tall, with stiffly erect whitish stems. Leaves opposite, small, sessile, ascending, elliptic. Flowers 1 per pedunculate inflorescence in leaf axils, cream-coloured with pink markings. July–Sept. Sandy and rocky flats, SN, G, NS, KV, WM, CCR (Lüderitz through Richtersveld and Namaqualand lowlands to Clanwilliam, western Karoo and Little Karoo to Port Elizabeth).

MONECHMA ± 40 spp., Africa and India

A. Flowers with a 4-lobed calyx

divaricatum (Nees) C.B.Clarke Long- or short-lived perennial shrub, semi-prostrate or ± erect, up to 1 m tall. Leaves linear-lanceolate, narrowed to base, young ones often folded, with recurved tips. Flowers 1 per leaf axil, ± subsessile, purple, mauve or white, often with dark veining on lower lip. (Feb.–)Aug.–Sept.(–Nov.). Stony hillsides and sandy flats, G, NH, KV (widespread through much of southern Africa).

A.' Flowers with a 5-lobed calyx
B. Plants with white or grey stems or leaves

crassiusculum P.G.Mey. Shrub or shrublet, up to 0.6 m tall, with mature stems white or grey with minute hairs. Leaves sessile, ± elliptic, hairy to glabrescent, thickish to semi-succulent. Flowers 1 per leaf axil, subsessile, pure white or with red veining on lower lip, rarely flushed pink. Aug.–Sept. On slopes or valleys in stony soils, SN, G (Lüderitz-Aus area through to Richtersveld Mountains). **(ece)**

incanum (Nees) C.B.Clarke Small shrub, up to 1 m tall, with gnarled woody stems at base, young stems grey-velvety. Leaves sessile, ± elliptic, covered with grey felt-like hairs, leathery. Flowers 1(2) per leaf axil, subsessile, white, often with purple veining. Aug.–Mar. Dry stony hillsides and sandy plains, NS, NH (Namibia, Namaqualand and Botswana through to southwestern Free State).

B.' Plants without white or grey stems or leaves

mollissimum (Nees) P.G.Mey. Much-branched, ± densely leafy shrub, up to 0.6 m tall. Leaves sessile or petiolate, ovate to elliptic, shortly or densely hairy. Flowers 1 per leaf axil, subsessile, magenta, deep mauve or whitish blue. June–Sept. Rocky slopes and dry riverbeds, SN, G (Lüderitz through to Springbok and E to Warmbad).

spartioides (T.Anderson) C.B.Clarke Glabrescent shrub, up to 2 m tall, with young stems branching at 90° to stem, often yellow-green. Leaves sessile or shortly petiolate, linear to ovate, usually glabrous, yellowish green. Flowers 1 per leaf axil, white, cream-coloured, pale mauve or blue. (Feb.–)Aug.–Sept.(–Dec.). Dry stony slopes, SN, G, NS, NH, KV, WM, TS, CCR (Namibia and Namaqualand through to Upper, Little and Great Karoo).

PETALIDIUM ± 35 spp., Africa to India

sp. A Woody, densely branched shrub, up to 1 m tall, with pale stems. Leaves in opposite clusters, shortly petiolate, oblanceolate, ± folded, with recurved tips. Flowers 1 per leaf axil, showy, white, with a pair of broad oblanceolate bracteoles at base. Aug.–Nov. Dry stony slopes and seasonal washes, G, NH (Richtersveld). **(ece)**

ACHARIACEAE (= *FLACOURTIACEAE* in part, *KIGGELARIACEAE*)

by D.A. Snijman

KIGGELARIA WILD PEACH 1 sp., tropical and subtropical Africa

africana L. Dioecious, semi-deciduous tree, up to 17 m tall, with smooth grey bark. Leaves elliptic, usually toothed, with hairy pockets in lower vein axils, male flowers in axillary cymes, female flowers solitary in axils, yellowish. Fruit round, pale inside with red seeds. Feb.–July. Rocky slopes and forest margins, ?G, KB, CCR (?near Gariep Mouth, Kamiesberg Mountains and Bokkeveld Mountains to SW Cape to tropical Africa).

AIZOACEAE (= *MESEMBRYANTHEMACEAE*)

by C. Klak, except
Amphibolia, Arenifera, **Astridia**, **Eberlanzia**, **Ebracteola**, **Polymita**, **Ruschia** & **Stoeberia** by M.H. Buys,
Cheiridopsis, **Conophytum** & **Lithops** by S.A. Hammer, **Bijlia** by H. Kurzweil

1. Petaloid staminodes absent, perigone lobes coloured inside, green outside:
2. Fruit indehiscent, a winged or horned nut; ovary inferior or half-inferior (subfamily TETRAGONIOIDEAE) . . . . . **Tetragonia**
2.' Fruit a capsule; ovary superior:
3. Capsule circumscissile; aril present, covering the seed completely (subfamily SESUVIOIDEAE):
4. Style 1 . . . . . **Trianthema**
4.' Styles 2–5 . . . . . **Sesuvium**
3.' Capsule loculicidal or septicidal, often hygrochastic; seeds never arillate (subfamily AIZOOIDEAE):
5. Ovary 4- or 5-locular with 2–many ovules in each locule; capsule with distinct expanding keels . . . . . **Aizoon**
5.' Ovary 2–5-locular with 1 ovule in each locule; capsule with expanding tissue lacking or rudimentary . . . . . **Galenia**
1.' Petaloid staminodes present, coloured inside and outside:
6. Placentation axile; keels reaching centre of fruit; nectaries a series of separate grooves (subfamily MESEMBRYANTHEMOIDEAE) . . . . . **Mesembryanthemum**
6.' Placentation basal or parietal, rarely axile; keels never reaching centre of fruit; nectaries a series of small teeth in a continuous ring or in groups (subfamily RUSCHIOIDEAE):
7. Fruit an indehiscent, fleshy berry . . . . . **Carpobrotus**
7.' Fruit dry:
8. Fruit breaking up into separate units:
9. Leaves triangular or terete in cross-section . . . . . **Conicosia**
9.' Leaves flat . . . . . **Hymenogyne**
8.' Fruit a loculicidal capsule:
10. Plants annual . . . . . **Cleretum**
10.' Plants perennial:
11. Capsule opening once only, expanding keels breaking after opening:
12. Leaves soft; flowers yellow, coppery or pinkish . . . . . **Scopelogena**
12.' Leaves hard; flowers white to pale pink . . . . . **Stoeberia**
11.' Capsule opening repeatedly, expanding keels remaining functional:
13. Leaves with a diadem or terminal whorl of hairs . . . . . **Trichodiadema**
13.' Leaves without a diadem:
14. Leaves heterophyllous:
15. Plants tiny, compact, up to 30 mm tall:
16. First leaf-pair forming a corpuscle, second leaf-pair basally connnate for ¼ to ½ of the length . . . . . **Diplosoma**
16.' Two leaf-pairs per season, completely connate, forming egg-shaped or nearly spherical corpuscles . . . . . **Oophytum**
15.' Plants shrubby, > 50 mm tall:
17. Stems succulent and with regular circular constrictions . . . . . **Monilaria**

17.' Stems non-succulent:
18. Free parts of leaves tongue-shaped to triangular ..... **Mitrophyllum**
18.' Leaves never tongue-shaped:
19. Second leaf-pair connate for < ⅓ of its length ..... **Dicrocaulon**
19.' Second leaf-pair connate up to ± ½ of its length ..... **Meyerophytum**
14'. Leaves homophyllous:
20. Surface of young internodes with prominent bladder-cells ..... **Drosanthemum**
20.' Surface of young internodes glabrous:
21. Leaves with large bladder-cells with outer thickened walls ..... **Jacobsenia**
21.' Leaves usually with much flattened bladder-cells, if prominent, then without outer thickened cell walls:
22. Leaf surface rough from raised dots or warts:
23. Fruit 8–12-locular ..... **Aloinopsis**
23.' Fruit < 8-locular:
24. Plants sunken in the ground ..... **Titanopsis**
24.' Plants not sunken into the ground:
25. Flowers sessile or subsessile ..... **Stomatium**
25'. Flowers stalked:
26. Covering membranes much reduced ..... **Rhinephyllum**
26.' Covering membranes almost complete ..... **Chasmatophyllum**
22.' Leaf surface smooth or velvety:
27. Fruit 5- or 6(7)-locular:
28. Fruit without closing body:
29. Covering membranes reduced, covering the locule ⅔ or less:
30. Leaves with sticky surface ..... **Psammophora**
30.' Leaves not sticky:
31. Leaves of a pair highly fused:
32. Petals basally connate forming a tube; old leaves forming a persistent sheath over new leaves during dry season ..... **Conophytum**
32.' Petals free to shortly fused towards base; old leaves persistent throughout dry season ..... **Lithops**
31.' Leaves of a pair fused < ½:
33. Flowers yellow:
34. Leaves moderately succulent ..... **Delosperma**
34.' Leaves thick and highly succulent:
35. Leaves trigonous to terete, with keel and margins inconspicuous **Peersia**
35.' Leaves trigonous, distinctly keeled ..... **Schwantesia**
33.' Flowers white, pink or magenta:
36. Leaves moderately succulent ..... **Delosperma**
36.' Leaves thick and highly succulent:
37. Leaves shortly clavate to almost globose ..... **Jensenobotrya**
37.' Leaves 3-angled:
38. Leaves trigonous, dirty green; flowers remain open once opened **Nelia**
38.' Leaves sharply keeled, glaucous; flowers open and close repeatedly ..... **Hartmanthus**
29.' Covering membranes ± complete:
39. Flowers white, pink or magenta:
40. Plants shrubby; leaves slender, i.e. < 6 mm thick:
41. Leaves distinctly fused into sheath at base:
42. Upper part of fruit raised ..... **Phiambolia**
42.' Upper part of fruit almost flat ..... **Hammeria**
41.' Leaves only slightly or not fused into a sheath at base:
43. Lower part of fruit bell-shaped; fruit easily breaking off ..... **Ruschiella**
43.' Lower part of fruit funnel-shaped (rarely bell-shaped); fruit not breaking off ..... **Lampranthus**
40.' Plants compact; leaves thick and highly succulent, i.e. > 6 mm thick:
44. Fruit 5-locular ..... **Braunsia**
44.' Fruit mostly 6(7)-locular:
45. Compact clumps; leaves trigonous, unequal in length ..... **Gibbaeum**
45.' Plants compact, in most plants only one leaf-pair present in the resting state; leaves deltoid, equal ..... **Didymaotus**
39.' Flowers yellow or greenish yellow:
46. Flowers greenish yellow ..... **Ruschianthus**
46.' Flowers yellow:
47. Leaves laterally compressed in upper part ..... **Hereroa**

47.' Leaves trigonous, not compressed. . . . . **Lampranthus**
28'. Fruit with closing body:
48. Plants with thickened tap-root . . . . . **Ebracteola**
48'. Plants with fibrous roots:
49. Closing body very large . . . . . **Antimima**
49.' Closing body small to medium sized:
50. Valve wings present:
51. Fruit 6-locular. . . . . **Octopoma**
51.' Fruit 5-locular:
52. Epidermis smooth. . . . . **Amphibolia**
52.' Epidermis finely papillate . . . . . **Eberlanzia**
50.' Valve wings absent:
53. Leaves finely papillate; flowers 30–70 mm diam., mostly 6-locular **Astridia**
53.' Leaves smooth; flowers mostly up to 30 mm diam., rarely up to 60 mm, mostly 5-locular:
54. Leaves trigonous to triangular; flowers mostly white, pink or magenta, rarely yellow . . . . . **Ruschia**
54.' Leaves gibbose to humped; flowers yellow . . . . . **Bijlia**
27.' Fruit > 7-locular:
55. Leaves club-shaped, sunken into the ground with only apical windows visible . . . . . **Fenestraria**
55.' Leaves not club-shaped; plants rarely sunken into the ground:
56. Covering membranes reduced, i.e. covering < ⅔ of the locule:
57. Leaf surface not sticky . . . . . **Namibia**
57.' Leaf surface sticky . . . . . **Psammophora**
56.' Covering membranes covering the locule ± completely:
58. Leaves velvety, hairy or rough:
59. Plants with a thickened rootstock . . . . . **Deilanthe**
59.' Plants without a thickened rootstock:
60. Fruit without or with small closing body:
61. Fruit without closing body; flowers 1–3. . . . . **Vanheerdia**
61.' Fruit with small closing body; flowers solitary . . . . . **Ihlenfeldtia**
60.' Fruit with large closing body:
62. Leaves and base of capsule velvety . . . . . **Odontophorus**
62.' Leaves and base of capsule rough. . . . . **Cheiridopsis**
58.' Leaves smooth:
63. Fruit without closing body:
64. Leaves soft . . . . . **Malephora**
64.' Leaves hard:
65. Fruit with covering membranes:
66. Leaves grey from a thick wax cover; flowers cream or white . . . **Wooleya**
66.' Leaves green to dark green; flowers magenta:
67. Leaves finger-shaped . . . . . **Namaquanthus**
67.' Leaves trigonous to club-shaped . . . . . **Enarganthe**
65.' Fruit with narrow or no covering membranes:
68. Calyx lobes 4; shrubs with 3–5 branches, rarely more compact . . . . . **Juttadinteria**
68.' Calyx lobes 5; plants compact:
69. Leaf epidermis smooth. . . . . **Dracophilus**
69.' Leaf epidermis rough like sandpaper . . . . . **Hartmanthus**
63.' Fruit with closing body:
70. Plants shrubby:
71. Capsule 8–16-locular:
72. Closing body large, i.e. blocking exit of the locule; valve wings broad. . . . . **Leipoldtia**
72.' Closing body not blocking exit of the locule; valve wings narrow or absent:
73. Leaves trigonous to terete; flowers in well-developed dichasia . . . . . **Ottosonderia**
73.' Leaves trigonous to triquetrous; flowers solitary:
74. Flowers white to pink; leaves mucronate. . . . . **Schlechteranthus**
74.' Flowers white; leaves mucronate or without mucro . . . . . **Polymita**
71.' Capsule 6–8-locular:
75. Shrubs with spines developing after capsules have been shed . . . **Arenifera**
75.' Shrubs not spinescent . . . . . **Octopoma**

70.' Clump-forming or creeping shrublets:
76. Leaves heterophyllous ..... **Vanzijlia**
76.' Leaves homophyllous or anisophyllous in a pair:
77. Leaves soft ..... **Glottiphyllum**
77.' Leaves hard:
78. Leaves with conspicuous dark dots:
79. Fruit dark brown, > 10 mm diam. ..... **Pleiospilos**
79.' Fruit pale brown, < 10 mm diam. ..... **Tanquana**
78.' Leaves without dark dots:
80. Flowers with ovary walls raised forming a hypanthium ..... **Argyroderma**
80.' Flowers without hypanthium:
81. Capsule with large closing body:
82. Fruit high-topped, i.e. upper part higher than lower part ..... **Hallianthus**
82.' Fruit with lower and upper part of about the same height ..... **Cephalophyllum**
81.' Capsule with small closing body:
83. Flowers yellow, magenta, salmon, orange or copper; petals and stamens not very numerous. ..... **Jordaaniella**
83.' Flowers white to pale yellow; petals, filamentous staminodes and stamens very numerous ..... **Cylindrophyllum**

Supergroup 1 Petals coloured inside, green and like sepals on the outside; leaves slightly succulent

AIZOON SPEKVYGIE 13 spp., N Africa to India and Afghanistan; southern Africa.

A. Flowers terminal

sarmentosum L.f. Prostrate or sprawling subshrub, procumbent branches 100–150 mm long, internodes with few to many white hairs. Leaves subterete, opposite, 10–45 mm long, hair cover variable. Flowers in terminal cymes, 1–3(–5) at branch tips, white or cream-coloured inside. June–Oct. Dry flats and lower slopes, NS, CCR (Port Nolloth to Cape Town and Swellendam). **(gce)**

A.' Flowers apparently axillary

canariense L. Prostrate annual or short-lived perennial, up to 400 mm long, shortly hairy when young. Leaves spathulate or oval, narrowing into a petiole 3–18 mm long, blades 10–50 × 4–15 mm, adpressed-hairy. Flowers sessile in flattened, axillary clusters, yellow-green inside. Fruit 5–9 mm diam. July–Sept. Dry stony flats, often in disturbed ground, NS, NH, CCR (Namaqualand to Clanwilliam, Karoo to N Africa and Arabia).

karooicum Compton Woody shrub, with erect to procumbent branches, 50–200 mm long, internodes covered with long, white adpressed hairs. Leaves alternate, elliptic-lanceolate, often folded, 15–30 × 3–5 mm, retrorsely adpressed-hairy. Flowers sessile, apparently axillary, yellow. Mar.–June. Sandy depressions, TS, CCR (Laingsburg, Worcester to Little Karoo, Heidelberg). **(gce)**

zeyheri Sond. Similar to **A. canariense** but leaves tiny (4–6 × 2–3 mm), flowers tiny (2.25 mm long), and fruit smaller (2.5 mm diam.). ?Flowering time. Among rocks, ?NH, ?NS (Namaqualand). **(ece)**

GALENIA BRAKBOS 28 spp., southern and S tropical Africa

A. Flowers in terminal, symmetrically branched cymes; styles 2

africana L. KRAALBOS, GEELBRAKBOS Yellow-green, softly woody shrublet, sometimes up to 1 m tall. Leaves opposite, linear-oblanceolate, epidermis with papillae and glandular hairs, sticky to touch. Flowers in terminal panicles, inconspicuous, ± 1.5 mm long, styles 2. Oct.–Dec. Dry flats and lower slopes often on disturbed ground, SN, NS, NH, KB, KV, WM, TS, CCR (southern Angola to Namaqualand to Uniondale, Karoo and E Cape).

namaensis Schinz Similar to **G. africana** but leaves without stalked glands. Nov.–Dec. In rocky places, especially dry riverbeds, G, NH (Namibia, Free State and N Cape).

procumbens L.f. Stiffly branched, yellowish shrublet, up to 1 m tall. Leaves opposite, small, oblanceolate, recurved. Flowers in small dichotomous cymes, whitish, ± 2 mm long, styles 2. Aug.–Oct. Stony flats in karroid scrub, NH, KB, CCR (Namaqualand to southern Karoo and Free State).

rigida Adamson Like **G. africana** but up to 500 mm tall, leaves rigid, not drooping when dry, flowers in flat-topped umbels. Oct.–Jan. Rocky slopes, WM, CCR (Sutherland to Clanwilliam). **(gce)**

A.' Flowers in secund cymes; styles 2–5

B. Styles 2

crystallina (Eckl. & Zeyh.) Fenzl Sprawling, grey-mealy shrublet, up to 150 mm tall, with branches up to 400 mm long. Leaves oblanceolate, folded. Flowers in secund cymes, yellow or pink, ± 2 mm long, styles 2. July–Dec. Sandy flats, G, NS, NH, KV, WM, CCR (Namaqualand to Worcester, Little Karoo to Uitenhage).

dregeana Fenzl ex Sond. Erect, stout, woody shrub, up to 450 mm tall, internodes pale yellow. Leaves opposite to ± alternate, petioles thick, 2 mm long, suborbicular, coarsely papillate, blades 7–15 × 7–13 mm. Flowers in dense glomerate cymes on terminal panicles, 5-lobed and densely covered with scales outside, anthers deep orange. Fruit 2-locular. Sept.–Oct. Dry riverbanks, SN, G (southern Namib to Richtersveld). **(ece)**

fruticosa (L.f.) Sond. Twiggy, grey-felted shrublet, up to 500 mm tall. Leaves opposite, obovate, folded. Flowers in secund cymes on stiff branchlets that often become spiny, red or yellow, ± 1 mm long, styles 2. Aug.–Dec. Shale flats in karroid scrub, SN, G, NS, NH, KV, WM, TS, CCR (Namibia and Karoo to SW Cape and Little Karoo).

hemisphaerica Adamson Hemispherical shrub, 200–250 mm tall, 300–500 mm diam., stems woody basally, much branched, internodes pale brown, young ones papillate, older smooth. Leaves opposite, deciduous, flat, wedge-shaped, obtuse, 8–15 × 2–4 mm, papillate. Flowers in terminal dichasia, 5-lobed and papillate outside, styles 2. Fruit 2(3)-locular. July. Dry open places in sand, SN, G (Aus and Buchuberg to Steinkopf).

pruinosa Sond. Like **G. fruticosa** but leaves glabrous, flowers mauve, styles 2(3). Aug.–Sept. Rocky flats, SN, G, NS, NH, CCR (Namibia to Piketberg). **(gce)**

B.' Styles 3–5

affinis Sond. Like **G. filiformis** but always glabrous, plant twiggy and styles 3(5). Sept.–Oct. Dry rocky slopes, NH, CCR (Bitterfontein and Karoo to Montagu and Langeberg Mountains).

collina (Eckl. & Zeyh.) Walp. Like **G. filiformis** but leaves often sticky, flowers larger, 2.5–3 mm, styles 3(5). Mainly Sept.–Nov. Rocky slopes, SN, G, NS, NH, KV, WM, TS, CCR (Aus to Namaqualand to George). **(gce)**

cymosa Adamson Like **G. filiformis** but flowers in terminal, forked inflorescences, styles mostly 4 or 5. Oct.–Nov. Dry stony slopes and flats, TS, CCR (Karoo, Little Karoo and E Cape).

filiformis (Thunb.) N.E.Br. Prostrate subshrub, with branches up to 800 mm long, glabrescent. Leaves oblanceolate. Flowers crowded in secund cymes on short, lateral branchlets, pink or white, ± 2 mm long, styles (3)5. Mainly Aug.–Oct. Sandy slopes, especially in dry riverbeds, WM, TS, CCR (western Karoo and Bokkeveld Mountains to King William's Town).

glandulifera Bittrich Low, perennial shrub, up to 100 mm tall, 100–600 mm diam., main stem erect, lateral branches decumbent or ascending, ending in cymose inflorescences. Leaves opposite on main stem, alternate on lateral ones, petioles 2–7 mm long, blade obovate, obtuse, ± 20 × 8 mm on main stem but smaller on lateral branches, bearing large translucent papillae. Flowers sessile, 5-lobed, magenta or purple inside, styles 5. Fruit 5-angled. Oct. ?Habitat, TS (Great Karoo, Whitehill to Prince Albert).

meziana K.Müll. Low shrub, with prostrate branches, young stems minutely papillate. Leaves opposite but alternate in inflorescence, deciduous, spathulate, up to 9 × ± 1.5 mm, scaly-papillate on both sides. Flowers in axillary groups, 5-lobed, 1.5–2 mm long, styles 3 or 4, stamens 5 or 10. Fruit 3- or 4-locular. Nov. Sandy or gravelly places, SN, G, NS, NH (Aus to Garies). **(ece)**

papulosa (Eckl. & Zeyh.) Sond. Shrub, 100–400 mm tall, with ascending to decumbent branches. Leaves alternate, rarely opposite, obovate to cuneate, succulent, covered with big, coarse, round papillae, 10–30 × 8–17 mm. Flowers in lax, secund cymes, anthers yellow. Fruit mostly 5-locular. Aug.–Oct. Dry slopes and watercourses, SN, G, NH, KV, WM, TS, CCR (Swakopmund to Piketberg, Ceres to Uniondale).

portulacacea Fenzl Prostrate to suberect shrub, with ascending shoots, woody at base. Leaves opposite, but alternate in flowering parts, oblong to spatulate, flat, obtuse, papillate, grey-mealy and sparsely long-hairy. Flowers in groups of 5–7 in lax, terminal cymes, anthers yellow. Fruit 3- or 5-locular. Aug.–Sept. Dry sandy areas, NS, WM, TS, CCR (Namaqualand and Karoo to Mossel Bay).

pubescens (Eckl. & Zeyh.) Druce BLOUBRAKBOSSIE Low, twiggy shrub, branches erect or prostrate. Leaves alternate, obovate-spatulate, hairy. Flowers in secund cymes, pinkish inside, anthers pink. Fruit (3)5-locular. Oct.–Dec. Rocky or disturbed flats, TS, CCR (Karoo and Clanwilliam to Grahamstown).

sarcophylla Fenzl JOUBERTSBRAKBOSSIE, VANWYKSBRAKBOSSIE Low shrub, with prostrate to suberect branches, up to 300 mm tall. Leaves opposite in lower parts, alternate above, obovate or spatulate, grey-mealy, softly hairy and succulent. Flowers in secund cymes, anthers yellow, rarely pink. Fruit 3- or 4-locular. July–Oct. In sand or gravel, SN, G, NS, NH, KV, WM, TS, CCR (Swakopmund to Namaqualand and Karoo to Clanwilliam and Uniondale).

secunda (L.f.) Sond. VANWYKSBRAKBOSSIE Low shrub, with branches 10–50 mm long. Leaves alternate, obovate, densely hairy. Flowers in secund cymes, white or pink. Fruit (3)5-locular. July–Dec. Dry stony slopes, KV, TS, CCR (Karoo to Piketberg, Ceres to KwaZulu-Natal).

squamulosa (Eckl. & Zeyh.) Fenzl ex Sond. Low shrub, with decumbent or prostrate branches, 200–500 mm long. Leaves and internodes covered with broad, spreading scales. Flowers in terminal cymes, yellow inside, covered with scales outside. July–Aug. In damp brackish hollows and streambeds, SN, G, NH, KV (Swakopmund to Namaqualand and Karoo).

subcarnosa Adamson Prostrate mat-forming shrub, 100–250 mm diam., young stems finely pruinose or papillate, with few appressed scales. Leaves acute or subacute, concave above, 3–7 × 1–3 mm. Flowers on short, alternate, 1-sided lateral branches, 5-lobed, 1.5 mm long, finely papillate, styles 5. Fruit 5-angular, broader than deep, 5-locular. Aug.–Oct. Open rocky places, WM (N Cape to Sutherland, Karoo, Zimbabwe).

SESUVIUM 22 spp., worldwide in tropical and subtropical areas

mesembryanthemoides Wawra & Peyritsch Prostrate annual to perennial subshrub, forming large clumps, internodes with densely placed, watery-glossy papillae. Leaves densely arranged, terete, concave above, basally broader and enclosing stem, 6–15 mm long, 2–4 mm diam. Flowers solitary, sessile, papillate outside, pink to purple inside. Fruit 3- or 4-locular. Sept. On sand and gravel along seashore, SN (Mossamedes, Angola and Lüderitz-South).

sesuvioides (Fenzl) Verdc. Herb, with only slightly woody stems at base, internodes with prominent papillae when young, branches up to 500 mm long. Leaves on 2–5 mm long petioles, blades elliptical, 7–20 × 3–10 mm, margins revolute. Flowers mostly sessile, rosy inside. Fruit 2-locular. Sept.–Oct. Sandy and gravelly areas in dry subtropical climates, SN, G (worldwide in dry tropical and subtropical areas).

TETRAGONIA KINKELBOS, KLAPPERBRAK 57 spp., Africa, S America, Australia, Asia

A. Plants entirely herbaceous, annual or tuberous

echinata Aiton (including **T. microptera** Fenzl) Prostrate, succulent annual, up to 300 mm tall. Leaves ovate to orbicular. Flowers subsessile, 2–4 in axils, greenish, stamens as many as sepals. Fruit globose, with spiny ridges and horns. June–Sept. Sandy slopes and disturbed ground, SN, G, NH, KV, WM, TS, CCR (Namibia to Stellenbosch, Ladismith to Grahamstown).

nigrescens Eckl. & Zeyh. (including **T. portulacoides** Fenzl) Tuberous perennial, with sprawling stems up to 500 mm long. Leaves obovate to suborbicular, often red beneath. Flowers in axillary and terminal umbels, mostly on slender pedicels, yellow or cream-coloured, sometimes orange, reverse often magenta, 3–4 mm long. Fruit winged. July–Oct. In sand at low altitudes, NH, KV, CCR (Namaqualand and western Karoo to Humansdorp). **(gce)**

pillansii Adamson Many-stemmed, papulose herb, 60–100 mm tall. Leaves on petioles 20 mm long, blades oblong, lanceolate, narrowing basally, 20–30 × 5–8 mm. Flowers aggregated, sessile, densely papillate, lobes triangular, stigmas 2 or 3(4). Fruit round to cylindrical, truncate, 4–9 × ± 4 mm, with 8 longitudinal ridges. Sept. Sandy riverbeds, NS (Hondeklipbaai to Wallekraal). **(ece)**

A.' Stems woody, at least at base

arbuscula Fenzl Like **T. spicata** but fruit pendulous. Mainly June–Sept. Dry stony slopes, WM, TS, CCR (Namibia, from Gordonia to Free State, W to E Cape).

decumbens Mill. (including **T. rangeana** Engl.) Sprawling perennial, with branches up to 1 m long. Leaves papillose-hirsute, obovate-oblong, fleshy. Flowers in branched axillary clusters, smaller than leaves, yellow. Fruit with rigid wings. Mainly Aug.–Nov. Coastal dunes, SN, G, NS, CCR (Lüderitzbucht to E Cape).

fruticosa L. KLIMOPKINKELBOSSIE Like **T. spicata** but branches often long and trailing through bush, leaves with margins recurving. Mainly Sept.–Nov. On sand or among rocks, most commonly near the sea but also inland, NS, NH, KV, CCR (Namaqualand to Clanwilliam to Port Elizabeth and Graaff-Reinet).

glauca Fenzl Softly woody shrublet, up to 500 mm tall. Leaves elliptic-lanceolate, glaucous, margins narrowly revolute. Flowers solitary in axils, on slender pedicels, yellow. Fruit pendulous, 4-winged with narrow ridges between. July–Oct. Dry karroid areas, G, NH, KV, TS, CCR (Namibia to W Cape and Prince Albert). **(gce)**

macroptera Pax Erect or sprawling shrub, up to 600 mm tall, branches ascending. Stems papillate when young, later glabrescent, pale, ridged when dry. Leaves firm, flat or folded, often revolute, oblong, 15–30 × 4–6 mm. Flowers solitary in upper axils, papillate outside, stigmas 2 or 3. Fruit large, 16–25 × 16–25 mm, smooth, flat or slightly emarginate at top, 4-winged. Aug. Among rocks, NH, KV, CCR (Namibia to Piketberg).

namaquensis Schltr. Subshrub, with ascending branches up to 300 mm tall. Leaves elliptic, papillose-hirsute, margins slightly revolute. Flowers in axillary clusters, on short pedicels, 3–4 mm long, yellow. Fruit softly winged, up to 10 mm long. June–Oct. Shale rocks, NS, KV, CCR (Namaqualand to SW Cape). **(gce)**

reduplicata Welw. ex Oliv. (including **T. arbusculoides** Engl.) Erect, branched shrublet, 300–800 mm tall. Stems pale coloured, with distinct raised decurrent lines, younger ones papulose. Leaves petiolate, blades obovate, acute, rather thick, coarsely papulose, blades 10–20 × 5–10 mm. Flowers axillary, in groups of 2 or 3, lobes 3 or 4, yellow inside, stigmas 2 or 3. Fruit 3- or 4- winged, deeply notched at top. Sept.–Oct. Riverbeds, SN, G, NH (southern Angola, Namibia to Namaqualand and Prieska).

saligna Fenzl Sprawling shrublet, with stems up to 600 mm long. Leaves linear-oblanceolate, leathery. Flowers subsessile, in axillary and terminal clusters, yellow, stigmas 1 or 2(–4). Fruit ovoid, ridged to subglobose. Sept.–Nov. Rocky slopes, NS, WM, TS, CCR (Namaqualand and Karoo to Caledon and Oudtshoorn).

sarcophylla Fenzl (including **T. distorta** Fenzl, **T. robusta** Fenzl) Compact, twiggy shrub, up to 400 mm tall. Leaves small, oblanceolate, margins revolute, midribs prominent beneath. Flowers 1–few in upper axils and in terminal racemes, yellow, 2–3 mm long. Fruit 4-winged, 4–15 mm long. June–Sept. Dry stony slopes, NS, NH, KV, WM, TS, CCR (Namaqualand to E Cape).

spicata L.f. (including **T. calycina** Fenzl) Erect or sprawling shrub, stems up to 1 m long. Leaves rhomboid-lanceolate. Flowers 2–5 in cymes, 3–4 mm long, yellow. Fruit broadly winged, with knobs between wings. July–Oct. Granite and sandy slopes, SN, NH, KV, WM, TS, CCR (Namaqualand and Karoo to Grahamstown).

verrucosa Fenzl Glistening subshrub, with sprawling branches up to 300 mm long. Leaves oblanceolate, margins slightly revolute, often incurved-ascending. Flowers subsessile in upper axils and in terminal racemes, yellow. Fruit winged, 15–20 mm long. Aug.–Sept. Stony karroid slopes, SN, G, ?NH, KV, TS, CCR (southern Namibia to western Little Karoo and Prince Albert). **(gce)**

virgata Schltr. Like **T. spicata** but flowers on 5–10 mm long, slender pedicels and fruit large and smooth. July–Aug. Dry places at low altitudes, NH, KV, ?WM, CCR (Upington and Namaqualand to Clanwilliam).

[**Excluded species** Poorly known and probably conspecific with one of the above: **T. haworthii** Fenzl]

TRIANTHEMA 28 spp., worldwide in tropical and subtropical areas

parvifolia E.Mey. ex Sond. Perennial herb, with prostrate branches, slightly woody at base, internodes papillate or glabrous, shining. Leaves opposite, unequal, petiolate, blades oblong to subrotund, obtuse. Flowers in ternate cymes, 1.5–2 mm long, stamens 5. Fruit operculum conical,

apically truncate surrounded by a thickened ring, 1- or 2-seeded. Dec. Stony hills or dry, sandy riverbeds, G, WM, TS (Warmbad to Namaqualand, Karoo to Prince Albert).

Supergroup 2 *Petals coloured on the inside and outside; leaves succulent*

ALOINOPSIS 8 spp., western Karoo to E Cape

loganii L.Bolus Compact, dwarf succulent, with a thick, truncate rootstock up to 200 mm long, 2 or 3 leaf-pairs to a branch, forming a rosette. Leaves ± erect, spathulate, with an apical thickening developing a triangle, ± 30 × 17 mm, 5–6 mm thick, with prominent warts. Flowers 1–3, petals yellow. Fruit 10-locular, without a closing body. Sept. On grey, flat, gravelly areas at edge of winter rainfall region, TS (Laingsburg region: Matjiesfontein). **(ece)**

luckhoffii (L.Bolus) L.Bolus Compact, dwarf succulent, with an irregularly thickened rootstock, with 2 or 3 leaf-pairs to a branch, forming a rosette. Leaves fat, triangular, almost as thick as broad, with pearl-like warts up to 1 mm diam., 16–18 × 10–11 mm, 6–7 mm thick. Flowers without bracts, ± 25 mm diam., sepals 6, petals salmon, yellow, orange, cream, often changing from base to tip. Fruit rather flat-based, closing bodies present, valve wings broad, 8–10-locular. Aug.–Sept. On calcareous slopes and flats, WM (Calvinia). **(ece)**

malherbei (L.Bolus) L.Bolus Compact, dwarf succulent, with a thick, truncate rootstock broadening and splitting into several, erect branches at top, with 2 or 3 leaf-pairs to a branch, forming a rosette. Leaves flat and wide, erect, with prominent warts, 20–25 × 15–17 mm, 4–5 mm thick. Flowers without bracts, 16–20 mm diam., calyx lobes 6, petals salmon to pink, stamens collected into a central cone, yellow in upper half. Fruit nearly globose, with large closing bodies, 8–11-locular. ?Jan. On shaley lower slopes, in flats or in crevices, WM (Calvinia). **(ece)**

spathulata (Thunb.) L.Bolus Compact, dwarf succulent, with a thick, truncate rootstock broadening and splitting into several erect branches at top, with 2 or 3 leaf-pairs to a branch, forming a rosette. Leaves flat and wide, erect, warts moderately developed, 10–20 × 8–10 mm, 2.5–3 mm thick. Flowers without bracts, 25–30 mm diam., calyx lobes 5, petals ?pink or ?white. Fruit raised in centre at top, closing bodies absent or tiny but with a bulge in their place, valve wings narrowing into awns distally, 10- or 11-locular. Aug. On shaley flats, WM (Sutherland). **(ece)**

AMPHIBOLIA ± 5 spp., southern Namibia and Karoo to W Cape **(gce)**

rupis-arcuatae (Dinter) H.E.K.Hartmann Erect, ± compact, succulent shrub, up to 500 mm tall. Leaves densely set, trigonous, 12–15 × 5–8 mm, green to grey-green. Flowers 1(–3) per cyme, up to 12 mm diam., white with a dark central stripe, rarely pale pink apically. Fruit 5-locular, base long, funnel- or bell-shaped, mostly enclosed by bracteoles, covering membranes with a distal closing ledge at end, closing bodies small, hook-shaped. Sept.–Dec. Mostly in sand or gravel near sea, SN, G, NS (Lüderitzbucht to near Kleinsee). **(ece)**

saginata (L.Bolus) H.E.K.Hartmann Low shrub, up to 400 mm tall. Leaves club- to crescent-shaped, 10–20 × ± 8 mm. Flowers purple with a basal dull dark purple line separated by a whitish rim from a dark red outer area. Fruit 5-locular, base long, funnel-shaped, with closing ledges at distal end of covering membranes, closing bodies tiny, knob-shaped. July–Sept. Rocky slopes on mountains, 750–1 150 m, SN (Lüderitz-South: Klinghardt Mountains). **(ece)**

succulenta (L.Bolus) H.E.K.Hartmann Low shrub, up to 400 mm tall. Leaves club-shaped, slender, 15–30 × 4–5 mm, greyish green. Flowers 14–17 mm diam., purple, with a darker line at base separated from whitish rim. Fruit 5-locular, base long, funnel-shaped, covering membranes with closing ledges or broad rodlets at ends, closing bodies tiny, hook-shaped. Aug.–Sept. Loamy places amongst rocks and gravel in fog zone, G, NS (southwestern Richtersveld to Hondeklipbaai). **(ece)**

[**Insufficiently known species Amphibolia obscura** H.E.K.Hartmann]

ANTIMIMA ± 100 spp., Namibia, winter rainfall region of South Africa, Bushmanland and Free State

A. Plants shrubby; leaves shortly fused at bases

addita (L.Bolus) H.E.K.Hartmann Compact to clumped, succulent shrub, with long-shoots. Leaves elongate, subcylindrical, shortly fused to opposite ones, 25 × 3 mm. Flowers in rich

cymes, petals pale magenta, staminodes white. Fruit 5-locular, valve wings absent. June. Gravelly slopes, G, NH (Richtersveld to Springbok). **(ece)**

hantamensis (Engler) H.E.K.Hartmann & Stüber Erect, succulent shrub, up to 250 mm tall. Leaves trigonous, 10–15 mm long, smooth. Inflorescence with peripheral spines and 1–7 flowers. Fruit with high valve rims. July–Aug. Stony shale soil, WM, TS, CCR (Cederberg Mountains to Matjiesfontein). **(gce)**

klaverensis (L.Bolus) H.E.K.Hartmann Low, succulent shrub, up to 100 mm tall, smelling of fish. Leaves terete to trigonous, 10–15 × ± 5 mm, ± 6 mm thick, epidermis with low papillae. Flowers solitary, bracteoles in middle of pedicels. Fruit 5-locular, rims and top low, valve wings extremely narrow. June–July. ?Habitat, KV (Klawer). **(ece)**

koekenaapensis (L.Bolus) H.E.K.Hartmann Succulent shrub, up to 250 mm tall. Leaves triquetrous, pointed, ± 10 × 5 mm, up to 5 mm thick, epidermal cells slightly elevated. Flowers mostly solitary. Fruit with high valve rims, 5-locular, expanding keels with awns. June–July. Loamy soils, NH, KV (southern Namaqualand and Knersvlakte). **(ece)**

komkansica (L.Bolus) H.E.K.Hartmann Bushy, succulent shrub, up to 600 mm tall. Leaves trigonous, up to 25 × 4 mm, 5 mm thick, epidermis with low papillae. Flowers mostly solitary on short- and long-shoots, up to 20 mm diam., petals in 5 groups. Fruit 5-locular, rims high, with tiny valve wings. Aug. ?Habitat, NH (Komkans). **(ece)**

piscodora (L.Bolus) H.E.K.Hartmann Dense, clump-forming, succulent shrub, with erect long branches and internodes of stem ± equally long as leaves. Leaves trigonous, ± 20 mm long, up to 5 mm thick, epidermis with low papillae. Flowers solitary, up to 24 mm diam., pink, with bracteoles at base of pedicels. Fruit 5-locular. Mainly Mar. and Nov. with 100–200 mm rainfall per annum, sometimes July. ?Habitat, TS (Prince Albert). **(ece)**

watermeyeri (L.Bolus) H.E.K.Hartmann Very similar to **A. klaverensis** but without a fishy odour. June–July. On flats covered with quartz pebbles, KV (Knersvlakte). **(ece)**

A.' Plants compact, partly forming 3–5 long-shoots; leaves distinctly fused
B. Old leaves not forming a sheath around new set of leaves, new leaves moderately fused

alborubra (L.Bolus) Dehn ex H.E.K.Hartmann Succulent shrub, with compact centre from which ± 5 long-shoots arise. Leaves trigonous, those in compact centre 60–80 mm long, those on long-shoots 20–30 × 8–10 mm, 8–10 mm thick, papillate. Flowers 3–7, in cymes, petals white, staminodes white with magenta tip. Fruit 5-locular. June. Gravelly to sandy soils, G, NS (northern Namaqualand). **(ece)**

amoena (Schwantes) H.E.K.Hartmann Compact, succulent shrub, forming a dense cushion, up to 150 mm diam. Leaves up to 25 × 8 mm, 8 mm thick, sheath 8 mm long. Flowers solitary, on long pedicels. Fruit 5-locular. ?Flowering time. On rocky slopes, NS (Port Nolloth). **(ece)**

bracteata (L.Bolus) H.E.K.Hartmann Succulent shrub, growing in loose cushions. Leaves trigonous, ± 9 mm long, epidermis smooth. Flowers 1–3, with bracteoles in middle of pedicel and smaller than foliage leaves, ± 15 mm diam., petals white. Fruit 5-locular, covering membranes with remains of stiff wings in radial position. May–Aug. Amongst big quartz boulders on slopes, NS (Port Nolloth to Hondeklipbaai). **(ece)**

compacta (L.Bolus) H.E.K.Hartmann Dense, low, succulent shrub, up to 80 mm tall. Leaves trigonous, tip recurved, ± 9 mm long, epidermis smooth. Flowers 1–3, with bracteoles in middle of pedicel and smaller than foliage leaves, ± 17 mm diam., petals pink, filamentous staminodes pink with magenta tips. Fruit 5-locular, covering membranes with stiff wings in radial position, narrow valve wings present. Aug.–Sept. ?Habitat, NH (northern Namaqualand: between Springbok and Wallekraal). **(ece)**

compressa (L.Bolus) H.E.K.Hartmann Clumped, succulent shrub, forming a cushion, up to 120 mm tall, with some long-shoots protruding diagonally. Leaves trigonous, 15 mm long, epidermis papillate. Flowers solitary, with bracteoles near base of pedicel, ± 20 mm diam., pink. Fruit 5-locular, covering membranes high in centre, valve wings very narrow. June. On steep slopes with quartzite, G (Richtersveld: Khubus). **(ece)**

dekenahi (N.E.Br.) H.E.K.Hartmann Compact to clumped, succulent shrub, up to 30 mm tall, stems, hypocotyls and roots thickened. Leaves trigonous, mucronate, epidermis with low papillae. Flowers solitary, 12–20 mm diam., petals magenta, filamentous staminodes white or white with magenta tips. Fruit partly disintegrating, with remnants star-shaped. Aug. In crevices in shale, WM (Williston to Sutherland and Fraserburg).

excedens (L.Bolus) Klak Succulent shrub, up to 240 mm tall, stems up to 3 mm diam. Leaves spreading, ovate to subglobose, 4–8 × 3–4 mm, 3–4 mm thick, epidermis cells hardly raised. Flowers 1–3, purplish pink. Fruit 5-locular. June–Sept. ?Habitat, NH, KV (Bitterfontein to Vanrhynsdorp). **(ece)**

longipes (L.Bolus) Dehn ex H.E.K.Hartmann Clumped, cushion-forming, succulent shrub, up to ± 80 mm tall. Leaves slender, trigonous, 35–40 mm long, ± 9 mm thick. Flowers solitary, on long pedicels, petals pink. Fruit on pedicels up to 60 mm long, 5-locular, valve wings short and narrow, with radial wings on covering membranes. June. On quartzitic ridges, G (Richtersveld). **(ece)**

maleolens (L.Bolus) H.E.K.Hartmann Erect, succulent shrub, up to 250 mm tall. Leaves trigonous, 12–25 × 3–4 mm, 3–4 mm thick, epidermis papillate. Flowers solitary, ± 25 mm diam., petals and filamentous staminodes pink to magenta. Fruit 5-locular, with high rims. Sept.–Oct. ?Habitat, NS (Hondeklipbaai and Wallekraal). **(ece)**

modesta (L.Bolus) H.E.K.Hartmann Succulent shrub, with compact base and erect long-shoots. Leaves on long-shoots, up to 35 mm long, trigonous, mucronate, epidermis velvety. Flowers 2 or 3 per cyme, petals basally white, apically magenta. Fruit 5-locular, without valve wings. June. In crevices of granitic rock, SN (S of Aus to Lorelei, Witpütz). **(ece)**

nobilis (Schwantes) H.E.K.Hartmann Compact, succulent shrub, internodes up to 5 mm thick. Leaves thick, convex, 20–30 × up to 10 mm, up to 10 mm thick, velvety. Flowers solitary. Fruit with low top, 6-locular. ?Flowering time. In decomposed material on rocks, G (northern Namaqualand). **(ece)**

nordenstamii (L.Bolus) H.E.K.Hartmann Compact, succulent shrub, with long, erect or decumbent shoots, internodes blackish. Leaves trigonous, obtuse, up to 12 mm long, 5 mm diam., epidermis of free parts papillate. Flowers solitary on crowded short-shoots, petals magenta-pink, filamentous staminodes magenta with pink bases. Fruit 5-locular, with narrow valve wings. May. In quartz ridges between rocks, KV (Vredendal: Holrivier). **(ece)**

paripetala (L.Bolus) Klak (= *Ruschia paripetala* (L.Bolus) L.Bolus, *Antimima hexamera* (L.Bolus) Klak, *A. crassifolia* (L.Bolus) H.E.K.Hartmann) Decumbent to erect, robust, succulent shrub, 300–600 mm tall, sometimes creeping in other shrubs. Leaves semi-cymbiform, 25–40 ×14–24 mm, 14–24 mm thick, epidermis distinctly papillate. Flowers solitary, up to 27 mm diam., petals white to pale pink. Fruit 6-locular, almost flat-topped, without valve wings. June. Frequent near the coast and further inland, also on shale, G, NS (Richtersveld to Hondeklipbaai). **(ece)**

pauper (L.Bolus) H.E.K.Hartmann Succulent shrub, up to 350 mm tall, branches erect, with few side branches pointing in all directions. Leaves on upper branches 10–20 mm long, up to 6 mm thick, basal leaves up to 40 mm long, tips rounded, with a short mucro, epidermis with low papillae. Flowers 1–3, ± 12 mm diam. Fruit top with high rims, 5-locular. ?Flowering time. On gravelly to rocky slopes, G (SE of Jakkalswater). **(ece)**

perforata (L.Bolus) H.E.K.Hartmann Succulent shrub, with erect, stiff branches and short-shoots, from a dense, clumped centre. Leaves triquetrous, 10–15 mm long, apically recurved and apiculate, epidermis with long papillae. Flowers 1–3, up to 14 mm diam., petals pale magenta, filamentous staminodes white. Fruit 6-locular, with low rims. July–Aug. On sandy flats with limestone gravel, SN, G (S of Lüderitz to lower Gariep Valley). **(ece)**

pilosula (L.Bolus) H.E.K.Hartmann Similar to **A. paripetala** in overall habit and in having 6-locular fruit, but fruit with broad valve wings. Erect, robust, succulent shrub, up to 240 mm tall. Leaves subfalcate to subclavate, 30–45 × 6–8 mm, 10–15 mm thick, apiculate, epidermis velvety and grey, due to dense covering of long papillae. Flowers 1–3, in compact cymes, petals white. Fruit with top raised, 6-locular, rims low, valve wings broad. May–June. Rocky sandstone slopes, G (N of Steinkopf). **(ece)**

pumila (L.Bolus) H.E.K.Hartmann Dwarf succulent, forming dense clumps, up to 100 mm diam. Leaves of one pair forming a sheath, a second leaf-pair enclosed which unfolds during rainy season, showing 2 almost oval, spreading leaves, epidermis papillate. Flowers ± 18 mm diam., petals and filamentous staminodes pink. Fruit 5-locular, with high rims. ?Flowering time. On shale, WM, TS (Calvinia to Laingsburg). **(ece)**

quarzitica (Dinter) H.E.K.Hartmann Resembling **A. perforata** in habit but fruit 5-locular. ?Flowering time. On quartzitic hills, SN (southern Namib). **(ece)**

solida (L.Bolus) H.E.K.Hartmann Resembles **Argyroderma fissum** in its decumbent growth and finger-shaped leaves. Flowers mostly in threes. Fruit 5-locular. May–June. On loamy gentle slopes or flats with a light cover of quartz pebbles, KV (Vredendal, Vanrhynsdorp). **(ece)**

turneriana (L.Bolus) H.E.K.Hartmann Compact, succulent shrub. Leaves triquetrous with convex sides, basal sheath ⅓ to half as long as leaves, free parts up to 15 × 8 mm, 8 mm thick,

epidermis with long papillae. Flowers in threes, rarely solitary, petals pinkish magenta, filamentous staminodes apically pink, magenta towards base. Fruit 5-locular, with low rims, valve wings present. ?Flowering time. In crevices of white quartz, marble or limestone (sympatric with **A. dualis**), KV (Vanrhynsdorp). **(ece)**

B.' Old leaves forming a dry sheath around new set of leaves, new leaves highly fused to opposite ones

C. Plants compact; leaves ± as long as broad

androsacea (Marloth & Schwantes) H.E.K.Hartmann Low, dense, mat-forming, succulent shrub, up to 150 mm tall, 500 mm diam., much branched, but internodes of stem not visible. Leaves free from each other, tips spreading horizontally, surface slightly papillate. Flowers solitary, small and red. Fruit almost sessile, 5-locular. Aug. On flats, WM (Sutherland). **(ece)**

argentea (L.Bolus) H.E.K.Hartmann Compact, succulent shrub. Leaves triquetrous, densely papillate, giving them a silvery colour. Flowers solitary, petals pink, longitudinally striped, with a few pale pink staminodes. Fruit on pedicels 20–30 mm long, expanding keels short. Mar. Habitats with < 100 mm rainfall per annum, SN (southern areas of Lüderitz-South). **(ece)**

dualis (N.E.Br.) H.E.K.Hartmann Similar to **A. turneriana** but flowers always solitary and epidermis with short papillae. June. On limestone rocks, KV (Vredendal, Vanrhynsdorp). **(ece)**

elevata (L.Bolus) H.E.K.Hartmann Clumped, succulent shrub, up to 60 mm tall. Leaves almost equal, free parts broadly trigonous, ± 6 × 3 mm, 3 mm thick, epidermis with elevations resulting in a rough surface, free leaves persisting. Flowers solitary. Fruit 5-locular, with high rims. July. ?Habitat, NH (Namaqualand). **(ece)**

evoluta (N.E.Br.) H.E.K.Hartmann Compact, succulent shrub. Leaves dissimilar in shape and size, one leaf-pair smooth, forming a white body during resting stage, with ciliate margins, completely embracing the subsequent one with longer free parts, with short papillae, ± 4 mm long, body ± 4 mm diam. Flowers 16 mm diam., petals magenta. Fruit nearly sessile, 5-locular, with high rims. Oct. Crevices of quartz and limestone rocks mixed with marble, KV, WM (Loeriesfontein, Knersvlakte). **(ece)**

fenestrata (L.Bolus) H.E.K.Hartmann Compact, dense, succulent shrub, up to 120 mm tall. One leaf-pair consisting of a long, smooth, white sheath, embracing the subsequent leaves at their bases, these latter free for half their length. Flowers solitary, magenta. Fruit 5-locular, with low rims. June. Limestone outcrops with marble, KV (Vanrhynsdorp). **(ece)**

ivori (N.E.Br.) H.E.K.Hartmann Very similar to **A. pygmaea** but leaf tips truncate. ?Flowering time. In crevices in exposed sandstone, WM (Sutherland to Fraserburg).

lodewykii (L.Bolus) H.E.K.Hartmann Densely branched, flat to semi-globose, succulent shrublet, with internodes of stem completely hidden by remains of old leaves. One leaf-pair forming a white, smooth sheath, free papillate tips very short, second leaf-pair also highly connate, entirely papillate, bodies formed during resting stage ± 4 × 4 mm. Flowers solitary. Fruit 5-locular. Mar. On quartz gravel, NH (Namaqualand E of Kamiesberg Mountains). **(ece)**

minima (Tischer) H.E.K.Hartmann Compact, succulent shrub, 50–60 mm tall. Leaves connate for half their length, trigonous, pale green, keel and margins densely dotted, 5–7 × 3–5 mm, 2–3 mm thick. Flowers on pedicels ± 10 mm long. Fruit 5-locular. A little known species. Flowering time, habitat and distribution unknown. (Namaqualand). **(ece)**

pygmaea (Haw.) H.E.K.Hartmann Much-branched, succulent shrub, in small dense clumps, up to 150 mm diam. Leaf-pairs form conical white bodies during resting period, old leaves divided by deep, taper-pointed, cut incisions. Flowers solitary, on pedicels raised well above main plant body. Fruit 6-locular. July–Aug. Shale or tillite outcrops on flats, TS, CCR (Worcester to Matjiesfontein). **(gce)**

ventricosa (L.Bolus) H.E.K.Hartmann Compact, succulent shrub, resembling a species of **Cheiridopsis**, up to 100 mm tall. Leaves dimorphic, free parts trigonous, papillate, 40–80(–120) × 13–17 mm, ± 13 mm thick. Flowers solitary, 54 mm diam., magenta or white. Fruit 4–6-locular, lacking valve wings. June–July. Rock outcrops, NS, CCR (Hondeklipbaai to Pakhuis Pass). **(gce)**

C.' Plants compact with long-shoots; leaves longer than broad

buchubergensis (Dinter) H.E.K.Hartmann Compact to clumped, low, succulent shrub, with internodes of stem rarely visible and mostly enclosed by old leaves. Leaves trigonous, forming spherical bodies ± size of a pea, which represents the lateral branches, with low papillae. Flowers mostly solitary, magenta. Fruit 5-locular, with low rims, ± 5 mm diam. ?Flowering time. In rock crevices, SN (Buchuberg). **(ece)**

defecta (L.Bolus) H.E.K.Hartmann Low, succulent shrub, up to 130 mm tall, 150 mm diam., internodes of stem 5–15 mm long. Leaves on short-shoots fused for ± half their length, those on long-shoots shortly fused, free parts with distant papillae, otherwise smooth. Flowers solitary, without filamentous staminodes. Fruit with small closing bodies. Aug. ?Habitat, NH (Springbok). **(ece)**

distans (L.Bolus) H.E.K.Hartmann Erect, succulent shrublet, 100–120 mm tall, stems up to 4 mm diam. Leaves dimorphic, in pairs, the first pair conical, spreading at apices, second pair connate, sheath swollen, especially on one side, free portion 3-angled, 4–8 mm long. Flowers solitary, 15 mm diam., magenta. Aug. Stony flattish areas on sandstone, 450–700 m, TS, CCR (Clanwilliam to Tanqua Karoo). **(gce)**

dolomitica (Dinter) H.E.K.Hartmann Similar to **A. buchubergensis** in the formation of lateral branches consisting of a pair of leaves only, but distinguished by compact base, erect long-shoots with visible internodes, and larger bodies formed by leaf-pair, i.e. ± size of a hazelnut. ?Flowering time. In crevices of dolomite hills, SN (Sperrgebiet: Buntfeldschuh). **(ece)**

emarcescens (L.Bolus) H.E.K.Hartmann Similar to **A. stayneri**. Succulent shrub, with erect to straggling branches from a compact centre, roots tuberous, internodes of stem yellow, later greyish. Leaves dimorphic, 7–10 × ± 2 mm, ± 2 mm thick, with low papillae. Flowers solitary, purplish pink. Fruit 5-locular, with high rims, no valve wings, closing bodies smaller compared to typical ones for the genus. Aug.–Sept. In mountain renosterveld, scrambling in other bushes, WM (Sutherland). **(ece)**

exsurgens (L.Bolus) H.E.K.Hartmann Succulent shrub, dense at centre, with spreading, numerous long-shoots. Leaves with sheath of one pair turning papery for most of its length when dry, second pair triquetrous, in both pairs margins and keels smooth, rounded. Flowers solitary, pinkish purple. May–June. In karroid vegetation, WM (Calvinia). **(ece)**

granitica (L.Bolus) H.E.K.Hartmann (= *A. limbata* (N.E.Br.) H.E.K.Hartmann) Prostrate, succulent shrublet, with slender spreading branches. Leaves erect, mucronate, lower surface keeled, glaucous. Flowers solitary, 12 mm diam., pink. June–Aug. Granite or gneissic rocks, NS, CCR (Hondeklipbaai to Saldanha Bay). **(gce)**

hallii (L.Bolus) H.E.K.Hartmann Similar to **A. subtruncata** but one leaf pair developing into a papery white sheath in **A. hallii**. Succulent shrub, with compact centre and long-shoots, erect at first, later decumbent and rooting at nodes some distance away from primary centre, forming a secondary compact centre. One leaf-pair developing into a papery white sheath of ± 4 mm long, free parts ± 3 mm long, second leaf-pair shortly fused, free parts ± 6 mm long, with low papillae. Flowers solitary, purplish pink. Fruit 5-locular. July. In loamy gravelly soils, TS (Tanqua Karoo to Matjiesfontein). **(ece)**

intervallaris (L.Bolus) H.E.K.Hartmann Succulent shrub, with erect and decumbent branches up to 280 mm long, internodes ochre to brown, 30–40 mm long, up to 4 mm diam. First leaf-pair with long, loose sheaths, enclosing subsequent leaves, free parts up to 35 × 11 mm, 9 mm thick, second leaf-pair shortly fused, only 9–15 mm long, both types papillate. Flowers solitary, on pedicels up to 15 mm long. Fruit 5-locular. May. On sandstone, KV, TS, CCR (Vanrhynsdorp, Clanwilliam, Tanqua Karoo). **(gce)**

loganii (L.Bolus) H.E.K.Hartmann Caespitose succulent, up to 50 mm tall, white during dry season. One leaf-pair shortly fused, papillate, apiculate, second pair forming a long, smooth sheath and short, free parts papillate, both ± 9 × 5 mm, 3 mm thick. Flowers raised above plant on ± 20 mm long pedicels. Fruit 6-locular. ?Flowering time. In crevices of sandstone rocks, WM (Roggeveld). **(ece)**

luckhoffii (L.Bolus) H.E.K.Hartmann Clumped, densely leaved, succulent shrub, up to 50 mm tall. One leaf-pair turning into a basally brown sheath, with 2–3 mm long free parts, the other leaf-pair with short sheath and 5–6 mm long free parts. Flowers solitary, raised well above main plant body. Fruit 5-locular. June. ?Habitat, TS (Tanqua Karoo). **(ece)**

mesklipensis (L.Bolus) H.E.K.Hartmann Low, dense, dwarf, succulent shrub, up to 60–100 mm tall. One leaf-pair connate for 2–3 mm long, drying into a greyish brown sheath, other leaf-pair shortly connate, free parts of both types papillate. Flowers solitary. Fruit 5-locular. Apr. In gravel at 1 300 m, NH (Springbok). **(ece)**

meyerae (Schwantes) H.E.K.Hartmann Compact, succulent shrub, up to 50 mm tall. Leaves apparently in three different types: most commonly leaves forming a sheath with free tips in resting state, free parts with low papillae, up to 8 mm long. Flowers solitary, with 4 new branches developing below, ± 15 mm diam., petals in 5 groups. Fruit with small closing bodies. May–June. In quartz gravel, NS (northern Namaqualand). **(ece)**

oviformis (L.Bolus) H.E.K.Hartmann Low, succulent shrub, up to 60 mm tall, only long-shoots developed. One leaf-pair connate for 5–8 mm, with free parts shortly triquetrous, second type of

leaf-pair shortly connate, triquetrous, papillate, ± 6 × 3 mm, ± 3 mm thick. Flowers solitary, with a free pair of leaves below and two smaller additional pairs developing into side branches, petals pink, filamentous staminodes white. Mar.–Apr. ?Habitat, NS (Namaqualand: Buffelsrivier). **(ece)**

papillata (L.Bolus) H.E.K.Hartmann Succulent shrub, up to 200 mm tall, at first compact, with long-shoots developing vertically from base. One leaf-pair connate for at least half of its length, forming a white sheath during resting period, second pair ± 10 mm long, connate for ± 3 mm, free parts elongate-trigonous, free parts densely papillate. Flowers solitary, up to 20 mm diam., petals magenta, filamentous staminodes white, apically purple. Fruit without closing bodies, valve wings narrow. May. Among rocks or in flats with quartz pebbles, G, NH (Namaqualand). **(ece)**

prolongata (L.Bolus) H.E.K.Hartmann Similar to **A. emarcescens** in habit, differing mainly in the long, thin yellow shoots, which sometimes climb extensively in other shrubs. Aug. In shaley soil, WM (Sutherland). **(ece)**

pusilla (Schwantes) H.E.K.Hartmann Dense, low cushion, up to 250 mm tall. Leaves develop long, smooth, persistent sheaths, one leaf-pair persisting during dry season and enclosing the next leaf-pair, sheaths up to 5 mm long, free parts ± 3 mm long. Flowers solitary, petals in 5 groups. Fruit flat-topped, 5-locular. June. In flats with sand, decomposed granite and quartz gravel, G, NH (northern Namaqualand: Steinkopf area). **(ece)**

schlechteri (Schwantes) H.E.K.Hartmann Compact, succulent shrub. One type of leaf-pair with sheaths persisting as a series of tubes around old stem, free parts of leaves short, the other pair trigonous, ± 9 × 3–4 mm, 3–4 mm thick, connate for ± 5 mm. Flowers solitary. Fruit with high rims, covering membranes with radial wings, valve wings narrow. ?Flowering time. In loam with few quartz pebbles, NH (northern Namaqualand). **(ece)**

simulans (L.Bolus) H.E.K.Hartmann Low, succulent shrub. One leaf-pair with sheaths 4–5 mm long, free parts 1–2 mm long, papillae low, other type of leaf-pair with a sheath ± 4 mm long, free parts up to 9 mm long. Flowers solitary, petals pinkish purple. Fruit unknown. Oct. ?Habitat, KV (Vanrhynsdorp). **(ece)**

stayneri (L.Bolus) H.E.K.Hartmann Leaves and stems similar to **A. emarcescens** but stouter in **A. stayneri**, i.e. stems basally up to 10 mm diam. Leaves dimorphic, 8–10 mm long, finely papillate. Flowers solitary, 20–25 mm diam., purplish pink. Fruit with high rims, valve wings absent, closing bodies large. July. In shaley soils in open vegetation, WM (Calvinia: Hantamsberg). **(ece)**

subtruncata (L.Bolus) H.E.K.Hartmann Similar to **A. hallii** but papery leaf sheath not white. Erect at first, later decumbent or twining in other bushes, with branches up to 250 mm long. Leaves dimorphic, one pair turning papery for most of its length in resting state, shorter ones up to 6 mm long, longer ones 6–10 mm long, fused below. Flowers solitary, stalked, 25 mm diam., pink. Sept. In karroid formations in sand or sandstone, often scrambling in other bushes, WM, CCR (Nieuwoudtville to Sutherland). **(gce)**

varians (L.Bolus) H.E.K.Hartmann Succulent shrub, with internodes longer than leaves. Leaves papillate, 20–27 × ± 4 mm, ± 4 mm thick. Flowers 1–3, on short-shoots. Flowers with petals in five groups, purplish pink. Fruit 5-locular. May. In loamy places among granitic outcrops, NH (between Springbok and Garies). **(ece)**

viatorum (L.Bolus) Klak (= *Antimima bina* (L.Bolus) H.E.K.Hartmann, *Ruschia bina* L.Bolus) Spreading, succulent shrublet, up to 150 mm tall. Leaves papillate, fused below, free parts up to 8 mm long. Flowers solitary, ± 16 mm diam., petals pink, staminodes white, apically dark purple. Aug.–Sept. On gravel or shale in open patches of dense shrubby vegetation, NH, CCR (Bitterfontein to Clanwilliam). **(gce)**

wittebergensis (L.Bolus) H.E.K.Hartmann Clumped, succulent shrub, up to 50 mm tall, with equal leaves. Leaves ± boat-shaped, ± 4 × 4 mm, 2 mm diam. Flowers solitary, petals and filamentous staminodes pinkish purple. Fruit 5- or 6-locular, with narrow valve wings, closing bodies small. Aug. Karroid veld, TS, CCR (Touwsrivier to Laingsburg and western Little Karoo). **(gce)**

ARENIFERA SANDVYGIE, PLAKKERTJIE 4 spp., Richtersveld to Calvinia, Knersvlakte to Matjiesfontein **(gce)**

A. Leaves sticky with sand adhering to surface; calyx 4-lobed; fruit valve-wings rectangular, broad

pillansii (L.Bolus) A.G.J.Herre Succulent shrublet, up to 160 mm tall, densely branched, old branches forming spines. Leaves 3-sided, sticky, collecting wind-blown sand, warty with age.

Flowers pink, pale towards base, filamentous staminodes and stamens arranged in a cone, white below, pink above, nectary a ring. Fruit 8-locular, top as wide as base, rims conspicuous, valve wings large, rectangular, old fruit bases not persistent, stigma bases persistent. Aug.–Oct. Gravelly flats, mainly shrubland, G (Richtersveld). **(ece)**

A.' Leaves without sand adhering to surface; calyx 5(6)-lobed; fruit valve-wings very narrow or absent

pungens H.E.K.Hartmann Succulent shrublet, up to 150 mm tall, entirely covered with conspicuous, spiny, flowerless pedicels. Leaves 3-sided. Flowers pink, filamentous staminodes white below, pink above, nectary a ring. Fruit 6- or 7-locular, top as wide as base, valve rims conspicuous, valve wings absent, expanding keels diverging, old fruit bases persistent. July. ?Habitat, G, NH, WM (Richtersveld and Namaqualand to Calvinia). **(ece)**

spinescens (L.Bolus) H.E.K.Hartmann Succulent shrublet, up to 300 mm tall, with mostly blunt spines formed by old pedicels after fruit fall. Leaves 3-sided. Flowers pink to purplish pink, filamentous staminodes arranged in a cone, pink, nectary a ring. Fruit 7-locular, with top half as long as base, valve rims inconspicuous, valve wings narrow in young stage but absent when older, expanding keels diverging, centre of fruit remaining sunken, old fruit bases not persistent. Aug.–Oct. ?Habitat, KV, CCR (widespread from Vanrhynsdorp to Matjiesfontein). **(gce)**

stylosa (L.Bolus) H.E.K.Hartmann Succulent shrublet, up to 250 mm tall, with spiny, flowerless pedicels. Leaves 3-sided. Flowers pink to purplish pink, filamentous staminodes arranged in a cone, white, nectary a ring. Fruit 7-locular, with top slightly shorter than base, valve rims inconspicuous, valve wings absent, expanding keels diverging, old fruit bases persistent. Aug.–Oct. ?Habitat, G, NH, KV (Richtersveld, Namaqualand to Knersvlakte). **(ece)**

ARGYRODERMA 11 spp., Knersvlakte and Vredendal **(ece)**

A. Leaves finger-shaped

fissum (Haw.) L.Bolus Densely clumped, dwarf, succulent, forming mats with age. Leaves finger-shaped, spreading, 12–60 mm long. Flowers solitary, up to 45 mm diam., yellow or magenta, rarely bright red, with a white base. Fruit many-locular. June–Aug. Mostly in loamy flats adjacent to quartz gravel, KV (Vredendal to Vanrhynsdorp). **(ece)**

A.' Leaves hood-shaped to semi-orbicular

congregatum L.Bolus Compact, dwarf succulent, with up to 5(–13) branches. Leaves hood-shaped, a pair 15–30 × 10–20 mm, old leaves yellow with age, persisting. Flowers solitary, 25–35 mm diam., yellow, rarely magenta or white. Fruit ± 12-locular. Apr.–May. Between rough gravel and quartz, KV (Vredendal, Vanrhynsdorp). **(ece)**

crateriforme (L.Bolus) N.E.Br. Similar to **A. congregatum** in habit and leaf shape but old leaves grey and deciduous as in **A. delaetii**. Flowers solitary, 20–35 mm diam., yellow, rarely magenta or white. Fruit at least 12-locular. Apr.–May. Prefers deeper soils with fewer quartz pebbles than **A. delaetii**, KV (Vredendal, Vanrhynsdorp). **(ece)**

delaetii C.A.Maass Dwarf succulent, forming a single head (rarely 2 or 3), sunken into the ground. Leaves semi-elliptical, flattened above, a pair 20–50 × 15–30 mm, old leaves withering grey, disintegrating after 1 or 2 seasons. Flowers solitary, 20–50 mm diam., white, red, magenta or yellow. Fruit 14–24-locular. Apr.–June. On flats or slopes with quartz pebbles, KV (Vanrhynsdorp). **(ece)**

framesii L.Bolus Compact, branched, dwarf succulent. Leaves hood-shaped, keeled, a pair up to 20 × 8–12 mm, old leaves reddish brown, persisting, in 4 rows. Flowers solitary, 20–25 mm diam., yellow or magenta. Fruit 10–12-locular. May–June. Between rough quartz gravel, KV (Vredendal, Vanrhynsdorp). **(ece)**

patens L.Bolus Similar to **A. framesii** but larger overall, i.e. leaf-pair > 20 × 13 mm. Flowers solitary, 25–40 mm diam., magenta, pink, white or yellow. Fruit ± 12-locular. May–June. In quartz or limonite, KV (Vredendal, Vanrhynsdorp). **(ece)**

pearsonii (N.E.Br.) Schwantes Single headed, dwarf, succulent, rarely with up to 5 branches. Leaves semi-globular, a pair 18–40 × 14–30 mm, old leaves red-brown, forming a tight bowl sur-

rounding bases of fresh leaves. Flowers solitary, 30–35 mm diam., magenta or pink, with a white or yellow base. Fruit ± 12-locular. May–July. On quartz, KV (Vredendal, Vanrhynsdorp). **(ece)**

ringens L.Bolus Very similar to **A. delaetii** but plant 3–5-branched, leaves with a wide gap between them and not sunken into the ground. Flowers solitary, 40–50 mm diam., magenta with a white base. Fruit 14–18-locular. Apr.–May. On yellow quartz and granite, KV (Vanrhynsdorp). **(ece)**

subalbum (N.E.Br.) N.E.Br. Highly branched, dwarf succulent, with 20–40 heads. Leaves semi-globular, a pair 10–15 × 10–13 mm, old leaves red-brown, persistent. Flowers solitary, up to 25 mm diam., magenta with a white base. Fruit 12-locular. June–July. On hills of limonite or quartz, between big pebbles or rocks, KV (Vredendal). **(ece)**

testiculare (Aiton) N.E.Br. Compact, occasionally branched, dwarf succulent, forming columns. Leaves semi-globular, keeled, a pair 25–35 × 15–25 mm, old leaves yellow with age, forming a tight bowl surrounding bases of fresh leaves. Flowers solitary, 25–35 mm diam., magenta, rarely pink or white. Fruit 12–18-locular. May–June. On flats with quartz pebbles, KV (Vanrhynsdorp). **(ece)**

theartii Van Jaarsveld Similar to **A. subalbum** in the highly branched habit and roundish leaves but old leaves yellow. Flowers solitary, magenta. Fruit ± 13-locular. May–June. On quartz flats, KV (Vanrhynsdorp). **(ece)**

ASTRIDIA 8 spp., southwestern Namibia and Richtersveld to Hondeklipbaai (ece)

*A. Flowers white to pink (see also **A. longifolia**)*

hallii L.Bolus Woody shrub, 400–500 mm tall. Leaves glaucous, 3-sided with distinct keel, 50–70 mm long, 30 mm thick, papillae present, velvety. Flowers ± 60 mm diam., white, stamens white, filamentous staminodes absent, nectary a ring. Fruit 6-locular, 13–14 mm diam., rims ± 3 mm high, closing bodies large, hook-shaped, seeds dark brown to maroon, with short papillae. Apr.–June. In between rocks, SN, G (Namibia: Witpütz, to E of Alexander Bay). **(ece)**

velutina Dinter Woody shrub, up to 500 mm tall. Leaves velvety, half moon-shaped, 30–50 mm long, 15–20 mm thick, papillae long. Flowers 30–70 mm diam., white to pink, stamens arranged in a cone, nectary a ring. Fruit 6-locular, ± 12 mm diam., rims 3–5 mm high, seeds pale yellow to brown, with long papillae. June–Aug. In between rocks, SN, G (Namibia: Klinghardt Mountains to northeastern Richtersveld). **(ece)**

A.' Flowers yellow, orange or red to purple

citrina (L.Bolus) L.Bolus Woody shrub, ± 300–500 mm tall. Leaves grey-green, 50–70 mm long, 13–19 mm thick, velvety, half moon-shaped, papillae low. Flowers solitary, yellow, 36–64 mm diam., bracts boat-shaped, stamens and staminodes arranged in a cone, yellow, nectary a ring. Fruit 11–12 mm diam., robust, 6-locular, closing bodies hook-shaped, covering membranes with small closing rodlets beneath, valve wings present, seeds maroon, with papillae higher than broad. July–Aug. Rock crevices with some quartz, SN, G (southwestern Namibia to Richtersveld). **(ece)**

herrei L.Bolus Woody shrub, up to 400 mm tall. Leaves pinkish grey, glaucous, loosely arranged, finger-like to sickle-shaped, 50–80 mm long, ± 15–16 mm thick, apex blunt. Flowers magenta to red with yellow towards base, ± 50 mm diam. Fruit 6-locular, ± 12 mm diam., valve wings absent, seeds dark brown, papillae broader than high. Sept.–Oct. In between rocks, G (northern Richtersveld). **(ece)**

longifolia (L.Bolus) L.Bolus Woody shrub, broadening with age, up to 500 mm tall. Leaves slender, glaucous, appearing finger-like although 3-sided, 40–90 mm long, 15–16 mm thick. Flowers predominantly red, with yellow near base (rarely entirely white), 45–50 mm diam., stamens and staminodes arranged in a cone, nectary a ring. Fruit ± 15 mm diam., 6-locular, closing bodies large, valve wings absent, seeds dark maroon. Aug.–Sept. In between rocks, G (northern Richtersveld). **(ece)**

lutata (L.Bolus) Friedrich ex H.E.K.Hartmann Woody shrub, up to 400 mm tall. Leaves 25–35 mm long, ± 15 mm thick, glaucous, half moon-shaped, papillae low. Flowers solitary, yellow, 30–42 mm diam., stamens and staminodes arranged in a cone. Fruit 6-locular, valve wings absent, seeds papillae, broader than high. Sept.–Oct. In shale or mixed rubble, SN, G (southwestern Namibia and Richtersveld: Sendelingsdrif to Arrisdrif). **(ece)**

speciosa L.Bolus Small shrub, up to 300 mm tall. Leaves velvety, half moon-shaped, 35–50 mm long, 18–20 mm thick. Flowers reddish orange to purple, with yellow-white towards base, 35–55

mm diam., stamens and staminodes arranged in a cone, nectary a ring. Fruit 6-locular, valve wings absent. ?Flowering time. Gravelly soil near rocks, SN, G (southwestern Namibia to northern Richtersveld). **(ece)**

vanheerdei L.Bolus Shrub broad, up to 200 mm tall. Leaves 30–70 mm long, 15–23 mm thick, glaucous, half moon-shaped, apex acute, epidermis smooth. Flowers purple to brick-red, ± 50 mm diam., staminodes absent, nectary inconspicuous. Fruit unknown. Apr. (in cultivation). Rock crevices, G (Richtersveld: N of Khubus, little-known). **(ece)**

[**Excluded species** Insufficiently known **A. alba** (L.Bolus) L.Bolus (possibly conspecific with **A. longifolia** or **A. speciosa**), **A. dulcis** L.Bolus (possibly conspecific with **A. velutina**), **A. hillii** L.Bolus, and **A. rubra** (L.Bolus) L.Bolus]

BIJLIA PRINCE ALBERT VYGIE 2 spp., W Cape **(gce)**

dilatata H.E.K.Hartmann Stemless, tufted perennial. Leaves trigonous, irregularly clavate, almost as broad as thick, up to 20 × 10 mm in upper half, whitish green, smooth. Flowers 1–3, shortly stalked, yellow. Fruit 5-locular. Apr.–May. On flats with broken dolerite and quartzite gravel, TS (Prince Albert). **(ece)**

tugwelliae (L.Bolus) S.A.Hammer Stemless, densely leafy, clump-forming, succulent perennial, up to 80 mm tall. Leaves trigonous, sabre-shaped, narrow and deeply keeled, up to 60 mm long. Flowers shortly stalked, 40–50 mm in diam., yellow. Fruit 5-locular. Feb.–Aug., mainly Apr.–July. Sandstone outcrops and cliffs, TS, CCR (Bosluiskloof to Prince Albert). **(gce)**

BRAUNSIA 4 spp., W Cape, Tanqua Karoo to Little Karoo **(gce)**

apiculata (Kensit) L.Bolus Erect, succulent shrub, up to 200 mm tall. Leaves 3-angled, densely covered in soft hairs, 15–30 × 5–9 mm, 5–9 mm thick, apex recurved and apiculate. Flowers solitary, 24–30 mm diam., petals pink. Fruit 5-locular, with valve wings, without closing bodies. July–Sept. On Ecca shales, TS, CCR (Cederberg Mountains, Tanqua Karoo to Little Karoo). **(gce)**

geminata (Haw.) L.Bolus Erect, succulent shrub, 200–300 mm tall. Leaves sharply 3-angled, 10–20 × 5–6 mm, smooth. Flowers solitary, bracteoles enclosed in uppermost leaves, petals pink to magenta. Fruit 5-locular, with valve wings, without closing bodies. Apr.–May. On sandstone and shale, TS, CCR (Tanqua Karoo to Little Karoo, Prince Albert). **(gce)**

stayneri (L.Bolus) L.Bolus Succulent shrub, with decumbent, creeping stems, occasionally rooting at nodes. Leaves up to 10 × 6 mm, smooth, not keeled. Flowers solitary, enclosed in bracteoles on a short pedicel, petals pink to magenta. Fruit 5-locular, with valve wings, without closing bodies. Seeds echinate. May. On sandstone, TS (Tanqua Karoo). **(ece)**

CARPOBROTUS 13 spp., worldwide in mediterranean-type to moderate climates without hard winters

edulis (L.) L.Bolus RANKVY, SOURFIG, VELDVY Succulent shrub, with trailing robust stems, up to ± 2 m long and winged, 10–15 mm thick internodes. Leaves 3-angled, straight or slightly curved, (40–)50–120(–140) mm long, 7–20 mm thick, dull or pale green. Flowers pedicellate, solitary, 70–90 mm diam., yellow, turning pink when aging. Fruit 7–14-locular, fleshy, an indehiscent berry. July–Oct. On coastal and inland sandy soils, NS, NH, CCR (widespread in N Cape and W Cape, naturalised in Australia, Tasmania, California and Britain).

quadrifidus L.Bolus ELANDSVY, SUURVY Succulent shrub, with trailing robust stems, up to ± 2.5 m long and 4–6-angled, winged, 15–20 mm thick internodes. Leaves 3-angled, 80–140 × 18–25 mm, glaucous, margins entirely cartilaginous. Flowers pedicellate, solitary, 120–150 mm diam., white, pale pink or magenta. Fruit 13–22-locular, fleshy, an indehiscent berry. Aug.–Sept. On coastal and inland sandy soils, NS, CCR (Namaqualand to Langebaan). **(gce)**

CEPHALOPHYLLUM 32 spp., Namaqualand, Bushmanland and W Cape

A. Primary shoot forming a compact head, secondary shoots procumbent

alstonii Marloth ex L.Bolus Compact, succulent shrub. Leaves apically trigonous, basally rounded, greyish, very long (60–120 mm), erect. Flowers bright red-magenta, stamens reddish brown.

Fruit with persistent fruit stalks, 18–20-locular, seeds smooth. July–Sept. Succulent associations on sandstone soils, TS, CCR (SW edge of Tanqua Karoo to E side of Ceres Mountains). **(gce)**

corniculatum (L.) Schwantes Compact, succulent shrub, with mostly annual, lateral shoots, which may root. Leaves apically trigonous, basally rounded, greyish. Flowers with yellow petals and stamens. Fruit with persistent fruit stalks, 10–30 mm diam., 13–17-locular. July–Sept. Finely grained soils on open flats, TS (Tanqua Karoo). **(ece)**

pillansii L.Bolus Compact, succulent shrub, with annual, decumbent inflorescences. Leaves apically trigonous, basally rounded, grey and very long (80–130 mm). Flowers with yellow petals, stamens brownish to purple. Fruit 15–20-locular. June–Sept. Sandy loamy flats between granite or sandstone rocks, NS, NH (Namaqualand). **(ece)**

tricolorum (Haw.) Schwantes Creeping, succulent shrub. Leaves apically trigonous, basally rounded, 80–120 mm long. Flowers with yellow petals, stamens orange and apically brownish to purple. Fruit without persistent stalks, 14–16 mm diam., 15–17-locular. June–Sept. In karroid vegetation, rare in sandveld, sandy to loamy soils, KV, WM, CCR (Knersvlakte, Nieuwoudtville, Clanwilliam). **(gce)**

A.' Primary shoot indistinguishable from secondary stems

B. Plants creeping

compressum L.Bolus Creeping, succulent shrub, not rooting at each node, internodes corky. Similar to **C. ebracteatum** but leaves spreading, trigonous, 40–65 mm long. Flowers in rich terminal inflorescence, petals yellow. Fruit with stout, high valve rims. Seeds 0.95–1.05 mm long. Apr. In alluvial soils, SN (southern Namib). **(ece)**

curtophyllum (L.Bolus) Schwantes Creeping or compact, succulent shrub. Leaves trigonous, pointed, 30–55 mm long, dark green. Flowers up to 37 mm diam., petals magenta, filaments white, anthers yellow or petals cream-coloured, stamens purple-maroon. Fruit base mostly bowl-shaped. July–Sept. Open succulent associations, on Dwyka shale, TS, CCR (Tanqua Karoo to Worcester-Robertson Karoo). **(gce)**

ebracteatum (Pax ex Schltr. & Diels) Dinter & Schwantes Creeping, succulent shrub, with long corky internodes. Leaves trigonous, acute, dark to greyish green, 15–60 mm long. Flowers yellow. Fruit with stout, erect valve rims. Seeds 0.7–0.9 mm long. July–Aug. In gravelly and sandy coastal plains, SN, G (Lüderitz to Alexander Bay). **(ece)**

framesii L.Bolus Creeping, succulent shrub, with short, corky internodes. Leaves erect, club-shaped, dark green, 30–70 mm long. Flowers with cream-coloured, yellow or magenta petals, yellow or magenta stamens, in all possible combinations. June–Aug. Often as settlers in disturbed ground or on alluvial soils, NH, KV, WM, TS (Riethuis to Vredendal, northern Tanqua Karoo). **(ece)**

goodii L.Bolus Creeping, succulent shrub, with long, brown, corky internodes, centre of plant more densely leaved and therefore appearing compact. Leaves erect, rounded, apically keeled, dark green, 40–50 mm long. Flowers with yellow petals, stamens yellow or magenta. May–June. Loamy patches over sandstone or granite, G, NH (Vioolsdrif to Springbok). **(ece)**

inaequale L.Bolus Creeping, succulent shrub, with short thick yellow internodes. Leaves rounded-trigonous, apically keeled, yellow or grey-green, 30–100 mm long. Flowers yellow, rarely magenta. Fruit usually 12-locular. July–Aug. Sand or loamy sand on coastal plain, NS (northern Namaqualand). **(ece)**

niveum L.Bolus Creeping, succulent shrub, with long internodes. Leaves short, 20–30 mm long, trigonous, spreading, dark green. Flowers magenta, yellow or cream-coloured. Fruit with low, soon disintegrating valve rims. June–Aug. Often on quartz or sandstone, NS, NH, KV (Namaqualand to Vanrhynsdorp). **(ece)**

rigidum L.Bolus Creeping, succulent shrub, internodes yellow and shorter than leaves. Leaves almost club-shaped, dark to pale green, usually erect, 40–90 mm long. Flowers usually solitary, petals yellow or yellow and magenta. Fruit typical for the genus. June–Aug. Loamy to sandy soils, also colonising disturbed ground, G, NS, NH (Richtersveld and Namaqualand). **(ece)**

staminodiosum L.Bolus Creeping, succulent shrub, with short internodes, young internodes dark brown. Leaves rounded, dark green, 30–45 mm long. Flowers with white petals and filamentous staminodes. Fruit stalks erect, base of fruit hemispherical. June–Aug. On quartz slopes, KV (Knersvlakte). **(ece)**

B.' Plants not creeping

caespitosum H.E.K.Hartmann Densely clumped, rarely compact, succulent shrub. Leaves markedly unequal in young leaf-pair, apically trigonous, 30–55 mm long, dark green. Flowers magenta to whitish, copper to cream. Fruit 9- or 10-locular, valve wings narrow. June. On quartz flats, KV (Knersvlakte). **(ece)**

confusum (Dinter) Dinter & Schwantes Compact, succulent shrub, rarely in dense clumps. Leaves erect, cylindrical, pointed, 20–65 mm long, dark green. Flowers 1–3, yellow. Fruit with robust valve rims. Sept. Usually forming monotypic stands on quartz pebble flats overlaying sandstone or dolomite, SN (mountainous regions of southern Namib). **(ece)**

hallii L.Bolus Compact, succulent shrub, up to 110 mm diam., without runners. Leaves erect, up to 50 mm long, internodes covered by old leaf sheaths. Flowers solitary, petals magenta, becoming white towards centre. Fruit 10(–12)-locular, base bowl-shaped, decumbent when mature. June–July. On Ecca shales, WM (Loeriesfontein). **(ece)**

herrei L.Bolus Ascending to erect, succulent shrub. Leaves usually circular in cross section, also trigonous, 45–100 mm long. Flowers with yellow petals, stamens pale yellow. Fruit in persistent, erect, richly branched cymes, developing over several years. July–Aug. On shaley slopes in shrubby succulent associations, SN, G (southern Namib to Richtersveld). **(ece)**

numeesense H.E.K.Hartmann Compact, succulent shrub, with long, brown decumbent internodes. Leaves erect, spindle-shaped, 45–100 mm long. Flowers in rich cymes, petals yellow or magenta with yellow bases. Fruit with robust, persistent valve rims. Aug. On shaley or gravelly slopes of gneiss, granite or quartzite, G (northern Richtersveld). **(ece)**

parvibracteatum (L.Bolus) H.E.K.Hartmann Loosely clumped, succulent shrub. Leaves bluntly trigonous, apically keeled, short, < 20 mm long, dark green. Flowers magenta or cream-coloured. Fruit usually short-stalked, < 30 mm long. July–Aug. ?Habitat, KV (Vanrhynsdorp). **(ece)**

pulchellum L.Bolus Compact, succulent shrub, rarely rooting at nodes, internodes short and corky. Leaves rounded, not keeled, erect, dark green, 15–35 mm long. Flowers yellow or magenta, stamens yellow. Fruit erect, base semi-globose. May–June. On quartz, KV (northern Knersvlakte). **(ece)**

pulchrum L.Bolus Compact, succulent shrub, internodes thick (up to 10 mm) and spongy. Leaves cylindrical, apically rounded, erect, dark green. Flowers magenta, stamens brownish purple. Fruit with fairly narrow valve wings, 12- or 13-locular. May–Aug. On alluvial soils, KV (southern Knersvlakte). **(ece)**

regale L.Bolus Compact, succulent shrub, with decumbent, annual, flowering branches. Leaves trigonous to rounded, yellowish green to greyish. Flowers in rich inflorescences, petals reddish magenta, orange or yellow, or many coloured. Fruit typical for the genus. May–July. Quartzitic outcrops, NS, NH (northern Namaqualand). **(ece)**

spissum H.E.K.Hartmann Similar to **C. caespitosum** but habit strictly compact with fewer branches, leaves longer (45–60 mm) and locule number 11–15. July. On quartz flats, KV (Vanrhynsdorp). **(ece)**

tetrastichum H.E.K.Hartmann Ascending to erect, succulent shrub, with woody stems. Leaves trigonous, completely enveloping stem, dark green. Flowers with yellow petals, stamens pale yellow. Fruit in persistent, erect, richly branched cymes, developing over several years. ?Flowering time. In sand between rocks close to the sea, NS (Port Nolloth). **(ece)**

CHASMATOPHYLLUM 8 spp., Namibia, Karoo, E Cape, Free State to southern Mpumalanga

braunsii Schwantes (including **C. willowmorense** (L.Bolus) L.Bolus) Low, tiny, succulent shrub, up to 20 mm tall, with 1 or 2 leaves per branch, internodes invisible. Leaves semi-ovate, 7–14 × 3–5 mm, 3–5 mm thick, covered in white warts. Flowers almost sessile, petals in 2 rows, 6–9 mm long, yellow, filamentous staminodes absent. Fruit top almost flat, closing bodies very small, valve wings ending in awns, 5-locular. Nov. ?Habitat, TS, CCR (Laingsburg to Willowmore and Victoria West).

musculinum (Haw.) Dinter & Schwantes Compact to shrubby succulent, up to 30 mm tall, with short, thickish rhizomes forming adventitious roots. Leaves trigonous to triquetrous, 10–25 × 4–5 mm, 4–5 mm thick, keel and margins with 0–4 teeth, epidermis rough from raised warts. Flowers almost sessile, petals deep yellow, suffused reddish outside, open at ± 15:00–18:00. Fruit

long-stalked, top almost flat, closing bodies absent, 5-locular. Nov.–Dec. On flats, in shale or coarser sand or gravel, TS, CCR (as for the genus).

stanleyi (L.Bolus) H.E.K.Hartmann Low, succulent shrub, 70–90 mm tall, with a stout thick woody ± 15 mm wide rootstock, branches ascending, internodes up to 7 mm diam. at base. Leaves trigonous, 10–13 × 3 mm, up to 4 mm thick, keel with a prominent recurved tooth below apex, margins occasionally with a tooth on each side, epidermal cells raised. Flowers solitary, 20–24 mm diam., yellow, on branches protruding above plant. Fruit without closing bodies, valve wings very broad, 5-locular. Sept.–Oct. On stony to shaley slopes, TS, CCR (Beaufort West, Aberdeen, Laingsburg to Prince Albert, Willowmore).

CHEIRIDOPSIS ± 29 spp., southern Namibia, N and W Cape

acuminata L.Bolus Succulent subshrub, old plants raggedly clumped and rather lank, 150 mm tall, 250 mm diam., not deciduous. Leaf-pairs gaping, fattish, pale blue-grey, finely and densely speckled, fuzzy, very shortly keeled, toothless, margins translucent. Flowers solitary, huge, petals dirty white to dull yellow. Fruit 10-locular, globose below. Aug.–Sept. Quartzite flats or on slopes, G (Numees, Khubus, Great Helskloof, northwestern Richtersveld). **(ece)**

alata L.Bolus Succulent subshrub, old plants sparsely clumped, 40–60 mm tall, 100 mm diam., deciduous. Leaves forming united pairs, long and short in succession, pale blue-grey, finely and densely speckled, edges with translucent fin-like ridges. Flowers solitary, huge, petals yellow. Fruit 10-locular. Aug.–Sept. Quartzite outcrops, NH (just W and S of Steinkopf). **(ece)**

aspera L.Bolus Succulent subshrub, old plants long-stemmed, stems chestnut-brown, zigzagging, 200 mm tall, 250 mm diam. Leaves not deciduous; leaf-pairs gaping, dark green, shiny when turgid, finely and densely warty, with hard white bosses, shortly keeled, toothless to well-toothed. Flowers solitary, mid-sized, petals yellow. Fruit 10–12-locular, funnelform below, ruby red above (when young). Aug.–Sept. Quartzite outcrops, NH (around Steinkopf). **(ece)**

brownii Schick & Tischer Succulent subshrub, old plants densely clumped, 50 mm tall, 150 mm diam., not deciduous. Leaves fat, not gaping, never toothed, mildly keeled, pale greyish green or greenish tan. Flowers solitary, modest, short-stalked, petals yellow. Fruit 10–12-locular. Aug.–Sept. Dolomite flats, SN, G (Sperrgebiet: Daberas to Alexander Bay). **(ece)**

caroli-schmidtii (Dinter & A.Berger) N.E.Br. Succulent subshrub, old plants densely clumped, 30–60 mm tall, 50–150 mm diam., not deciduous. Leaves in shortly gaping pairs, pale blue-grey to olive-green [Spitzkop], finely and densely speckled, margins sometimes gap-toothed. Flowers solitary, huge, petals yellow. Fruit 10–12-locular. Aug.–Sept. Quartzite flats or on slopes, SN (southern Namibia: Aus to Kuckaus and Rosh Pinah). **(ece)**

delphinoides S.A.Hammer Succulent subshrub, old plants densely clumped, 30–60 mm tall, 50–120 mm diam., deciduous. Leaves pale blue-grey, conspicuously and translucently spotted, forming united pairs, long and short in succession, tips broadened, dolphin-snout-like. Flowers solitary, large, petals yellow, white-centred, appearing when leaves wither. Fruit 10-locular. Aug.–Oct. On powdery shale flats or on rocky slopes, NH (W of Bulletrap and S of Tierberg). **(ece)**

denticulata (Haw.) N.E.Br. Succulent shrub, old plants densely clumped, 100–250 mm tall, up to 400 mm diam., not deciduous. Leaf-pairs forming a gaping V, each leaf flaring to tip, unequally toothed (absent one year but fiercely present the next), pale bluish grey to silvery white, never brownish, rarely green, subtly mottled. Flowers solitary, huge, long- and sturdily-stalked, petals pale yellow to cream or white with a rosy tinge. Fruit 12–20-locular. Aug.–Sept. On flats or slopes, ubiquitous, G, NH (lower Richtersveld to Bitterfontein). **(ece)**

derenbergiana Schwantes Succulent subshrub, old plants densely clumped, 30–40 mm tall, 50–100 mm diam., deciduous. Leaves ± thick, forming united pairs, long and short in succession, pale or lively grey-green, edges outlined in green. Flowers solitary, huge, petals yellow. Fruit 10–12-locular. Aug.–Sept. Quartzitic flats or on slopes, NH (Steinkopf Plateau to extreme western Bushmanland).

gamoepensis S.A.Hammer Succulent subshrub, old plants clumped, 30–60 mm tall, 50–100 mm diam., deciduous. Leaf-pairs robust, ± thick, long and short, sharply keeled, gaping and blushing red apically, pale blue-green, finely spotted. Flowers solitary, short but huge, petals yellow, drooping. Fruit 10-locular. Aug.–Sept. On quartzitic or calcrete flats, NH (Gamoep and Platbakkies). **(ece)**

glomerata S.A.Hammer Succulent subshrub, old plants very densely clumped into domes, 30–40 mm tall, 50–120 mm diam., not deciduous. Leaves contiguous, chubby, softly keeled, whitish. Flowers solitary, large, short-stalked, petals brilliant magenta, densely placed and folded over

stamens and stigmas. Fruit 9–12-locular. Aug.–Sept. On quartzitic flats, NS (SE of Port Nolloth, Naroegas, NW of Nutabooi). **(ece)**

herrei L.Bolus Succulent subshrub, old plants tightly clumped, 30–40 mm tall, 50–80 mm diam., not deciduous. Leaf-pairs chubby, not gaping, keels rather sharp, pale greyish blue, conspicuously spotted. Flowers solitary, short-stalked, petals egg yolk-yellow. Fruit 10-locular. Aug.–Sept. Quartzite flats, often in spongy saline soil, or on rocky slopes, G (eastern Richtersveld, Eksteenfontein to Klipbok). **(ece)**

imitans L.Bolus Succulent subshrub, old plants densely clumped, inclining towards the sun, looking permanently windswept, 40–80 mm tall, 150 mm diam. Leaves dark brown when old, long-persistent, 30–80 mm tall, 50–120 mm diam., deciduous but obsolete leaves not forming a complete sheath, new leaves dark green, sharply tapering, widely gaping. Flowers relatively small, petals dull yellow. Fruit 10-locular, robust and persistent. Aug.–Sept. Quartzite flats, NH, KB (Kamiesberg Mountains, Witwater to Platbakkies). **(ece)**

meyeri N.E.Br. Mat-forming, succulent, dwarf shrub, old plants densely but raggedly clumped, 10–30 mm tall, 50–120 mm diam., stems thin and brittle, conspicuous in age, deciduous, dormant corpuscles clam-shaped. Leaf-pairs of 2 types, united or divided, deep green, turning deep purple toward spring. Flowers solitary, disproportionately large, petals yellow. Fruit 10-locular. Aug.–Sept. Shale flats or on slopes, often with some quartzite, G (T'Gabies E of Kosies to Steinkopf). **(ece)**

minor (L.Bolus) H.E.K.Hartmann Mat-forming, succulent subshrub, old plants densely clumped, 10–20 mm tall, 50–150 mm diam., deciduous, dormant corpuscles periwinkle-shaped, white, appearing torpid. Leaf-pairs of a season long and short, exceptionally small, reddening in spring. Flowers solitary, disproportionately large, petals yellow. Fruit 10-locular. Aug.–Sept. On quartzite grit flats, NH (eastern edge of Kamiesberg Mountains to western edge of lower Bushmanland).

namaquensis (Sond.) H.E.K.Hartmann Succulent subshrub, old plants densely clumped, 30–100 mm tall, 50–200 mm diam., deciduous, stems slender, rather elongate in age. Leaves pale blue-grey to green-grey, long and narrow, finely spotted, forming united pairs, long and short in succession. Flowers solitary, large, petals golden to dark yellow. Fruit 9- or 10(11)-locular. Aug.–Oct. Widespread, G, NH, KV, WM, TS (Umdaus N of Steinkopf through Namaqualand to Calvinia, Sutherland to Matjiesfontein). **(ece)**

pearsonii N.E.Br. Succulent subshrub, densely clumped, 30–60 mm tall, 50–120 mm diam., roots fleshy. Leaves pale blue-grey, sharply tapering, minutely spotted, basally flushed red, smooth, rather soft, persistent. Flowers solitary, midsized, petals dull yellow. Fruit 10-locular. Aug.–Oct. Damp, rocky slopes, KB (Kamiesberg Mountains, near Leliefontein). **(ece)**

peculiaris N.E.Br. Succulent subshrub, old plants sparsely clumped, 30–80 mm tall, 50–120 mm diam., deciduous, dormant corpuscles castanet- or jacaranda-pod-shaped. Leaf-pairs long, spreading, and divided vs. short, erect, and united, grey-green to purplish, with a waxen sheen in damp conditions and often irregularly and slightly grooved, margins knife-like, deep green or rarely red. Flowers very large, petals rich yellow. Fruit 9–12-locular, robust and persistent. Aug.–Sept. Shale flats or on gneiss slopes, G, NH (western edge of Geelvlei Plateau, N of Steinkopf to Springbok). **(ece)**

pillansii L.Bolus Succulent subshrub, old plants richly clumped, 60–100 mm tall, 100–200 mm diam., not deciduous. Leaf-pairs ± erect, not gaping, often puffy, keels ± soft, sometimes crimped [then matching *Cheiridopsis crassa* L.Bolus, Port Nolloth], epidermis pale greyish white, fuzzy, conspicuously spotted. Flowers solitary, quasi-sessile, petals white to cream, pale rose or rich yellow [Ploegberg]. Fruit 10–14-locular, globose. Aug.–Sept. Quartz flats, often in spongy, saline soil or on low slopes, G (western Richtersveld, Augrabies and Lekkersing to just S of Ploegberg). **(ece)**

pilosula L.Bolus Succulent subshrub, old plants raggedly clumped and rather lank, 150 mm tall, 250 mm diam., not deciduous. Leaf-pairs gaping, slender, pale blue-grey, finely but densely hairy, prominently keeled, toothless, margins translucent. Flowers solitary, huge, petals yellow. Fruit 10-locular, globose below. Aug.–Sept. Quartzite flats or on slopes, G (Richtersveld: Stinkfontein Mountains and Klipbok). **(ece)**

ponderosa S.A.Hammer Succulent subshrub, old plants densely clumped and short-stemmed in age, 150 mm tall, 250 mm diam., not deciduous. Leaf-pairs not gaping, grossly fat, pale green-grey, finely but densely hairy, mildly keeled, minutely toothed, margins translucent. Flowers solitary, huge, cup-shaped, petals yellow. Fruit 10-locular, globose below. Aug.–Sept. Quartzite flats or on slopes, G (lower Richtersveld: Skimmelberg near Grasvlakte). **(ece)**

purpurea L.Bolus Robust, clump-forming, succulent subshrub, 80–120 mm tall, 400 mm diam., often raggedly stemmed in age, not deciduous. Leaf-pairs pale grey-green, margins slightly crenate [crimped], mildly keeled, faintly spotted. Flowers solitary, petals brilliant magenta, infolded,

anthers grey. Fruit 10-locular, globose. Aug.–Sept. On quartzite outcrops or flats, G (Karrachab to Maerfontein). **(ece)**

robusta (Haw.) N.E.Br. Succulent subshrub, old plants thickly clumped, 200 mm tall, 400 mm diam., not deciduous. Leaf-pairs large, elongate-chubby, gaping, softly keeled above, pale greyish blue to greyish green, spotted. Flowers solitary, short-stalked, petals yellow to cream or white with pink tinges. Fruit 10–13-locular. Aug.–Sept. Rocky flats of diverse rocky types, SN, G (lower Namibia and Richtersveld). **(ece)**

rostrata (Haw.) N.E.Br. Succulent, old plants densely clumped, 30–80 mm tall, 50–180 mm diam., deciduous. Leaves pale greenish grey, translucently spotted, forming united pairs, ± equal but differing in degree of fusion, blushing by early summer. Flowers usually solitary, pedicels very elongate, often slender, petals yellow. Fruit 8(9)-locular. Aug.–Oct. Calcrete or granite, often littoral, NH, CCR (Rietpoort and Vredenburg to Hopefield). **(gce)**

schlechteri Tischer (including **C. amabilis** S.A.Hammer, **C. campanulata** G.Will. and **C. pulverulenta** L.Bolus) Succulent subshrub, old plants densely clumped, 30–80 mm tall, 50–120 mm diam., not deciduous. Leaf-pairs ± erect, dark dull green or fish-scaled, white (N of Eenriet), keeled, margins darker green or reddish (Gamoep). Flowers solitary, disproportionately large, petals dark yellow to ivory. Fruit 9–12-locular, mostly 10. Aug.–Sept. Shale, quartzite, or calcrete flats or on gneiss slopes, G, NH (Jakkalswater, N of Eenriet to Umdaus, Gamoep and Bushmanland).

speciosa L.Bolus (including **C. splendens** L.Bolus) Robustly clump-forming, succulent subshrub, 100 mm tall, 300 mm diam., often shortly stemmed in age, not deciduous. Leaf-pairs pale grey-green, margins slightly crenate [crimped], mildly keeled, faintly spotted. Flowers solitary, petals carmine to coppery, sometimes magenta-centred, rarely pure golden, never infolded, anthers pale yellow. Fruit 10-locular, globose. Aug.–Sept. On quartzite outcrops or flats, G, NH (near Lekkersing to Vlakmyn and Spitskloof). **(ece)**

turbinata L.Bolus Succulent subshrub, old plants loosely clumped in age, internodes generous, 50–120 mm tall, 50–300 mm diam., deciduous. Leaf-pairs very long and very short, dull deep green, sharply keeled. Flowers solitary, large, petals yellow. Fruit 10–14-locular. Aug.–Sept. Shale flats or on gneiss outcrops, G, NH (Geelvlei, N of Steinkopf to W and E of Springbok). **(ece)**

umbrosa S.A.Hammer & P.Desmet Succulent subshrub, old plants densely clumped, 30–80 mm tall, 50–80 mm diam., deciduous. Leaves pale greenish grey, translucently spotted, differing radically in degree of fusion, reddening by early summer. Flowers solitary, pedicels very elongate, very slender, petals yellow. Fruit 10-locular. Aug.–Sept. Shaded and damp crevices of gneiss, rarely on exposed quartzite, NH (E of Concordia: Khurisberg). **(ece)**

umdausensis L.Bolus Robust, succulent subshrub, old plants short-stemmed, stems chestnut-brown, stout, 200 mm tall, 450 mm diam., not deciduous. Leaf-pairs gaping but parallel, dark green, shiny when turgid, grossly and densely warty, with hard white bosses, shortly keeled, well-toothed, teeth sometimes toothy. Flowers solitary, midsized, petals yellow. Fruit 10-locular, globose below, ruby red above when young. Aug.–Sept. Hot quartzite slopes, G, NH (Umdaus, N of Geelvlei Plateau and E of Concordia: Khurisberg). **(ece)**

velox S.A.Hammer Delicately diffuse, succulent shrublet, 250 mm tall, 400 mm diam., not deciduous. Leaf-pairs medium green, papillate, mildly keeled, faintly spotted, wispily bristle-toothed near tips. Flowers solitary, midsized, pale yellow, not opulent. Fruit 10-locular, smallish, globose, plum red when young. Aug.–Sept. Quartzite plateaux, G (Richtersveld: Ploegberg). **(ece)**

verrucosa L.Bolus Succulent subshrub, old plants tightly clumped, 30–40 mm tall, 50–80 mm diam., not deciduous. Leaf-pairs small, chubby, not gaping, pale greyish blue, conspicuously dark-spotted, keels absent, tips semi-globose. Flowers solitary, short-stalked, small, petals yellow. Fruit 10-locular. Aug.–Sept. In sand-filled crevices of shale or dolomite, SN, G (Oranjemund and E of Alexander Bay near Grootderm and Beauvallon). **(ece)**

[**Poorly known species C. rudis** L.Bolus]

CLERETUM (= *DOROTHEANTHUS*) 14 spp., Namaqualand and W edge of Bushmanland, W Cape, Karoo

A. Plants with inconspicuous flowers and short-stalked

lyratifolium Ihlenf. & Struck Prostrate to decumbent, succulent annual. Leaves irregularly lyrate, stem-clasping. Flowers short-stalked or sessile, solitary, 4–5 mm diam., white. Fruit with a

30–40 mm long stalk. Aug.–Sept. On flats in shaley gravel, KB, TS, CCR (Kamiesberg Mountains, Swartruggens to Laingsburg and Fraserburg).

papulosum (L.f.) L.Bolus Trailing, papillose, succulent herb. Leaves strap to racket-shaped. Flowers yellow, ovary top ribbed. Fruit with high rims. July–Sept. Sandy places, G, NS, NH, KB, KV, WM, TS, CCR (Namaqualand to Mossel Bay). **(gce)**

A.' Plants with large flowers (20–60 mm diam.) and long pedicels

booysenii (L.Bolus) Klak (= *Dorotheanthus booysenii* L.Bolus) Small, succulent annual, up to 15–30 mm diam. Leaves racket-shaped. Flowers white to pale pink, magenta or cream-coloured. Fruit rounded on top, base semi-orbicular. Sept. Open areas on gravelly shale, 1 200–1 600 m, WM (near Sutherland). **(ece)**

hestermalense (Ihlenf. & Struck) Klak (= *Dorotheanthus bellidiformis* (Burm.) N.E.Br. subsp. *hestermalensis* Ihlenf. & Struck) Tufted, succulent annual. Leaves ligulate to racket-shaped. Flowers magenta with white bases or plain white, ovary flat-topped. Fruit with large or small closing bulge, covering membranes concealing ⅔ of each locule. Aug.–Sept. Mostly on sandy flats, NS, NH, KB (Port Nolloth to Bitterfontein). **(ece)**

maughanii (N.E.Br.) Klak (= *Dorotheanthus maughanii* (N.E.Br.) Ihlenf. & Struck) Succulent annual. Leaves racket-shaped. Flowers with white, yellowish or pinkish petals often with a yellowish central ring, top of ovary with 5 distinct, fleshy rod-shaped lobes, stamens deep red. Fruit rounded on top, base semi-orbicular. July–Sept. Gravelly sand and between small shale chips, WM (Loeriesfontein and near Calvinia). **(ece)**

patersonjonesii Klak Similar to *C. schlechteri* but leaves racket-shaped and more papillate. Aug.–Sept. In recently burnt areas among fynbos, 1 100–1 150 m, KB (Kamiesberg Mountains). **(ece)**

rourkei (L.Bolus) Klak (= *Dorotheanthus rourkei* L.Bolus) Succulent annual. Leaves very narrowly racket-shaped. Flowers with petals racket-shaped or pointed at tips, broadest at base, orange-red, salmon or yellow, ovary flat-topped. Fruit with covering membranes absent or as narrow rims. July–Aug. On red sand, NH, KV (Namaqualand to Vanrhynsdorp). **(ece)**

schlechteri (Schwantes) N.E.Br. (= *Cleretum papulosum* (L.f.) L.Bolus subsp. *schlechteri* (Schwantes) Ihlenf. & Struck) Similar to *C. papulosum* but flowers large and on long pedicels. July–Sept. Sandy places, NH, KB, CCR (Springbok to Kamieskroon, Nieuwoudtville). **(gce)**

CONICOSIA GANSIES, SNOTWORTEL, VARKSLAAI 2 spp., Namaqualand to E Cape

elongata (Haw.) N.E.Br. Prostrate, succulent, perennial herb, with tuberous rootstock. Leaves annual, cylindrical to subcylindrical in cross section. Flowers yellow, styles free. Fruit lacking expanding keels, valves open to release seeds when dry, breaking off near base at a preformed place. Aug.–Oct. In sand, G, NS, NH, KB, CCR (Richtersveld and Karoo to Touwsrivier).

pugioniformis (L.) N.E.Br. Tufted, succulent, perennial herb, up to 400 mm tall, with thick taproot. Leaves trigonous, rosette of main stem perennial. Flowers yellow, styles free. Fruit lacking expanding keels, opening to release seeds when dry, persisting on stalks. Sept.–Nov. Sandy flats, mostly coastal, G, NS, CCR (Richtersveld to Port Elizabeth). **(gce)**

CONOPHYTUM 87 spp., southern Namibia to E Cape

A. Plants night-flowering

acutum L.Bolus Single-bodied geophyte, rarely sparsely clustered, up to 10 mm diam. Leaf-pairs succulent, up to 15 mm long, 8 mm diam., shaped like a fat pear, only truncate, windowed tip exposed. Epidermis smooth, dull or shining green, reddish toward spring, deliquescing by summer. Flowers nocturnal, scented, long-tubed, petals almost wholly fused, ivory. Apr.–May. Fruit with axile placentation. Salty quartz flats, KV (Bitterfontein). **(ece)**

angelicae (Dinter & Schwantes) N.E.Br. Clusters up to 40 mm diam. Leaf-pairs succulent, depressed-globose, up to 18 mm long, 12 mm diam., round or ± square in section. Epidermis smooth as putty, obscurely faceted or deeply furrowed, pale tan to greyish green. Flowers nocturnal, scented, petals bronze, pale yellow or purple-red, not much longer than succulent brown sepals. Mar.–May. Quartz flats or crevices, G, NH (eastern Richtersveld to Concordia, and Pofadder and Warmbad in Bushmanland).

armianum S.A.Hammer Clusters up to 20 mm diam. Leaf-pairs succulent, up to 6 mm long, 4 mm diam., top-shaped, perfectly round in section, apex distinctly flattened. Epidermis coffee-brown, shining, hairless, covered with darkly translucent pimples. Flowers nocturnal, fragrant, petals few, short, pinkish brown. Apr.–June. Quartzite flats or ledges, G (Geelvlei Plateau N of Steinkopf and Jakkalswater). **(ece)**

breve N.E.Br. Clusters up to 20 mm diam. Leaf-pairs succulent, up to 10 mm long, 8 mm diam., usually half that, globose. Epidermis pale yellowish green or glaucous, dull, spotless, often with wrinkle-traces like a new-born baby, fissure not reddened. Flowers nocturnal, showy, petals yellow, amber, brick-red, short. Apr.–June. Quartzite or gneiss ridges, G, NS, NH (Khubus, Oograbies, Kleinsee). **(ece)**

calculus (A.Berger) N.E.Br. Clusters up to 100 mm diam. Bodies succulent, up to 30 mm long, 30 mm diam., globose. Epidermis chalky green, smooth, entirely unmarked, fissure zone never outlined in red. Flowers nocturnal, strongly scented of carnation, large, golden to reddish orange, ivory, pale peach. Apr.–June. Salty quartz flats and slight slopes, full sun, NH, KV (Vanrhynsdorp to Bitterfontein with subsp. **vanzylii** also at Geselskapbank, Concordia, Kangnas to Pofadder).

carpianum L.Bolus Clusters up to 80 mm diam. Leaf-pairs succulent, up to 10 mm long, 6 mm diam., wedge-shaped, curved and sharply keeled, shortly bilobed, soft. Epidermis pale grey, spotted, all surfaces minutely papillate. Flowers nocturnal, scented, relatively large, petals cream, stigmas protruding, May–June. Damp gneiss cliffs with lichens, G (Ploegberg). **(ece)**

depressum Lavis Single or sparsely branched dwarf. Leaf-pairs succulent, up to 5 mm long, 8 mm diam., lentil-shaped, wholly fused, brown to grey-green, covered with soft, short, felt-like hairs. Flowers nocturnal, small, ephemeral or tireless, fragrant, petals short, tan to brick-red. Apr.–May. Stable pans of finely weathered gneiss grit, NH, KB (Concordia to Leliefontein). **(ece)**

halenbergense (Dinter & Schwantes) N.E.Br. Clusters up to 100 mm diam. Leaf-pairs succulent, up to 20 mm long, 12 mm diam., elongate-cordate with a wedge-shaped apex, strongly keeled and bilobed. Epidermis pale greyish green, short-papillate, coarsely spotted with green, keels not outlined in red. Flowers nocturnal, scented, short-tubed, petals cream, yellow, copper, wine-red, May–June. Gneiss or quartzite ridges, SN (Haalenberg, Tschaukaib, Sperrgebiet). **(ece)**

hammeri G.Will. & H.C.Kennedy Sparsely branched geophyte, up to 25 mm diam. Leaf-pairs succulent, up to 15 mm long, 15 mm diam., wholly fused, gumdrop-shaped, translucent but somewhat cloaked in the whitish, skeletonised, old leaves. Epidermis pale green to reddish, cells visible as glistening, very small bumps. Flowers nocturnal, scented, pale yellow to ochre or rarely pink. Apr.–May. Quartzite-covered sides of low hillocks on soft, spongy soil, G (Klipbok, eastern Richtersveld). **(ece)**

hians N.E.Br. Clusters up to 200 mm diam. Leaf-pairs succulent, up to 15 mm long, 6 mm diam., cylindrical with a wedge-shaped apex, sharply keeled, bilobed, lobes gaping, often dusted with the powdery remnants of old skins. Epidermis pale greyish green, spotless, keels and fissure zone never outlined in red, all surfaces minutely papillate. Flowers nocturnal, scented, short, petals cream to yellow or copper. Apr.–June. Gneiss or quartzite ridges, G, NS, NH (Eksteenfontein, Kleinsee, western Spektakelberg). **(ece)**

klinghardtense Rawe Clusters up to 100 mm diam. Leaf-pairs succulent, up to 30 mm long, 15 mm diam., cordate with a wedge-shaped apex, mildly keeled, shortly bilobed. Epidermis pale yellowish green to greyish green, short-papillate, spotted with green, keels and/or margins outlined in red. Flowers nocturnal, scented, short-tubed, petals wide, cream to yellow or copper, sometimes bordered in red. May–June. Gneiss, pegmatite or quartzite ridges, SN (Sperrgebiet: Heioab). **(ece)**

loeschianum Tischer Dense, domed clusters up to 100 mm diam. Leaf-pairs succulent, up to 12 mm long, 6 mm diam., cylindrical, with a wedge-shaped apex, keeled, shortly bilobed. Epidermis pale yellowish green, spotless, keels and/or fissure zone outlined in red, hairless. Flowers nocturnal, scented, short, petals cream to yellow or copper. Apr.–June. Gneiss or quartzite ridges, G (Lorelei to Sandberg, northern Richtersveld). **(ece)**

maughanii N.E.Br. OOGIES Single or sparsely branched geophyte, up to 40 mm diam. Leaf-pairs succulent, up to 30 mm long, 35 mm diam., fused into a soft, ± globose body, sometimes truncate, always at least patchily translucent. Epidermis pale green to ochre or saturated beet-red, colours intensifying as dormancy approaches in late winter, smooth to roughish, without well-defined markings. Flowers nocturnal, powerfully scented, white, cream-coloured to faintly amber or pink. Apr.–June. Quartz flats, G, NH (Oograbies flats, Eksteenfontein, Concordia and Warmbad, Pofadder and Kakamas in Bushmanland).

obcordellum (Haw.) N.E.Br. Clusters up to 200 mm diam. Leaf-pairs succulent, up to 25 mm long, 30 mm diam., top-shaped to cordate, apex usually truncate, sometimes concave or ±

bilobed, irregularly round to ± kidney-shaped in section. Epidermis pale white-green, glaucous, reddish, or dull grey, usually spotted, splattered, and lined with green, dark red or purple, markings often prominent, shining as if enamelled. Flowers nocturnal, single or in delayed cymes of 3, strongly scented, petals white, pale yellow, amber, pink or rich smoky magenta, often with red tips. Mar.–June. Sandstone ridges, quartz flats, NH, WM, CCR (Garies, Bitterfontein, Calvinia, Clanwilliam, Botterkloof, Skitterykloof, Karoopoort, Kaiman's Gat, Patatsrivier). **(gce)**

pageae (N.E.Br.) N.E.Br. Clusters up to 200 mm diam. Leaf-pairs succulent, up to 25 mm long, 35 mm diam., often 1/6 that size, top-shaped, truncate to slightly convex or concave. Epidermis glaucous-green to pale yellowish green, rarely spotted, often wrinkled, fissure usually surrounded with red and sometimes raised like a doughnut. Flowers nocturnal, showy, scented, petals golden yellow, amber, white, rarely pale pink or bright blue, stigmas 4–6. Apr.–June. Gneiss crevices, gypsum, quartzite rubble, shale cliffs or ledges, SN, G, NH, KB, WM (Steinkopf, Springbok, Komaggas, Wallekraal, Bitterfontein, Kliprand, Nieuwoudtville, Calvinia). **(ece)**

phoeniceum S.A.Hammer Single-bodied geophyte, rarely clustered up to 15 mm diam. Leaf-pairs succulent, up to 10 mm long, 12 mm diam., top-shaped, wide-windowed. Epidermis emerald-green, darker at large, irregularly bordered, central window, covered with long, coarse papillae. Flowers nocturnal, scented, petals short, fiery orange to amber or maroon. Mar.–Apr. Quartz flats, G (Steinkopf Plateau). **(ece)**

pubicalyx Lavis Clusters up to 100 mm diam. Leaf-pairs succulent, up to 6 mm long, 3 mm diam., often ½ that size or less, inversely pear-shaped. Epidermis dark grey-green, covered with fine whitish hairs. Flowers nocturnal, small, scented, petals short, maroon to amber. Apr.–June. Quartz flats, NH (Paulshoek, Platbakkies, Witbank, Kliprand). **(ece)**

quaesitum (N.E.Br.) N.E.Br. Clusters up to 200 mm diam. Leaf-pairs succulent, up to 40 mm long, 15 mm diam., cordate, usually bilobate and strongly keeled, lobes sometimes beak-like. Epidermis pale greyish green to pale yellowish green, heavily spotted or spotless, often wrinkled even when ± turgid. Flowers nocturnal, scented, short-tubed, petals white to pink, rarely magenta, filaments often prominent. Apr.–June. On gneiss/quartzite cliffs, slopes, or in rubble, SN, G (Sperrgebiet to Lorelei, Remhoogte, Klipbok, Tatasberg). **(ece)**

saxetanum (N.E.Br.) N.E.Br. Dense, domed clusters, up to 100 mm diam. Leaf-pairs succulent, up to 10 mm long, 6 mm diam., inversely pear-shaped to globose, apex usually keeled, shortly bilobed. Epidermis greyish, whitish or bluish green, sometimes red, sparsely spotted, shiny. Flowers nocturnal, scented, uncommon, petals cream to faint pink. Apr.–June. Gneiss, shale, limestone, quartzite ridges, essentially coastal, SN, G, NS (Lüderitz to Holgatrivier, lower Gariep Valley and some odd populations in the eastern Sperrgebiet). **(ece)**

stephanii Schwantes Clusters up to 150 mm diam. Leaf-pairs succulent, up to 15 mm long, 8 mm diam., globose to depressed-globose. Epidermis grey-green to deep reddish green, covered with long, erect, glassy hairs. Flowers nocturnal, small, scented, petals short, off-white, pale yellow, pink or maroon. Mar.–June. Quartzite cliffs, G, NH (Rosyntjieberg, Grasvlakte, Oograbies, Anenous, Concordia). **(ece)**

stevens-jonesianum L.Bolus Clusters up to 100 mm diam. Leaf-pairs succulent, up to 15 mm long, 15 mm diam., depressed-globose. Epidermis 'India-rubber'-grey to glaucous or chalky, thickly spotted, spots slightly prominent, fissure never surrounded with red. Flowers nocturnal, showy, scented, petals yellow to amber, stigmas often 8 (4–6 being most common in genus). Apr.–June. Gneiss slabs, quartzite flats, calcrete rubble, G, NH (Eksteenfontein, Klipbok, Anenous Pass, outliers from Silverfontein, Platbakkies and Gamoep may belong to a distinct taxon). **(ece)**

truncatum (Thunb.) N.E.Br. Clusters up to 200 mm diam. Leaf-pairs succulent, up to 25 mm long, 25 mm diam., often half that size, cylindrical, apex truncate or convex, slightly bilobed and/or keeled. Epidermis greyish green to yellowish green or reddish, finely or coarsely spotted, sometimes streaked as well. Flowers nocturnal, scented, petals white to pale yellow, pink or smoky violet. Mar.–June. Quartzite flats amongst pebbles, sandstone ridges, TS, CCR (Robertson, Laingsburg, Steytlerville).

uviforme (Haw.) N.E.Br. Clusters up to 200 mm diam. Leaf-pairs succulent, up to 25 mm long, 25 mm diam., inversely pear-shaped to globose, apex usually ± bilobed. Epidermis greyish green to ochre or reddish, spotted, tear-dropped, or streaked, markings often prominent, shining. Flowers nocturnal, scented, petals white to pale yellow or amber, often with red tips. Mar.–June. Quartzite or calcrete flats, sandstone or limestone ridges, NS, NH, KV, WM, CCR (Kleinsee to Smorenskadu, Lutzville to Calvinia). **(gce)**

A.' Plants day-flowering, a few species flowering in the late afternoon

albiflorum (Rawe) S.A.Hammer Succulent perennial, forming dense flat mats. Leaf bodies 8–15 mm long, lobes acutely keeled, glabrous. Epidermis spotted and streaked, sheath whitish or reddish brown, persistent. Flowers diurnal, petals white. Fruit 4- or 5-locular. Mar.–June. Depressions in granite outcrops, NH, CCR (Komkans and W Coast). **(gce)**

auriflorum Tischer Clusters up to 10 mm diam. Leaf-pairs succulent, up to 15 mm long, 8 mm diam., cylindrical, convex or truncate above. Epidermis dark green or brown to pale reddish brown, smooth and shiny when turgid, spotted or irregularly streaked with dark green, but not striate. Flowers diurnal, short-tubed, petals chrome yellow. Mar.–Apr. Quartzite ridges or cliffs, NH (Spektakelberg, Komaggas, Koringhuis). **(ece)**

bachelorum S.A.Hammer Solitary or sparsely branching from old nodes. Leaf-pairs succulent, up to 15 mm long, 12 mm diam., wholly fused, top-shaped, apex distinctly flattened. Epidermis reddish, smooth, with an implausibly plastic sheen, minutely green-spotted. Flowers diurnal, large, petals deep pink, basally white, poking through the thick resting sheath. Oct.–Nov. Quartzite ridges, NH (SE of Port Nolloth). **(ece)**

bilobum (Marloth) N.E.Br. Robust, pomelo-sized cushions or subshrub, with concealed or visible internodes. Leaf-pairs succulent, up to 70 mm long, 30 mm diam., only partly fused, cordate to rabbit-eared in side view, apices keeled or rounded. Epidermis yellowish green to glaucous, pinkish, or ruddy, smooth from palpable wax plates, or shortly papillate, papillae sometimes arranged in fish-scale patterns, keels often red, fissure zone flanked by windowed patches. Flowers diurnal, large, yellow, rarely white or pinkish. Feb.–June. Ubiquitous on slopes, G, NH (lower Gariep Valley and Bushmanland to near Bitterfontein).

blandum L.Bolus Clusters up to 150 mm diam. Leaf-pairs succulent, up to 30 mm long, 15 mm diam., chisel-shaped, keeled and bilobed, each lobe ending in a fine point. Epidermis whitish green, covered with fine papillae, sometimes with red lines or spots on keels. Flowers diurnal, scented, petals abundant, white to rose. Apr.–June. Crevices of quartzite, G, NH (Geselskapbank to Concordia). **(ece)**

bolusiae Schwantes Enormous cushions, up to 400 mm diam., or modest clusters. Leaf-pairs succulent, up to 25 mm long, 12 mm diam., top-shaped, apex truncate or convex, often faintly keeled. Epidermis greyish green, rarely with a few red spots or streaks, or pale yellow-green. Flowers diurnal, popping through old sheaths, petals magenta with dark yellow pollen, or pale pink with pallid pollen. Sept.–Dec. Quartzite cliffs, G (Oograbies to Lekkersing). **(ece)**

brunneum S.A.Hammer Clusters up to 30 mm diam. Leaf-pairs succulent, up to 15 mm long, 10 mm diam., cylindrical, apex convex. Epidermis brown, rarely pure green, shiny, spotless, finely rippled. Flowers diurnal, purple. Apr.–May. Fruit dark brown, shed alongside the plants in autumn. Quartz/gneiss flats, KV (Nuwerus). **(ece)**

bruynsii S.A.Hammer Domed clusters, up to 30 mm diam. Leaf-pairs succulent, up to 25 mm long, 8 mm diam., skinny-cylindrical. Epidermis pale yellowish green, spotless, smooth, keel line faintly red but never prominent. Flowers diurnal, long-lived, with imbricate yellow petals, other floral parts invisible. July–Sept. Rocky flats, KV (Nuwerus). **(ece)**

caroli Lavis Single or sparsely clustering, up to 50 mm diam. Leaf-pairs succulent, up to 30 mm long, 15 mm diam., cylindrical, apex truncate, greasily windowed, usually ± bilobed, lobes often gaping. Epidermis ochre to dull greyish green, notably paler around window margins, without warts, or with a few obscure ridges. Flowers diurnal, scented, often paired, petals white to pinkish grey. Apr.–May. Quartzite or calcrete flats, NH (W of Platbakkies near Paulshoek but largely just N of Kliprand). **(ece)**

chauviniae (Schwantes) S.A.Hammer Clusters up to 300 mm diam. Leaf-pairs succulent, up to 35 mm long, 15 mm diam., cordate to globose, apex often ± bilobed, keeled and contorted. Epidermis greyish green to bluish green, harshly papillate, keels thickly lined or smeared with dark red, sometimes spotted with green. Flowers diurnal, showy, petals rather broad, magenta. Apr.–May. Gneiss slopes or quartzite ridges, NH (Arondegas, Nuwerus). **(ece)**

chrisocruxum S.A.Hammer Clusters up to 50 mm diam. Leaf-pairs succulent, up to 18 mm long, 10 mm diam., inversely conical. Epidermis grey-green, smooth, fissure crossed by a reddish or dark green line, clear or smudged. Flowers diurnal, long-tubed, petals pink or white. Oct.–Nov. Sandwiched into quartzite cliffs, NH (hills SE of Port Nolloth). **(ece)**

chrisolum S.A.Hammer Single-bodied dwarf. Leaf-pairs succulent, up to 10 mm long, 6 mm diam., inversely conical. Epidermis dusky bluish green, smooth, green-spotted. Flowers diurnal, long-tubed, petals pink or white. Apr.–May. Pans of quartzite grit, NH (hills SE of Port Nolloth). **(ece)**

concavum L.Bolus Partly submerged, modest cushions. Leaf-pairs succulent, up to 20 mm long, 20 mm diam., resembling small, green, pale yellow or blushing peaches, with a subtranslucent apex and a depressed central fissure. Flowers diurnal, petals white to rarely yellow, honey-scented. ?Flowering time. Saline quartz flats, NS (Riethuis, NE of Hondeklipbaai). **(ece)**

concordans G.D.Rowley Often confused with **C. pubescens** and **C. caroli** but single or very sparsely clustering, up to 30 mm diam. Leaf-pairs succulent, up to 35 mm long, 25 mm diam., cylindrical, apex slightly convex, windowed, usually ± bilobed, lobes often gaping. Epidermis dull greyish green or bronze, slightly fuzzy from short papillae. Flowers diurnal, scented, small, petals white to pink. Apr.–May. Brownish quartz rubble, NH (only known from Brakfontein, NW of Loeriesfontein, but may reach a point near Rietfontein). **(ece)**

cubicum Pavelka Clusters up to 50 mm diam. Leaf-pairs succulent, up to 15 mm tall, 10 mm diam., inversely conical, apex ± concave, ± square in section. Epidermis pale bluish green to pale brownish, smooth, often red-spotted to -crossed. Flowers diurnal, corolla tubes extraordinarily long (up to 60 mm), tawny, petals white, filaments red. Apr.–May. Gneiss cliffs, G (hills NE of Eksteenfontein). **(ece)**

cylindratum Schwantes Clusters up to 100 mm, readily separating. Leaf-pairs succulent, up to 25 mm long, 15 mm diam., cylindrical, with a convex apex, slightly lobed, lobes unequal. Epidermis yellowish green, very smooth, without dots, shiny when active. Flowers diurnal, petals white to pale pink. Feb.–May. Crevices in gneiss slabs or grit pans, NH (De Drif to Mesklip). **(ece)**

danielii Pavelka (= *C. jarmilae* Halda) Clusters up to 50 mm diam. Leaf-pairs succulent, up to 20 mm long, 10 mm diam., cordate with a wedge-shaped apex, sharply keeled, shortly bilobed. Epidermis greyish green, covered with short, shining papillae, spotted with green, keels and/or margins outlined in red. Flowers diurnal, short-tubed, petals magenta, Apr.–June. Eroding, iron-bearing cliffs, NH (W of Platbakkies). **(ece)**

devium G.D.Rowley Single-bodied, soft-tissued geophyte, rarely sparsely clustered. Leaf-pairs succulent, up to 10 mm long, 6 mm diam., fused halfway up, gaping, only truncate-windowed tips exposed to view. Epidermis dull grey-green, covered with short or long papillae, never reddening. Flowers diurnal, scented, small, petals white or pink. Apr.–May. Quartzite flats or gneiss/pegmatite ridges, G (Steinkopf). **(ece)**

ectypum N.E.Br. Clusters up to 40 mm diam., usually covered in old white skins. Leaf-pairs succulent, up to 25 mm long, 10 mm diam., cylindrical, truncate to chiselled or sulcate above. Epidermis green to reddish brown, shiny when turgid, striate to sulcate, minutely white-spotted, never pustulate, smooth. Flowers diurnal, long-tubed, showy, petals pink to white or chrome yellow, often with a contrasting throat, [orange-red in hybrids with **C. bilobum** (= *C.* × *marnierianum*)] or in mixed stands of yellow and pink. Mar.–June. Crevices or rubble of gneiss or quartzite, NH (Anenous, Steinkopf, Springbok). **(ece)**

ernstii S.A.Hammer Clusters, up to 80 mm diam. Leaf-pairs succulent, up to 25 mm long, 18 mm diam., top-shaped, apex truncate to slightly concave or irregularly keeled, fissure-zone inflated. Epidermis grey-green, sometimes purplish toward sides, covered in dense, coarse, grey papillae. Flowers diurnal, opening after ± 15:00, large, lustrous pink. May–June. Cliff-dwellers in half shade, G (Sandberg, eastern Lorelei, northern Richtersveld). **(ece)**

flavum N.E.Br. Clusters up to 300 mm diam. Leaf-pairs succulent, up to 35 mm long, 30 mm diam., often half that, inversely conical, apex truncate to ± convex. Epidermis whitish green, bluish green or grass-green, heavily spotted or immaculate, smooth, shining. Flowers diurnal, petals yellow (orange or red in hybrids with **C. wettsteinii**), filaments and stigmas often ruby-red. Apr.–May. Gneiss, shale, or quartz ridges or in rubble, G, NH (Kosies, Anenous, Steinkopf, Jakkalswater, Concordia, possibly Kakamas). **(?ece)**

francoiseae (S.A.Hammer) S.A.Hammer Clusters up to 100 mm diam. Leaf-pairs up to 20 mm long, 15 mm diam., inversely conical, apex distinctly flattened. Epidermis greyish blue, finely spotted or not, smooth, dull. Flowers diurnal, petals mauve to reddish pink. Nov. Quartzite cliffs, G (Oograbies). **(ece)**

fraternum (N.E.Br.) N.E.Br. Flat clusters, up to 100 mm diam. Leaf-pairs succulent, up to 20 mm long, 10 mm diam., inversely conical, truncate to irregularly concave above. Epidermis pale whitish green, glabrous, thickly green-spotted, sometimes banded with red. Flowers diurnal, long-tubed, white to pale pink to white, filaments red. Feb.–Apr. Granite slabs with lichens, G (Skimmelberg, Grasvlakte, Kabies-se-Kop). **(ece)**

frutescens Schwantes Messily branched shrublets, up to 400 mm tall. Leaf-pairs succulent, up to 45 mm long, 20 mm diam., shaped like lobster claws and often unequal, internodes up to 30 mm long. Epidermis yellowish green, smooth, spotless, often thickly lined with red at twisting keels.

Flowers diurnal, showy, brick-red to salmon, rarely pure yellow. Jan.–Mar., sometimes reblooming in Apr.–May. Quartzite slopes, often in shade, NH (Kourkamma, Komaggas). **(ece)**

globosum (N.E.Br.) N.E.Br. Domed clusters up to 20 mm diam. Leaf-pairs succulent, up to 25 mm long, 25 mm diam., globose to depressed-globose. Epidermis pale greyish green, smooth as soap, unspotted. Flowers diurnal, long-tubed, petals white or pink, filaments forming a golden ring. Mar.–May. Quartzite ridges, NS, NH (Garies, Kotzesrus). **(ece)**

hanae Pavelka (= *C. tomasii* Halda) Clusters up to 200 mm diam. Leaf-pairs succulent, up to 30 mm long, 15 mm diam., cordiform, apex sharply keeled, often with secondary, flying buttress-like keels on sides, very shortly bilobate. Epidermis pale green, finely spotted, shiny-smooth. Flowers diurnal, showy, petals reddish magenta. Jan.–Mar. Shaded cliffs, NH (Sterkstroom). **(ece)**

hermarium (S.A.Hammer) S.A.Hammer Clusters up to 100 mm diam. Leaf-pairs succulent, up to 20 mm long, 10 mm diam., often half that, perfectly cylindrical, apex convex, vaguely windowed. Epidermis yellowish green, never reddening, covered with translucent, miniature windows which ± coalesce apically. Flowers diurnal, produced from current leaf-pair, petals magenta, inner filaments forming a yellow ring, Mar.–May. Quartzite ridges, NH (Smorenskadu to Areb in the transition between Namaqualand and Bushmanland).

herreanthus S.A.Hammer Robust clusters, up to 200 mm diam. Leaf-pairs succulent, up to 60 mm long, 20 mm diam. at base, broadening and then tapering to a sharp point, triangular in section and fused only in lower quarter, widely gaping, pustulate on inner faces, firm in texture. Epidermis pale whitish green to pinkish, finely spotted or not, smooth. Flowers diurnal, huge, strongly scented, petals white to rose, stigmas long. Apr.–May. Quartzite or gneiss ridges, G (Klipbok, Rooiberg, Umdaus, E of Kosies). **(ece)**

irmae S.A.Hammer & Barnhill Clusters up to 10 mm diam. Leaf-pairs succulent, up to 10 mm long, 8 mm diam., cylindrical, truncate to irregularly sulcate above. Epidermis reddish brown, shiny when turgid, not striate, minutely white-spotted, smooth. Flowers diurnal, long-tubed, petals chrome yellow. Apr.–May. Quartzite cliffs, NH (W of Anenous). **(ece)**

jucundum (N.E.Br.) N.E.Br. Domed clusters, up to 100 mm diam., often with elongate stems in age. Leaf-pairs succulent, up to 25 mm long, 25 mm diam., usually much smaller, fused, globose to depressed-globose, never keeled. Epidermis pale greyish green to glaucous, heavily spotted or puckered with green, sometimes freckled in red, smooth, occasionally with very short papillae. Flowers diurnal, long-tubed, pink or white. Feb.–May. Gneiss or quartzite cliffs, SN, G (Aus, Sendelingsdrif, Steinkopf). **(ece)**

khamiesbergense (L.Bolus) Schwantes Clusters up to 100 mm diam. Leaf-pairs succulent, up to 15 mm long, 8 mm diam., cylindrical with a wedge-shaped and bilobed apex, smelling like raspberries. Epidermis purple-green to grey-green, shining, encrusted with whitish warts. Flowers diurnal, scented, borne from a new leaf pair which co-exists with an old one, often self-fertile, petals pink or white. Aug.–Oct. Steep gneiss slopes with lichens, or in fine rubble, KB (Kamiesberg Mountains: Eselskop, Leliefontein, Rooiberg). **(ece)**

lithopsoides L.Bolus Clusters up to 80 mm diam. Leaf-pairs succulent, up to 25 mm long, 10 mm diam., cylindrical, apex convex to slightly bilobate, windowed. Epidermis purplish brown to bright chartreuse, often with a mottled pattern of opaque brownish 'islands' or smudges, sometimes with wart-like groups of prominent cells. Flowers diurnal, long-tubed, petals magenta, basally white, filaments forming a yellow to cinnabar ring, stigmas hidden. Apr.–May. Quartz cliffs, slopes, or rubble, NH (Concordia to Kouberg with a lost outlier near Kakamas in Bushmanland).

longibracteatum L.Bolus Clusters up to 100 mm diam. Leaf-pairs succulent, up to 15 mm long, 10 mm diam., cordate, apex usually shortly bilobed, mildly keeled, old skins whitish. Epidermis bluish green, smooth, shiny, elaborately lined with green or red. Flowers diurnal, petals yellow. Apr.–May. Quartzite ridges, NH (Komaggas). **(ece)**

longum N.E.Br. Solitary, double-bodied or sometimes richly clustered, up to 100 mm diam. Leaf-pairs succulent, up to 40 mm long, 20 mm diam., long-cylindrical, apex truncate to convex, often with asymmetric keels, windowed and bilobed, lobes usually short and not gaping. Epidermis green, rarely purple, dull or shiny, fuzzed or frosted from short, crowded papillae. Flowers diurnal, scented, petals white or pink. Apr.–May. Quartzite or gneiss/pegmatite cliffs, often in deep pockets of soil in half shade, G (Klipbok, Umdaus, Konkyp, Eenriet). **(ece)**

lydiae (H.Jacobsen) G.D.Rowley Solitary, double-bodied or sparsely clustered, up to 50 mm diam. Leaf-pairs succulent, up to 30 mm long, 20 mm diam., long-cylindrical, apex truncate to convex, windowed and bilobed, lobes usually short and not gaping. Epidermis purplish green to brown or green, dull or shiny, often richly reddened on sides. Flowers diurnal, scented, petals white with

pink tips, solidly pink or white. Apr.–May. Quartzite flats or low slopes, NH (Geselskapbank, Concordia, Smorenskadu, Kangnas, on margins of Bushmanland).

marginatum Lavis Clusters up to 100 mm diam. Leaf-pairs succulent, up to 30 mm long, 10 mm diam., long-cylindrical or pear-shaped, apex convex, often bilobate. Epidermis greyish green to chalky green, sometimes glazed with red, heavily spotted with green, especially on keels, smooth or finely papillate. Flowers diurnal, scentless, petals magenta, sometimes drooping. Apr.–May. On or between quartzite cliffs, often in half shade, NH (Concordia and Smorenskadu, Areb, Naip, Goodhouse and Pofadder in Bushmanland).

meyeri N.E.Br. Domed or straggly cushions, up to 300 mm diam. Leaf-pairs succulent, up to 25 mm long, 15 mm diam., well-fused, cordate, apex rounded, sometimes keeled. Epidermis yellowish green to glaucous, smooth from palpable wax, or shortly papillate, keel lines sometimes red, fissure zone flanked by small, windowed patches. Flowers diurnal, medium-sized, petals yellow, rarely white, never pink, often drooping. Mar.–June. Gneiss or quartzite slopes often in shade, occurring near or with **C. bilobum** and hybridising with it, G, NS, NH (Great Helskloof, Oograbies, Kleinsee, Anenous). **(ece)**

minutum (Haw.) N.E.Br. Clusters up to 300 mm diam. Leaf-pairs succulent, up to 25 mm long, 30 mm diam., often ⅓ that size, inversely conical, apex truncate, sometimes (deeply) concave, fissure long or short. Epidermis bluish green, rarely purple, spotted or not, smooth, rarely palpably papillate. Flowers diurnal, petals mauve to pink, rarely white (in littoral populations), inner filamentous, staminodes yellow to orange, anthers and stigmas invisible. Mar.–May. Quartz flats or ridges, gneiss or limestone ridges, sometimes littoral, NS, NH, KV (Groenrivier to Gamoep, Bitterfontein, Holrivier, Vanrhynsdorp). **(ece)**

mirabile A.R.Mitch. ex S.A.Hammer Clusters up to 100 mm diam. Leaf-pairs succulent, up to 12 mm long, 6 mm diam., cylindrical to nearly globose, apex convex, slightly bilobed and faintly keeled. Epidermis dark grey-green, often reddish green toward spring, covered with long, erect, glassy hairs. Flowers diurnal, petals narrow, magenta or rarely white, anthers and stigmas recessed. May–June. Quartzite ridges and fissures, often in seepage zones, NH (between Concordia and Hoitsmyn). **(ece)**

obscurum N.E.Br. Clusters up to 150 mm, often scraggly. Leaf-pairs succulent, up to 20 mm long, 10 mm diam., inversely conical, apex truncate to concave. Epidermis bright green to deep blackish green, shiny, smooth or with crocodilian-like bumps, sometimes spotted with red. Flowers diurnal, long-tubed, tube externally magenta, petals pink to white, filaments red or magenta. Mar.–May. Quartz or gneiss crevices in rubble, G, NS, NH (Eksteenfontein, Jakkalswater, Oograbies, Wolfberg, Nutabooi, Riethuis). **(ece)**

pellucidum Schwantes Clusters up to 80 mm diam. Leaf-pairs succulent, up to 20 mm long, 12 mm diam., cylindrical, apex convex and usually bilobate, variably windowed. Epidermis purplish brown to greyish brown often with a mottled pattern of opaque brownish 'islands' or smudges, sometimes with wart-like groups of prominent cells, often with a central depressed patch or an even, chequered pattern. Flowers diurnal, long-tubed, petals white, pink, rarely magenta, filaments forming a yellow to cinnabar ring, stigmas hidden. Feb.–May. Crevices of gneiss slabs, on gneiss/quartzite cliffs, slopes, or in rubble, NH, KB (Steinkopf, Garies, Kamiesberg Mountains, Rooifontein). **(ece)**

pubescens (Tischer) G.D.Rowley Solitary or sparsely clustering, up to 50 mm diam. Leaf-pairs succulent, up to 35 mm long, 15 mm diam., long-cylindrical, apex truncate, windowed, bilobed, lobes often gaping. Epidermis dull green to purplish green, greyed from long or short papillae. Flowers diurnal, scented, sepals prominent, acute, reflexed, petals pink or white. Apr.–June. Quartzite or calcrete flats, NH (Silverfontein, Rooifontein, Platbakkies, Gamoep). **(ece)**

reconditum A.R.Mitch. Trailing mats, up to 100 mm diam., cryptic. Leaf-pairs succulent, up to 10 × 4 mm, fused only basally, leaves slender-cylindrical, apex truncate, triangular, windowed. Epidermis greyish brown to dark red (grass-green when newly emergent in spring), covered with warts. Flowers diurnal, short, petals white to pink, stigmas short. Feb.–Apr. Grit pans or crevices on slabs of gneiss, NH, KV (Kliprand, Platbakkies, eastern Kamiesberg Mountains, and eastern Knersvlakte close to Nieuwoudtville). **(ece)**

regale Lavis Clusters up to 200 mm diam. Leaf-pairs succulent, up to 45 mm long, 20 mm diam., chisel-shaped, bilobed, soft, old leaves reddish. Epidermis grey-green, covered in long, rough papillae, blistered on either side of fissure. Flowers diurnal, showy, scented, petals rose, stigmas long. May–June. Deep crevices of quartzite, NH (Ratelpoort). **(ece)**

ricardianum Loesch & Tischer Clusters up to 300 mm diam. Leaf-pairs succulent, up to 15 mm long × 20 mm diam., inversely conical, apex abruptly flattened to subtly convex, fissure hardly

visible. Epidermis very pale green, densely and evenly spotted, smooth, shining, very tender, red on sides. Flowers diurnal, short-tubed, petals white to pink. (Jan.–)Apr.–May. Shaded quartz or gneiss ridges or on crumbling shale, G (southern Namibia: Sonberg and Lorelei). **(ece)**

roodiae N.E.Br. Clusters up to 50 mm diam., readily separating. Leaf-pairs succulent, up to 20 mm long, 10 mm diam., short-cylindrical with a convex or truncate apex, unequal, soft. Epidermis green, reddish brown to beet-red, shiny when active, often irregularly ridged, spotted. Flowers diurnal, petals white to pink. Mar.–May. Crevices in gneiss slabs or grit pans, NH, KB (Concordia to Witvlak). **(ece)**

rugosum S.A.Hammer Clusters up to 10 mm diam. Leaf-pairs succulent, up to 15 mm long, 10 mm diam., cylindrical with a truncate apex, markedly unequal, soft. Epidermis chocolate-brown, shiny when active, irregularly ridged, spotted. Flowers diurnal, reliably self-fertile, petals white to pink, often barely formed and developing stigmas. Mar.–Apr. Seepage spots on gneiss slabs or in rubble with mosses, NH, KV (Ellenboog, Garies, Bitterfontein, Sterkstroom). **(ece)**

schlechteri Schwantes Clusters up to 100 mm diam. Leaf-pairs succulent, up to 25 mm long, 20 mm diam., inversely conical, apex irregularly concave. Epidermis very pale green, spotted or not, smooth, shining, tender, often looped with red. Flowers diurnal, short-tubed, petals white to pink. Apr.–May. Silt-filled troughs in quartz ridges, G (Farquharson-se-Kop). **(ece)**

smorenskaduense de Boer Solitary or paired, < 10 mm diam. Leaf-pairs succulent, up to 22 mm long, 10 mm diam., cigar-shaped, softly truncate, squishy. Epidermis yellowish green, never reddening, covered with slightly raised, translucent, miniature blisters. Flowers diurnal, long lasting, petals magenta, flat on ground, produced from concealed new leaf-pair. June–Aug. Quartzite hills, NH (Smorenskadu, bordering the winter and summer rainfall regions). **(ece)**

subfenestratum Schwantes Solitary or rarely clustering, ± geophytic. Leaf-pairs succulent, up to 30 mm long, 30 mm diam., globose, slightly lobed and ± windowed apically. Epidermis pale green, densely spotted, spots usually coalescing to form a greasy looking window, smooth or shortly fuzzy, never pustulate. Flowers diurnal, slightly scented, thick-tubed, petals rather broad, pale to deep pink or magenta. Mar.–May. Quartz flats, rarely on low quartz ridges, and there forming clusters, KV (Holrivier, Quaggaskop, Steenkampskraal). **(ece)**

subterraneum T.C.Smale & T.Jacobs Solitary, geophytic. Leaf-pairs succulent, pear-shaped, up to 15 mm long, 10 mm diam., but much smaller when flowering, apically windowed. Epidermis pale green, smooth. Flowers diurnal, scented, brilliant red-magenta. Apr. Quartz flats, G (N of Eksteenfontein). **(ece)**

tantillum N.E.Br. Clusters up to 150 mm diam. Leaf-pairs succulent, up to 20 mm long, 10 mm diam., long-cylindrical, apex keeled, often bilobate. Epidermis bluish green to chartreuse, sometimes glazed with red, heavily spotted or netted with red or dark green, smooth or finely papillate. Flowers diurnal, petals magenta, pink, white with pink margins, or chrome. Mar.–May. On or between quartzite cliffs, often in half shade, NH (Steinkopf, Eenriet, Spektakelberg, Gamoep). **(ece)**

taylorianum (Dinter & Schwantes) N.E.Br. Clusters up to 400 mm diam. Leaf-pairs succulent, up to 30 mm long, 20 mm diam., cordiform, apex keeled or not, often bilobate. Epidermis bluish green to reddish or pale bluish white, heavily spotted, shiny-smooth or finely papillate. Flowers diurnal, showy, petals magenta or pink. Jan.–May. Quartzite or crumbling sandstone cliffs or ridges, often in shade with ferns, SN, G (Klinghardt Mountains, Rooiberg, Rooiberg II in N Richtersveld, Rosyntjieberg, Quachous near Ploegberg). **(ece)**

vanheerdei Tischer Clusters up to 100 mm diam. Leaf-pairs succulent, up to 35 mm long, 12 mm diam., torpedo-shaped. Epidermis yellowish green, never reddening, covered with raised, translucent, miniature blisters. Flowers diurnal, petals magenta. Feb.–Apr. Quartzite ridges, NH (Kangnas, on the edge of the winter and summer rainfall regions). **(ece)**

velutinum Schwantes Clusters up to 300 mm diam. Leaf-pairs succulent, up to 20 mm long, 12 mm diam., cordate to globose, apex often ± bilobed and keeled. Epidermis greyish green, spotted, velvety-papillate or shining, keels lined with green or red or unmarked. Flowers diurnal, showy, petals magenta, pink or white (orange in hybrids with **C. auriflorum** and **C. meyeri**). ?Flowering time. Quartzite ridges, NH (Komaggas, Kourkammaberg). **(ece)**

verrucosum (Lavis) G.D.Rowley Solitary or sparsely clustering, up to 50 mm diam. Leaf-pairs succulent, up to 25 mm long, 16 mm diam., cylindrical, apex truncate, obscurely windowed and usually ± bilobed, lobes often gaping. Epidermis ochre to reddish brown, heavily warty (but warts disappearing when turgid). Flowers diurnal, scented, often paired, petals white to pinkish grey. ?Flowering time. Quartzite or calcrete flats, NH (Kouberg to Kliprand). **(ece)**

violaciflorum Schick & Tischer Clusters up to 200 mm diam. Leaf-pairs succulent, up to 25 mm long, 12 mm diam., inversely pear-shaped to ± globose, apex usually shortly bilobed, keeled, old

skins chestnut-brown. Epidermis whitish to bluish green, smooth, lined with green or red. Flowers diurnal, petals purple (orange or red in hybrids with **C. bilobum**). Apr.–May. Quartzite flats or ridges, NH (Springbok). **(ece)**

wettsteinii (A.Berger) N.E.Br. Clusters up to 300 mm diam. Leaf-pairs succulent, up to 20 mm long, 30 mm diam., inversely conical, apex truncate, usually tilted, fissure eccentrically placed. Epidermis greyish to bluish green, spotted or not, smooth, shining. Flowers diurnal, petals mauve to pink, rarely white, filaments visible. Apr.–May. Gneiss slabs, quartz ridges, G, NH (Grasvlakte, Anenous, Vaalheuwel). **(ece)**

[**Excluded taxa C. × cupreiflorum** Tischer is a natural hybrid involving **C. velutinum** and **C. bilobum, C. meyeri**, and/or **C. auriflorum;** for **C. × marnierianum** Tischer & H.Jacobsen see **C. ectypum**]

CYLINDROPHYLLUM 5 spp., W Cape and Karoo

comptonii L.Bolus Succulent shrub, compact when young, later in dense clumps and creeping, up to 250 mm diam., old leaves persisting between new growth. Leaves terete, glaucous, older leaves blackish green, 80–100 × up to 10 mm, up to 10 mm thick. Flowers solitary, with white to straw-coloured petals, filamentous staminodes and stamens very numerous. Fruit 5-locular, valve wings broad, closing bodies medium-sized. Oct.–Nov. On shaley flats, TS, CCR (Little Karoo, Prince Albert Road).

hallii L.Bolus Succulent shrub, up to 200 mm diam., 100 mm tall. Leaves terete, 60–75 × 5–7 mm, old leaves black and persisting on stem. Flowers solitary, petals cream, merging into filamentous staminodes, up to 65 mm diam. Fruit 5-locular. Oct. On shaley slopes, WM (Loeriesfontein). **(ece)**

tugwelliae L.Bolus Densely cushion-shaped, succulent shrub, up to 600 mm diam., 250 mm tall. Leaves terete, apically pointed, glaucous, older leaves blackish green, old leaves persisting between new ones, 50–80 × up to 10 mm, up to 10 mm thick. Flowers solitary, with white to salmon or peach-coloured petals, filamentous staminodes and stamens very numerous. Fruit 5-locular, valve wings broad, closing bodies small. Nov. On flats in finely grained soils, TS, CCR (Laingsburg to Prince Albert Road and Prince Albert).

DEILANTHE 3 spp., Little and Great Karoo to Free State

hilmarii (L.Bolus) H.E.K.Hartmann Compact, dwarf succulent, with fleshy turnip-like roots. Leaves erect slender, almost as broad as thick. Flowers 1–3, yellow with reddish tips, opening after 15:00. Fruit mostly 10- or 11-locular. Sept. Ecca shales, TS (Matjiesfontein to Laingsburg). **(ece)**

peersii (L.Bolus) N.E.Br. Compact, dwarf succulent, with fleshy turnip-like roots. Leaves much broader than thick, triangular, velvety. Flowers 1–3, up to 25 mm diam., yellow, nocturnal, open from ± 18:00–02:00. Fruit mostly (10–)12–14-locular, with small closing bodies. Sept. Shale gravel, silt or quartz pebbles, TS, CCR (Matjiesfontein to Uniondale and Karoo).

thudichumii (L.Bolus) S.A.Hammer (= *Aloinopsis thudichumii* L.Bolus, *Nananthus thudichumii* (L.Bolus) G.D.Rowley Like **D. peersii** but flowers open from ± 15:00–18:00, petals ± 2 mm broad, stigmas feathery. Sept. Shaley soils, WM, TS (Loeriesfontein to Laingsburg). **(ece)**

DELOSPERMA SKAAPVYGIE ± 158 spp., Namibia, N and W Cape to E Africa

acocksii L.Bolus Succulent shrub, up to 160 mm tall, root woody, 20–25 mm diam. Leaves subcylindrical, greyish green, minutely pubescent to glabrous, ± 17 × 1.5–2.5 mm, 1.5–2.5 mm thick. Flowers ± 33 mm diam., petals yellow, paler at bases. Sept.–Oct. Frequent on upper slopes of foothills and spurs of Roggeveld Escarpment, WM (Sutherland). **(ece)**

crassum L.Bolus Erect, succulent shrub, up to 300 mm tall, basal stem up to 45 mm diam., basal internodes up to 25 mm diam., stems shiny yellowish brown, young ones finely papillate. Leaves erect to spreading, subterete, 15–25 mm long, up to 3 mm thick, bright green. Flowers solitary, up to 25 mm diam., petals straw-coloured, few filamentous staminodes yellow, basally white. July–Aug. Stony ground, NH, KV, CCR (Kamieskroon to Vredenburg). **(gce)**

klinghardtianum (Dinter) Dinter & Schwantes (= *Delosperma ausense* L.Bolus) Dense, succulent shrub, 100–150 mm tall, up to 200 mm diam., erect branches with soft wood, up to 7 mm diam., dark brownish grey. Leaves in pairs, mostly aggregated near ends of branches, 8–10 mm long, 3–4 mm thick, elongate-ovate, densely covered with round bladder-cells. Flowers mostly solitary, petals white to dark pink, filamentous staminodes white, apically recurved. Fruit elevated on top, 4–5 mm diam. June–Sept. On quartzitic mountains, SN, G (S of Aus to Richtersveld). **(ece)**

sphalmanthoides S.A.Hammer Dwarf succulent, forming small mats, up to 90 mm diam., internodes up to 2 mm long, enclosed by leaves. Leaves erect, subcylindrical, ± 12 × 2 mm, 2 mm thick, papillate. Flowers solitary, ± 15 mm diam., petals ± 20–35 per flower, pink. Fruit ± 3 mm diam. Aug. In shallow soils over sandstone rocks, 1 500–1 600 m, WM (Sutherland). **(ece)**

subincanum (Haw.) Schwantes Erect, branched, succulent shrub, up to 600 mm tall. Leaves soft, young ones finely papillate, trigonous, apically recurved and sometimes truncate, < 25 mm long. Flowers mostly in threes, petals white. Fruit 5-locular. Sept.–Oct. Among karroid shrub, TS, CCR (Matjiesfontein to E Cape and Great Karoo).

DICROCAULON 7 spp., Namaqualand to Klawer **(gce)**

A. Long-shoots usually with only 2 leaf-pairs per season

grandiflorum Ihlenf. Very similar to **D. ramulosum** but shrub up to 500 mm tall, corpuscle of first leaf-pair short, leaves of second pair up to 55 mm long, flowers up to 40 mm diam., white or pink, isolated by different chromosome numbers and geographic distribution. July–Sept. In rock crevices on quartzitic reefs, KV (Rooiberg to Vredendal). **(ece)**

microstigma (L.Bolus) Ihlenf. Robust, cushion-forming, succulent shrub, up to 100 × 300 mm. Leaf-pairs dissimilar in shape, papillate, first leaf-pair of season 3–6 mm long, 2–5 mm diam., second leaf-pair connate for ± ¼ of its length, up to 30 mm long, flat above. Flowers solitary on pedicels up to 40 mm long, reddish purple. Fruit mostly 6-locular. Aug.–Sept. Shallow soils, mostly in quartz pebble patches, KV, TS (Knersvlakte to Klawer and western Tanqua Karoo). **(gce)**

ramulosum (L.Bolus) Ihlenf. Succulent shrub, up to 200 mm tall. Leaf-pairs dissimilar in shape, papillate, first leaf-pair short, forming a spherical to oviform, 2-lobed corpuscle, second pair up to 30 mm long. Flowers up to 35 mm diam., white. Fruit (4)5(6)-locular. July–Aug. In shallow soils with quartz pebbles, NS (western Namaqualand: Hondeklipbaai). **(ece)**

A.' Long-shoots with > 2 leaf-pairs per season

brevifolium N.E.Br. Densely branched, succulent shrub, main branches ascending to erect from a short trunk of ± 10 mm diam., up to 150 × 200 mm. Leaf-pairs dissimilar in shape, papillate, first leaf-pair of a season 4–6 × 4–5 mm, second leaf-pair connate for ± half its length, 7–10 mm long, connate part 3–4 mm diam. Flowers with a cup-shaped structure underneath calyx, sepals 4, petals and filamentous staminodes white. Fruit (5)6(7)-locular. Nov.–Jan. Shallow soils, often with quartz pebbles, KV (Vanrhynsdorp). **(ece)**

humile N.E.Br. Very similar to **D. brevifolium** but differs from it by a more compact and prostrate habit, very short internodes even on long-shoots and pink, narrowly ovate petals. Sept. Shallow soils with quartz pebbles, KV (Vanrhynsdorp). **(ece)**

nodosum (A.Berger) N.E.Br. Dense, spherical, succulent shrub, with very slender stems, up to 400 mm tall, 300 mm diam. Leaf-pairs dissimilar in shape, papillate, first leaf-pair of a season 3–6 mm long, 2–5 mm diam., on short-shoots only half the size, second and following leaf-pairs uniform, up to 28 mm long, 3–4 mm diam. Flowers with 4 sepals, petals nearly filiform, often ± curled, 18–20 mm diam. Fruit mostly 4–9-locular. Nov.–Dec. Slopes or flats with quartz pebbles, NH, KV (Garies to Vredendal). **(ece)**

spissum N.E.Br. Rather robust, succulent shrub, up to 300 mm tall, 200 mm diam., short-shoots densely covered with remnants of old leaf sheaths. Leaf-pairs dissimilar in shape, smooth and glossy, corpuscle of first leaf-pair of season 8–11 mm long, 6–7 mm diam., second leaf-pair connate for ± ⅓ of its length, up to 16 mm long, 7–8 mm diam. Flowers without a cup-shaped structure underneath calyx, sepals 5, petals white. Fruit 5-locular. Sept.–Oct. Loamy sand densely covered with quartz pebbles, NS (western Namaqualand: Hondeklipbaai). **(ece)**

DIDYMAOTUS 1 sp., Tanqua Karoo **(ece)**

lapidiformis (Marloth) N.E.Br. Compact, dwarf succulent, mostly consisting of a single pair of leaves in resting state. Leaves brownish green, pressed together in resting state, each leaf triangular in cross section, up to 40 mm long, broad and thick. Flowers solitary, on lateral shoots to one or both sides of new central leaf-pair, up to 35 mm diam., white to pink, bracteolate. Fruit mostly 6-locular. Sept.–Oct. Brown shale, TS (Tanqua Karoo). **(ece)**

DIPLOSOMA EENDEVOETVYGIE 2 spp., southern Namaqualand to W Cape **(gce)**

luckhoffii (L.Bolus) Schwantes Short-lived, succulent, perennial herb, up to 30 mm tall. Leaves deciduous, corpuscle of first leaf-pair of season spherical, second leaf-pair oblong, soft to touch. Flowers solitary, sessile or shortly pedicellate, petals basally white, upper part reddish magenta. Fruit mostly 6-locular. June–July. Highly saline soils with a cover of quartz pebbles, KV (Vredendal to Vanrhynsdorp). **(ece)**

DOROTHEANTHUS **see CLERETUM**

DRACOPHILUS 2 spp., Namib to northern Namaqualand **(ece)**

dealbatus (N.E.Br.) Walgate Compact, succulent, dwarf shrub, becoming caespitose with age, internodes enclosed. Leaves 6–8 to a branch, fat, elongate-trigonous, with rounded keel and margins, epidermis smooth, 25–40 mm long, < 15 mm diam., greyish blue. Flowers solitary, bracteolate, opening in late afternoon, petals magenta or white, up to 35 mm diam., stamens in an erect central cone or column with age. Fruit flat-topped, closing body absent, 8–10-locular. July–Aug. In gravelly flats, SN, G (southern Namib to northern Namaqualand). **(ece)**

delaetianus (Dinter) Dinter & Schwantes Similar to **D. dealbatus** but leaves hood-shaped, with teeth along keel and margins, often also on sides, length at most twice the breadth, flowers with < 50 petals. Sept. On flats with fine gravel of sand and limestone, SN (southern Namib at edge of the winter rainfall area). **(ece)**

DROSANTHEMUM DOUVYGIE 110 spp., Namibia to E Cape

A. Stems hispid, bearing long, erect hairs

albens L.Bolus (= *D. littlewoodii* L.Bolus) Low, succulent shrub, up to 90 mm tall, 340 mm diam., internodes 10–30 mm long, up to 1.5 mm diam. Leaves semi-terete, 10–12 × 3 mm, 3–4 mm thick, epidermis with globose, dense papillae. Flower pedicels up to 8 mm long, petals white, filamentous staminodes none or few. Fruit 5-locular. Sept. ?Habitat, SN, G (Namieskloof and Richtersveld). **(ece)**

archeri L.Bolus Decumbent, succulent shrub, with decumbent branches up to 200 mm long, internodes 10–15 mm long, up to 2 mm diam. Leaves subcylindrical, up to 15 mm long, up to 2–3.5 mm thick, papillae globose, dense. Flowers solitary on short, erect, lateral shoots, 22–27 mm diam., petals pink, filamentous staminodes absent. Fruit 5-locular, placenta ending in two white, tiny knobs. Aug. In finely grained soils, TS (Karoopoort to Laingsburg). **(ece)**

breve L.Bolus Cushion-shaped succulent shrub, up to 80 mm tall, branches erect to decumbent, up to 180 mm long, internodes 10–20 mm long. Leaves distantly arranged, subcylindrical, 15–21 mm long, 2.5–3.5 mm thick, epidermis with dense, globose papillae. Flower pedicels 5–10 mm long, petals pink, basally white, filamentous staminodes absent. Fruit pedicels remaining as prickly, apically branched spines after fruit fall, base funnel-shaped, top with low rims, 5-locular. Oct. On loamy slopes with some stones, NH (Garies to Bitterfontein). **(ece)**

concavum L.Bolus Succulent shrub, with prostrate to decumbent branches, internodes up to 15 mm long, older ones smooth. Leaves subcylindrical, 6–10 mm long, up to 3 mm thick, epidermis with dense, globose papillae. Flowers solitary on short shoots, petals up to 12 × 2 mm, pale pink, basally white, filamentous staminodes few. Fruit 5-locular. Sept. ?Habitat, WM (Calvinia). **(ece)**

eburneum L.Bolus Tufted, succulent shrub, with decumbent branches, internodes ochre. Leaves subcylindrical, 10–20 mm long, 1.5–2 mm thick, epidermis with dense, globose papillae. Flower

pedicels 10–14 mm long, petals up to 15 × 2 mm, white, filamentous staminodes none. Fruit 5-locular. June–Aug. ?Habitat, WM, TS (between Sutherland and Matjiesfontein). **(ece)**

filiforme L.Bolus Succulent shrub, with subdecumbent and twisting branches, up to 280 mm long, internodes slender, 20–30 mm long. Leaves terete, 10–15 mm long, epidermis with dense, globose papillae. Flower pedicels 40–60 mm long, petals up to 13 × 2 mm, pink, filamentous staminodes none. Fruit 5-locular. Sept. ?Habitat, NH (Komaggas). **(ece)**

framesii L.Bolus Succulent shrub, with prostrate to decumbent branches and erect, short shoots, forming low cushions, 70–80 mm tall. Leaves subcylindrical, 10–13 mm long, up to 4 mm thick, epidermis with dense, globose papillae. Flowers solitary on short shoots, up to 30 mm diam., pedicels 10–25 mm long, petals white, filamentous staminodes none. Fruit base bell-shaped, 5-locular. Sept. On flats or hills in finely grained Dwyka tillite, TS (Tanqua Karoo). **(ece)**

hispidum (L.) Schwantes Erect or spreading, succulent shrublet, 300–600 mm tall, internodes up to 27 mm long, usually longer than leaves, covered by long, stiff hairs except on basal internodes. Leaves terete, obtuse, bending downwards, densely papillate. Flowers solitary, magenta, without filamentous staminodes. Fruit 5-locular. Sept.–Nov. Pioneer, NS, NH, KV, CCR (dry parts of southern Africa).

mathewsii L.Bolus Succulent shrub, up to 80 mm tall, internodes up to 1.5 mm diam. Leaves subcylindrical, up to 12 × 2.5 mm, up to 3.5 mm thick, epidermis with dense, globose papillae. Flowers solitary, pedicels 25–50 mm long, petals up to 15 × 1.5 mm, purplish pink, filamentous staminodes none. Fruit base funnel-shaped, expanding keels diverging, valve wings rectangular, 5-locular. ?Flowering time. ?Habitat, KV (Vanrhynsdorp). **(ece)**

nordenstamii L.Bolus Low, succulent shrub, with decumbent to prostrate branches up to 200 mm long. Leaves terete, 10–15 mm long, up to 3 mm thick, epidermis with dense, globose papillae. Flower with pedicel 10–30 mm long, petals up to 13 mm long, pale rose-pink, without filamentous staminodes. Fruit base bell-shaped, valve wings almost rectangular, 5-locular. Oct.–Feb. ?Habitat, G (S of Witpütz). **(ece)**

oculatum L.Bolus Cushion-shaped, succulent shrub, up to 90 mm tall, branches decumbent. Leaves subcylindrical, up to 11 × 2.5 mm, up to 3.5 mm thick, epidermis with dense, globose papillae. Flower with pedicel 7–15 mm long, reaching up to 30 mm in fruit, petals purplish pink, basally with a broad white line. Fruit base bell-shaped, top highest in centre, expanding keels broad and parallel to tip of valve, valve wings almost rectangular, 5-locular. ?Flowering time. In loam with some quartz pebbles, KV (Vanrhynsdorp). **(ece)**

schoenlandianum (Schltr.) L.Bolus Succulent shrub, up to 150 mm tall. Leaves subcylindrical, 5–8 mm long, 3 mm thick, epidermis with dense, globose papillae, dark green. Flowers solitary, 25 mm diam., petals whitish, cream- to lemon-coloured, filamentous staminodes none. Fruit base bell-shaped, expanding keels parallel, valve wings rectangular, 5-locular. July–Sept. On low hills and flats, NH, KV (Garies to Vanrhynsdorp). **(ece)**

subplanum L.Bolus Low-growing, succulent shrub, with elongate, decumbent to prostrate branches, rarely rooting. Leaves spreading to ascending, somewhat club-shaped, 8–14 × ± 3 mm, ± 3 mm thick, epidermis with rough, small shining papillae, glaucous green. Flower with pedicel 20 mm long, petals rose-pink, filamentous staminodes absent. Fruit on a conspicuously hairy pedicel, 5-locular. Sept. ?Habitat, WM (Calvinia). **(ece)**

A.' Stems bearing apically rounded bladder-cells

albiflorum (L.Bolus) Schwantes Slender, much-branched, succulent shrublet, up to 150 mm tall. Leaves terete, obtuse, 7–10 mm long, 4 mm thick, epidermis with dense, globose papillae. Flowers solitary, petals white, filamentous staminodes none. Fruit base a short funnel, 5-locular. Oct.–Dec. ?Habitat, TS, CCR (Matjiesfontein to Little Karoo). **(gce)**

brevifolium (Aiton) Schwantes Succulent shrub, up to 250 mm tall and 300 mm diam., with erect, stiff filiform main branches, bearing many short shoots. Leaves cylindrical, papillate, spreading widely. Flower 22 mm diam., petals magenta, filamentous staminodes clustered into a cone around stamens. Fruit base short, bell-shaped, valve wings semi-lunate or almost rectangular. ?Flowering time. On gravelly flats, KV (Vanrhynsdorp). **(ece)**

comptonii L.Bolus Laxly branched, succulent shrub, branches up to 250 mm long. Leaves cylindrical, up to 9 mm long, 3 mm thick, epidermis with dense, globose to ovate papillae. Flowers solitary, up to 28 mm diam., petals pink, up to 13 mm long, ?filamentous staminodes. Fruit base bell-shaped, 5-locular. Oct. ?Habitat, TS (Laingsburg). **(ece)**

crassum L.Bolus Stiff, succulent shrub, up to 260 mm, with yellow-brown stems papillate when young, becoming twisted with age. Leaves ovate, 5–8 mm long, up to 3 mm thick, papillate. Flowers solitary, petals up to 10 mm long, filamentous staminodes absent. Fruit deciduous, on bluntly spinescent pedicels, base funnel-shaped, short, expanding keels diverging, 5-locular. Sept. Karroid scrub in loamy sand, TS, CCR (Tanqua Karoo to Little Karoo). **(gce)**

curtophyllum L.Bolus (= *D. subclausum* L.Bolus) Small, succulent shrub, 100–300 mm tall, branches rooting when growing in sand. Leaves subcylindrical, 3–5 mm long, 2–4 mm thick, shining papillate. Flowers solitary, subsessile, petals up to 7 mm long, pale pink or white, filamentous staminodes absent. Fruit base funnel-shaped, rims low, expanding keels diverging subapically, 5-locular. Sept.–Oct. In sand or gravel, NS, NH (Port Nolloth to Nuwerus). **(ece)**

cymiferum L.Bolus Erect, succulent shrublet, up to 150 mm tall, stems spreading at right angles, papillate when young. Leaves terete, obtuse, 6–12 mm long, up to 3 mm thick, papillate. Flowers 3–5 in cymes, lateral flowers being shed and leaving a spiny pedicel, petals white to cream-coloured or pale pink. Fruit base bowl-shaped to semi-globose, expanding keels parallel but diverging distally, 5-locular. Nov.–Dec. Dwyka tillite, WM, TS, CCR (NE Cederberg Mountains and Tanqua Karoo to Kenhardt).

deciduum H.E.K.Hartmann & Bruckmann Erect, succulent shrublet, up to 350 mm tall. Leaves terete, obtuse, bright green, papillate, deciduous. Flowers solitary, rarely up to 3, petals ± 25 mm long, pale pink, filamentous staminodes absent. Fruit base a short funnel, closing bodies present, 5-locular. July–Aug. Loamy soil with gravel, KV (Knersvlakte). **(ece)**

diversifolium L.Bolus Small, succulent shrublet, up to 120 mm tall. Leaves boat-shaped, up to 10 × 4 mm, up to 5 mm thick, papillate, those on long, upper shoots, subterete, basally broadened, up to 35 × 3.5 mm, up to 4 mm thick. Flowers solitary, up to 30 mm diam., petals magenta, pink or almost white, filamentous staminodes absent. Fruit base elongate funnel-shaped, closing bodies forming edocarpal sills, 6-locular. July–Sept. In deep soil, usually covered with quartz pebbles, NS, NH, KV, CCR (Namaqualand to Clanwilliam). **(gce)**

globosum L.Bolus Erect, much-branched, succulent shrub, up to 450 mm tall, internodes brown. Leaves globose, falling easily off plant, up to 3 mm thick, densely papillate. Flowers up to 17 mm diam., petals magenta, filamentous staminodes pink. Fruit 5-locular, almost star-shaped. June–July. In loamy soil, TS, CCR (Laingsburg to Montagu and Prince Albert). **(gce)**

godmaniae L.Bolus Erect, succulent shrublet, up to 150 mm tall, 200 mm diam., internodes ochre. Leaves terete, up to 9 mm long, 2.5 mm thick, densely papillate. Flowers 1–3, on pedicels up to 35 mm long, petals pinkish purple, without filamentous staminodes. ?Fruit. Sept. ?Habitat, NH (Springbok). **(ece)**

inornatum (L.Bolus) L.Bolus (= *D. tardum* L.Bolus) Very similar to **D. deciduum** but closing body small vs. large. Sept. Mostly in loamy soils or on slopes with quartzite, SN, G (southern Namib and Richtersveld). **(ece)**

karrooense L.Bolus Erect, succulent shrub, up to 200 mm tall, internodes maroon. Leaves terete, 8–11 mm long, 3–5 mm thick, epidermis with dense, globose papillae. Flowers solitary, up to 30 mm diam., petals pink, filamentous staminodes few. Fruit 5-locular. Aug. In karroid vegetation, TS (Laingsburg to Graaff-Reinet).

luederitzii (Engl.) Schwantes Densely leaved, succulent shrub, forming cushions, 100–150 mm tall, up to 1 m diam. Leaves terete, up to 10 mm long, ± 3 mm thick, epidermis with dense, globose papillae. Flowers 16–18 mm diam., petals white, filamentous staminodes absent. Fruit 5-locular. Oct. In sand or gneiss near the sea, SN (Swakopmund to Lüderitz and Witpütz).

pulverulentum (Haw.) Schwantes Erect shrub, up to 150 mm tall, internodes without papillae. Leaves boat-shaped to semi-globose, 10–15 × 4–6 mm, 4–6 mm thick. Flowers 1(–3), 26 mm diam., petals pinkish purple, filamentous staminodes absent. Fruit base funnel-shaped, valve wings broad, 6-locular. Aug.–Sept. In karroid vegetation, NH, KV (Nuwerus to Klawer). **(ece)**

ramosissimum (Schltr.) L.Bolus Tufted, cushion-forming, succulent shrub. Leaves semi-cylindrical, 6–10 mm long, up to 2 mm thick, epidermis with dense, globose papillae. Flowers solitary, petals pink to magenta. Fruit 5-locular. Sept. In sand, 170 m, KV (Vanrhynsdorp). **(ece)**

salicola L.Bolus Compact, densely branched, succulent shrublet, up to 250 mm tall. Leaves globose to subglobose. Flowers solitary, pale pink, without filamentous staminodes. Fruit 5-locular. Oct.–Nov. In sand near the coast, G, NS, CCR (Alexander Bay to Piketberg). **(gce)**

[**Excluded species D. erigeriflorum** (Jacq.) Stearn, **D. hirtellum** (Haw.) Schwantes, **D. pauper** (Dinter) Dinter & Schwantes, insufficiently known and possibly conspecific with one of the above species.]

EBERLANZIA 8 spp., southwestern Namibia to Namaqualand coast **(ece)**

A. Flowers with 5 petals or less

clausa (Dinter) Schwantes Shrub, up to 500 mm tall, becoming spiny with loss of flowers and fruits. Leaves short, round, swollen, papillate. Petals present, pink, filamentous staminodes numerous, white. Fruit 5-locular, 10–12 mm diam., closing bodies large, hook-shaped, closing rodlets present beneath covering membrane, valve wings narrower than expanding keels, not tapering towards apex. Aug.–Oct. Uplands, SN (southern Namibia). **(ece)**

sedoides (Dinter & A.Berger) Schwantes Shrub, up to 300 mm tall, becoming cushion-shaped with age, spiny due to aborted or discarded fruit. Leaves 3-sided, papillate. Flowers without petals, filamentous staminodes numerous, white, stamens white. Fruit 5-locular, 8–12 mm diam., closing bodies hook-shaped, closing rodlets present, valve wings very narrow. Aug.–Oct. Coastal regions, SN, G, NS (Lüderitz to Hondeklipbaai). **(ece)**

A.' Flowers with > 20 petals
B. Covering membranes on fruit with closing ledges beneath

gravida (L.Bolus) H.E.K.Hartmann Shrub, up to 350 mm tall, internodes grey. Leaves 3-sided to round, apex obtuse, covered with long papillae. Flowers 30 mm diam., petals pink, up to 12 mm long, filamentous staminodes numerous, pink, stigmas red. Fruit 5-locular, 8–10 mm diam., closing bodies hook-shaped, valve wings broader than expanding keels, tapering towards apex. Aug.–Sept. ?Habitat, NH (Steinkopf to Wildepaardehoek). **(ece)**

B.' Covering membranes on fruit with closing rodlets beneath

cyathiformis (L.Bolus) H.E.K.Hartmann Shrub, up to 400 mm tall, internodes whitish. Leaves red, round, covered with low papillae. Inflorescence becoming spiny as fruit stalks break off. Flowers numerous, pink. Fruit 5-locular, closing bodies hook- to knob-shaped, closing rodlets present, valve wings almost as broad as expanding keels, tapering towards apex. Sept.–Oct. Lower slopes and flats in loam, sand or gravel, G (Richtersveld). **(ece)**

dichotoma (L.Bolus) H.E.K.Hartmann Shrub, up to 300 mm tall, internodes grey. Leaves short, club-shaped. Flowers purple, sepals with large papillae, filamentous staminodes numerous, purple, paler towards base. Fruit 5-locular, 6–7 mm diam., closing bodies small, hook-shaped, closing rodlets conspicuous, valve wings narrow, almost as broad as expanding keels, tapering towards either end. Sept.–Oct. Inland, G, NH (Richtersveld to Komaggas). **(ece)**

ebracteata (L.Bolus) H.E.K.Hartmann Shrub, up to 300 mm tall. Leaves 3-sided, with distinct keel and margins, covered with papillae. Flowers 30 mm diam., petals white to pink, filamentous staminodes numerous, white. Fruit 5-locular, 6–8 mm diam., closing bodies hook-shaped, closing rodlets present, valve wings broader than expanding keels, tapering towards apex. Sept.–Oct. Gravelly flats or between rocks, SN, G (southwestern Namibia, N of lower Gariep Valley to Richtersveld). **(ece)**

parvibracteata (L.Bolus) H.E.K.Hartmann Shrub, up to 300 mm tall, internodes light grey to white. Leaves round, apex obtuse, covered with short papillae. Flowers pink-purple, filamentous staminodes few. Fruit 5-locular, closing bodies hook-shaped, closing rodlets present, valve wings narrower than expanding keel, hardly tapering towards apex. Aug.–Oct. Gravelly slopes, NS (Wallekraal). **(ece)**

schneideriana (A.Berger) H.E.K.Hartmann Shrub, up to 500 mm tall, internodes whitish, papillate. Leaves 3-sided, sickle-shaped, covered with long papillae. Flowers purple, pale towards base, filamentous staminodes pale pink. Fruit 5-locular, 8–10 mm diam., closing bodies, hook-shaped, closing rodlets present, valve wings broader than expanding keels, tapering towards apex. Aug.–Sept. Rocky areas, SN, G (southwestern Namibia to northern Richtersveld). **(ece)**

EBRACTEOLA 4 spp., central Namibia, N Cape and NW Province

derenbergiana (Dinter) Dinter & Schwantes Compact, tufted, succulent perennial, ± 100 mm tall, taproot thickened. Leaves stiff, 3-sided, laterally compressed, keel and margins rounded, dotted. Flowers pink, pale towards base, sometimes white, pedicels short, filamentous staminodes and stamens white, arranged in a cone, nectary a ring. Fruit persisting in centre of plant, 5-locular,

funnel-shaped, tapering into fruit stalk, expanding keels ending in an awn, closing bodies small and round or bigger and egg-shaped. Aug.–Oct. Finely grained soils, SN, G (southern Namibia and northern Richtersveld).

fulleri (L.Bolus) Glen Compact, tufted, succulent perennial, ± 100 mm tall. Leaves slender, almost terete. Flowers pink, pale towards base, pedicels short, filamentous staminodes and stamens mostly white, sometimes tipped red, arranged in a cone, nectary a ring. Fruit 5-locular, base short, distinct from pedicel, expanding keels ending in an awn, closing bodies flattened. Aug.–Sept. Gritty soils on plains, G (southeastern Namibia, Richtersveld to Kenhardt).

ENARGANTHE 1 sp., Richtersveld **(ece)**

octonaria (L.Bolus) N.E.Br. Succulent shrub, up to 450 mm tall, 400 mm wide, with internodes longer than leaves. Leaves trigonous, 30–35 mm long, pale green, epidermis smooth. Flowers solitary, ± 40 mm diam., magenta, without filamentous staminodes. Fruit 8-locular, valve wings narrow and tapering into awns, without closing bodies. June–July. On slopes of quartzite, G (Richtersveld). **(ece)**

FENESTRARIA 1 sp., southern Namib and Namaqualand **(ece)**

rhopalophylla (Schltr. & Diels) N.E.Br. WINDOWPLANT Compact to caespitose, dwarf succulent, sunken in ground. Leaves clavate, dark green, only apical window visible. Flowers 1(2), 25–70 mm diam., yellow to coppery or white. Fruit stalk 30–40 mm long, (8–)10(–16)-locular, valve wings broad, closing bodies small. July–Aug. On coastal aeolian sands or gravel, rarely in pockets above dolomite, SN, G, NS (Lüderitz to S of Kleinsee). **(ece)**

GIBBAEUM VOLSTRUISTONE ± 16 spp., W Cape to western Karoo **(gce)**

gibbosum (Haw.) N.E.Br. Dwarf succulent, up to 100 mm tall, forming compact clumps, 60–100 mm diam., with a woody rootstock. Leaves unequal, larger leaf slightly incurved, trigonous towards apex, the shorter leaf with a less pronounced hump. Flowers 20–30 mm diam., pink to magenta. Fruit 6- or 7-locular. Aug. Pebbly shale or quartz patches, TS, CCR (western Karoo to Matjiesfontein and Little Karoo). **(gce)**

GLOTTIPHYLLUM SKILPADKOS 16 spp., Karoo, W and E Cape

A. Leaves decussate

peersii L.Bolus Mat-forming, dwarf, succulent shrub, with ascending, later decumbent stems, internodes visible but short. Leaves erect, decussate, soft, long leaf of a pair 40–65 mm long, short one 8–14 mm long, basally with a constriction, apically keeled, bright green. Flowers yellow. Fruit stalks persistent, tops raised, base spongy, valve wings or awns absent, 8-locular. Mar. On quartz, TS (Klaarstroom to Graaff-Reinet).

surrectum (Haw.) L.Bolus Mat-forming, dwarf, succulent shrub, internodes enclosed by old leaf sheaths. Leaves decussate, subterete, soft. Flowers yellow. Fruit stalks short, persistent, woody, valve wings or awns absent, locules 8 or fewer. Mar.–Apr. On decomposed, shaly sandstone, TS, CCR (Prince Albert and Little Karoo to Willowmore). **(gce)**

A.' Leaves distichous

neilii N.E.Br. Compact, dwarf, succulent shrub, with 2 or 3 decumbent branches. Leaves mostly distichous, old one persisting for several years, margins sharp, surface grey. Flowers yellow. Fruit always persisting in the centre of the plant, held tightly by old leaves, top flattish, base spongy, locules 8(–10). ?Flowering time. In quartz patches in open vegetation, TS (Prince Albert). **(ece)**

nelii Schwantes Compact, dwarf, succulent shrub, up to 5-branched or more with age. Leaves several to many on a branch, distichous, margins mostly rounded, margins dotted from subhypodermal idioblasts, bright green. Flowers yellow. Fruit persisting in the centre of plant, held tightly by old leaves, tops high, base spongy, locules 7 or 8. Apr. Mostly on quartz under bushes, TS, CCR (Prince Albert to Willowmore and Jansenville).

suave N.E.Br. Compact, dwarf, succulent shrub, with 3 or rarely more decumbent branches. Leaves oval above, margins sharp, distichous, surface greyish. Flowers yellow. Fruit dropping off, tops moderately high, rims low, base conical, valve wings narrow, locules 8 or 9. Apr.–May. On quartz or shaly sandstone, TS, CCR (Laingsburg to western Little Karoo). **(gce)**

HALLIANTHUS 2 spp., Namaqualand **(ece)**

griseus S.A.Hammer & U.Schmiedel Compact, succulent shrub, with longer side branches, up to 60 mm tall, up to 180 mm diam. Leaves pale silvery blue, subcompressed-digitiform, up to 20 × 4 mm. Flowers ± 30 mm diam., very pale yellow, petals threadlike, filamentous staminodes conically collected and recurving. Fruit 10–14-locular. Aug. Saline soils on quartz, NH (SE of Bitterfontein). **(ece)**

planus (L.Bolus) H.E.K.Hartmann Procumbent, succulent shrub, with a central head and trailing side branches, not rooting at nodes. Leaves triangular in cross section, dark green. Flowers 3–5 in cymes, rarely solitary, petals white or magenta, filamentous staminodes conically collected. Fruit (7–)10(–12)-locular. June–July. On rocky outcrops or steps of granite, sandstone or quartz, G, NS, NH, KV (Richtersveld to Vanrhynsdorp). **(ece)**

HAMMERIA 3 spp., eastern Cederberg Mountains, Tanqua Karoo to Sutherland **(gce)**

gracilis Burgoyne Very similar to **H. meleagris** but habit less compact, plant trailing on the ground, and leaves more delicate and greenish. Aug. Shale flats, WM (Sutherland). **(ece)**

meleagris (L.Bolus) Klak Succulent shrub, up to 60 mm tall, compact when young, later developing decumbent to creeping long shoots. Leaves in pairs of dissimilar size and shape, adpressed or spreading in wet conditions, trigonous, up to 15 mm long, 4 mm thick, glaucous, with small apical teeth. Flowers solitary, ± 25 mm diam., on pedicels up to 25 mm long, petals pink, longitudinally striped. Fruit 5-locular, valve wings broad, without closing bodies. June–Aug. Shale flats, TS (Tanqua Karoo). **(ece)**

HARTMANTHUS 2 spp., southern Namib and Richtersveld **(ece)**

hallii (L.Bolus) S.A.Hammer Similar to **H. pergamentaceus** but often more compact in habit, epidermis rough like sandpaper and fruit 8–10-locular. Sept.–Oct. Rocky slopes, SN (southern Namib, NW of distribution area of **H. pergamentaceus**). **(ece)**

pergamentaceus (L.Bolus) S.A.Hammer Succulent shrub developing erect, high branches from a compact centre. Leaves sharply triquetrous, glaucous, withering into long-lived, parchment-like dry leaves (persisting for many years on plant), up to 70 × ± 15 mm, up to 20 mm thick, epidermis smooth. Flowers in terminal cymes, bracteoles persisting over several years, 45–55 mm diam., petals white to pink, stamens in a central cone. Fruit flat-topped to forming a low cone, elongate funnel-shaped basally, valve wings broad, without closing body, 5-locular. Aug.–Sept. Rocky slopes and valleys, up to 1 100 m, G (Richtersveld). **(ece)**

HEREROA CLOCK PLANT, SLAAPVYGIE ± 30 spp., Namibia to E Cape

brevifolia L.Bolus Succulent shrub, forming dense cushions up to 70 mm tall, 200 mm diam., stems up to 25 mm diam. at base. Leaves apically subtruncate to subacute, 20–30 × 5–9 mm, 3–7 mm diam., subapical thickening 6–7 mm thick, epidermis granular. Flowers in cymes, 29 mm diam., opening around noon, pedicels up to 60 mm long, petals yellow, filaments white. Fruit 5-locular, closing bodies small. ?Flowering time. ?Habitat, TS (Prince Albert). **(ece)**

crassa L.Bolus Dense, succulent shrub, up to 120 mm tall, 300 mm diam. Leaves falcate, 25–32 × up to 7 mm, up to 11 mm thick, keel rounded, epidermis a little rough. Flowers solitary or in elongate monochasia, bracteoles connate for most of their length, forming a cup below flower, petals yellow, red outside. Fruit base short, 5-locular, closing bodies absent, valve wings narrow. Sept.–Oct. On slopes with quartzite rock, TS (Laingsburg to Prince Albert, Beaufort West).

fimbriata L.Bolus Like **H. crassa** and **H. joubertii** but shrub up to 350 mm tall, leaves present for entire length of the erect shoots and fruit long-stalked and large (10–12 mm diam.). ?Flowering time. In shaley rocky places, TS (Prince Albert). **(ece)**

joubertii L.Bolus Like **H. fimbriata** and **H. crassa** but internodes short, leaves long and fat (30–45 × up to 9 mm, up to 9 mm thick), bracteoles spreading, fruit 8–10 mm diam. Oct. On flats with broken shale, TS (Laingsburg, Prince Albert). **(ece)**

latipetala L.Bolus Erect, succulent shrub, up to 90 mm tall, 130 mm diam., stems up to 4 mm diam. Leaves falcate, up to 35 mm long, broadest and up to 11 mm thick below apex. Flowers in cymes of up to 7, up to 32 mm diam., bracteoles up to 5 mm long, petals golden yellow, reddish outside. Fruit 5-locular, closing bodies big. ?Mar. ?Habitat, TS (Prince Albert). **(ece)**

nelii Schwantes Densely leaved, cushion-shaped, succulent shrub, up to 100 mm tall, with flowering branches higher than shrubby part. Leaves falcate, compressed, 25–30 × 5 mm, up to 10 mm thick, epidermis slightly rough. Flowers 1–3 in terminal cymes, bracteoles spreading, petals yellow. Fruit 5-locular, closing bodies absent. ?Flowering time. On flats with broken shale, TS (Tanqua Karoo). **(ece)**

odorata (L.Bolus) L.Bolus Small, sprawling, succulent shrublet, up to 100 mm tall, with erect flowering branches. Leaves spreading to inclined, mostly subcylindrical, glaucous. Flowers 3 per branch, up to 22 mm diam., on pedicels up to 10 mm long, yellow with red tips. Sept.–Oct. In shaley flats, TS, CCR (Matjiesfontein and Little Karoo, Swellendam). **(gce)**

puttkameriana (Dinter & A.Berger) Dinter & Schwantes Compact, highly branched, succulent shrub, up to 100 mm tall. Leaves terete in lower part, inconspicuously keeled in upper part, almost triangular in cross section, 60–70 × 6–7 mm, 6–7 mm thick, epidermis slightly rough. Flowers 1–3, 24–32 mm diam., petals yellow. Fruit 5-locular, closing bodies small. Sept. In crevices of granitic, gneissic or quartzitic rock, SN, G (Cape Cross to Richtersveld, Karas Mountains).

[**Excluded species** **H. carinans** (Haw.) Dinter & Schwantes ex H.Jacobsen, **H. granulata** (N.E.Br.) Dinter & Schwantes, **H. incurva** L.Bolus, **H. stenophylla** L.Bolus, **H. teretifolia** L.Bolus, insufficiently known and possibly conspecific with one of the above species.]

HYMENOGYNE 2 spp., N and W Cape **(gce)**

glabra (Aiton) Haw. Erect or prostrate annual, up to 30 mm tall. Leaves flat, with bladder-cells along margins. Flowers yellow, stigmas basally connate forming a style, style broadening from base towards top, appearing funnel-shaped. Fruit breaking into mericarps, seed bags filling locule, seeds 2 per locule. Aug.–Oct. Rare, in sandy places, NH, CCR (Kamieskroon, Clanwilliam to Cape Town). **(gce)**

IHLENFELDTIA 2 spp., eastern Namaqualand along the edge of the winter rainfall region and into Bushmanland

excavata (L.Bolus) H.E.K.Hartmann Compact, dwarf succulent, rarely sunken into the ground. Leaves thick, trigonous, acutely keeled, papillate, mucronate, up to 25 × ± 15 mm, ± 15 mm thick. Flowers solitary, up to 70 mm diam., petals yellow, often purplish suffused, rarely creamy white. Fruit 10–15-locular, with small closing bodies. Aug.–Sept. Along the edge of the winter rainfall area, on white quartz, NH (Springbok to Kliprand and Bushmanland).

JACOBSENIA 3 spp., Namaqualand to Knersvlakte **(ece)**

hallii L.Bolus Compact, low, succulent shrub, up to 150 mm tall. Leaves spreading, more-or-less digitiform, up to 70 mm long, 10 mm diam., upper surface flattened, lower surface slightly keeled, with large, ± circular bladder-cells. Flowers solitary, up to 80 mm diam., petals white or pale yellow. Fruit (5)6(–8)-locular. Aug.–Sept. In shallow, rocky soils with large, quartz pebbles, NH, KV (southern Namaqualand to Vredendal). **(ece)**

kolbei (L.Bolus) L.Bolus & Schwantes Succulent shrub, with erect long-shoots up to 500 mm tall and lateral short-shoots. Leaves usually terete, up to 60 mm long, 10 mm diam., often much smaller on short-shoots, with large mostly elliptic bladder-cells. Flowers solitary, up to 60 mm diam., petals white, rarely red. Fruit (5)6-locular. Aug.–Oct. In shallow rocky soils, KV (Vredendal, Vanrhynsdorp). **(ece)**

vaginata (L.Bolus) Ihlenf. (= *Anisocalyx vaginatus* (L.Bolus) L.Bolus, *Drosanthemopsis vaginata* (L.Bolus) Rauschert) Compact, succulent shrub, up to 80(–200) mm tall. Leaves with upper surface flattened and lower surface keeled towards apex, up to 35 mm long, 11 mm diam.,

with ± circular bladder-cells. Flowers solitary, up to 40 mm diam., petals mostly white. Fruit (6–)9(–16)-locular. Aug.–Oct. In loamy, highly saline sand with quartz pebbles, NH (southwestern Namaqualand). **(ece)**

JENSENOBOTRYA 1 sp., Namib **(ece)**

lossowiana A.G.J.Herre Densely leaved, decumbent, succulent shrub, with internodes remaining soft and spongy. Leaves shortly clavate to almost globose, basal 5–7 mm diam., apical 12–15 mm diam., greyish pink. Flowers ebracteolate, on pedicel ± 10 mm long, 20–25 mm diam., petals pink, often white at base. Fruit withering quickly, 5-locular, valve wings broad, keels parallel. Aug.–Oct. In crevices of gneiss near the sea, SN (Lüderitz: Spencer Bay). **(ece)**

JORDAANIELLA 7 spp., coastal plain of southern Namibia, Namaqualand and W Cape **(gce)**

clavifolia (L.Bolus) H.E.K.Hartmann Creeping, succulent shrub, with internodes 10–20 mm long, 2.5–5 mm diam. Leaves ± terete, 18–50 × 4–5 mm. Flowers 45–75 mm diam., yellow. Fruit 14- or 15-locular, closing bodies small. June–July. In strandveld, NS (Kleinsee to Hondeklipbaai). **(ece)**

cuprea (L.Bolus) H.E.K.Hartmann Creeping, succulent shrub, with internodes < 15 mm long, > 5 mm diam. Leaves ± terete, 50–100 × 8–14 mm. Flowers 30–100 mm diam., various shades of yellow, apically orange to pink, often salmon-coloured. Fruit 14–20-locular, closing bodies small. June–Aug. In strandveld, SN, G, NS (Lüderitz-South and northern Namaqualand). **(ece)**

spongiosa (L.Bolus) H.E.K.Hartmann Succulent shrub, with creeping to ascending stems and internodes up to 10 mm diam. Leaves thick, finger-shaped, ± 100 mm long, 10–15 mm diam. Flowers 70–100 mm diam., red with an orange centre. Fruit 18–28-locular, closing bodies very small or absent. Sept.–Oct. In strandveld, G, NS (Alexander Bay to Groenrivier Mouth). **(ece)**

uniflora (L.Bolus) H.E.K.Hartmann Creeping, succulent shrub, with internodes 20–30 mm long, 3.5–4.5 mm diam. Leaves ± terete, green and erect, > 60 × 5–7 mm. Flowers 40–45 mm diam., yellow. Fruit 15- or 16-locular, closing bodies small. July–Aug. Northern part of strandveld in open patches among shrubs, G, NS (Alexander Bay to Port Nolloth). **(ece)**

JUTTADINTERIA 5 spp., southern Namib and northern Namaqualand **(ece)**

A. Leaf margins distinctly toothed, teeth numerous, large

ausensis (L.Bolus) Schwantes Succulent shrub, with erect to ascending, rarely decumbent branches, internodes mostly visible and long. Leaves slender, forming a distinct but not very pronounced triangle below apex. Flowers 40–55 mm diam., petals white. Fruit 8–12-locular. Sept. Gravelly to sandy plains with calcrete inclusions and some quartz, occasionally on mountain slopes, 650–1 000 m, SN (Aus). **(ece)**

simpsonii (Dinter) Schwantes Similar to **J. ausensis** but leaves with a pronounced rhomboidal thickening below apex. July–Oct. On granitic-gneiss ridges and coarse gravelly to sandy slopes, 390–600 m, SN (Kovis Mountains and Haalenberg). **(ece)**

A.' Leaf margins and keel untoothed or with few minute teeth

albata (L.Bolus) L.Bolus Similar to **J. attenuata** but procumbent to erect in habit and with large (minimum width at base 12 mm but usually far wider) pale, smooth and ± untoothed leaves that taper to a narrow apex. Sept. Sandy soil on rocky slopes and S-facing, gravel, river terraces, 20–75 m, SN, G (southern Namib, common along lower Gariep Valley). **(ece)**

attenuata Walgate Prostrate to slightly procumbent, succulent shrub. Leaves long, relatively slender, dotted, almost untoothed, up to 45 mm long, 12 mm thick. Flowers up to 55 mm diam., petals white. Fruit 8-locular. Aug.–Sept. Sandy, often calcareous soils, rocky slopes or on plains, 260–770 m, SN (central plains and koppies of the southern Namib). **(ece)**

deserticola (Marloth) Schwantes Decumbent, rarely ascending or erect, dwarf, succulent shrub, up to 250 mm tall, internodes enclosed by leaf bases or very short. Leaves boat-shaped to pointed, < 30 × 20 mm, with a hard apical mucro and few very fine teeth along margins. Flowers 20–35 mm diam., petals white. Fruit 7–9-locular. Aug.–Sept. Flat patches of gravelly sand near the

coast, occasionally on rocky dolomite or granitic-gneiss slopes in sandy and stony soil, 15–250 m, SN, G (Lüderitz to Richtersveld). **(ece)**

LAMPRANTHUS ± 90 spp., southern Namibia and western and southern regions of South Africa

A. Flowers 3–9

dregeanus (Sond.) N.E.Br. (= *L. globosus* (L.Bolus) L.Bolus, *L. gracilipes* (L.Bolus) N.E.Br.) Erect shrublet, 200–600 mm tall. Leaves spreading, subfalcate, 6–9 mm long. Flowers in cymes, ± 32 mm diam., white, pale pink or magenta. Sept.–Oct. Stony granite or sandstone slopes or on cliffs, frequent after fires, 100–1 065 m, KB, CCR (Kamiesberg Mountains to Gifberg, Piketberg, Tulbagh, Villiersdorp). **(gce)**

esterhuyseniae L.Bolus (= *L. littlewoodii* L.Bolus, *L. vanheerdei* L.Bolus) Erect or more rarely straggling, richly branched, succulent shrub, up to 240 mm tall, 300 mm diam. Leaves trigonous, scabrous, 10–20 × up to 2 mm. Flowers 3–9 per cyme, on pedicels 25–40 mm long, petals magenta to pink or white, without filamentous staminodes. Fruit 5-locular, 6–7 mm diam. Oct.–Nov. Amongst fynbos, 150–750 m, NS, NH, KB (Steinkopf to Groenrivier, Kamieskroon). **(ece)**

godmaniae (L.Bolus) L.Bolus Erect, succulent shrub, up to 400 mm tall. Leaves shortly fused to opposite ones towards bases, cylindrical to trigonous, up to 30 mm long, 5 mm diam., grey. Flowers 3-nate, 42 mm diam., white, pink or magenta, filamentous staminodes present. Fruit 5-locular, base funnel-shaped, expanding keels diverging. Sept.–Oct. Usually sandy flats or rocky outcrops, 450–1 100 m, G, NH, WM (northern Namaqualand to NE of Grasberg on Bokkeveld Escarpment). **(ece)**

paucifolius (L.Bolus) N.E.Br. Erect, succulent shrub, 200–300 mm tall. Leaves trigonous, scabrous, acute, 17 × 1–2 mm, 1–2 mm thick. Flowers in small cymes, up to 27 mm diam., filamentous staminodes apically recurved. Fruit 5-locular, base funnel-shaped, expanding keels diverging. Sept.–Oct. In shale fynbos with renosterbos, 600–1 200 m, KB, CCR (Kamiesberg Mountains to Pakhuis Mountains). **(gce)**

stipulaceus (L.) N.E.Br. (including **L. amoenus** (Salm-Dyck ex DC.) N.E.Br., **L. hoerleinianus** (Dinter) Friedrich, **L. suavissimus** (L.Bolus) L.Bolus) Succulent shrub, up to 700 mm tall, stems pale grey-brown. Leaves trigonous, up to 35 mm long. Flowers 3–5, up to 40 mm diam., magenta, more rarely white or pink, without filamentous staminodes. Fruit 5-locular, base funnel-shaped, keels diverging. July–Oct. Deep sandy flats or more rarely among rocks, SN, G, NS, CCR (southern Namibia to Cape Town). **(gce)**

A.' Flowers 1–3

borealis L.Bolus Erect, glabrous, succulent shrub, with stems 90–180 mm long. Leaves free from each other towards bases, bluntly trigonous, up to 25 mm long, 3–5 mm thick. Flowers 1–3, 40–50 mm diam., pale rose, without filamentous staminodes. Fruit 5-locular, base funnel-shaped, expanding keels diverging. Sept. On rocky gneiss slopes, SN, G, NH (southern Namibia, Richtersveld to Springbok). **(ece)**

densipetalus (L.Bolus) L.Bolus (= *L. plautus* N.E.Br.) Small, erect, loosely branched, succulent shrub, up to 260 mm tall. Leaves trigonous to almost cylindrical, shortly fused to opposite ones towards bases, spreading to erect, upper side flattened, glaucous, 20 mm long, 3 mm thick. Flowers solitary, up to 35 mm diam., white or pale rose, without filamentous staminodes. Fruit 5-locular, brown, base funnel-shaped, expanding keels diverging. June–Aug. Mostly on sandy flats, NS, NH (Port Nolloth to Garies). **(ece)**

haworthii (Donn ex Haw.) N.E.Br. Erect, freely branched, succulent shrublet, 400–600 mm tall. Leaves trigonous to almost cylindrical, shortly fused to opposite ones, ascending to spreading, densely pruinose with grey, 25–40 × 3–4 mm. Flowers 1–3, up to 70 mm diam., pale magenta, inner petals short representing filamentous staminodes incurved over stamens. Fruit 5-locular, base funnel-shaped, expanding keels diverging. Sept.–Oct. Mostly on sandstone soils among rocks or on flats, TS, CCR (Clanwilliam, Ceres, Laingsburg to Uniondale, Oudtshoorn to Graaff-Reinet).

holensis L.Bolus Shrubby succulent, stems 200 mm long. Leaves shortly fused to opposite ones towards bases, acute, cylindrical, very slender, 45–55 mm long, 2–3 mm diam. Flowers solitary, up to 55 mm diam., white, without filamentous staminodes. Fruit 5-locular, brown, base funnel-shaped, keels diverging. Aug.–Sept. In shale, KV (Holrivier to Rooiberg). **(ece)**

otzenianus (Dinter) Friedrich Branched, succulent shrub, somewhat rambling, 200–450 mm tall, 500–800 mm diam. Leaves free from each other towards bases, incurved, almost cylindrical, obtuse, smooth, pale green, 20–28 mm long, 3–4 mm diam. Flowers solitary, 20–30 mm diam., pink to magenta, filamentous staminodes absent. Fruit 5-locular, greyish white, base bell-shaped, keels parallel, with false placenta. Aug.–Sept. Often in disturbed places, on shale, in flats, SN, G, NS, NH, WM, TS (southern Namibia, Namaqualand, Bushmanland to Tanqua Karoo).

procumbens Klak Prostrate, trailing, succulent shrub, rooting at nodes, with flowering branchlets erect, up to 55 mm tall. Leaves shortly fused to opposite ones towards bases, spreading to erect, trigonous, (11–)16–21 × 2–3 mm, 2–3 mm thick, glaucous, smooth. Flowers solitary, 40–50 mm diam., golden yellow, without filamentous staminodes. Fruit 5-locular, base funnel-shaped, grey, keels diverging. Aug. Sandy flats, in sand fynbos, NS (Hondeklipbaai to Kotzesrus). **(ece)**

uniflorus (L.Bolus) L.Bolus Branched, succulent shrub, somewhat rambling, 200–450 mm tall. Leaves free from each other towards bases, incurved, almost cylindrical, obtuse, smooth, pale green, 20–28 mm long, 3–4 mm diam. Flowers solitary, 20–35 mm diam., pink to magenta, filamentous staminodes conically arranged. Fruit 5-locular, grey, base bell-shaped, keels parallel. ?Flowering time. Often in disturbed places, on shale, in flats, NS, NH, KV, WM, TS, CCR (Namaqualand, Bushmanland to Little Karoo).

watermeyeri (L.Bolus) N.E.Br. Decumbent to erect, sparsely branched, robust, succulent shrub, up to 300 mm tall. Leaves free towards bases, semi-cylindrical, 20–25 mm long, up to 6 mm diam. Flowers 1(–3), 50–70 mm diam., white or magenta, without filamentous staminodes. Fruit 5-locular, brown, base funnel-shaped, expanding keels diverging. July–Oct. In sandy soils, NS, KV, WM, TS, CCR (Hondeklipbaai to Lambert's Bay and Tanqua Karoo). **(gce)**

LEIPOLDTIA 12 spp., southern Namibia, Namaqualand, inland areas of W Cape and western region of E Cape **(gce)**

A. Inflorescences with lateral spines

alborosea (L.Bolus) H.E.K.Hartmann & Stüber Low, succulent shrub, up to ± 120 mm tall. Leaves somewhat sickle-shaped, 20–30 × 5–6 mm, grey. Flowers solitary, in threes or 7 per inflorescence, up to 30 mm diam., pale pink to white. Fruit 6–9-locular, with large closing bodies. July–Aug. On shaley slopes, SN, G, NS (Lüderitz-South to western Namaqualand). **(ece)**

compacta L.Bolus Flat, cushion-shaped shrub, branching densely at their ends, spines inconspicuous. Leaves slender, triangular in cross section, ± 15 mm long, 3 mm diam., green. Flowers usually solitary, pale pink to white. Fruit 6–9-locular, closing bodies large. May–June. On fine loamy alluvial soils, G (Richtersveld). **(ece)**

A.' Inflorescences without spines
B. Leaves > 40 mm long

frutescens (L.Bolus) H.E.K.Hartmann Erect or decumbent, succulent shrub. Leaves finger-shaped, basally connate into a sheath, > 70 mm long, old leaves persist on plant. Flowers 3–5 in a cyme, up to 35–50 mm diam., yellow. Fruit ± 12-locular, with large closing bodies. July–Aug. Coastal plain, NS (Port Nolloth to Kleinsee). **(ece)**

gigantea Klak Succulent shrub, 300–500 mm tall, up to 1 m diam., stems woody. Leaves finger-shaped, circular in cross section, smooth, basally fused into a sheath for 4–5 mm, free parts 45–70 × 6–9 mm, 6–9 mm thick. Flowers 3–5 together, 30–35 mm diam., petals white or more rarely pink, filamentous staminodes absent. Fruit 9-locular, with broad valve wings and large closing bodies. July. In karroid vegetation, 500–600 m, NH (Garies). **(ece)**

rosea L.Bolus Decumbent, succulent shrub, forming large mats with age, rooting at nodes. Leaves finger-shaped, basally connate into a sheath, < 70 mm long, old leaves persist on plant. Flowers in forked, 2-flowered, reduced cymes, up to 40 mm diam., bright magenta. Fruit mostly 10-locular, with large closing bodies. Aug.–Sept. On gentle slopes with fine, gravelly dolerite, ± 650 m, WM (Loeriesfontein to Calvinia). **(ece)**

B.' Leaves < 30 mm long

calandra (L.Bolus) L.Bolus Very similar to **L. schultzei** but flowers ± 43 mm diam., white to pale pink. July. On gravelly flats, NS, NH (Namaqualand). **(ece)**

klaverensis L.Bolus Loosely branched, succulent shrub, up to 200 mm tall, with spreading branches. Leaves erect, upper side flat, back surface keeled, 10–16 mm long, basally fused into a sheath. Flowers solitary, on pedicels 15–25 mm long, 20 mm diam., pink, without filamentous staminodes. Fruit 7-locular. July. On loamy, gravelly, arid slopes, KV (near Klawer). **(ece)**

laxa L.Bolus Succulent shrub, with 5–10 erect, long shoots, ± 350 mm tall. Leaves trigonous. Flowers 2 or 3 together, 9–33 mm diam., pink, filamentous staminodes and stamens collected into a central cone. Fruit ± 10-locular, base funnel-shaped. July–Sept. On gravelly flats, G, NH (Richtersveld to Springbok). **(ece)**

lunata H.E.K.Hartmann & Rust Erect, succulent shrub, with 2–5 long shoots, ± 400 mm tall. Leaves strongly compressed laterally, crescent-shaped, ± 25 mm long. Flowers in reduced cymes, 12–33 mm diam., petals racket-shaped, pink, filamentous staminodes and stamens collected into a central cone. Fruit 9–14-locular, base shallow. ?Flowering time. In granite rock crevices on mountains, G (Richtersveld). **(ece)**

schultzei (Schltr. & Diels) Friedrich Decumbent, succulent shrub, 100–700 mm tall. Leaves trigonous, ± 15 mm long. Flowers in cymes, up to 30 mm diam., magenta, without filamentous staminodes. Fruit ± 10-locular. July–Sept. On flats with gravel, sand or loam, G, NS, NH, KV, WM, TS, CCR (Richtersveld, Namaqualand to Uniondale). **(gce)**

uniflora L.Bolus Succulent shrub, 200–300 mm tall, with erect stems up to 2 mm thick. Leaves spreading, trigonous, 4–7 mm long, 3–5 mm thick. Flowers solitary, 17 mm diam., pink. Fruit 8–10-locular. July. Quartzitic flats, NS (between Port Nolloth and Komaggas). **(ece)**

weigangiana (Dinter) Dinter & Schwantes Succulent shrub, with 3–20 mostly erect long-shoots, up to 500 mm tall. Leaves trigonous to laterally compressed, 10–15 mm long, only shortly fused at bases. Flowers 1–3, up to 30 mm diam., pale pink, pink or magenta, filamentous staminodes and stamens conically collected. Fruit ± 10-locular. Aug. On flats or mountains, SN, G, NH (southern Namibia to Namaqualand). **(ece)**

LITHOPS 37 spp., Namibia, southeastern Botswana and South Africa

*A. Flowers white, but may have a pink tinge (see also **L. localis**)*

karasmontana (Dinter & Schwantes) N.E.Br. Dwarf, obconical, succulent plant, usually 2–6-headed. Leaf-pair closely set, elliptic to kidney-shaped from above, upper surfaces usually somewhat convex [truer for subsp. **eberlanzii** than for other subspp.], smooth to slightly wrinkled, tinted blue, mauve, pink-brown or green on an opaque, grey-white background, often marked with rusty red. Flowers white, 25–30 mm diam. Apr.–June. On gravel plains, SN (Sperrgebiet, E of Lüderitz to Klein Karas).

marmorata (N.E.Br.) N.E.Br. Dwarf, obconical, succulent plant, in many-headed clumps. Leaf-pair widely gaping, elliptic to ± kidney-shaped from above, upper surfaces convex, sometimes ± humped, opaque pale grey, tinged with pale blue, green, cream or smoky pink, with darker marbling. Flowers white, 25–35 mm diam. Apr.–June. Gravel plains of quartzite, gneiss, pegmatite and schist, G, NH (just E of Kosies to near Springbok and into Bushmanland).

optica (Marloth) N.E.Br. Dwarf, obconical, succulent plant, up to 20-headed. Leaf-pair slightly gaping, lopsided, mostly kidney-shaped from above, upper surfaces usually convex, smooth, usually with large, open windows, mottled in southern populations, whitish grey, grey or beige, sometimes tinged green, pink, blue or yellow. Flowers white, often tinged pink, 12–15 mm diam. or bigger. Late May–July., much earlier in the south. In sand-covered fissures of gneiss rocks, SN (Sperrgebiet coastal strip). **(ece)**

villetii L.Bolus Dwarf, obconical, succulent plant, up to 8-headed. Leaf-pair diverging very slightly, sometimes revealing a central blister, elliptic to kidney-shaped from above, upper surfaces somewhat convex, smooth to slightly wrinkled, markings greenish, pinkish, brownish, maroon or creamy grey, often sharply incised. Flower white, 20–25 mm diam. May–July. Dark brown shale, grey sandstone and calcrete, NH (NW of Kliprand to Upper Karoo).

A.' Flowers yellow or yellow and white
*B. Flowers plain yellow (see also **L. geyeri**)*

francisci (Dinter & Schwantes) N.E.Br. Dwarf, top-shaped, succulent plant, usually 3–6-headed. Leaf-pair closely set, unequal, elliptic to kidney-shaped from above with a deep fissure between them, upper surfaces distinctly convex or flattish, beige, grey, cream, green or faint pink, with

transparent dots, sometimes aligned in rows. Flower yellow, 15–20 mm diam. May–July. On gentle slopes amongst gneiss and schist gravel, or in fissures of pure quartzite, SN (E of Lüderitz: Kovisberg, Haalenberg and Konipberg). **(ece)**

hermetica D.T.Cole Dwarf, top-shaped, succulent plant, mostly 2-headed. Leaf-pair mostly unequal, slightly divergent, upper surfaces flat to convex, slightly wrinkled, opaque to partly translucent, pale grey with dark grey to greenish grey markings, often flushed pink. Flower yellow, up to 27 mm diam. Apr.–June. On dolomite rocks, mostly with whitish calcrete stones, SN (Sperrgebiet: Tsaus Plateau). **(ece)**

localis (N.E.Br.) Schwantes (= *L. terricolor* N.E.Br.) Dwarf, obconical, succulent plant. Leaf-pair closely set, ± kidney-shaped from above, parted by a fairly deep fissure, upper surfaces usually convex, smooth, densely covered with dusky dots on an earth-coloured background. Flower yellow, sometimes with a white centre, rarely pure white. Apr.–May. Black shale, gravel, quartzite and weathered sandstone, TS, CCR (Laingsburg to NW of Port Elizabeth and Great Karoo).

schwantesii Dinter Dwarf, ± heart-shaped, succulent plant. Leaf-pair closely set, elliptical to kidney-shaped from above, upper surfaces flat to slightly convex, obscurely translucent, smooth to very slightly wrinkled, greyish green, tinted salmon, pink or mustard-brown, markings reddish, branched. Flower yellow, 20–30 mm diam., petals drooping. Apr.–May. In quartzite and gneiss, calcrete and limestone, and granitic gravel, SN (Namibia to northeastern Sperrgebiet).

*B.' Flowers yellow with a white centre (see also **L. optica** and **L. localis**)*

comptonii L.Bolus Dwarf, obconical, succulent plant, mostly 2–4-headed. Leaf-pair parted by a fairly deep fissure, elliptic to kidney-shaped from above, upper surfaces ± convex to very slightly humped, or usually flattish, sometimes startlingly so, with open or somewhat occluded windows with pinkish beige, light grey or pale greenish grey markings. Flower yellow with a white centre, ± 20–25 mm diam. Apr.–May. On gravelly flats amongst dark brown, grey or greyish white pebbles or in shallow pockets of limestone, WM, TS (between Calvinia, Ceres and Laingsburg). **(ece)**

divergens L.Bolus Dwarf, double wedge-shaped, succulent plant, usually 2–4-headed. Leaf-pairs widely gaping and slightly lopsided, elliptic from above, upper surfaces somewhat convex, opaque to translucent, pale grey-green, like frosted glass or amethyst. Flower yellow with a white centre, 15–30 mm diam. Apr.–May. Shaley flats covered with quartzite and calcrete, NH, KV (E of Kliprand and N of Vanrhynsdorp, also near coast). **(ece)**

geyeri Nel Dwarf, top-shaped, succulent plant, 2-headed or in ample clumps. Leaf-pair closely set, ± equal, with a fairly deep fissure between them, elliptical from above, upper surfaces convex, rarely with open windows, usually covered with markings in various shades of grey, beige or pink. Flower clear yellow, usually with a small white centre, 25–30 mm diam. Mid-autumn. On quartzite outcrops, G (Richtersveld National Park). **(ece)**

helmutii L.Bolus Dwarf, heart-shaped, succulent plant. Leaf-pair widely gaping, lopsided, elliptic from above, upper surfaces convex and usually camel-humped, windows rarely open, usually occluded, with mottling in various shades of greenish grey, often appearing glassy, shiny when turgid. Flower yellow with a white centre, 25–30 mm diam. Mid-autumn. On quartzite gravel patches, NH (NE of Steinkopf). **(ece)**

herrei L.Bolus Dwarf, double wedge-shaped, succulent plant. Leaf-pair closely set to slightly gaping, somewhat unequal, elliptic to kidney-shaped in outline, upper surfaces slightly convex above, mossily opaque to translucent, smooth or slightly wrinkled, in shades of grey, tinged with green, blue, cream, yellow, pink or buff. Flower rich egg-yellow with a large, white centre, 15–20 mm diam. Apr.–May. Amongst rock outcrops in schist, quartzite, gneiss and calcrete, G (lower Gariep Valley). **(ece)**

meyeri L.Bolus Dwarf, double wedge-shaped, succulent plant. Leaf-pair widely gaping, usually lopsided, upper surfaces flat to convex, often humped, smooth, windows cloudy, uniformly milky green, rarely reddish. Flower yellow with a white centre, mostly 25–30 mm diam., stigmas sometimes saffron-red. Apr.–May. On quartzite gravel plains, G (Richtersveld, N and NW of Lekkersing). **(ece)**

naureeniae D.T.Cole Dwarf, double wedge-shaped, succulent plant, usually 2–5-headed. Leaf-pair diverging, often slightly lopsided, elliptic from above, upper surfaces convex, smooth, opaque to translucent, often with large windows, pale grey or beige, sometimes tinged with cream, pink or green or bronze. Flower lustrous yellow with a white centre, mostly 25–30 mm diam. Late Apr.–May. Between gneiss stones, NH (SW of Gamoep). **(ece)**

otzeniana Nel Dwarf, somewhat heart-shaped, succulent plant. Leaf-pair slightly gaping, elliptic from above, upper surfaces convex, smooth to ± wrinkled, margins with boldly scalloped markings, windows fairly large, in shades of light grey, usually tinged with pale pink, cream, green or blue. Flower yellow with a white centre, 20–30 mm diam. Apr.–June. In decomposed granite often under shrubs, WM (N and NW of Loeriesfontein, on margins of Bushmanland).

viridis H.A.Lückh. Dwarf, long heart-shaped, succulent plant. Leaf-pair somewhat divergent, elliptic from above, upper surfaces ± raised, translucent, smooth, windows completely open, greyish or bluish green, rarely plum-coloured, uniform in appearance. Flower yellow with white centre, 25–30 mm diam. Late Mar.–Apr. Sunken in weathered chert and shale, WM (between Loeriesfontein and Calvinia). **(ece)**

MALEPHORA VINGERKANNA ± 17 spp., Namibia: Rehoboth, N and W Cape

crassa (L.Bolus) H.Jacobsen & Schwantes Creeping, succulent shrub, rooting at almost each node, forming densely leaved mats, up to 1 m diam., internodes shining, spongy, > 4 mm diam. Leaves much longer than internodes, trigonous to almost club-shaped, up to 40 mm long, ± 14 mm thick. Flowers solitary, on very short, erect shoots, pedicels 10–20 mm long, sepals 5, petals 13–29 mm long, yellow. Fruit base funnel-shaped, top flat, 8–10 mm diam. Aug.–Oct. Loamy flats, TS (Tanqua Karoo). **(ece)**

latipetala (L.Bolus) H.Jacobsen & Schwantes Sprawling, succulent shrub, branches decumbent, not rooting, with brown internodes. Leaves terete, apically acute, up to 25 × 3–5 mm, glaucous. Flowers with 5 sepals, 34 mm diam., golden-yellow. Fruit 9- or 10-locular. June–Dec. ?Habitat, TS, CCR (Matjiesfontein to Prince Albert and Little Karoo). **(gce)**

mollis (Aiton) N.E.Br. Profusely branched, succulent shrub, up to 500 mm tall, 0.45–1.1 m diam. Leaves in groups at base of well-developed side shoots, trigonous to terete, up to 20 mm long, ± 3 mm thick, basally fused into a sheath for ± 6 mm, recurved apically, grey. Flowers 1–3 on each branch, apparently in a rich inflorescence, petals yellow. Fruit pedicels 30–40 mm long, base funnel-shaped, top slightly raised, 7–10-locular. ?Flowering time. ?Habitat, TS (Laingsburg). **(ece)**

pienaarii Van Jaarsveld Differs from all other species in the genus by its large (45–55 mm diam.), white flowers. Fruit 8- or 9-locular. Oct. Flat, stony soil, TS (Prince Albert). **(ece)**

purpureo-crocea (Haw.) Schwantes Succulent shrub with erect, later prostrate to decumbent branches, internodes spongy. Leaves almost terete, 50–90 mm long, 8–10 mm thick, glaucous due a thick covering of wax. Flowers in erect cymes, sepals 5, petals magenta outside, saffron-coloured inside. Fruit stalks ± 100 mm long, base funnel-shaped, 9- or 10-locular. July–Sept. Loamy flats, NH, KV (Namaqualand to Knersvlakte). **(ece)**

[**Excluded species** **M. crocea** (Jacq.) Schwantes, **M. flavo-crocea** (Haw.) H.Jacobsen & Schwantes, **M. herrei** (Schwantes) Schwantes, **M. lutea** (Haw.) Schwantes, **M. ochracea** (A.Berger) H.E.K.Hartmann, and **M. verruculoides** (Sond.) Schwantes are insufficiently known and possibly conspecific with one of the above species.]

MESEMBRYANTHEMUM (= APTENIA, ARIDARIA, ASPAZOMA, BROWNANTHUS, CAULIPSOLON, DACTYLOPSIS, PHYLLOBOLUS, PRENIA, PSILOCAULON, SCELETIUM, SYNAPTOPHYLLUM) 103 spp., southern Angola and southern Africa

Group 1 *Flowers with the stamens free or shortly fused towards bases (rarely fused into a petal-stamen tube in **M. amplectens** and **M. digitatum**); seeds usually small, 0.5–1.2(–1.5) mm long, pale-coloured and almost smooth*

A. Annuals
B. Epidermal bladder-cells conspicuous, i.e. leaves papillate

excavatum L.Bolus Prostrate or decumbent, succulent, annual herb. Leaves channelled, usually very narrowly obovate, rarely linear, up to 20 mm long, 5 mm diam., epidermal bladder-cells

distinct. Flowers in dichasia, up to 15 mm diam., yellow. Fruit 5-locular, valve wings reflexed and fused in pairs. Sept.–Nov. Disturbed areas, TS, CCR (Tanqua Karoo, Laingsburg, Beaufort West).

nodiflorum L. Prostrate to decumbent, succulent, annual herb. Leaves almost cylindrical or slightly channelled, linear, 15–20 mm long, 2–5 mm diam., epidermal bladder-cells conspicuous. Flowers 5–10 mm diam., white or pale pink. Fruit 5-locular, valve wings reflexed and fused in pairs. Sept.–Oct. Disturbed places, SN, NH, KV, CCR (only recorded from Lüderitz, Wallekraal and Vanrhynsdorp, frequent from Piketberg to Cape Peninsula, from Worcester to Oudtshoorn, and outside southern Africa as given for the genus).

stenandrum (L.Bolus) L.Bolus Very similar to **M. nodiflorum** but flowers larger, 15–30 mm diam. and petals more numerous. Sept.–Dec. Disturbed places, NH, KV, WM, TS, CCR (Steinkopf to Clanwilliam, Calvinia to Hopetown, De Aar, and Beaufort West).

B.' Epidermal bladder-cells inconspicuous, i.e. leaves smooth

eurystigmatum Gerbaulet Decumbent, succulent, annual herb, prostrate when in flower. Leaves cylindrical, linear, up to 70 mm long, 10 mm diam., epidermal bladder-cells much flattened. Flowers deeply funnel-shaped, up to 60 mm diam., straw-yellow, filamentous staminodes present, stamens and staminodes very numerous, stigmas shortly connate basally with ovary. Fruit 5-locular. Sept.–Oct. On flats in disturbed places, TS (Tanqua Karoo). **(ece)**

juttae (Dinter & A.Berger) N.E.Br. (= *Synaptophyllum juttae* (Dinter & A.Berger) N.E.Br.) Prostrate to decumbent, succulent, annual herb, first green, later yellow to reddish coloured. Leaves opposite and 4-ranked, flat, roundish or oval, connate into a disc or a cone, 10–20 × 10–20 mm, upper ones much smaller and free, smooth. Flowers in dichasia, 7–15 mm diam., white, filamentous staminodes absent. Fruit 4-locular, with valve wings. Aug.–Sept. In fog zone, SN (Lüderitzbucht). **(ece)**

longistylum DC. Decumbent to erect, succulent, annual or biennial herb, without a basal leaf-rosette, 100–400 mm tall, stems terete. Leaves flattened, linear to narrowly oblong, 20–35 × 2–10 mm, epidermal bladder-cells usually inconspicuous, rounded or somewhat flattened. Flowers in dichasia, 10–20(–25) mm diam., white, often with pink tips and/or straw-coloured base. Fruit 5-locular, valve wings reflexed and fused in pairs. June–Oct. In disturbed places, NH, KV, CCR (occasional from Steinkopf to Vanrhynsdorp, frequent in W Cape, Little Karoo to Alexandria). **(gce)**

subtruncatum L.Bolus Prostrate, succulent, annual herb, up to 20 mm tall, 60–100 mm diam. Leaves almost cylindrical, almost truncate, up to 12 × 5 mm, smooth. Flowers 20–25 mm diam., pink, basally white or straw-coloured. Fruit 5-locular. Sept.–Oct. In disturbed places, TS, CCR (Tanqua Karoo and Little Karoo). **(gce)**

A.' Perennials
C. Bladder-cells on the stems much flattened
D. Flowers 20–30 mm diam.

leptarthron A.Berger (= *Psilocaulon leptarthron* (A.Berger) N.E.Br.) Erect, succulent shrub, up to 500 mm tall, very regularly branched with straight branches, internodes distinctly articulate, smooth. Leaves almost cylindrical or slightly trigonous, free from each other, without an apical mucro. Flowers solitary, terminating long side branches, 25 mm diam., white, filamentous staminodes gathered into a cone. Fruit 5-locular. Aug.–Oct. Firm, red, calcareous loams, NH, KV (Knersvlakte, Nuwerus to Vanrhynsdorp). **(ece)**

rapaceum Jacq. (= *Caulipsolon rapaceum* (Jacq.) Klak) Succulent geophyte, with prostrate, annual stems and tuberous rootstock. Leaves almost cylindrical or slightly trigonous, free from each other towards bases, epidermal bladder-cells flattened, without apical mucro. Flowers solitary or few in dichasia, 20–30 mm diam., white, filamentous staminodes absent. Fruit 5-locular, deeply funnel-shaped. Aug.–Oct. Disturbed places on flats, NS, NH, KV, WM (Hondeklipbaai to Knersvlakte, Calvinia). **(ece)**

D.' Flowers 5–15 mm diam.

articulatum Thunb. (= *Psilocaulon articulatum* (Thunb.) N.E.Br.) Decumbent to erect, succulent shrub, becoming prostrate in loose or sandy soils, 100–300 mm tall, stems with minute, hair-like bladder-cells. Leaves deciduous, subcylindrical with upper surface somewhat flattened, free from each other to base, with an apical mucro. Flowers several together in dichasia, up to 10 mm diam., magenta to pale pink or white, filamentous staminodes conically arranged. Fruit 5-locular.

Oct.–Jan. Pioneer, often growing along roadsides or disturbed areas, SN, NS, NH, KV, WM, TS, CCR (southern Namibia, N Cape and W Cape).

bicorne Sond. (= *Psilocaulon bicorne* (Sond.) Schwantes) Prostrate, succulent shrub, with a cluster of short stems in centre and long, trailing, flowering shoots, stems smooth. Leaves deciduous, subcylindrical, free from each other to base, with a short apical mucro. Flowers few together in a dichasium or solitary on side shoots, up to 15 mm diam., white, filamentous staminodes conically arranged. Fruit 5-locular. Nov.–Feb. Pioneer, TS, CCR (Worcester and Caledon to Willowmore and Port Elizabeth). **(gce)**

coriarium Burch. ex N.E.Br. (= *Psilocaulon coriarium* (Burch. ex N.E.Br.) N.E.Br.) ASBOS Erect, succulent shrub, up to 1.5 m tall, 3 m diam., stems smooth. Leaves subcylindrical with upper surface somewhat flattened, free from each other, short, often not longer than 5 mm, occasionally with short apical mucro. Flowers in dichasia, 10(–13) mm diam., white or pinkish, filamentous staminodes gathered into a cone. Fruit 4- or 5-locular. Oct.–Jan. Pioneer, often growing along roadsides, mainly summer rainfall region, WM, TS, CCR (Namibia, N Cape and W Cape).

dinteri Engler (= *Psilocaulon dinteri* (Engler) Schwantes) Prostrate to decumbent, dwarf, succulent shrub, up to 250 mm tall, older stems very succulent, internodes distinctly articulate, barrel-shaped if growing in saline coastal areas, otherwise cylindrical, epidermal bladder-cells flattened or wart-like. Leaves subcylindrical with upper surface somewhat flattened, free from each other, occasionally with an apical mucro. Flowers in dichasia, 5–10 mm diam., puce, pink or occasionally white, filamentous staminodes gathered into a cone. Fruit 5-locular. Sept.–Jan. Weedy, often in saline habitats, SN, G, NS, NH, KV, CCR (southern Namibia, N Cape and W Cape). **(gce)**

granulicaule Haw. (= *Psilocaulon granulicaule* (Haw.) Schwantes) Decumbent to erect, succulent shrublet, up to 0.25 m tall, stems with conspicuous internodes, with dome-shaped or warty bladder-cells. Leaves free from each other, without a mucro. Flowers solitary or rarely several together on shorter side shoots, 5–8 mm diam., pale yellow or cream, filamentous staminodes conically arranged. Fruit 5-locular. Oct.–Nov. Variety of soils mainly outside the winter rainfall region, TS, CCR (Namibia to Kimberley, Free State, W Cape, and E Cape).

junceum Haw. (= *Psilocaulon junceum* (Haw.) Schwantes) Erect, often dwarf, succulent shrub, (100–)300–450(–600) mm tall, internodes articulate, smooth. Leaves free from each other, without a mucro. Flowers in dichasia, up to 15 mm diam., white, pink or pale pink; filamentous staminodes conically arranged. Fruit 4- or 5-locular. Oct.–Dec. Pioneer, often in disturbed areas, NS, NH, KB, KV, WM, TS, CCR (widespread, Namaqualand, W Cape and E Cape).

neofoliosum Klak (= *Psilocaulon foliosum* L.Bolus) Erect, large, succulent shrub, up to 1 m tall, occasionally more, 1–1.5 m diam., densely and regularly branched, internodes inconspicuous, smooth, stems becoming woody. Leaves subcylindrical with upper surface somewhat flattened, shortly connate to opposite ones or free, soon dropping (as the stem becomes woody), without a mucro. Flowers in dichasia, 15 mm diam., white, filamentous staminodes gathered into a cone. Fruit 5-locular. Sept.–Nov. Firm reddish often gneissic loam, NS, NH (Port Nolloth to Bitterfontein). **(ece)**

salicornioides Pax (= *Psilocaulon salicornioides* (Pax) Schwantes) Decumbent to erect, succulent shrub, up to 400 mm tall, becoming prostrate in sandy soils, internodes in coastal form distinctly articulate. Leaves subcylindrical with upper surface somewhat flattened, shortly fused to opposite ones towards bases, with a short apical mucro. Flowers in dichasia, rarely solitary along short side branches, up to 10 mm diam., white, pale pink to puce, filamentous staminodes conically arranged. Fruit 5-locular. Sept.–Jan. Mainly coastal saline habitats in sand or loam or between granite outcrops, SN (coastal plain of Namibia and Klinghardt Mountains to Warmbad).

subnodosum A.Berger (= *Psilocaulon subnodosum* (A.Berger) N.E.Br.) Erect, succulent shrub, up to 500(–800) mm tall, internodes indistinctly articulate, epidermal bladder-cells flattened or with pointed tips in the inflorescence, glaucous. Leaves subcylindrical with upper surface somewhat flattened, shortly fused to opposite ones, with a short apical mucro. Flowers in dichasia, 10–15 mm diam., white or pink, filamentous staminodes gathered into a cone. Fruit 5-locular. Aug.–Dec. Disturbed places in a variety of soils, G, NS, NH (lower Gariep Valley to Gordonia and Kenhardt, and Namaqualand).

C.' Bladder-cells on the stems raised and closely packed
E. Flowers in few- to many-flowered dichasia

arenosum Schinz (= *Brownanthus arenosus* (Schinz) Ihlenf. & Bittrich) Erect, succulent shrub, 0.5 m tall, up to 1 m diam., branches straight, epidermal bladder-cells with vertical and horizontal diameters equal. Leaves subcylindrical, pairs shortly fused towards bases when young. Flowers

in many-flowered dichasia, 10–15 mm diam. Fruit 4- or 5-locular, seed bags present. Oct.–Nov. On plains or foothills usually in deep sand along coast and inland, SN, G, NS, NH (southern Namibia and northern Namaqualand). **(ece)**

neglectum (S.M.Pierce & Gerbaulet) Klak (= *Brownanthus neglectus* S.M.Pierce & Gerbaulet) Erect, succulent shrub, 300–400 mm tall, up to 0.7 m diam., branches much tangled, internodes cylindrical, epidermal bladder-cells with vertical and horizontal diameters equal. Leaves subcylindrical, pairs shortly fused when young. Flowers few, in cymes, 5–10 mm diameter. Fruit 4-locular, seed bags absent. Aug.–Oct. On plains usually in sand, SN, G, NS (southwestern Namibia and northern Namaqualand). **(ece)**

nucifer (Ihlenf. & Bittrich) Klak (= *Brownanthus nucifer* (Ihlenf. & Bittrich) S.M.Pierce & Gerbaulet) Erect, succulent shrub, 300–400 mm tall, up to ± 500 mm diam., branches somewhat tangled, internodes conspicuously constricted at nodes and appearing like a string of beads, epidermal bladder-cells with vertical and horizontal dimensions equal. Leaves subcylindrical, free from each other, without overlapping bases. Flowers 5–10, in cymes. Fruit 3- or 4-locular, nutlike. Nov. In dry river valley on slopes with dark rocks, SN, G (lower Gariep Valley). **(ece)**

pseudoschlichtianum (S.M.Pierce & Gerbaulet) Klak (= *Brownanthus pseudoschlichtianus* S.M.Pierce & Gerbaulet) Erect, succulent shrub, 0.7–1 m tall, up to 1 m diam., branches straight, internodes cylindrical, epidermal bladder-cells brick-shaped (longer than wide). Leaves subcylindrical, free from each other, with overlapping bases. Flowers few to many in dichasia, 10–15 mm diam. Fruit 4-locular, seed bags present. Sept.–Oct. On plains or foothills usually found in deep sand, SN, G, NS, NH (southern Namib and northern Namaqualand). **(ece)**

schenckii Schinz (= *Brownanthus ciliatus* (Aiton) Schwantes subsp. *schenckii* (Schinz) Ihlenf. & Bittrich) Dwarf, succulent shrub, decumbent to erect, 150–300 mm tall, up to 1 m diam., internodes cylindrical. Leaves subcylindrical, pairs shortly fused towards bases, with a ring of white hairs at leaf bases. Flowers few, in dichasia, 10–15 mm diam. Fruit 5-locular, seed bags present. Sept.–Oct. On gravelly plains, SN, G, NH (southern Namibia, northern Namaqualand and Bushmanland).

vaginatum Lam. (= *Brownanthus ciliatus* (Aiton) Schwantes subsp. *ciliatus*) HAARSLAAI Dwarf, succulent shrub, decumbent to erect, 150–250 mm tall, up to 1 m wide, internodes cylindrical. Leaves subcylindrical, pairs shortly fused towards bases, with a ring of white hairs at leaf bases. Flowers few, in dichasia, 10–15 mm diam. Fruit 5-locular, seed bags absent. Oct.–Dec. On plains in eroding shale and on gravelly slopes, KV, WM, TS, CCR (Knersvlakte, Great Karoo, Tanqua Karoo, Little Karoo).

E.' Flowers solitary at the tips of branches

amplectens L.Bolus (= *Aspazoma amplectens* (L.Bolus) N.E.Br.) Erect, bush-like, succulent shrublet, up to 150 mm tall, stems articulate, succulent, with high xeromorphic bladder-cells. Leaves opposite and 4-ranked, forming a tubular basal sheath around stem, slightly flattened on upper surface, bladder-cells ± flattened. Flowers solitary, up to 45 mm diam., white or pale yellow, filamentous staminodes present. Fruit 4- or 5-locular. Sept.–Oct. On quartzite hills, G, NS, NH (Richtersveld and Namaqualand). **(ece)**

corallinum Thunb. (= *Brownanthus corallinus* (Thunb.) Ihlenf. & Bittrich) KORAALVYGIE Erect, succulent shrub, 105–350 mm tall, nodes of stem conspicuously constricted, resembling a string of beads, epidermal bladder-cells with vertical and horizontal dimensions ± equal. Leaves obtusely trigonous, free from each other towards bases. Flowers solitary, 10–15 mm diam. Fruit 5-locular, seed bags absent. Oct. On flats or gentle slopes in quartz, NS, NH, KV (Riethuis to Knersvlakte). **(ece)**

digitatum Aiton (= *Dactylopsis digitata* (Aiton) N.E.Br.) DUIM-EN-VINGER Highly compact, dwarf succulent shrublet, entire plant reduced to a single pair of leaves, up to 200 mm tall. Leaves alternate, cylindrical, smooth, sheathing the stem, first of vegetative period long, second one shorter, entire leaf drying out completely and providing a protective cover in resting season. Flowers 10–20 mm diam., white to cream, filamentous staminodes absent, stamens and stigmas concealed. Fruit 5-locular. Nov.–Dec. Quartz covered saline shale, KV (Knersvlakte). **(ece)**

glareicola (Klak) Klak (= *Brownanthus glareicola* Klak) Dwarf, erect, succulent shrub, up to 170 mm tall, 250 mm diam., internodes cylindrical, epidermal bladder-cells with hair-like extensions. Leaves concave above, convex below, overlapping at bases. Flowers solitary, 10–15 mm diam. Fruit 5-locular, without seed bags. Oct. Flat to gently sloping patches of quartz gravel on clay, KV (Vanrhynsdorp). **(ece)**

springbokense Klak (= *Brownanthus fraternus* Klak) Very woody, erect, succulent shrub, up to 250 mm tall, 500 mm diam., only younger parts of stem succulent, internodes cylindrical, epidermal bladder-cells with hair-like extensions. Leaves subcylindrical, bases overlapping. Flowers solitary, 7–10 mm diam. Fruit 5-locular, seed bags absent. Oct.–Nov. On Nama shales on gently sloping hills, NH (Springbok). **(ece)**

marlothii Pax (= *Brownanthus marlothii* (Pax) Schwantes) Large, cushion-forming, succulent shrub, 100–150 mm tall, up to 1 m diam., internodes heart-shaped. Leaves obtusely trigonous, free from each other, persisting as a pointed tip when dry, with a conspicuous fringe of cilia basally. Flowers solitary, up to 15 mm diam. Fruit (4)5-locular, seed bags absent. Sept.–Nov. In gravel in the coastal fog belt of the southern Namib, SN, G (Spencer Bay to Alexander Bay). **(ece)**

namibense Marloth (= *Brownanthus namibensis* (Marloth) Bullock) Large, cushion-forming, succulent shrub, 100–150 mm tall, up to 1 m diam., internodes cup-shaped. Leaves ovately trigonous, shortly fused to opposite ones when young, partly persisting as papery bristles, with a papery, ciliate sheath basally. Flowers solitary, 10–15 mm diam. Fruit 5-locular, seed bags absent. Sept. In gravel in the coastal fog belt, SN (Spencer Bay to Sperrgebiet: Buntfeldschuh).

tomentosum Klak (= *Brownanthus pubescens* (N.E.Br. ex C.A.Maass) Bullock) Large, cushion-forming, succulent shrub, up to 250 mm tall, 0.8–1 m diam., internodes cup-shaped. Leaves subcylindrical, shortly connate to opposite ones when young, with conspicuous fringe of cilia forming a white rim basally. Fruit 5-locular, seed bags absent. Aug.–Oct. In stony ground often on patches of quartz gravel, SN, G (southern Namib, lower Gariep Valley). **(ece)**

Group 2 *Flowers with the stamens fused into a petal-stamen tube; seeds medium to large, 1.1–2 mm long, usually dark brown with a rough surface*

A. Annuals
B. Leaves cylindrical

cryptanthum Hook.f. Decumbent to erect, succulent, annual herb, up to 250 mm tall, prostrate when in flower. Leaves cylindrical, linear, up to 50 mm long, 15 mm diam., smooth. Flowers up to 10 mm diam., white or yellow, petals, staminodes and stamens very few. Fruit 5-locular, valve wings reflexed and fused in pairs. Oct. Salty habitats, along the fog zone of the northern Namib, SN (southwestern Angola, Swakopmund, Lüderitz, St. Helena, Azores, Cape Verde and Canary Islands, Mauritania, N Africa, Palestine, Mediterranean Basin, California, and Australia).

fastigiatum Thunb. Decumbent to erect, succulent, annual herb, up to 100 mm tall, prostrate when in flower. Leaves cylindrical, linear, up to 40 mm long, 7 mm diam., epidermal bladder-cells usually conspicuous. Flowers 10–15 mm diam., white, petals, staminodes and stamens not very numerous. Fruit 5-locular, valve wings reflexed and fused in pairs. Oct.–Nov. In disturbed open places, KV (Koekenaap to Vanrhynsdorp). **(ece)**

hypertrophicum Dinter KINDERPIELETJIES Decumbent to erect, succulent, annual herb, up to 250 mm tall, 1 m diam., prostrate when in flower. Leaves cylindrical, linear, up to 70 mm long, 10 mm diam., epidermal bladder-cells usually inconspicuous. Flowers up to 60 mm diam., white to pale yellow, petals, staminodes and stamens very numerous. Fruit 5-locular, valve wings reflexed and fused in pairs. Sept.–Jan. In disturbed places, SN, G, NS, NH (Haalenberg, Richtersveld and Namaqualand). **(ece)**

B.' Leaves flat

barklyi N.E.Br. OLIFANTSOUTSLAAI Very large, decumbent to erect, succulent, biennial herb, up to 1.5 m tall, stems usually distinctly 4-angled and winged. Leaves flat, ovate, basal ones largest, up to 400 × 250 mm, margins undulate, epidermal bladder-cells small. Flowers 40–60 mm diam., pink or pale pink, petals, staminodes and stamens very numerous. Fruit 5-locular. Sept.–Nov. Sandy plains, SN, G, NS, NH (southwestern Namibia and northwestern Namaqualand). **(ece)**

crystallinum L. Prostrate, succulent, annual herb, with a small non-flowering rosette of leaves, stems terete. Leaves flat, ovately racket-shaped, basal ones largest, ± 60 × 35 mm, margins undulate, epidermal bladder-cells very large. Flowers 15–30 mm diam., white, suffused with pink, petals, staminodes and stamens not very numerous. Fruit 5-locular. Oct.–Nov. Along the coast, SN, G, NS, CCR (southwestern Angola to Cape Peninsula to E Cape, possibly introduced in other Mediterranean type climates).

gariusanum Dinter Prostrate, succulent, annual herb, without a basal vegetative rosette, main stem short, stems terete. Leaves flat, obovoid to rhomboid, basal ones largest, ± 50 × 30 mm, margins only slightly undulate, epidermal bladder-cells conspicuous. Flowers 30–40 mm diam., white, petals, staminodes and stamens very numerous. Fruit 5-locular. Aug.–Oct. Sandy plains, SN, G (southern Namibia and Richtersveld).

guerichianum Pax SOUTSLAAI Like **M. crystallinum** but stems 4–6-angled, sometimes winged, bladder-cells much smaller and flowers larger, 25–55 mm diam. Sept.–Dec. Sandy plains and disturbed areas, SN, G, NS, NH, WM, TS, CCR (?southwestern Angola, Namibia, Namaqualand to Malmesbury and Worcester and Ceres to Cradock).

pellitum Friedrich Decumbent to erect, succulent, annual or biennial herb, without a basal vegetative rosette, main stem up to 500 mm tall, terminated by a flower, stems terete. Leaves flat, basal ones largest, up to 150 × 80 mm, margins undulate. Flowers up to 50 mm diam., white, petals, staminodes and stamens very numerous. Fruit 5-locular. Sept.–Dec. On open plains and disturbed ground, SN, G, NS (Aus to Rosh Pinah and Richtersveld to Hondeklipbaai). **(ece)**

A.' Perennials
C. Wax layer on epidermis thick and easily wiped off; epidermal bladder-cells flattened
D. Stems herbaceous or only weakly lignified

pallens Aiton (= *Prenia pallens* (Aiton) N.E.Br.) Prostrate, succulent shrub, with internodes of main stem shorter than those on side branches. Leaves flatly triquetrous, ovate or narrowly ovate, bladder-cells much flattened. Flowers pink with white centre or completely yellow, rarely pink with yellow centre. Fruit 4- or 5-locular, locules very deep. Aug.–Nov. Karroid areas and disturbed places, G, NS, NH, KV, WM, TS, CCR (N Cape and W Cape). **(gce)**

sladenianum L.Bolus (= *Prenia sladeniana* (L.Bolus) L.Bolus) SKOTTELOOR Prostrate, succulent shrub, with internodes of stems of equal length. Leaves flat, almost circular. Flowers whitish to slightly pinkish. Fruit 4-locular, locules somewhat deepened. Sept.–Oct. On lower hills or in sandy riverbeds, G (Richtersveld). **(ece)**

tetragonum Thunb. (= *Prenia tetragona* (Thunb.) Gerbaulet) Erect, succulent shrub, with internodes of stems of equal length. Leaves (sub)cylindrical, linear. Flowers whitish to yellowish or pinkish. Fruit 4-locular, locules much deepened. Sept.–Nov. Karroid areas on plains or disturbed areas, SN, G, NH, KV, WM, TS, CCR (southern Namibia, N Cape, W Cape and Free State).

D.' Stems woody

brevicarpum (L.Bolus) Klak (= *Aridaria brevicarpa* L.Bolus) DONKIEBOS Large, succulent shrub, up to 1 m tall. Leaves almost cylindrical, succulent, up to 30 mm long, 4 mm diam. Flowers in dichasia, white, suffused pale yellow or copper, open during the day, closing at dusk. Fruit 4-locular, lower part shallow, valve wings rigid and preventing fruit closing once open. Aug.–Sept. Karroid areas, SN, G, NS, NH, KV, CCR (southwestern Namibia through Namaqualand to Clanwilliam). **(gce)**

noctiflorum L. (= *Aridaria noctiflora* (L.) Schwantes) VLEISBOS Large, succulent shrub, up to 1 m tall. Leaves almost cylindrical, up to 50 mm long, 7 mm diam. Flowers in dichasia, white, suffused with various shades of pink, red, salmon, copper or yellow, opening at dusk, closing in morning or sometimes at night, older flowers may remain open. Fruit 4-locular, lower part slender, upper part conical or hemispherical, valves sometimes not closing again completely once open. Aug.–Oct. Karroid areas, SN, G, NS, NH, KV, CCR (southern Namibia, N Cape, W Cape to E Cape).

occidentale Klak (= *Aridaria vespertina* L.Bolus) Succulent shrub, up to 300 mm tall. Leaves almost cylindrical, up to 10 × 6 mm. Flowers in dichasia, pink, sometimes suffused with copper, opening in afternoon, closing at dusk. Fruit 4-locular, lower part slender, upper part hemispherical to cubic, opening and closing repeatedly. Sept.–Oct. Karroid hills, G (lower Gariep Valley, Richtersveld). **(ece)**

serotinum (L.Bolus) Klak (= *Aridaria serotina* L.Bolus) Succulent shrub, up to 300 mm tall or rarely more. Leaves almost cylindrical, usually up to 25 mm long, 10 mm diam. Flowers in dichasia, white, suffused with copper, pinkish copper or pink, rarely yellowish, opening at dusk, closing during night. Fruit 4-locular, lower part slender, upper part hemispherical to cubic, opening and closing repeatedly. Aug.–Oct. Karroid areas, SN, G, NS, NH, KV, CCR (southern Namibia through Namaqualand to Clanwilliam). **(gce)**

C.' Wax layer of epidermis less conspicuous; epidermal bladder-cells rarely flattened
E. Old dry leaves 'skeletonised'

archeri (L.Bolus) Klak (= *Sceletium rigidum* L.Bolus) Scrambling to erect, succulent shrub, branches often robust. Leaves not overlapping, flat, up to 25 mm long, tips recurved, bladder-cells small but very conspicuously vaulted, glittering, secondary veins curved. Flowers sessile, whitish, ± 20 mm diam. Fruit 4(5)-locular, valve wings absent. Sept.–Oct. Karroid areas, TS (Laingsburg and Prince Albert Districts). **(ece)**

emarcidum Thunb. (= *Sceletium emarcidum* (Thunb.) L.Bolus ex H.Jacobsen) Decumbent, scrambling, succulent shrub, rarely erect, with weak branches. Leaves not overlapping, flat, up to 35 mm long, tips recurved, bladder-cells small but conspicuously vaulted, secondary veins curved. Flowers stalked, whitish, ± 20 mm diam. Fruit 4(5)-locular, valve wings present. Aug.–Oct. Karroid areas, climbing in other bushes, WM, TS (between and in the districts of Prieska, Beaufort West, Cradock and Calvinia).

exalatum (Gerbaulet) Klak (= *Sceletium exalatum* Gerbaulet) Decumbent or scrambling, succulent shrub, with weak branches. Leaves not overlapping, flat, up to 35 mm long, tips recurved, bladder-cells small but conspicuously vaulted, secondary veins curved. Flowers stalked, whitish, ± 20 mm diam. Fruit 4-locular, valve wings absent. Sept.–Oct. Under bushes, NH, KB, WM (Springbok to Calvinia). **(ece)**

tortuosum L. (= *Sceletium tortuosum* (L.) N.E.Br.) KANNA, KOUGOED Decumbent or scrambling, succulent shrub. Leaves overlapping, flattened, up to 40 mm long, tips incurved, bladder-cells large but rather plain, secondary veins straight. Flowers more-or-less sessile, white to pale yellow, pale salmon or pale pink, 20–30 mm diam. Fruit 4(5)-locular, valve wings present. Aug.–Oct. Karroid areas, under bushes or in the open, G, NH, KV, WM, TS, CCR (Namaqualand to Montagu and Aberdeen Districts).

E.' Old dry leaves sometimes becoming spiny but never 'skeletonised'
F. Plants geophytic with tuberous roots

amabile (Gerbaulet & Struck) Klak (= *Phyllobolus amabilis* Gerbaulet & Struck) Small, prostrate, succulent geophyte, with tuberous roots, stems weakly lignified. Leaves opposite and 4-ranked below inflorescence, otherwise alternate, flattened, narrowly ovate, with prominent epidermal bladder-cells. Flowers pale yellow, ± 20 mm diam. Fruit 5-locular. Aug. Rocky sites, WM (Sutherland). **(ece)**

grossum Aiton (= *Phyllobolus grossus* (Aiton) Gerbaulet) Prostrate to decumbent or scrambling, succulent geophyte with tuberous roots, stems weakly lignified. Leaves opposite and 4-ranked below inflorescence, otherwise alternate, subcylindrical, narrowly ovate to linear, with prominent epidermal bladder-cells. Flowers 20–30 mm diam., lemon- or straw-yellow, pale salmon or apricot. Fruit 5-locular. Sept.–Nov. On slopes or plains, often scrambling in other bushes, WM, TS, CCR (Nieuwoudtville to Ceres and Sutherland to Worcester, Cradock and Albany Districts).

holense Klak (= *Phyllobolus herbertii* (N.E.Br.) Gerbaulet) Small, clustered, succulent geophyte, with thickened roots, stems weakly lignified, corky basally, short, but flowering stems may be elongated. Leaves alternate, subcylindrical, with large but somewhat flattened epidermal bladder-cells. Flowers up to 40 mm diam., outer petals white or pale yellow, inner petals bright yellow. Fruit 5-locular. Aug. On quartz, KV (Holrivier). **(ece)**

lilliputanum Klak (= *Phyllobolus abbreviatus* (L.Bolus) Gerbaulet) Small, prostrate, succulent geophyte, with tuberous roots, stems weakly lignified. Leaves opposite and 4-ranked, flattened, broadly ovate, with large epidermal bladder-cells. Flowers pale yellow, ± 20 mm diam. Fruit 5-locular. Sept.–Oct. On shale covered with quartz pebbles, KV (Vanrhynsdorp). **(ece)**

oculatum N.E.Br. (= *Phyllobolus oculatus* (N.E.Br.) Gerbaulet) Prostrate to decumbent or rarely scrambling, succulent geophyte, up to 1 m diam., roots thickened into a taproot, stems weakly lignified. Leaves opposite and 4-ranked, soon becoming alternate, flattened, narrowly ovate, with large epidermal bladder-cells. Flowers 20–30 mm diam., pale yellow to pale salmon-pink or sand-coloured. Fruit 5-locular. Sept.–Oct. In rocky sites or in sand, SN, G, NS, NH (southwestern Namibia and northwestern Namaqualand). **(ece)**

oubergense (L.Bolus) Klak (= *Phyllobolus pumilus* (L.Bolus) Gerbaulet) Succulent, clustered geophyte, with tuberous roots, stems weakly lignified, short, flowering stems longer. Leaves opposite and 4-ranked below inflorescence, otherwise alternate, subcylindrical, narrowly ovate, with large epidermal bladder-cells. Flowers up to 30 mm diam., yellowish to pale salmon. Fruit 5-locular.

Sept.–Dec. On rocky sites in shallow soils, WM, TS, CCR (Sutherland, Montagu, Laingsburg and Prince Albert Districts). **(gce)**

prasinum (L.Bolus) Klak (= *Phyllobolus prasinus* (L.Bolus) Gerbaulet) Decumbent, succulent geophyte to hemicryptophyte, with thickened roots, stems weakly lignified, with a thick cork layer basally, mostly short, flowering stems longer. Leaves opposite and 4-ranked below inflorescence, otherwise alternate, subcylindrical, narrowly ovate, with large epidermal bladder-cells. Flowers up to 40 mm diam., greenish yellow. Fruit 5-locular. Aug. On quartziferous plains or hills, G, NS, NH (northwestern Namaqualand). **(ece)**

resurgens Kensit (= *Phyllobolus resurgens* (Kensit) Schwantes) Clustered, succulent geophyte, with thick rootstock, stems weakly lignified but with a thick cork layer, very short and not freely visible. Leaves alternate and tufted, subcylindrical, narrowly ovate, with large epidermal bladder-cells. Flowers up to 40 mm diam., greenish yellow to pale salmon. Fruit 5-locular. July–Sept. On rocky outcrops in sandy or grassy flats, NH, KB, WM, TS, CCR (Namaqualand, Ceres, Calvinia and Laingsburg Districts). **(gce)**

sinuosum L.Bolus (= *Phyllobolus sinuosus* (L.Bolus) Gerbaulet) Prostrate to decumbent or scrambling, succulent geophyte to hemicryptophyte, with tuberous roots, stems weakly lignified. Leaves opposite and 4-ranked below inflorescence, otherwise soon alternate, subcylindrical, narrowly ovate, with small or also prominent and often hair-like, epidermal bladder-cells, especially on receptacle and pedicel. Flowers 20–30 mm diam., shades of pale yellow, copper or cream. Fruit 5-locular. Aug.–Oct. Scrambling among bushes on plains or on slopes, G, NS, NH, KB (Richtersveld, northern Namaqualand to Bitterfontein). **(ece)**

tenuiflorum Jacq. (= *Phyllobolus tenuiflorus* (Jacq.) Gerbaulet) Succulent geophyte, with thick rootstock, stems prostrate and weakly lignified, corky basally, short, flowering stems longer. Leaves opposite and 4-ranked below inflorescence, alternate, subcylindrical, narrowly ovate, with large-tipped or hair-like epidermal bladder-cells, especially on receptacle and pedicel. Flowers up to 40 mm diam., greenish yellow to yellow or with greyish pink outer petals. Fruit 5-locular. Aug. On quartz, KV (Vanrhynsdorp district). **(ece)**

F.' Plants not geophytic, without or rarely with tuberous roots

baylissii (L.Bolus) Klak (= *Phyllobolus saturatus* (L.Bolus) Gerbaulet) Decumbent to erect, small, often scrambling, succulent shrublet, roots not tuberous, stems lignified, slender, base thickened. Leaves opposite and 4-ranked, at least partly persistent, base somewhat spinescent, subcylindrical, narrowly ovate to linear, with small, epidermal bladder-cells. Flowers ± 30 mm diam., yellow, copper-salmon, pale salmon, pale pink or cream, stamens and stigmas not concealed. Fruit 5-locular. Sept.–Nov. Scrambling among bushes, G, NH, KV, WM, TS, CCR (Namaqualand to Clanwilliam, Calvinia to Karoopoort). **(gce)**

bulletrapense Klak Decumbent to erect, densely branched, succulent shrub, 200–350 mm tall, 350 mm diam., stems lignified. Leaves alternate, narrowly ovate to linear, 10–25 × 2 mm, 2 mm thick, at least partly persistent, epidermal bladder-cells conspicuous. Flowers in a many-flowered dichasium, white, pale pink or pale yellow, 20–30 mm diam., stamens and stigmas not concealed. Fruit 5-locular. Oct. In hard gravelly ground with scattered quartz, 800 m, NH (Springbok). **(ece)**

chrysophthalmum (Gerbaulet & Struck) Klak (= *Phyllobolus chrysophthalmus* Gerbaulet & Struck) Erect, succulent shrublet, up to 150 mm tall, roots tuberous, stems lignified. Leaves persistent, opposite and 4-ranked, subcylindrical, narrowly ovate, with large epidermal bladder-cells. Flowers 10–20 mm diam., with bright pink outer and golden yellow inner petals, petals collected into a cylinder with only outer ones spreading, stamens and stigmas concealed. Fruit 5-locular. Oct. On flats between dwarf shrubs in deep soils, KV (Vanrhynsdorp area). **(ece)**

deciduum (L.Bolus) Klak (= *Phyllobolus deciduus* (L.Bolus) Gerbaulet) Erect, succulent shrub, up to 700 mm tall, roots not tuberous, stems lignified, stout. Leaves deciduous, alternate except first two pairs, cylindrical, narrowly ovate to linear, with fairly large, epidermal bladder-cells. Flowers 20–30 mm diam., salmon-pink, with yellow inside, stamens and stigmas not concealed. Fruit 5-locular. July–Aug. Rocky hills and alluvial plains, G, NS, NH (northwestern Namaqualand). **(ece)**

decurvatum (L.Bolus) Klak (= *Phyllobolus decurvatus* (L.Bolus) Gerbaulet) Decumbent to erect, succulent shrub, up to 400 mm tall, branches curving downwards, roots not tuberous, stems lignified. Leaves persistent, opposite and 4-ranked, subcylindrical, narrowly ovate, with small, somewhat flattened bladder-cells. Flowers 20–30 mm diam., salmon-pink, with cream inside, stamens and stigmas not concealed. Fruit 4- or 5-locular. Aug.–Sept. Lower rocky hillsides, G (Richtersveld). **(ece)**

delum L.Bolus (= *Phyllobolus delus* (L.Bolus) Gerbaulet) Decumbent to erect, succulent shrub, up to 200 mm tall, roots not tuberous, stems lignified. Leaves persistent, opposite and 4-ranked, subcylindrical, narrowly ovate, with small, somewhat xeromorphic bladder-cells. Flowers 10–20 mm diam., with bright reddish pink outer and yellow inner petals, stamens and stigmas concealed. Fruit 5-locular. Oct.–Nov. On rocky, sometimes quartzitic sites, G, NH, KV, WM (Namaqualand to Vanrhynsdorp and Calvinia Districts). **(ece)**

flavidum Klak (= *Phyllobolus congestus* (L.Bolus) Gerbaulet) Small, succulent shrublet, up to 50 mm tall, in clusters, roots not tuberous, stems weakly lignified, becoming somewhat corky, usually short. Leaves deciduous, opposite and 4-ranked, subcylindrical, narrowly ovate, with large epidermal bladder-cells. Flowers up to 20 mm diam., yellow, stamens and stigmas not concealed. Fruit 5-locular. Sept. Rocky sites and often on quartz, KV (Knersvlakte). **(ece)**

gariepense (Gerbaulet & Struck) Klak (= *Phyllobolus gariepensis* Gerbaulet & Struck) Decumbent to erect, succulent shrub, 200–300 mm tall, roots not tuberous, stems weakly lignified. Leaves persistent, opposite and 4-ranked below inflorescence, otherwise alternate, somewhat flattened, with large epidermal bladder-cells. Flowers 20–30 mm diam., bright pink, stamens and stigmas not concealed. Fruit 5-locular. Sept. Rocky slopes, G (northeastern Richtersveld). **(ece)**

latipetalum (L.Bolus) Klak (= *Phyllobolus latipetalus* (L.Bolus) Gerbaulet) Clustered, small, succulent shrublet, up to 50 mm tall, roots not tuberous, stems weakly lignified, becoming somewhat corky, usually short. Leaves deciduous, opposite and 4-ranked below inflorescence, otherwise alternate, subcylindrical, with prominent epidermal bladder-cells, becoming somewhat spinescent when dry and remaining on stems for some time. Flowers ± 20 mm diam., bright pink, whitish inside, stamens and stigmas not concealed. Fruit 5-locular. Aug.–Oct. Quartzitic hills, NH (Steinkopf to Springbok and Bushmanland, Pofadder).

ligneum (L.Bolus) Klak (= *Phyllobolus melanospermus* (Dinter & Schwantes) Gerbaulet) Erect, succulent shrub, up to 250 mm tall, roots not tuberous, stems weakly lignified. Leaves opposite and 4-ranked below inflorescence, otherwise alternate, subcylindrical, narrowly ovate, with large epidermal bladder-cells. Flowers 20–30 mm diam., various shades of yellow to straw- or sand-coloured, stamens and stigmas not concealed. Fruit 5-locular. Sept. Rocky sites and often on quartz, SN, G (southern Namib, Karas, Pofadder).

nitidum Haw. (= *Phyllobolus nitidus* (Haw.) Gerbaulet) Decumbent to erect, succulent shrub, up to 300 mm tall, occasionally cushion-like or scrambling, roots not tuberous, stems weakly lignified but with a thick cork layer. Leaves persistent, opposite and 4-ranked, subcylindrical, narrowly ovate, with conspicuous bladder-cells. Flowers 20–30 mm diam., yellow or pale yellow, occasionally pale pink or salmon, stamens and stigmas not concealed. Fruit 4- or 5-locular. Sept.–Oct. Widespread on plains, NH, KV, WM, TS (Kenhardt, Gamoep to Vanrhynsdorp, Calvinia, Ceres, Laingsburg, Prince Albert, Worcester, Montagu and Ladismith districts).

quartziticola Klak (= *Phyllobolus quartziticus* (L.Bolus) Gerbaulet) Erect, succulent shrub, up to 300 mm tall, roots not tuberous, stems at first weakly, then later more lignified, with a thick cork layer. Leaves persistent, opposite and 4-ranked, subcylindrical, narrowly ovate, with small, flattened, epidermal bladder-cells. Flowers 20–30 mm diam., very pale pink or salmon, stamens and stigmas not concealed. Fruit 4(5)-locular. Oct.–Nov. On sand or quartz, G, NS (along coast from lower Gariep Valley to Olifants River). **(ece)**

spinuliferum Haw. (= *Phyllobolus spinuliferus* (Haw.) Gerbaulet) Erect, succulent shrublet, up to 300 mm tall, roots not tuberous, stems very stout, weakly lignified but with a huge cork layer. Leaves persistent, opposite and 4-ranked, subcylindrical, narrowly ovate, with small, flattened, epidermal bladder-cells. Flowers 20–30 mm diam., pale yellow to straw-coloured or pale salmon to dull orange, stamens and stigmas not concealed. Fruit 4-locular. Sept.–Nov. On plains in deep soils, G, NS, NH, KV (Lekkersing to Klawer). **(ece)**

splendens L. (= *Phyllobolus splendens* (L.) Gerbaulet) Erect, succulent shrub, 0.3–1 m tall, with woody stems. Leaves persistent, opposite and 4-ranked below inflorescence, otherwise alternate, almost cylindrical, narrowly ovate, with small epidermal bladder-cells. Flowers 1–3(–5), 30–40 mm diam., cream, pale pink, pale salmon or pale yellow, filamentous staminodes present, reproductive parts not concealed. Fruit 5-locular. Sept.–Oct. On plains or lower slopes, WM, TS, CCR (Beaufort West to Fauresmith, Worcester and Ceres to Albany District).

trichotomum Thunb. (= *Phyllobolus trichotomus* (Thunb.) Gerbaulet) Erect, small, succulent shrublet, up to 200 mm tall, roots not tuberous, stems lignified. Leaves persistent, opposite and 4-ranked, subcylindrical, narrowly ovate, with small, xeromorphic, epidermal bladder-cells. Flowers 10–20 mm diam., cream, pale salmon or with bright reddish pink outer and cream (rarely yellow) inner petals, stamens and stigmas concealed. Fruit 4-locular. Sept.–Oct. Rocky

sites and sometimes on quartz, G, NS, NH, KV, CCR (Richtersveld and Namaqualand to Piketberg). **(gce)**

vanheerdei (L.Bolus) Klak (= *Phyllobolus roseus* (L.Bolus) Gerbaulet) Succulent shrub, up to 1 m tall, stems lignified, stout. Leaves persistent and becoming somewhat spiny when dry, alternate, subcylindrical, narrowly ovate, with fairly large, epidermal bladder-cells. Flowers up to 30 mm diam., pink to salmon, stamens and stigmas not concealed. Fruit 5-locular. Sept.–Oct. Sandy soils among granite boulders, NH (Springbok to Kamieskroon). **(ece)**

[**Excluded species** **Psilocaulon densum** N.E.Br., insufficiently known and possibly conspecific with one of the above species.]

MEYEROPHYTUM 2 spp., northwestern and western Namaqualand **(ece)**

globosum (L.Bolus) Ihlenf. Compact, sparsely branched, succulent shrub, up to 100 mm tall, 200 mm diam., with internodes very short and thick, up to 15 mm diam. Leaf-pairs dissimilar in shape, first pair up to 17 mm long, second pair 50–70 mm long, connate part up to 25 mm diam. Flowers white. Fruit on pedicel up to 100 mm long, usually 5(6)-locular, 9–13 mm diam. Aug.–Sept. In loamy soils with quartz pebbles, NH (Springbok to Komaggas). **(ece)**

meyeri (Schwantes) Schwantes Cushion-shaped, freely branched, succulent shrub, up to 300 mm diam., with internodes 2–3 mm diam. Leaf-pairs dissimilar in shape, first pair up to 12 mm long, second pair 35 mm long, connate part up to 4 mm diam. Flowers with petals magenta, rose with white bases or plain white. Fruit on pedicel up to 45 mm long, (4)5(–7)-locular, 4–10 mm diam. Aug. In loamy soils, often with quartz pebbles, G, NS (northwestern Namaqualand: Lekkersing to Steinkopf, Port Nolloth to Wallekraal). **(ece)**

MITROPHYLLUM 6 spp., northern Namaqualand **(ece)**

A. Stalks of fruits bent; flowers magenta

roseum L.Bolus Low, succulent shrub, up to 150 mm tall, later bending over. Leaves heterophyllous, first leaf-pair 15–20 × 6–10 mm, free parts tongue-shaped to triangular, second and subsequent leaf-pairs connate for 1/5, 15–35 mm long, ± 5 mm diam. Flowers solitary, magenta. Fruit without a closing body, valve rims high. Aug.–Sept. Among rocks on W-facing slopes receiving fog, NH (Komaggas). **(ece)**

A.' Stalks of fruits erect and straight; flowers yellow or white, rarely very pale pink or magenta
B. Corpuscles formed by leaves mostly > 45 mm long, > 15 mm thick; anthers golden yellow

grande N.E.Br. Succulent shrub, with compact centre and short-shoots only from which erect long-shoots develop, internodes 10–15 mm diam. Leaves heterophyllous, first leaf-pair 60–120 × 15–30 mm, free parts tongue-shaped to triangular, second leaf-pairs connate for 4/5 forming a corpuscle, 25–100 × 15–35 mm, oval in diam. Flowers with yellow or white petals. Fruit with covering membranes extending ± ⅓ over locules. May–July. On S to SE slopes with quartzitic stones, G (Brakfontein and N of Oograbies Mountains). **(ece)**

mitratum (Marloth) Schwantes Succulent shrub, with compact centre or laxly branched, up to 600 mm tall. Leaves heterophyllous, first leaf-pair 40–100 × 15–22 mm, free parts tongue-shaped to triangular, second leaf-pairs connate for 2/3–4/5 forming a corpuscle, 35–100 × 15–35 mm, cylindrical. Flowers breaking through the resting corpuscle, petals white, often suffused with magenta. Fruit with very narrow covering membranes or these absent. Feb.–Mar. On S to SE slopes with quartzitic stones, G (northern Namaqualand: S and N of Oograbies Mountains). **(ece)**

B.' Corpuscles formed by leaves < 45 mm long, < 15 mm thick; anthers whitish

abbreviatum L.Bolus Densely branched succulent shrub, up to 400 mm tall. Leaves heterophyllous, first leaf-pair 10–30 × 5–8 mm, free parts tongue-shaped to triangular, second leaf-pairs connate for 4/5 of its length, forming a corpuscle, corpuscle thicker than the stem bearing it,

round to oval in diam. Flowers with white petals, suffused with pink. Fruit stalk not corky basally. Mar.–Apr. In crevices of quartzitic rocks, G (Oograbies Mountains). **(ece)**

clivorum (N.E.Br.) Schwantes Succulent shrub, up to 600 mm tall. Leaves heterophyllous, first leaf-pair 10–50 × 8–20 mm, free parts tongue-shaped to triangular, second leaf-pairs connate for half to 2/3 of its length, forming a corpuscle, corpuscle ± as thick as the stem bearing it, 10–40 mm long, 5–15 mm diam. Flowers with white or yellow petals, suffused with pink. Fruit stalk not corky basally. May–June. S and SE slopes with rocks, often in shady places, G, NH (eastern and southern Richtersveld to Wildepaardehoek Pass). **(ece)**

dissitum (N.E.Br.) Schwantes Succulent shrub, up to 400(600) mm tall. Leaves heterophyllous, first leaf-pair 10–50 × 8–15 mm, free parts tongue-shaped to triangular, second leaf-pairs connate for 4/5 of its length, forming a corpuscle, corpuscle at rest 10–40 mm long, 5–15 mm diam. Flowers with white or yellow petals, suffused with pink. Fruit stalk corky and dark brown basally, distinct from top. May–June. S and SE slopes, in crevices of quartzitic rocks or in coarser rubble on steeper slopes, G (between Helskloof and Karrachabpoort). **(ece)**

[**Insufficiently known species Mitrophyllum margaretae** S.A.Hammer]

MONILARIA ERTJIEVYGIE 5 spp., N and W Cape **(gce)**

A. Sclerotic sheaths flattened in one direction

obconica Ihlenf. & S.Jörg. Sparsely branched, succulent shrub, up to 200 mm tall, sclerotic sheaths in side view obconical, rims of old sclerotic sheaths spreading. First leaf-pair forming a nearly spherical corpuscle up to 10 mm diam., second leaf-pair ± 100 × 3–5 mm. Flowers solitary, up to 45 mm diam., pedicels up to 100 mm long, petals usually white, sometimes suffused with red. Fruit 5(6)-locular. July–Aug. At altitudes > 1 000 m, NH (Springbok region). **(ece)**

scutata (L.Bolus) Schwantes Similar to **M. obconica** but sclerotic sheaths in side view nearly rectangular to obovate, rims of old sclerotic sheaths tightly pressed to the stem. July–Aug. In shallow soil with a light covering of quartz pebbles, G, NS, NH (Richtersveld to Wallekraal). **(ece)**

A.' Sclerotic sheaths jug-shaped or barrel-shaped

chrysoleuca (Schltr.) Schwantes Sparsely branched, succulent shrub, up to 200 mm tall, stems up to 15 mm diam., terminal sclerotic sheaths covering the internodes tough and completely covering the corpuscle of the next season's first leaf-pair. First leaf-pair forming a nearly spherical corpuscle up to 10 mm diam., second leaf-pair ± 100 × 3–5 mm. Flowers solitary, on pedicels up to 100 mm long, petals white, yellow, orange, salmon, red or magenta. Fruit 5(6)-locular. July–Aug. In quartzitic flats, KV (Vanrhynsdorp). **(ece)**

moniliformis (Thunb.) Ihlenf. & S.Jörg. Sparsely branched, succulent shrub, up to 200 mm tall, terminal sclerotic sheaths covering the internodes comparatively soft and short, incompletely covering the corpuscle of the next season's first leaf-pair. First leaf-pair forming a nearly spherical corpuscle up to 10 mm diam., second leaf-pair ± 100 × 3–5 mm. Flowers solitary, up to 45 mm diam., on pedicels up to 100 mm long, petals usually white. Fruit 5(6)-locular. July–Aug. Quartz patches, KV, CCR (Vanrhynsdorp to Klawer). **(gce)**

pisiformis (Haw.) Schwantes Similar to **M. chrysoleuca** but stems slender and crowded, ± 5–9 mm diam., sclerotic sheaths 4–9 × 4–8 mm. July–Aug. May be sympatric with **M. chrysoleuca** and **M. moniliformis,** quartz patches, KV, CCR (Vanrhynsdorp to Olifants River Mouth). **(gce)**

NAMAQUANTHUS 1 sp., Namaqualand **(ece)**

vanheerdei L.Bolus Succulent shrub, up to 300 mm tall, 600 mm wide, with internodes of stem shorter than leaves. Leaves cylindrical, ± 50 mm long, 12 mm diam., dark green, usually covered by a black ?lichen. Flowers 1(–3), magenta, filamentous staminodes 0–few. Fruit (8–)12(–17)-locular, valve wings slender, without closing bodies. Seeds echinate. July. Rocky quartzitic slopes, NS (known from two localities E of Port Nolloth). **(ece)**

NAMIBIA 3 spp., Namib **(ece)**

cinerea (Marloth) Dinter & Schwantes Compact, dwarf succulent, forming a ± semi-globose body with up to 30 branches, each with 2 or 3 leaf-pairs. Leaves grey to grey-brown, fat, trigonous with

bulging sides, velvety, 20–30 × 15–20 mm, 12–20 mm thick. Flowers solitary, ebracteolate, sepals 5 or more, petals white, stamens erect in a central column. Fruit (9–)12–13-locular, without covering membranes, base always rounded to semi-globose. Aug.–Sept. Crevices on dolomite, limestone and quartzitic outcrops, slopes and ridges, 40–280 m, SN (small area S and SE of Lüderitzbucht). **(ece)**

pomonae (Dinter) Dinter & Schwantes ex Walgate A poorly known species which has been reported to grow sympatrically with **N. cinerea** but differs from the latter by fruit having 20–25 locules. ?Habitat, SN (Lüderitzbucht). **(ece)**

ponderosa (Dinter) Dinter & Schwantes ex H.Jacobsen Similar to **N. cinerea** but leaves pale green to light orange-brown, flowers pink, 4 or more sepals. Aug.–Sept. On slopes of gneissic and granite rock outcrops, 390–550 m, SN (small area NE of Lüderitzbucht). **(ece)**

NELIA 2 spp., northern Namaqualand **(ece)**

pillansii (N.E.Br.) Schwantes Compact, dwarf succulent, with up to 40 branches but mostly fewer, 2 or 3 leaf-pairs to a branch. Leaves trigonous, narrowing gradually from base to tip, 20–50 × 5–12 mm. Flowers in cymes of 1–3, with bracts and bracteoles, outer spreading petals at most as long as calyx lobes, petals merging into filamentous staminodes, stiff, white, later yellowish. Fruit 5-locular, with broad valve wings and no closing body, 6–8 mm diam. Aug.–Sept. On quartzitic slopes or on flats, G (northern Namaqualand). **(ece)**

schlechteri Schwantes Similar to **N. pillansii** but leaves widening subapically forming a triangle of equal sides at tip, < 20 mm long, flowers always solitary, with few (± 20) petals and smaller fruit (± 5 mm diam.). Mar. On quartzitic ridges, G (Oograbies Mountains). **(ece)**

OCTOPOMA 9 spp., Namaqualand and Clanwilliam to Little Karoo **(gce)**

connatum (L.Bolus) L.Bolus Low, succulent shrub, with flowering branches raised well above the leafy centre. Leaves trigonous to semi-terete, opposite pairs basally fused into a sheath, 13–25 × up to 5 mm, up to 5 mm thick. Flowers on long stalks, magenta. Fruit 8-locular, with small closing bodies, valve wings absent. Sept.–Oct. On gravelly flats or in rock crevices, G, NH, KV (Richtersveld to Vanrhynsdorp). **(ece)**

inclusum (L.Bolus) N.E.Br. Succulent shrub, up to 100 mm tall, with stem internodes not visible. Leaves arranged in four distinct rows, boat-shaped, opposite pairs basally fused into a sheath for ± 3 mm, free parts 6–9 × 4–5 mm, 4–5 mm thick. Flowers solitary, bracteoles almost enclosing the stalk, highly connate, petals pinkish magenta. Fruit 7- or 8-locular, closing bodies oval, valve wings absent. Oct. Near the coast, NS (Port Nolloth to Wallekraal). **(ece)**

nanum (L.Bolus) Klak (= *O. tanquanum* Klak, = *Ruschia nana* L.Bolus) Erect, much-branched, succulent shrublet, up to 100 mm tall. Leaves spreading, somewhat trigonous above, keels finely denticulate, up to 7 × 2–4 mm, 2–4 mm thick. Flowers solitary, petals and filamentous staminodes cream-coloured, 25–30 mm diam. Fruit 6-locular, with small closing bodies, valve wings broad. Oct.–Nov. On loamy flats, TS, CCR (Tanqua Karoo to northwestern Little Karoo). **(gce)**

subglobosum (L.Bolus) L.Bolus Erect, succulent shrub, up to 200 mm tall, 250 mm diam. Leaves only shortly fused to opposite ones at bases, trigonous, with a marked apical tooth and fine teeth on keel, green often with a red tinge, surface rough. Flowers solitary, magenta. Fruit 7- or 8-locular. June–Aug. On granite, NH (Springbok to N of Kamieskroon). **(ece)**

tetrasepalum (L.Bolus) H.E.K.Hartmann Succulent shrub, up to 130 mm tall, stems up to 30 mm diam. at base. Leaves boat-shaped, ± 3 × 4 mm, up to 5 mm diam., surface smooth. Flowers solitary, bracteoles larger than foliage leaves, pink. Fruit 7-locular. July–Aug. ?Habitat, KV (Vanrhynsdorp). **(ece)**

ODONTOPHORUS 4 spp., Namaqualand **(ece)**

angustifolius L.Bolus Clumped, succulent shrub, with internodes of stems spongy inside, smooth outside, shorter than leaves. Leaves trigonous to rhombic with subapical widening and thickening, i.e. gibbose or humped, slender, 30–50 mm long, 6–10 mm thick, with long (up to 5 mm) flexible teeth along margins, epidermis soft but not velvety. Flowers on long pedicels, solitary, bracteolate, petals yellow. Fruit 10-locular. Sept. On quartzite, G (Richtersveld, W of Steinkopf). **(ece)**

marlothii N.E.Br. Succulent shrub, with compact centre and long woody trailing, mostly climbing branches. Stems with internodes short in centre but longer than leaves on long-shoots. Leaves

trigonous to rhombic with subapical widening and thickening, i.e. gibbose or humped, 25–35 mm long, 7–10 mm thick, with 1–6 brittle teeth along margins, velvety. Flowers solitary, bracteolate, petals bright yellow, often with a white base. Fruit 10-locular. July. Shaley slopes and Nama quartzite, NH (Steinkopf to Springbok). **(ece)**

nanus L.Bolus Compact, succulent shrub, with internodes of stems enclosed and not visible. Leaves trigonous to rhombic with subapical widening and thickening, i.e. gibbose or humped, 25–50 mm long, 11–17 mm thick, margins with 1–6 teeth, velvety. Flowers solitary, bracteolate, petals pale yellow or cream-coloured, rarely white. Fruit 10-locular. June–July. On quartzitic slopes and rocks, G, NH (Eenriet, Breekpoort, Steinkopf area). **(ece)**

pusillus S.A.Hammer Erect, succulent shrub, up to 80 mm tall and diam., with internodes of stems corky and spongy, ochre. Leaves trigonous to rhombic with subapical widening and thickening, i.e. gibbose or humped, keel with tiny teeth, smooth. Flowers solitary, bracteolate, petals yellow, basally white. Fruit 10- or 11-locular. Aug. Upper slopes on patches of quartz gravel, G (SE of Khubus). **(ece)**

OOPHYTUM 2 spp., Vredendal, Vanrhynsdorp **(ece)**

nanum (Schltr.) L.Bolus Compact, dwarf succulent, old plants clumped, 10–20 mm tall, 10–30 mm diam., deciduous, corpuscles nearly spherical. Leaf-pairs of a season both visible, keeled. Flowers solitary, petals white to rose-pink. Fruit 6-locular. Aug.–Sept. In quartzitic flats or on slopes, KV (Vredendal, Vanrhynsdorp). **(ece)**

oviforme (N.E.Br.) N.E.Br. Compact, dwarf succulent, old plants clumped, 10–20 mm tall, 10–30 mm diam., deciduous, corpuscles ovoid. Leaves with second leaf-pair of a season included in the first, basal part of second leaf-pair membranous, without keels. Flowers solitary, petals white to rose-pink. Fruit 6-locular. Aug.–Sept. On quartzitic flats or slopes, KV (Vredendal, Vanrhynsdorp). **(ece)**

OTTOSONDERIA 1 sp., Namaqualand to Knersvlakte **(ece)**

monticola (Sond.) L.Bolus Highly succulent, dense shrub, up to 350 mm tall, 600 mm diam., with internodes of stems shorter than leaves. Leaves trigonous to terete, apiculate, basally connate, up to 500 mm long, 8 mm diam., smooth. Flowers in large persisting inflorescences, petals purplish pink, filamentous staminodes collected together. Fruit (7)8(9)-locular, closing bodies small. June–July. Among rock slabs, NS, NH, KV (Namaqualand to Knersvlakte). **(ece)**

PEERSIA 3 spp., western Mountain Karoo and Karoo

frithii (L.Bolus) L.Bolus Succulent shrub, compact or forming cushions, 80–100 mm tall. Leaves trigonous, tapering from a broader base to an often recurved, acute, pointed tip, epidermis smooth, old leaves remaining on stem for several years as black, dry fingers, 25–40 mm long, ± 8 mm thick. Flowers solitary, opening in evening, petals yellow, 6–12 mm long, pedicels > 20 mm long, 2 outer calyx lobes taller than 3 inner. Fruit 5-locular, closing bodies absent, valve wings broad, 7–9.5 mm diam. Sept.–Nov. Gentle slopes or flats on shales, TS (Laingsburg to Prince Albert and Aberdeen).

macradenia (L.Bolus) L.Bolus Similar to **P. frithii** but leaves almost terete, widening a little from base, narrowing abruptly at tip, 25–60 mm long, 6–8 mm thick. Sept.–Nov. Mostly on flats in shales, TS (Tanqua Karoo to Prince Albert). **(ece)**

vanheerdei (L.Bolus) H.E.K.Hartmann Similar to **P. macradenia** but leaf tips rounded and calyx lobes of equal length. Oct. On flats with Ecca shale, WM, TS (Calvinia to Tanqua Karoo). **(ece)**

PHIAMBOLIA 10 spp., Namaqualand to W Cape **(gce)**

unca (L.Bolus) Klak Succulent shrub, with spreading branches, up to 250 mm tall. Leaves trigonous, shortly fused at their bases, 10–25 × ± 3 mm, ± 3 mm thick, apiculate, with recurved tips. Flowers solitary, 18 mm diam., on pedicels up to 5 mm long, petals pale pink, filamentous staminodes and stamens conically collected. Fruit 5-locular, with top raised, closing bodies absent, with broad valve wings. July–Sept. Sandy areas, NH, WM, CCR (Steinkopf to Nieuwoudtville). **(gce)**

PLEIOSPILOS 4 spp., southern N Cape, eastern W Cape and western E Cape

compactus (Aiton) Schwantes Compact to clustered, dwarf, succulent, with > 4 branches. Leaves dotted, with a dorsal hump and lateral subapical bulges, length more than twice the width. Flowers solitary, yellow. Fruit 9–15-locular, mostly with a persistent stalk. Apr.–June. On shale slopes, TS, CCR (SE parts of Tanqua Karoo, Little and Great Karoo).

POLYMITA 2 spp., northern Namaqualand **(ece)**

albiflora (L.Bolus) L.Bolus Succulent shrub, up to 0.4 m tall. Leaves fused for half their length, 3-sided, longitudinally lined along leaf edges, tips divergent, mucro conspicuous, margins and keel often toothed. Flowers white, petals long, thin, stigmas numerous, nectary a ring. Fruit 8–10(–18)-locular, valve wings ± as broad as expanding keels, tapering slightly towards apex, closing bodies large, white. Aug.–Oct. Granite slopes or quartzite flats, G, NH (Steinkopf, Springbok to E of Kamieskroon). **(ece)**

steenbokensis H.E.K.Hartmann Like **P. albiflora** but shorter, mucro inconspicuous, fruit with valve wings broader than expanding keels, tapering considerably towards apex, becoming awn-like, closing bodies small, dark brown. Aug.–Sept. Granite slopes or quartzite flats, NH (between Port Nolloth and Springbok). **(ece)**

PSAMMOPHORA 4 spp., southern Namib to Gariep Valley **(ece)**

A. Shrubs; calyx 4-lobed; filamentous staminodes few (0–9)

modesta (Dinter & A.Berger) Dinter & Schwantes Succulent shrub, up to 150 mm tall. Leaves trigonous to triquetrous, rarely roundish, 20–40 × 7–10 mm, 6–8 mm thick, with prominent, raised, epidermal cells resulting in a rough appearance. Flowers solitary, bracteolate, 15–25 mm diam., petals pink to magenta, stamens numerous. Fruit 4–9-locular, covering membranes absent. Aug.–Sept. On gravel or in sand-filled pockets, SN, G (Lüderitz to lower Gariep Valley). **(ece)**

saxicola H.E.K.Hartmann Succulent shrub, up to 600 mm tall. Leaves crowded near apex, crescent-shaped, light to bright green, epidermis papillate, sticky. Flowers solitary, bracteolate, 35–40 mm diam., petals white, stamens in a central cone. Fruit 8-locular, covering membranes present but not fully covering locules. Sept. Stony, shaley, S-facing slopes, SN (mountains NW of Gariep near Sendelingsdrif). **(ece)**

A.' Compact plants; calyx 5(6)-lobed; filamentous staminodes numerous (17–20)

longifolia L.Bolus Compact, dwarf succulent, with up to 12 branches, up to 120 mm diam. Leaves erect to spreading, up to 40 × 10(–16) mm, 6(–13) mm thick, with elevated and densely packed epidermal cells. Flowers solitary, bracteolate, 20–23 mm diam., petals and filamentous staminodes white. Fruit (4)5(6)-locular. Aug. In coarse rubble or gravel, often in quartz, SN, G (southern Namib to lower Gariep Valley). **(ece)**

nissenii (Dinter) Dinter & Schwantes Compact, dwarf succulent, with up to 12 branches, up to 100 mm diam., sunken into the ground with only triangular leaf tips visible. Leaves broadening towards tip, 20–40 × up to 15 mm, epidermal cells raised and densely packed. Flowers solitary, bracteolate, 20–30 mm diam., petals and filamentous staminodes white. Fruit 5(6)-locular. Aug. In sand and gravel rich in limestone, also in pockets in quartz and dolomite, SN (southern Namib, N and E of distribution area of **P. longifolia**). **(ece)**

RHINEPHYLLUM 14 spp., W Cape and Karoo

graniforme (Haw.) L.Bolus Densely leaved, low cushion-forming, succulent shrub, up to 80 mm tall. Leaves shaped like grain, 6–7 mm long, rough from raised dots, old leaves persisting on stem in dry state for several years. Flowers solitary, petals yellow, opening in the late afternoon. Fruit top flat, 3–7 mm diam., valve wings broad, 5-locular. Sept.–Oct. On shaley flats, TS (Laingsburg to Prince Albert). **(ece)**

luteum (L.Bolus) L.Bolus Like **R. graniforme** but leaves less dense and old leaves less persistent; fruit with broader covering membranes and narrower valve wings. Sept.–Nov. On shaley flats, TS (Laingsburg to Prince Albert). **(ece)**

pillansii N.E.Br. (including **R. comptonii** L.Bolus) Compact to tufted, succulent shrub, up to 80 mm tall. Leaves trigonous with a pronounced chin, those of a pair differing in size, 13–20 × up to 10 mm, up to 9 mm thick, pale grey. Flowers solitary, yellow, stigmas slender. Fruit 6–9 mm diam., on persistent stalks up to 15 mm long, base funnel-shaped, top flat, valve wings broad, 5-locular. Oct.–Nov. On flats with grey shales, TS, CCR (Laingsburg to Ladismith). **(gce)**

RUSCHIA VYGIE ± 220 spp., dry parts of southern Africa

A. Leaf-pairs free from each other at the base or very shortly fused basally
B. Fruit small (2–4 mm diam.)

aspera L.Bolus Shrub, ± 220 mm tall. Leaves spreading, spherical to 3-sided, epidermis elevated above tannin idioblasts, dark green. Flowers solitary, enclosed by bracteoles, petals ± 0.75 mm broad, magenta, filamentous staminodes absent, filaments pink. Fruit 5-locular. Sept.–Oct. Granitic derived soils, NH (Steinkopf to Springbok and Pofadder).

atrata L.Bolus Shrub, ± 280 mm tall, internodes dark-coloured. Leaves 3-cornered, blue-green. Flowers 1–3 per cyme, 10 mm diam., base enclosed by bracteoles, pedicels short, petals 0.75 mm broad, pink, filamentous staminodes few, purple apically, pale below, stigmas purple to black. Fruit 5-locular. Aug.–Oct. In shale, quartzitic and granitic soils, G, NH (Sendelingsdrif to Tatasberg and S to Nuwerus). **(ece)**

capornii (L.Bolus) L.Bolus Shrub, ± 300 mm tall. Leaves 3-sided, small, easily shed, epidermis smooth. Flowers 90 mm diam., petals magenta, filamentous staminodes present, filaments white below, magenta above. ?Fruit. Aug.–Sept. Granitic and gneiss derived soils, NH, ?TS (Soebatsfontein to Garies, ?Karoopoort). **(ece)**

leucosperma L.Bolus Shrub, ± 100–200 mm tall, richly branched, young internodes papillate. Leaves roundish, keeled, hardly fused basally, pale green. Flowers 3 per cyme, base enclosed by largely fused bracteoles, sepals 6, petals 1 mm broad, magenta, filamentous staminodes magenta. Fruit 6-locular, base bell-shaped, top roundish, covering membranes with closing rodlets, closing body a small hook, expanding keels short, falling off when ripe, leaving a spiny stalk. July–Sept. In granitic soil, sand and shale, NH, KV, TS (Concordia to Vredendal and Ceres Karoo). **(ece)**

stricta L.Bolus Shrub, up to 1 m tall, internodes reddish when young, becoming brown to blackish. Leaves cresent-shaped, 15–25 × 7–12 mm, keel and margins cartilaginous, pale grey-green, bases of leaf-pairs separated by an elongate triangle. Flowers pale pink. Fruit 6-locular, without closing bodies ('big closing bodies' cannot be verified on the type material or on fresh plants), closing ledges very low. Aug.–Oct. Mainly granitic soils, G, NH, KV (E of Port Nolloth to Knersvlakte). **(ece)**

B.' Fruit large (> 5 mm diam.)
C. Plants spiny

cradockensis (Kuntze) H.E.K.Hartmann & Stüber Shrub, ± 300 mm tall, internodes dark coppery, brown or grey. Leaves 3-sided, without papillae. Flowers in often spiny cymes, mostly on lateral short-shoots, 7–14 mm diam., petals 1 mm broad, magenta, filamentous staminodes recurving. Nectaries orange or green. Fruit 5-locular, base funnel-shaped, valve wings absent. Aug.–Oct. On several substrates, mainly karroid bush, WM, TS, CCR (Nieuwoudtville to Grahamstown).

divaricata L.Bolus Shrub, ± 350 mm tall. Leaves 3-sided, surfaces convex, apex abruptly sharp-tipped. Flowers numerous in spiny cymes, 9–18 mm diam., petals 1 mm broad, dark pink, filamentous staminodes pale magenta. Fruit with narrow valve wings. Aug.–Oct. On sandy flats, often in gneiss or granite-derived soils, SN, CCR (S of Lüderitz to western Free State to Little Karoo).

spinosa (L.) Dehn Shrub, ± 350(–700) mm tall, internodes whitish grey turning coppery or black with age. Leaves 10–20 mm long, epidermis with elevations above idioblasts. Flowers in spiny cymes, ± 28 mm diam., petals purple, filamentous staminodes few (0–8). Fruit with or without narrow valve wings. Sept.–Dec. In a variety of soils, SN, KV, WM, TS, CCR (Namibia: Warmbad to E Cape).

C.' Plants without spines

brakdamensis (L.Bolus) L.Bolus Shrub, with hanging branches ± 230 mm long. Leaves 3-sided, sharp-tipped, epidermal cells raised. Flowers solitary, 13 mm diam., sepals with keel and margins finely toothed, sometimes with a large tooth, petals magenta, filamentous staminodes present, filaments white. Fruit base funnel-shaped, top raised, rims low, covering membranes with closing ledges, closing body hook-shaped, expanding keels not touching each other basally. June–July. Granitic soils, NH, KB (Karkams and Kamiesberg Mountains). **(ece)**

brevifolia L.Bolus Shrub, with branches ± 300 mm long. Leaves subovate, epidermal papillae mostly small, larger above sinus of leaf sheath. Flowers 1–3 per inflorescence, bracteoles basal on pedicels, connate to above middle, petals 0.75 mm broad, magenta, pale towards base, filaments pale. Fruit 5-locular. Sept.–Oct. Migmatite and gneiss derived soils, G, NH (Richtersveld to Springbok). **(ece)**

patulifolia L.Bolus Shrub, ± 300 mm tall, long-shoots dominating many lateral short-shoots, internodes ochre, becoming grey. Leaves 3-sided, ± 7 × 2–3 mm, obtuse, green. Flowers solitary, 12 mm diam., bracteoles midway along pedicel, petals in 5 groups, magenta, filamentous staminodes pink, filaments white, apically red. ?Fruit. ?In quartz, KV (Vanrhynsdorp, poorly known). **(ece)**

paucipetala L.Bolus Shrub, ± 240 mm tall, densely branched. Leaves ovate to subglobular, 5–10 × 5 mm, epidermis ± smooth. Flowers l–3 per cyme, small, petals few (± 25), 1 mm broad, purple-pink, filamentous staminodes absent, filaments pale pink. Fruit 5- or 6-locular. Aug. Granitic soils and quartz gravel, G (northern Richtersveld to E of Springbok).

robusta L.Bolus Erect shrub, ± 500 mm tall, lateral shoots becoming spiny, internodes dark brown. Leaves 3-sided, 6–9 × 3.5 mm, dark grey-green, with raised dots and low papillae. Flowers solitary or in small cymes, 18 mm diam., petals ± 1 mm broad, magenta, filamentous staminodes and filaments pale pink. Fruit 5-locular, base short, funnel-shaped, top semi-globular, rims high, covering membranes convex, closing rodlets protruding, closing body hook-shaped, expanding keels almost touching at base, dispersed by tumbling. Aug.–Nov. Mainly granitic or gneissic soils, G, NH (northern Namaqualand to Aggenys).

subsphaerica L.Bolus Shrub, ± 250 mm tall, internodes grey to brown. Leaves roundish, 4–5 × 3–4 mm, grey-green, rough from minute dots. Flowers solitary, ± 13 mm diam., petals 1 mm broad, magenta, filamentous staminodes few or none, filaments white, apically pink, persistent pedicels spiny. Fruit covering membranes with distal closing rodlets, closing body small. Sept.–Oct. ?Habitat, NH, KV (Springbok to Garies and Vanrhynsdorp). **(ece)**

A.' Leaf-pairs fused to each other below
D. Leaf blades shorter than basal leaf sheath

abbreviata L. Shrub, ± 300 mm tall, stems slightly constricted at nodes. Leaves ± 10 mm long, becoming shorter with age, papillate. Flowers mostly solitary, petals in 5 groups, white. Fruit 5-locular, base bell-shaped, top with high rims, covering membranes with a distinct distal closing ledge, closing body small, expanding keels short and roundish, well separated basally. July–Nov. Shaley, gravelly slopes, SN, G, NH (southwestern Namibia to Namaqualand and E to Williston).

campestris (Burch.) Schwantes Shrub, ± 400–450 mm tall, young branches with densely packed leaves. Leaves 3-sided, with a recurved apical hook. Flowers solitary, pink. Fruit 5-locular, base funnel-shaped, top raised with high rims, covering membranes convex, with low distal closing rodlets, closing body round, small, expanding keels separated from each other basally. Sept. On shale in renosterveld, WM (Besemgoedberg). **(ece)**

crassa (L.Bolus) Schwantes Shrub, with robust ascending branches, ?height. Leaf sheaths longer than blade, keel with a single tooth, epidermis long-papillate. Flowers 1–3 per inflorescence, 22 mm diam., petals 1 mm broad, white, filamentous staminodes and fertile filaments white. Fruit 5-locular. Nov.–Jan. On shale, TS (Matjiesfontein to Prince Albert). **(ece)**

inclusa L.Bolus Compact shrub, ± 60–80 mm tall. Leaves 3-sided, keeled, toothed. Flowers 15 mm diam., enclosed by bracteoles, petals 0.75 mm broad, magenta, filamentous staminodes present, filaments white, apically pink. Fruit 5-locular, base funnel-shaped, top raised, covering membranes convex, distal rodlets present, closing bodies small, hook-shaped, expanding keels not touching basally. ?Flowering time. Shale soil, TS (Matjiesfontein). **(ece)**

karrooica (L.Bolus) L.Bolus Shrub, ± 300 mm tall, branches ± erect. Leaves 3-sided, tip recurved, epidermis smooth. Flowers solitary, 50 mm diam., bracteoles ± midway along pedicel, petals

2- or 3-seriate, 2–3 mm broad, magenta, filamentous staminodes present, filaments purple. Fruit 5-locular, base short, funnel-shaped, top with medium high rims, covering membranes convex, closing rodlets hidden below, closing body an open hood, appearing triangular from above, expanding keels short, not touching basally. Sept.–Oct. Mainly tillite or mudstone, TS (W of Matjiesfontein to Prince Albert Road).

laxipetala L.Bolus Cushion-forming perennial, ± 60–70 mm tall, branches prostrate, with ± erect tips. Leaves with sheath up to 10 mm long, blade 3–5 mm long, 3-sided, smooth, keel with 1–3 teeth. Flowers solitary, 18 mm broad, petals 1 mm broad, magenta, filamentous staminodes present, filaments pink apically. Fruit 5-locular. Oct.–Dec. ?Habitat, TS (Williston to Touwsrivier and Matjiesfontein).

muricata L.Bolus Cushion-forming perennial, branches ± 300 mm long, prostrate, with ± erect tips, internodes enclosed by old leaves. Leaves 3-sided, rounded on top, keel and margins toothed. Flowers solitary, 10–12 mm diam., bracteoles on lower half of pedicel, petals 0.75 mm broad, pale pink, filamentous staminodes present. Fruit 5-locular, base funnel-shaped, top with high rims, covering membranes with closing ledges, closing body small, hood-shaped, expanding keels not touching basally, apically ending in awns which merge into narrow valve wings. Aug.–Oct. Mostly loamy to finely grained gravelly soils, NH, KV, TS (Steinkopf to Nuwerus and Kenhardt to Williston and Ceres Karoo).

perfoliata (Mill.) Schwantes Slightly woody shrub, ?height, internodes white with age. Leaves 3-sided, grey, merging into stems, blade with 2–4 teeth along keel and margins. Flowers solitary, petals pale purple, filamentous staminodes present. Fruit 5-locular. Oct.–Dec. Shale soils, TS (Matjiesfontein to Graaff-Reinet).

phylicoides L.Bolus Shrub, ± 150 mm tall. Leaves 3-sided, smooth, small, 5–10 × 1.5 mm, old leaves persistent. Flowers 3–5 per cyme, petals 0.75 mm broad, dull white, filamentous staminodes present, filaments white. Fruit 5-locular, base funnel-shaped, top semi-globose, covering membranes convex, closing ledge distinct, closing body absent, expanding keels touching basally. Oct. Coastal sand in fynbos, NS (Hondeklipbaai to Groenrivier). **(ece)**

rupicola (Engl.) Schwantes Roundish shrub, up to 1 m diam. Leaves 3-sided, ± 10 × 5 mm, keel slightly dentate, blade ± as long as basal sheath, papillate. Flowers pale pink. Fruit base long, bell- to funnel-shaped, rims dipping in centre, closing bodies broadening into locule. Aug.–Nov. ?Dolomite derived soils, SN (Aus to Boegoeberg, Keetmanshoop to Warmbad).

D.' Leaf blades longer than basal leaf sheath
E. Plants prostrate or sprawling

alata L.Bolus Loose shrub, with branches ± 180 mm long. Leaves 3-sided, margins and keel long-papillate. Flowers with bracteoles midway along pedicel, petals 3-seriate, 0.5 mm broad, pink, filamentous staminodes red at tips, pale below. Fruit 5-locular, base funnel-shaped. Mainly June–July. Granite derived and sandy soils, G, NS, NH, KV (Richtersveld to Pofadder to Knersvlakte).

ampliata L.Bolus Sprawling shrub, ± 250 mm tall. Leaves ± spherical. Flowers 1–3 per inflorescence, 18 mm diam., petals in 5 groups, 0.5 mm broad, magenta, filamentous staminodes white. Fruit 5-locular, base funnel-shaped, covering membranes with low closing ledges, closing bodies present. June–Aug. Coastal sands, ?granitic and ?quartzitic soils, G, NS (Richtersveld to Hondeklipbaai). **(ece)**

clavata L.Bolus Loose shrub, ± 200 mm tall. Leaves 3-sided, with low papillae. Flowers 11 mm diam., petals 0.5 mm broad, magenta, filamentous staminodes few, filaments magenta. Fruit 5-locular. Sept. Freely drained alluvium or limestone derived soils, KV (Vanrhynsdorp). **(ece)**

elineata L.Bolus Sprawling shrub, with branches ± 400 mm long, internodes blackish grey. Leaves 3-sided, recurved, sea-green, papillate. Flowers numerous in cymes, 12 mm diam., petals 0.75 mm broad, pink, filamentous staminodes white. Fruit top elevated 1 mm. Aug.–Oct. Crevices in granite, G, NH (eastern Richtersveld to Springbok). **(ece)**

fugitans L.Bolus Shrub, ?height, main branches sprawling, branchlets facing to one side. Leaves roundish, smooth, sea-green, sheath with a line. Flowers in cymes, bracteoles small, petals 1 mm broad, reddish purple, filamentous staminodes few, filaments pale to brownish basally, purple apically. Fruit 5-locular, base funnel-shaped, top low, covering membranes with long, protruding closing rodlets, closing body a tiny hook, expanding keels almost touching basally. Aug.–Sept. In a range of soils, NS, NH, KV (Alexander Bay to Port Nolloth and Bitterfontein to Vanrhynsdorp). **(ece)**

lerouxiae (L.Bolus) L.Bolus Shrub, with prostrate or sprawling main branches, branchlets erect. Leaves 3-sided, mucronate, greyish green. Flowers 3–5 per cyme, 56 mm diam., petals dentate,

multiseriate, 2–3 mm broad, magenta, ?filamentous staminodes, anthers yellow. Fruit 5-locular, base elongate, funnel-shaped, top with high rims, covering membranes convex; closing rodlets big in vertical position under distal end of covering membranes, closing body small, expanding keels not touching basally. Aug.–Oct. Granitic soils, NS, NH, WM (Nababeep to Wallekraal and Loeriesfontein). **(ece)**

lisabeliae L.Bolus Sprawling shrub, with branches ± 600 mm long, prostrate with ± erect tips, internodes brown, turning black with age. Leaves roundish, inconspicuously mucronate, green. Flowers 3 per cyme, bracteoles on lower half of pedicel, petals 3-seriate, 0.5–1.5 mm broad, magenta, filamentous staminodes absent, filaments magenta. Fruit with a closing body and closing rodlets, expanding keel diverging. Oct. ?Schist or ?dolomite, KV (Lutzville, poorly known). **(ece)**

tardissima L.Bolus Compact shrub, with prostrate branches up to 400 mm long, rising at tips. Leaves 3-sided, ± 40–70 × 4–5 mm. Flowers ± 15 mm diam., bracteoles forming a pouch around pedicel, petals densely seriate, 2 mm broad, magenta, filamentous staminodes white basally. Fruit 5-locular. June–Sept. Habitat poorly known, TS, CCR (between Calvinia and Ceres and Klawer to Tulbagh). **(gce)**

E.' Plants erect or cushion-shaped

acocksii L.Bolus Shrub, ± 300 mm tall. Leaves 3-cornered, glabrous, without elevations. Flowers mostly 3 per cyme, petals 1 mm broad, magenta, filamentous staminodes numerous, magenta, pale below. Fruit locules becoming free, base long, funnel-shaped, top with very high rims, covering membranes depressed towards centre, closing body a hook, expanding keels short. Aug.–Sept. Mudstone soils, WM, TS (Roggeveld Mountain slopes). **(ece)**

aggregata L.Bolus Shrub, with branches ± 360 mm long. Leaves round to club-shaped, sheath short, smooth. Flowers in many-flowered cymes, bracteoles basal, petals 0.5–1 mm broad, magenta, filamentous staminodes absent, anthers and pollen yellow-brown. Fruit 5-locular, base funnel-shaped, top raised, rims low, covering membranes with distal closing rodlets, closing body hook-shaped, expanding keels almost touching basally. Oct.–Nov. In gneiss, NH (Springbok to Komaggas to Kamieskroon). **(ece)**

bipapillata L.Bolus Rigid shrub, with branches ± 250 mm long. Leaves roundish, epidermis smooth, keel smooth. Flowers numerous, bracteoles below middle of 5–30 mm long pedicels, petals 1 mm broad, magenta, filamentous staminodes few, purple, basally white, filaments pink. Fruit 5-locular, base funnel-shaped. Aug.–Sept. Sandy soils, KV (Knersvlakte). **(ece)**

brevibracteata L.Bolus Straggling shrub, up to 100 mm tall. Leaves roundish, sheath 3–5 mm broad. Flowers in many-flowered cymes, 13 mm diam., petals 1 mm broad, magenta, filamentous staminodes few, filaments pink basally, red apically. Fruit 5-locular, base funnel-shaped, top with low rims, covering membranes convex, closing rodlet protruding, closing body hook-shaped, expanding keels touching basally. Sept.–Oct. Granitic soils, NH (Nababeep to near Soebatsfontein). **(ece)**

crassisepala L.Bolus Shrub, ± 200 mm tall. Leaves 3-sided, epidermis smooth. Flowers mainly 1–3(–5) per cyme, 17 mm diam., petals 1.25 mm broad, magenta, filamentous staminodes absent, fertile stamens magenta apically, white basally. Fruit 5-locular, base elongate funnel-shaped, bracteoles at or below the middle of pedicel, top raised, covering membranes rising convexly from a deeper centre, closing rodlets large, closing body a small hollow hook, expanding keels short. Aug.–Oct. Granite or gneiss derived soils, G, NS, NH (Port Nolloth to Steinkopf, Garies to Nuwerus). **(ece)**

decurvans L.Bolus Shrub, ± 450 mm tall. Leaves ± round, sheath swollen. Flowers numerous, in rich pyramidal cymes raised above plant, 20–26 mm diam., petals 1.5 mm broad, magenta, filamentous staminodes few, fertile filaments magenta. ?Fruit. Sept.–Oct. Alluvial soils, KV, CCR (Vanrhynsdorp, Lutzville to Citrusdal). **(gce)**

erecta (L.Bolus) Schwantes Shrub, ± 600 mm tall, internodes red, becoming grey. Leaves roundish, blue-grey to green, smooth, keel with small teeth, sheaths swollen. Flowers numerous in lax cymes, bracteoles on upper half of pedicel, petals magenta, filamentous staminodes not clearly visible, few, filaments pale pink. Fruit 5-locular. Sept.–Oct. Quartzitic and granitic soils, G, NH (eastern Richtersveld to Okiep). **(ece)**

extensa L.Bolus Loosely branched shrub, with branches ± 850 mm long, internodes brown. Leaves roundish, sea-green, epidermis rough when dry. Flowers in small contracted cymes, 12 mm diam., petals 1 mm broad, magenta, filamentous staminodes pale pink, apically brownish golden, filaments pale, apically red. Fruit 5-locular. Oct. Quartzitic and sandstone derived soil, G (near Oograbies, poorly known). **(ece)**

firma L.Bolus Shrub, ± 400 mm tall, internodes grey. Leaves ± sickle-shaped, apically recurved, 3-sided to roundish, yellowish green. Flowers numerous, 18 mm diam., petals 1 mm broad, magenta, filamentous staminodes present, filaments white, apically pink. Fruit 5-locular, base funnel-shaped, top raised, rims quite high, covering membranes with protruding closing rodlets, closing body prominent, with a narrow crest, expanding keels distant from each other basally. June–Aug. Well-drained alluvium and limestone soils, KV (Vanrhynsdorp). **(ece)**

floribunda L.Bolus Shrub, ± 300 mm tall. Leaves, 3-sided to roundish, sea-green. Flowers numerous in cymes, bracteoles near base of pedicels, petals 1.5 mm broad, pink, filamentous staminodes few, filaments pink above, white below, anthers and pollen brownish yellow. Fruit 5-locular. Aug.–Sept. On hills, KV (Vanrhynsdorp to Trawal). **(ece)**

glauca L.Bolus Shrub, > 300 mm tall, herbaceous parts glaucous, internodes grey to black, shining, spongy. Leaves 3-sided, keeled, papillate, abruptly and sharply tipped. Flowers in lateral and terminal cymes, usually 3 per cyme, 18 mm diam., petals 0.75 mm broad, pink, bracteoles basal, filamentous staminodes magenta apically. Fruit 5-locular, base funnel-shaped. ?Flowering time. Shale or granitic soils, G (northern Richtersveld and ?E Cape).

goodiae L.Bolus Shrub, ± 160 mm tall, with twisting branches, internodes ochre to dark blackish brown. Leaves 3-sided, blue greyish green, smooth or with low papillae. Flowers 3 per cyme, 30 mm diam., petals 2 mm broad, pink, filamentous staminodes absent, filaments purple. Fruit 5-locular, base funnel-shaped, top a high turret, rims of valves forming protruding, high corners at outer margin of fruit when closed, crateriform in centre, covering membranes with protruding closing rodlets, closing body a small hook, expanding keels not touching at bases. July–Sept. Mainly granite and gneiss derived soils, NS, NH, WM (Port Nolloth to Bitterfontein and northern Bokkeveld). **(ece)**

gracilipes L.Bolus Shrub, with branches ± 300 mm long. Leaves ± round, blunt apically, smooth. Flowers in cymes, bracteoles on middle of pedicels. Flowers in cymes raised above vegetative parts, petals 2 mm broad, magenta, filamentous staminodes absent, filaments magenta. Fruit 5-locular, base funnel-shaped, top raised, rims low, covering membranes with distal closing ledges, closing body a small hook, expanding keels not touching at bases. Oct. Granite or gneiss derived soils, KB (Kamieskroon, poorly known). **(ece)**

holensis L.Bolus Shrub, ± 200 mm tall, internodes reddish, becoming brown. Leaves 3-sided, blunt apically, smooth. Flowers 1–3 per cyme, bracteoles above middle of pedicel, petals 2- or 3-seriate, 2 mm broad, magenta, filamentous staminodes absent, filaments pale pink, apically bright red. Fruit 5-locular, base deep, funnel-shaped, top raised, rims low, covering membranes convex from deeper centre of fruit, with prominent closing rodlets and a low rim at distal end, closing body a small, hollow hook, expanding keels short, diverging. Sept. Alluvium soils, KV (Lutzville, poorly known). **(ece)**

inconspicua L.Bolus Cushion-forming perennial, ± 150 mm tall, internodes grey with age. Leaves 3-sided, blunt apically, epidermal cells ± elevated, grey-green. Flowers solitary, 12 mm diam., petals 0.75 mm broad, white, filamentous staminodes present. Fruit 5-locular, base funnel-shaped, top with high rims, covering membranes convex, distally with long closing ledges, closing body reduced to a rim or hook-shaped, expanding keels short, diverging widely. Oct. On low hills, ?SN, G (?southern Lüderitz area, lower Gariep Valley). **(ece)**

karrachabensis L.Bolus Shrub, with branches ± 90 mm long, internodes maroon. Leaves 3-sided, tip blunt, epidermis smooth. Flowers l–3 per cyme, 16 mm diam., bracteoles near base of pedicel, petals in 5 groups, 0.75 mm broad, pink, filamentous staminodes pale pink, filaments pink apically. Fruit with a big tubercle. June–July. Gneissic granite derived soils, G, NH (Richtersveld to Komaggas). **(ece)**

laxiflora L.Bolus Loosely branched shrub, ± 500 mm tall, internodes red to maroon. Leaves roundish, blunt apically, epidermis smooth. Flowers in terminal and lateral cymes, bracteoles above middle of pedicels, petals 1 mm broad, pink, filamentous staminodes and filaments pink. Sept.–Oct. Fruit 5-locular, top elevated 1.5 mm. Granitic soils, G, NH, KM (Stinkfontein Mountains to Bitterfontein). **(ece)**

middlemostii L.Bolus Shrub, ± 400 mm tall, internodes grey-brown. Leaves 3-sided, with convex sides, papillate, yellowish green. Flowers solitary, bracteoles on middle of pedicel, sepals 6, petals 3-seriate, 0.5–1.25 mm broad, pink-magenta, filamentous staminodes present, filaments white, surface of gynoecium densely papillate. Fruit 6-locular, base elongate, funnel- to bell-shaped, with long papillae, top with low rims, covering membranes convex, closing rodlets large, almost touching the hook-shaped, small closing body, expanding keels ending in short awns. Sept. Shale to granite derived soils, G (Helskloof Pass to Rooiberg, poorly known). **(ece)**

mutata G.D.Rowley Shrub, ± 260–300 mm tall, internodes reddish. Leaves 3-sided, glabrous. Flowers 3 per cyme, petals pink, filamentous staminodes absent. Fruit 5-locular, closing bodies small, of placental origin, rims high, covering membranes with closing rodlets, expanding keels long, valve wings broad. Sept. In tillite, TS (Touwsrivier: N of Bontberg). **(ece)**

nieuwerustensis L.Bolus Prostrate perennial, with branches ± 100–150 mm long, rising at tips, internodes ochre. Leaves roundish, 25–30 × 6 mm, tip obtuse, pale green. Flowers 3 per cyme, 30 mm diam., bracteoles on middle of pedicels, petals 2.5 mm broad, magenta, filaments magenta. Fruit 5-locular. Granitic soils, NH (Nuwerus). **(ece)**

obtusa L.Bolus Shrub, ± 400 mm tall, internodes blackish brown. Leaves 20–45 × 5–8 mm, pale greyish green, keeled, epidermis smooth. Flowers l–3 per cyme, 18 mm diam., bracteoles forming a pouch around base, petals ± 1.5 mm broad, magenta, filamentous staminodes absent. Fruit 6-locular, base short, funnel-shaped, top raised, rims low, closing body hook-shaped. Sept. Rocky places with shallow soils, SN, G, NH (Klinghardt Mountains to Sannagas). **(ece)**

pallens L.Bolus Shrub, ± 600 mm tall, internodes grey. Leaves 3-sided to roundish, 35–50 × 4–5 mm, tip recurved, pale grey-green, basal sheath swollen. Flowers in cymes held clear of vegetative parts, bracteoles on middle of pedicels, petals 1 mm broad, pale pink, filamentous staminodes few, filaments white, apically pink. Fruit 5-locular. Oct. Coastal duneveld, NS (Port Nolloth, poorly known). **(ece)**

pinguis L.Bolus Shrub, ± 100 mm tall, branches ascending to erect. Leaves round to ± club- or sickle-shaped, 25–30 × ± 13 mm, grey-green, shortly papillate. Flowers in cymes, ± 22 mm diam., petals in 5 groups, 0.5(–1) mm broad, white, filamentous staminodes numerous, white. Fruit 5-locular. Granitic and gneissic soils, NH (Komaggas, poorly known). **(ece)**

pollardii Friedrich Shrub, ± 300 mm tall, internodes brown. Leaves club-shaped, 10–30 × 4–10 mm, surface powdery in texture. Flowers solitary, bracteoles at base of pedicel, sepals 6, petals in 6 groups, 1–1.5 mm broad, white, filamentous staminodes white. Fruit 6-locular, base funnel-shaped, top with low rims, covering membranes convex, closing rodlets pronounced, closing body slender, expanding keels ending in short awns. Sandstone or granitic soils, SN, G, NH (Klinghardt Mountains to E of Port Nolloth). **(ece)**

punctulata (L.Bolus) L.Bolus ex H.E.K.Hartmann Shrub, ± 100 mm tall, internodes ochre to pale grey. Leaves awl-shaped, 14 × ± 3 mm, with a recurved whitish tip, old leaves persisting, surface rough. Flowers solitary, ± 14 mm diam., bracteoles near base of pedicel, petals 3-seriate, 0.5 mm broad, magenta, filamentous staminodes pink, filaments pink. Fruit 5-locular, base funnel-shaped, top with low rims, covering membranes convex with closing rodlets at their outer rim, closing body a small hook, expanding keels not touching basally, valve wings absent. Oct.–Dec. Sandstone soils at high altitudes, WM (Calvinia District, Wolfberg and Baviaansberg).

ruschiana (Dinter) Dinter & Schwantes Shrub, ± 600 mm tall. Leaves club-shaped, ± 40 × 9 mm, dark blue-green, pale grey when dry, epidermal cells ± raised. Flowers in rich cymes, bracteoles boat-shaped, petals purple. Fruit 5-locular, base funnel-shaped, top raised, low rims, covering membranes convex, distal closing rodlets protruding, closing body a small hook, expanding keels touching basally. Aug.–Sept. ?Habitat, SN (Klinghardt Mountains to Jakkals Mountains). **(ece)**

sandbergensis L.Bolus Shrub, ± 160 mm tall. Leaves 3-sided, club- to sickle-shaped, ± 30 × 6 mm, 15 mm thick, smooth. Flowers solitary, 50–60 mm diam., pedicels compressed, petals 3- or 4-seriate, ± 2.5 mm broad, mostly pale salmon, filamentous staminodes absent, filaments bright yellow. Fruit 5-locular. Granitic or quartz-rich soils, NS, NH (Komaggas and S near Riethuis). **(ece)**

semiglobosa L.Bolus Shrub, ± 200 mm tall. Leaves roundish, 18–32 × 8 mm, epidermal cells a little elevated. Flowers 1–3 per cyme, petals 1.25 mm broad, magenta, filamentous staminodes absent. Fruit 5-locular, base bell-shaped, top raised, valve rims very low (turret-shaped), covering membranes convex, distal closing rodlets large, closing body small, expanding keels diverging. Aug. Riverbanks, KV (Klawer). **(ece)**

senaria L.Bolus Shrub, with branches ± 300 mm long, internodes blackish grey. Leaves round to club-shaped, 20–35 × 5–8 mm, sea-green, tip blunt, surface long-papillate and velvety. Flowers solitary, 26–30 mm diam., sepals 6, petals 1 mm broad, magenta, filamentous staminodes and filaments arranged in pitcher-shape, apically purple, basally pink. Fruit 6-locular. Granitic derived soils, SN, G, NS, NH (Namibia: Witpütz to Springbok, and Port Nolloth). **(ece)**

solitaria L.Bolus Shrub, ± 250 mm tall. Leaves 3-sided to roundish, 15–32 × 3–5 mm, tip blunt, mucronate. Flowers 1–3 per cyme, bracteoles midway along pedicels, sepals 5(6), 0.5–0.75 mm broad, petals 1–3-seriate, 0.5–0.75 mm broad, reddish purple, filamentous staminodes present, filaments white. Fruit 5(6)-locular, base funnel-shaped, top moderately high, covering mem-

branes convex, closing rodlets big and protruding, closing body small, expanding keels distant from each other below. July. ?Habitat, KV (NE of Bitterfontein, Koekenaap). **(ece)**

subpaniculata L.Bolus Erect shrub, up to 300 mm tall. Leaves subterete, up to 30 × 3 mm. Flowers in many-flowered cymes, pink, petals 6 mm long. Fruit 5-locular. Aug.–Sept. Coastal sands, NS, CCR (Holgatrivier to Lambert's Bay). **(gce)**

testacea L.Bolus Shrub, with branches ± 240 mm long, internodes pale red to maroon. Leaves sickle- to crescent-shaped or ± round, 35–55 × 6 mm, pale sea-green, smooth. Flowers in terminal and lateral cymes, petals 1 mm broad, brick-red, filamentous staminodes few to absent. Fruit 5-locular, base funnel-shaped. Sept. Granitic soils, NH, KV (Nuwerus). **(ece)**

tribracteata L.Bolus Shrub, ± 300 mm tall. Leaves 3-sided to roundish, 30–40 × 5 mm, pale green, smooth. Flowers in cymes, ± 14 mm diam., bracteoles on lower half of pedicels, petals in 5 groups, reflexed, magenta, filamentous staminodes magenta, filaments apically magenta. ?Fruit. Aug. Granitic soils, NH (Koperberg). **(ece)**

vanheerdei L.Bolus Shrub, with decumbent branches ± 300 mm long, internodes reddish ochre, grey to white with age. Leaves roundish, 30–40 × 6–8 mm, smooth. Flowers in cymes, bracteoles midway along pedicel, petals 3- or 4-seriate, 0.5–2 mm broad, white, upper bracteoles forming a pouch, filamentous staminodes absent, filaments white. Fruit 5-locular, base elongate, funnel-shaped, top turret-shaped, covering membranes with distal, protruding closing rodlets, closing body a hook, expanding keels well separated basally. Sept. Aeolian sands and granitic soils, G, NS (Richtersveld, Rooiberg, Port Nolloth). **(ece)**

versicolor L.Bolus Shrub, with ascending branches ± 300 mm long. Leaves roundish, 95 × 8 mm, tip acute, grey-green, sheathing base swollen. Flowers in rich cymes, petals 1.5 mm broad, pink, withering reddish, filamentous staminodes white, apically pink, filaments becoming reddish gold. Fruit base elongate, funnel-shaped, top broader than upper rim of base, raised but with low rims, covering membranes convex, closing rodlets protruding, closing body hook-shaped, expanding keels almost touching each other basally. Sept.–Oct. In aeolian sands, NS (Hondeklipbaai). **(ece)**

viridifolia L.Bolus Shrub, with branches ± 60–120 mm long. Leaves roundish, 20–40 × 4–7 mm, ending abruptly with a sharp tip, smooth. Flowers 3–5 per cyme, petals 2 mm broad, magenta, filamentous staminodes absent, filaments purple. Fruit 5-locular, base funnel- to bell-shaped, covering membranes with big closing rodlets at distal ends, closing body narrowly oval. Aug.–Nov. A range of soil types, G, NS, NH, KV (southern Richtersveld to Vanrhynsdorp). **(ece)**

[**Species excluded Ruschia acuminata** L.Bolus, **R. acutangula** (Haw.) Schwantes, **R. breekpoortensis** L.Bolus, **R. brevipes** L.Bolus, **R. callifera** L.Bolus, **R. deminuta** L.Bolus, **R. dilatata** L.Bolus, **R. kuboosana** L.Bolus, **R. muelleri** (L.Bolus) Schwantes, **R. namusmontana** Friedrich, **R. primosii** L.Bolus, **R. sessilis** (Thunb.) **H.E.K.Hartmann**, and **R. valida** Schwantes are insufficiently known for inclusion here.]

RUSCHIANTHUS 1 sp., Namibia: Rosh Pinah **(ece)**

falcatus L.Bolus Compact, dwarf succulent, with up to 10 branches. Leaves erect to spreading, falcate, very shortly connate at base, spreading diagonally, 30–45 × 5–6 mm, up to 18 mm thick, greyish green, smooth. Flowers solitary, rarely 2, bracteolate, closely surrounded by leaves so not opening widely, petals greenish to pale yellow. Fruit 5-locular. Sept.–Nov. On dolomite outcrops in crevices, 1 200–1 400 m, G (Rosh Pinah). **(ece)**

RUSCHIELLA 4 spp., N and W Cape **(gce)**

cedrimontana Klak Diffusely branched, succulent shrub, 300–500 mm tall, with woody stems. Leaves subcircular in cross section, very shortly fused towards bases, bright green tinged with red towards tips, 5–10 × ± 2 mm, ± 2 mm thick. Flowers 3 together, ± 10 mm diam., pink, staminodes in a central cone. Fruit 5-locular. Aug.–Sept. Sandstone slopes, 750–1 000 m, TS, CCR (Clanwilliam, Cederberg Mountains and Tanqua Karoo). **(gce)**

SCHLECHTERANTHUS 2 spp., Richtersveld and northern Namaqualand **(ece)**

hallii L.Bolus Densely branched, succulent shrub, up to 400 mm tall. Leaves connate to opposite ones for about half their length, free parts erect to spreading, apiculate, smooth, 20–30 mm long,

8 mm thick. Flowers solitary, 20–25 mm diam., petals white to pink, filamentous staminodes numerous. Fruit 11- or 12-locular, valve wings narrow, closing bodies oval. May–July. On N-facing quartzitic slopes, G (Richtersveld). **(ece)**

maximiliani Schwantes Very similar to **S. hallii** but leaves 10–18 mm long and fruit mostly 10-locular. June. On S-facing quartzitic slopes, NS (Augrabies). **(ece)**

SCHWANTESIA 11 spp., southern Namibia to N Cape

acutipetala L.Bolus Compact, dwarf succulent. Leaves erect to spreading, trigonous, broadening only a little from base, broadest at ± 4/5 of their length, apically triangular, symmetrical when young, becoming asymmetrical when starting to flower, 25–50 × 13–18 mm. Flowers solitary, 38–45 mm diam., petals yellow, often white basally, filamentous staminodes absent, stamens in a central column, rims of later valves well visible as high ridges between which the stigmas arise in the centre. Fruit with high valve rims rising towards centre where they leave a cavity from which the stigmas have disappeared, without closing bodies, 5-locular. July. In crevices of quartzitic rocks, G (Warmbad to Richtersveld).

herrei L.Bolus Compact, dwarf succulent. Leaves erect to spreading, trigonous, narrowing from a broad base, symmetrical when young, becoming asymmetrical when starting to flower, 19–30 × 12–16 mm. Flowers solitary, ± 35 mm diam., petals yellow, often white basally, filamentous staminodes absent, stamens in a central column. Fruit with valve rims up to 2 mm high, central cavity less deep than in **S. acutipetala**, without closing bodies, 5-locular. May–Oct. In crevices of quartzitic ridges, G (Richtersveld). **(ece)**

loeschiana Tischer Similar to **S. herrei** but leaves shorter (14–24 × 10–17 mm). Fruit with low rims up to 1.2 mm high, meeting centrally and lacking the central cavity. Nov. On steep slopes among quartzitic rocks, SN (S of Lüderitz to Lorelei). **(ece)**

speciosa L.Bolus Compact, dwarf succulent. Leaves erect to spreading, trigonous, broadening subapically, keel and margins sharp, symmetrical when young, becoming asymmetrical when starting to flower, 26–31 × 13–17 mm. Flowers solitary, 24–30 mm diam., petals orange, filamentous staminodes absent, stamens in a central column. Fruit with valve rims up to 2 mm high, meeting in centre so without a central cavity, closing bodies absent, 5-locular. June. In crevices of yellow quartz, G (between Jakkalswater and Umdaus). **(ece)**

SCOPELOGENA 2 spp., Namaqualand and W Cape **(gce)**

bruynsii Klak Succulent shrub, up to 300 mm tall, 1 m wide, with stout, erect or spreading stems. Leaves crowded, shortly connate to opposite ones at base, incurved, erect, 3-angled to cylindrical, 16–50 mm long, 5–8 mm diam. Flowers in a much-branched inflorescence, yellow, salmon or pale pink; filamentous staminodes few and conically arranged with stamens. Fruit 5-locular, without closing bodies. Sept.–Oct. Low sandstone cliffs, NH, KV, TS, CCR (Namaqualand to Clanwilliam and Tanqua Karoo). **(gce)**

STOEBERIA 6 spp., southwestern Namibia, N and W Cape

arborea Van Jaarsv. Large, succulent shrub, up to 3.5 m tall. Leaves club-shaped, 20–30 mm long, blue-green. Flowers 5–7 mm diam., white, nectary a ring. Fruit a capsule, 5 mm wide, closing bodies absent, seeds pear-shaped. Aug.–Sept. Uplands amongst rocks, SN, G, NH (southern Namibia, Richtersveld to Kamieskroon). **(ece)**

beetzii (Dinter) Dinter & Schwantes Succulent shrub, up to 0.5 m tall. Leaves club-shaped, 30–35 mm long, grey-green. Flowers 6–8 mm diam., white, nectary a ring. Fruit a capsule, 7–9 mm wide, closing bodies present, seeds pear-shaped or slightly flat, dark brown. Aug.–Sept. Sandy coastal flats, SN, NS (Elizabeth Bay to Hondeklipbaai). **(ece)**

carpii Friedrich Succulent shrub, up to 1.5 m tall. Leaves broadly club-shaped, 60–90 mm long, whitish grey. Flowers 30–35 mm diam., white, nectary a ring. Fruit a capsule, 7–10 mm wide, closing bodies absent, seeds pear-shaped, dark yellow with dark brown elevations. Aug.–Sept. Amongst rocks on mountains, SN, G (southern Namibia to northern Richtersveld). **(ece)**

frutescens (L.Bolus) Van Jaarsv. Succulent shrub, up to 1.5 m tall. Leaves linear to club-shaped, 30–50 mm long, grey-green, leaf base fused for ± half to three quarters of their length. Flowers

10–12 mm diam., white, nectary a ring. Fruit a capsule, 7–10 mm wide, closing bodies present, seeds flat, brown. Aug.–Sept. Sandy to gravelly flats, SN, G, NS, NH, KB, KV (southern Namibia to near Gifberg). **(ece)**

gigas (Dinter) Dinter & Schwantes Succulent shrub, up to 0.8 m tall. Leaves club-shaped, 35–40 mm long, brown-green to green. Flowers 6–9 mm diam., white, nectary a ring. Fruit a schizocarp, becoming a fibrous basket-like skeleton, ± 4 mm wide, closing bodies present, seeds yellow, imbedded within mericarps. Aug.–Sept. Sandy pockets amongst rocks, SN, G (southwestern Namibia to Noordoewer).

utilis (L.Bolus) Van Jaarsv. Large, succulent shrub, up to 2 m tall. Leaves club-shaped, 10–40 mm long, grey-green. Flowers 10–12 mm diam., white, nectary a ring. Fruit a capsule, 5–7 mm wide, closing bodies absent, seeds pear-shaped, yellow. Aug.–Oct. Sandy to gravelly coastal flats, NS, NH, KV, CCR (Alexander Bay to Velddrif). **(gce)**

STOMATIUM 39 spp., Namaqualand to W Cape and Karoo

alboroseum L.Bolus Compact and semi-globose, dwarf succulent or flattish and forming mats with age, depending on soil depth. Leaves spathulate-trigonous, 20–25 × ± 10 mm, ± 7 mm thick, keel inconspicuous and almost smooth, margins undulate, with small, white, teeth-like warts, epidermis very rough. Flowers on short stalks, petals white to pink. Fruit 5-locular, base ± semi-globose. Aug.–Dec. On flats or in pans with a high content of lime, NH (Namaqualand and southwestern Bushmanland).

difforme L.Bolus (including **S. resedolens** L.Bolus) Compact to caespitose, dwarf succulent. Leaves spathulate to trigonous, broadened subapically, up to 26 × 16 mm, 9 mm thick, margins with 3–6(–18) teeth, keel smooth. Flowers on short stalks, petals yellow, apically red. Sept. In pockets of shallow gravel on bare dolerite sheets, WM, TS (Sutherland to Laingsburg). **(ece)**

loganii L.Bolus Like **S. difforme** but keels almost smooth, margins with 2 or 3 teeth. Sept. ?Habitat, TS (Laingsburg: Klein Roggeveld). **(ece)**

meyeri L.Bolus Like **S. alboroseum** but fruit with placenta raised by a false septum. May. On quartzite gravel and granite, NH (Steinkopf to Kliprand). **(ece)**

mustelinum (Haw.) Schwantes Compact, dwarf succulent, developing short, thickish stems with age. Leaves spreading widely, with only upper leaf surface visible, 15–20 × 8–22 mm, 4.5–7 mm thick, margins toothed, epidermis only a little rough. Flowers on short stalks, 25–30 mm diam., petals yellow. Fruit base semi-globose, placenta raised by a false septum, 5-locular. Sept. On bare shaley patches, WM (Loeriesfontein to Calvinia). **(ece)**

pluridens L.Bolus Like **S. alboroseum** but leaves erect with prominent big teeth on margins. June–Sept. On slopes with big round stones, NH (Pofadder to Kamiesberg Mountains).

suaveolens (Schwantes) Schwantes Compact, flat to semi-globose, dwarf succulent. Leaves spathulate with a thick, prominent chin at apex, 10–20 × 9–15 mm, 7–9 mm thick, tips almost semi-lunate as seen from above, keels and teeth inconspicuous, epidermis rough from numerous elevations. Flowers on short stalks, petals yellow. Fruit base bowl-shaped, breaking off stalk when ripe, 5-locular. July. In shallow pans, WM (Williston, Sutherland, Fraserburg).

suricatinum L.Bolus Low, tufted, dwarf succulent. Leaves almost erect, trigonous, 25–30 × 7–8 mm, 6 mm thick, epidermis moderately rough, margins 4- or 6-dentate. Flowers on short pedicels, lemon-yellow, ± 20 mm diam., nocturnal. May–Oct. At 350–1 130 m, TS, CCR (Laingsburg to Little Karoo). **(gce)**

TANQUANA 3 spp., Tanqua Karoo to Little Karoo **(gce)**

archeri (L.Bolus) H.E.K.Hartmann & Liede Compact, dwarf succulent, sunken into the ground, ± 10-branched. Leaves equal or a little unequal, 20–25 mm long, thick with rounded tips, punctate through presence of specialised cells below epidermis. Flowers solitary, bracteolate, petals yellow. Fruit 9- or 10-locular, with small closing bodies. Apr.–May. On shaley slopes, TS (Matjiesfontein, Tanqua Karoo). **(ece)**

prismatica (Schwantes) H.E.K.Hartmann & Liede Similar to **T. archeri** but plant positioned above ground, up to 30-branched, leaves unequal, 25–40 mm long, new leaf-pairs developing peripherally, and fruits borne in centre of plant. Mar.–May. On shale flats or slopes, TS (southern Tanqua Karoo). **(ece)**

TITANOPSIS 3 spp., Namibia to N Cape and Free State

hugo-schlechteri (Tischer) Dinter & Schwantes Similar to **T. schwantesii** but warts flat on top, translucent, not pearly. Aug. In red sand overlaying limestone or in limestone flats, NH (Warmbad to eastern Namaqualand and into Bushmanland).

schwantesii (Schwantes) Schwantes Compact, dwarf succulent, slightly sunken into the ground to well above the ground, rootstock 6–10-branched. Leaves 4–8 per branch, forming a rosette, 20–25 mm long, triangular, with a regular pattern of fine warts on tips, warts resembling densely packed pearls. Flowers 1–3, ebracteolate, 6 calyx lobes, petals yellow. Capsule stalked, 6-locular, soon breaking away and dispersing by tumbling, closing bodies present in northern populations. Aug. Limestone or quartzitic flats, NH (Klein Karas to eastern Namaqualand into Bushmanland).

TRICHODIADEMA DIADEMVYGIE 34 spp., southern Namibia to W Cape and Free State

mirabile (N.E.Br.) Schwantes Erect, succulent shrublet, up to 80 mm tall, branches densely white-hairy. Leaves connate basally, subcylindrical, 12–26 × 4–6 mm, fresh green, papillate, with apical hairs. Flowers subsessile, white, up to 40 mm diam. Fruit 6-locular. Nov.–Jan. Stony slopes, TS, CCR (Laingsburg to Uitenhage). **(gce)**

VANHEERDIA 2 spp., Namaqualand **(ece)**

primosii (L.Bolus) L.Bolus ex H.E.K.Hartmann Compact, dwarf succulent, sunken into the ground. Leaves anisophyllous, yellowish green, with a flattened, windowed top, margins and keel line with rows of teeth, papillate except for windows. Flowers 1–3, < 25 mm diam., petals golden yellow. Fruit mostly 10-locular, < 8 mm diam. ?Flowering time. Along the edge of the winter rainfall area on flats of highly decomposed limestone, NH (Gamoep to N of Kliprand). **(ece)**

roodiae (N.E.Br.) L.Bolus ex H.E.K.Hartmann Similar to **V. primosii** but plant mostly well above ground level, leaves markedly hunched, mostly keeled, without windows, flowers up to 45 mm diam. and fruits > 8 mm diam. Sept.–Oct. Along the edge of the winter rainfall region, on flats or slopes with coarse gravel and calcareous pebbles, NH, WM (Kliprand area). **(ece)**

VANZIJLIA 1 sp., southern Namaqualand to Vredendal **(gce)**

annulata (A.Berger) L.Bolus Small, succulent shrub, with a compact centre and long climbing to straggling branches. Leaves differing in shape, first leaf-pair on a branch connate for more than half its length, subsequent ones fused for less than half their length, smooth. Flowers terminal on long-shoots, solitary, 25–40 mm diam., petals white. Fruit 9–12-locular, valve wings broad, closing bodies large. July–Aug. On coastal sands and on loam over calcareous soils, NS, NH, KV, CCR (from N of Hondeklipbaai to Lambert's Bay). **(gce)**

WOOLEYA 1 sp., Namaqualand **(ece)**

farinosa (L.Bolus) L.Bolus Densely leaved, succulent shrub, up to 500 mm tall, 700 mm wide. Internodes shorter than leaves. Leaves terete and apically rounded, clavate, ± 30 mm long, 10 mm thick, grey from a thick wax covering, often covered by a ?black lichen. Flowers solitary, white to pale pink, filamentous staminodes collected into a cone around stamens. Fruit (9–)12(–16)-locular, short-stalked, valve wings present, closing bodies absent. July. Sandy soils near the sea, NS (Port Nolloth, Kleinsee, Hondeklipbaai). **(ece)**

AMARANTHACEAE (including *CHENOPODIACEAE*)

by L. Mucina and D.A. Snijman

1. Tepals dry and ± scarious; leaves entire (subfamily AMARANTHOIDEAE):
   2. Flowers unisexual; plants monoecious or dioecious; tepals glabrous . . . . . **Amaranthus**
   2.' Flowers bisexual:

3. Tepals glabrous; flowers in hairless spikes or capitula ..... **Hermbstaedtia**
3.' Tepals villous; flower clusters densely silky:
4. Bracts ovate, ± inconspicuous, the lowest ± 4 mm long ..... **Calicorema**
4.' Bracts lanceolate, conspicuous, the lowest ± 6 mm long ..... **Sericocoma**
1.' Tepals herbaceous; leaves entire or variously toothed or pinnatifid (subfamily CHENOPODIOIDEAE):
5. Embryo spiral; perisperm absent; perianth often accrescent with wings or spines:
6. Bracteoles at base of flowers scarious, small ..... **Suaeda**
6.' Bracteoles large, surrounding the flower in bud:
7. Leaves and bracteoles without an aculeolate apex; leaves with a swelling at the base; shrubs and subshrubs ..... **Caroxylon**
7.' Leaves and bracteoles with an aculeolate apex; leaves not swollen at base; annual herbs. ..... **Kali**
5.' Embryo annular or curved, rarely straight, perisperm usually abundant; perianth rarely accrescent or if accrescent with wings or spines then ebracteolate:
8. Free part of leaf reduced to a scale or tubercle:
9. Leaves alternate, amplexicaul; stems entire; flowers in axils of spirally arranged bracteal scales; perianth tube 3-dentate at apex ..... **Halopeplis**
9.' Leaves opposite, connate; stems articulate; flowers with opposite bracts; perianth 3- or 4-lobed:
10. Flowers 3 per cyme, rarely 2 or 1, unequally sized, arranged in a triangle ..... **Salicornia**
10.' Flowers 3–7(–12) per cyme, equally sized, arranged in a row ..... **Sarcocornia**
8.' Leaves well-developed, not reduced to tubercles or scales:
11. Flowers usually bisexual or sometimes intermixed with pistillate ones, if unisexual then ebracteolate and with a perianth:
12. Leaves usually broad, distinctly petiolate; plants usually with vesicular or glandular hairs ..... **Chenopodium**
12.' Leaves narrow, linear oblong without a distinct petiole; plants with simple hairs:
13. Perennial, mat-forming herb, with rooting stems ..... **Chenolea**
13.' Annual herbs or perennial subshrubs, without rooting stems:
14. Flowers solitary or in spicate inflorescences, perianth urn-shaped; fruiting perianth without appendages or with wings or spines ..... **Bassia**
14.' Flowers usually solitary or in pairs in leaf axils; perianth flat to cup-shaped; fruiting perianth hardened and winged ..... **Maireana**
11.' Flowers bracteolate, usually unisexual; pistillate flowers usually without perianth:
15. Bracts enveloping the fruit spongy or flap-like ..... **Atriplex**
15.' Bracts becoming slightly succulent:
16. Inflorescence leafy throughout; flowers in axillary clusters; pericarp of fruit thin ..... **Exomis**
16.' Inflorescence not leafy; flowers in naked, terminal inflorescences; pericarp of fruit thick ..... **Manochlamys**

AMARANTHUS ± 60 spp., tropical and warm temperate

dinteri Schinz Decumbent or erect annual herb, up to 400 mm tall, usually much-branched below, subglabrous or ± puberulous, stems leafy throughout. Leaves obovate to elliptic, sometimes with a central purplish blotch. Flowers minute, in dense axillary clusters, extending to near base of stem, whitish with green midrib. Fruit ovoid to rounded, ± coarsely wrinkled above. Jan.–May. Disturbed habitats, WM, TS, CCR (widespread from Namibia and Botswana to Little Karoo).

schinzianus Thell. Prostrate or erect annual herb, 30–500 mm tall, branched from below, glabrous, with stems appearing leafy up to apex. Leaves linear-oblanceolate. Flowers minute, in axillary cymose clusters, white with green midrib. Fruit obovoid to obconical, coarsely warted in upper part. Apr. In disturbed habitats, TS (Namibia to inland southern Africa to southern Karoo).

ATRIPLEX (= *BLACKIELLA*) SALTBUSH ± 300 spp., sub-cosmopolitan, particularly species-rich in dry warm temperate and subtropical regions

bolusii C.H.Wright (= *A. cinerea* sensu auct.) GREY SALTBUSH Greyish, scaly, monoecious or dioecious shrub, up to 5 m tall. Leaves elliptic-ovate to linear-lanceolate, entire or rarely ± sinuate-serrate. Flowers terminal and pyramidal-paniculate or axillary and arranged like a string of beads. Fruiting bracts with a hard stipe, roundish to broadly rhomboidal and weakly trilobed in upper part, hard and inflated in centre. May–June. Edges of salt marshes and in seasonal washes, sometimes cultivated for fodder, SN, G, NS, NH, TS, CCR (widespread, endemic to southern Africa).

***eardleyae** Aellen Monoecious, decumbent to erect, short-lived, perennial herb, up to 300 mm tall. Leaves elliptic to orbicular, ± 10 mm long, entire; base cuneate. Male flowers in small glomerules in distal leaf axils. Female flowers in scattered glomerules along branches. Fruiting brac-

teoles with a compressed, narrow campanulate to deltoid tube, ± 1–2 mm long; tube with a pair of small leaf-like appendages on adaxial surface near base or these sometimes lacking. May–June. Disturbed road verges, abandoned fields, G, NH, WM, CCR (alien in southern Africa, native to arid regions of Australia).

*__lindleyi__ Moq. (= *Blackiella inflata* (F.Muell.) Aellen) BLASIESOUTBOS, SPONGE-FRUIT SALTBUSH Monoecious, grey-mealy, rounded, short-lived herb, up to 300 mm tall. Leaves narrowly elliptic to obovate, toothed. Flowers in axillary clusters. Fruiting bracts triangular, fused into an inflated bladder, up to 12 mm long. May–Oct. Dry stony flats and disturbed sites, G, NS, NH, KV, WM, TS, CCR (widespread alien weed in southern Africa, native to arid regions of Australia).

*__nummularia__ Lindl. OLD MAN SALTBUSH Greyish green, predominantly dioecious shrub, up to 3 m tall, with creamy white stems. Leaves oval to triangular. Male flowers in separate glomerules arranged in panicles. Female flowers in compact clusters arranged in panicles. Fruiting bracteoles enlarging and surrounding seed, fan-shaped, attached at base only. ?July–Oct. Originally introduced as animal forage but now invasive, especially on saline alluvia of intermittent rivers, G, NS, NH, KV, CCR (widespread in semi-arid regions of southern Africa, native to Australia).

*__semibaccata__ R.Br. CREEPING SALTBUSH, KRUIPSOUTBOS Monoecious, grey-mealy, sprawling perennial herb, up to 300 mm tall. Leaves elliptic-obovate, often coarsely toothed, glabrescent above. Flowers minute in axillary clusters. Fruiting bracteoles rhomboid, free to ± near base, red, fleshy. Mainly Sept.–Dec. Disturbed habitats, SN, NS, NH, KV, TS, CCR (native to Australia, widespread weed in southern Africa).

__suberecta__ I.Verd. Monoecious, annual or perennial herb, with a subwoody base, up to 750 mm tall, with decumbent to erect branches, ± covered with swollen-based clear scale-like hairs. Leaves ovate to rhomboid, cuneate at base, coarsely sinuate-dentate, mealy above, scaly beneath. Flowers minute in axillary clusters. Fruiting bracteoles stipitate at base, broadly deltoid above, with apical lobes, ± bony. Sept.–Mar. Seasonally damp habitats, SN, G, KV, WM (widespread through southern Africa to Zimbabwe).

__vestita__ (Thunb.) Aellen (= *Atriplex halimus* C.H.Wright non L.) Monoecious, silvery mealy subshrub, up to 600 mm tall. Leaves oblanceolate. Flowers clustered in elongate spikes. Fruiting bracts subrotund, 10–15 mm long, softly papery, glabrescent and warty. Mainly Aug.–Dec. Saline flats and stream banks, SN, G, NS, NH, KV, WM, CCR (widespread in southern Africa).

__sp. A__ (= *A. patula* L. subsp. *austroafricana* Aellen) Prostrate or ascendant, grey-mealy annual herb, up to 500 mm tall. Leaves lanceolate to rhomboid, coarsely toothed to lobed below, glabrescent above. Flowers clustered in elongate spikes, whitish; fruiting bracts rhomboid, often with small horns, up to 2 mm long. Nov.–Apr. Sandy soils on edges of estuaries, wet interdune depressions and beaches, NS, CCR (seaboards of Atlantic and Indian Oceans from Namibia to Mozambique, endemic to southern Africa).

[__Introduced species__ __Atriplex hortensis__ L. and __A. muelleri__ Benth. have been recorded as weeds of disturbed places but neither is considered to be naturalised yet.]

__BASSIA__ (= *CHENOLEOIDES*) ± 20 spp., W Mediterranean, Africa to E Asia

__dinteri__ (Botsch.) A.J.Scott (= *Chenoleoides dinteri* (Botsch.) Botsch.) Dwarf shrub, like __Bassia salsoloides__ but leaves ovate and fruiting perianth without appendages. May–Sept. Gravelly-sandy desert plains close to the sea, SN, G (Sperrgebiet and S of Alexander Bay). **(ece)**

__salsoloides__ (Fenzl) A.J.Scott BASTERINKBOS Shrub, 0.4–1.6 m tall, with spreading shortly woolly branches. Leaves linear to filiform, succulent, ± pubescent. Flowers in tight short spike-like clusters, without bracteoles, perianth pubescent. Fruiting perianth enlarging into short firm brown-streaked wings, with irregularly toothed margins. Mar.–July. In sandy alluvial soils along water courses and seasonal washes, TS (Matjiesfontein to Beaufort West further N to Free State).

__CALICOREMA__ 2 spp., Namibia and N Cape

__capitata__ (Moq.) Hook.f. ASBOS, BLOUASBOS Rigid, much-branched, sparsely leafy subshrub, 0.5–1.5 m tall, with ± spreading lateral branches, very shortly white-woolly when young. Leaves confined to new growth, alternate, linear, 5–20 × 1–1.5 mm, succulent. Flowers few, in terminal capitate clusters, tepals densely white-silky on back, stamens purple. Sept.–Feb. Along dry washes and mountains slopes, SN, G (Namibia and from eastern Richtersveld to Gordonia).

squarrosa (Schinz) Schinz Rigid, much-branched, sparsely leafy subshrub, ± 0.6 m tall, with ± upright lateral branches, very shortly white-woolly when young. Leaves confined to new growth, alternate, elliptic, 5–19 × 2–4 mm, succulent. Flowers many, in short spikes, tepals densely white-silky on back, stamens reddish. Mar.–June. In dry streambeds, SN (central to southern Namibia).

CAROXYLON (= *SALSOLA* in part) SALTWORT ± 130–150 spp., southern Africa, the Mediterranean, Arabia, Pakistan, India, central Asia and China

A. Branches, leaves and flowers opposite or ± opposite

sp. A (= *Salsola adversariifolia* Botsch. Like **Sp. B** but leaves, bracteoles and perianth densely covered with persistent, appressed, straight, thickish hairs, perianth segments glabrous below wings. Jan. In shallow pans near river, KV (Soutrivier near Vanrhynsdorp). **(ece)**

sp. B (= *Salsola contrariifolia* Botsch.) Erect, branched shrub, ?height, with ± opposite branches, leaves and flowers, covered with short, spreading, crisped, entangled hairs, young branches 4-angled, perianth segments pubescent below wings, wings of fruit large, chaffy. ?Flowering time. Succulent shrublands on lime-rich soils, NH (Bitterfontein area). **(ece)**

sp. C (= *Salsola decussata* C.A.Sm. ex Botsch.) Shrub, ± 500 mm tall, with ± opposite branches, leaves and flowers. Leaves with appressed hairs, becoming glabrous, wrinkled when dry, floral leaves as long as bracts or shorter. Flowers in compact spikes, tepals conical-connivent above wings, outer sepals pubescent. Fruit without wings. July. Succulent shrublands, KV (E of Vanrhynsdorp). **(ece)**

sp. D (= *Salsola esterhuyseniae* Botsch.) Shrub, ± 300 mm tall. Leaves opposite, scale-like. Flowers in short, spike-like inflorescences, only some flowers at apex with imbricate, inward-folded, scale-like leaves below bracteoles, the others sessile with only 2 bracteoles and a floral leaf, tepals conical-connivent and shortly pubescent above wings, sometimes glabrous, wings chaffy. Fruit winged. Nov. Succulent shrublands, ?NH, KV (between Bitterfontein and Vanrhynsdorp). **(ece)**

sp. E (= *Salsola geminiflora* Fenzl ex C.H.Wright) Shrub, ± 250 mm tall, ± erect, with ± opposite branches and leaves. Leaves and bracteoles covered with sparse hairs, soon glabrescent, floral leaves half as long as bracteoles, wings large, chaffy. Flowers in short, spike-like inflorescences. Fruit winged. July. Succulent shrublands on skeletal soils, KV, WM (Vanrhynsdorp, Calvinia, Williston to Free Sate).

A.' Branches, leaves and flowers alternate

aphyllum (L.f.) Tzvelev (= *Salsola aphylla* L.f.) ASBOSSIE Shortly hairy, grey shrub, up to 1.2 m tall, with alternate branches, leaves and flowers. Leaves scale-like, fleshy, wrinkled when dry, with straight appressed hairs, soon becoming glabrous, floral leaves all equal in length to bracteoles or shorter. Flowers solitary in upper axils, sessile, furnished with only 2 bracteoles and a floral leaf, minute, tepals conical-connivent above wings. Fruit broadly winged. Dec.–Feb. Karoo shrublands on stony soils; often collected in saline habitats, SN, G, NS, NH, WM, TS, CCR (Namibia and Karoo to Uitenhage).

zeyheri Moq. (= *Salsola zeyheri* (Moq.) Bunge) VAALGANNA Shrub, up to 500 mm tall. Leaves of buds with an attenuate tip half as long as sheathing part of leaf, pubescence long, crisped, floral leaves ovate, shorter than bracteoles. Flowers sessile, with only 2 bracteoles and a floral leaf, perianth ± 4.5 mm long, segments above wings pubescent throughout their whole length. Aug.–Sept. Succulent shrublands on sandy-loamy soils derived from shales, G, NS, NH, KV (Richtersveld to around Vanrhynsdorp). **(ece)**

sp. F (= *Salsola araneosa* Botsch.) Scaly leaved shrub, up to 500 mm tall, with alternate branches, leaves and flowers. Leaves long-pubescent, of crisped or flexuose, entangled hairs, those of buds with an attenuate tip half as long as sheathing part, floral leaves ovate and ± half as long as bracteoles. Flowers sessile, with only 2 bracteoles and a floral leaf, tepals conical-connivent and pubescent above wings, with glabrous tips. Fruit winged. Oct. Sparse semi-desert shrublands, SN (Sperrgebiet: Klinghardt Mountains). **(ece)**

sp. G (= *Salsola arborea* C.A.Sm. ex Aellen) Woody, scaly leaved shrub, 1–3.5 m tall, with alternate branches, leaves and flowers. Leaves persistently pubescent, with short straight appressed hairs, floral leaves all equal in length to bracteoles or shorter, bracteoles broadly chaffy margined at apex and edges. Flowers sessile, with only 2 bracteoles and a floral leaf, tepals pubescent over whole upper surface below wings, conical-connivent and ± appressed-pubescent above wings.

Fruit winged. Aug.–Sept. Saline sandy and clayey alluvia of intermittent rivers and desert washes, SN (central Namibia to N of Lüderitz to S of Aus).

sp. H (= *Salsola atrata* Botsch.) Divaricately branched shrub, ± 200 mm tall, with branches, leaves and flowers alternate. Leaves scale-like, becoming blackish when dried, each with a spur-like attenuated swelling at base, densely covered with short, straight appressed hairs. Perianth segments conical-connivent above wings. ?Flowering time. Succulent shrublands on dry stony hills and in depressions rich in lime and salt, NH (Bitterfontein area). **(ece)**

sp. I (= *Salsola ceresica* Botsch.) Scaly leaved shrub, ± 500 mm tall, with alternate branches, leaves and flowers, young twigs reddish. Leaves with an attenuate, terete, fleshy tip, covered with ± long non-appressed hairs, floral leaves with a spur-like swelling at base. Tepals conical-connivent above wings, covered with ± long non-appressed hairs. Fruit winged. June. Succulent shrublands on shale flats, TS (Tanqua Karoo). **(ece)**

sp. J (= *Salsola gemmifera* Botsch.) Yellowish green, scaly-leaved shrub, ± 250 mm tall, with branches, leaves and flowers alternate. Leaves glabrous, chaffy margined and fringed laterally and on upper part, ± wrinkled when dry. Flowers in compact spike-like inflorescences, sessile, furnished with only 2 bracteoles and a floral leaf, tepals conical-connivent and shortly pubescent or sometimes glabrous above wings. Fruit winged. June. Desert stony flats, SN, G (E of Buchuberg and near Anenousberg). **(ece)**

sp. K (= *Salsola merxmuelleri* Aellen) Dense, scaly leaved shrub, up to 2.5 m tall, with alternate branches, leaves and flowers. Leaves pubescent, of straight flexuose, adpressed hairs, floral leaves all equal in length to bracteoles or shorter. Flowers sessile, furnished with only 2 bracteoles and a floral leaf, tepals conical-connivent above wings, pubescent below wings. Fruit winged. Mar. Sandy desert flats, SN (mouth of the Gariep). **(ece)**

sp. L (= *Salsola namibica* Botsch.) Scaly leafed shrub, ± 500 mm tall, with alternate branches, leaves and flowers. Leaves of buds and stems densely pubescent, of crisped hairs, except on margin, buds rarely glabrous, floral leaves ± longer than bracteoles. Flowers sessile, with only 2 bracteoles and a floral leaf, tepals conical-connivent and shortly pubescent or sometimes glabrous above wings. Fruit winged. Feb. Stony desert flats close to sea, SN (Namib Desert: Radford Bay near Lüderitz). **(ece)**

sp. M (= *Salsola nollothensis* Aellen and including **Salsola angolensis** Botsch., **Salsola hottentottica** Botsch., **Salsola luederitzensis** Botsch.) Much-branched, scaly leaved shrub, up to 2 m tall, with alternate branches, leaves and flowers. Leaves orbicular-triangular to reniform, with straight adpressed hairs, floral leaves of lower flowers equal in length to bracteoles (very rarely longer), shorter than those of upper flowers. Flowers sessile, with only 2 bracteoles and a floral leaf, tepals conical-connivent and shortly pubescent or sometimes glabrous above wings. Fruit winged. Jan. Coastal dunes and upper beaches, SN, NS (Angola to Lüderitz to Port Nolloth).

sp. N (= *Salsola pillansii* Botsch.) Bushy, scaly leaved shrub, ?height, often decumbent with 1-sided, ± sharp-tipped branches. Leaves alternate, with a minute obtuse tubercle at tip, at least some with a spur-shaped elongated swelling at base, pubescent with straight adpressed hairs, floral leaves of lower flowers equal in length to bracteoles (very rarely longer) and shorter than those of upper flowers. Flowers sessile, with only 2 bracteoles and a floral leaf, tepals conical-connivent above wings, pubescent below wings. Fruit reddish winged. Oct. ?Habitat, G (Richtersveld: Anisfontein). **(ece)**

sp. O (= *Salsola robinsonii* Botsch.) Cushion-forming shrub, ± 500 mm tall, with branches, leaves and flowers alternate, forming wide cushions. Leaves scale-like, with short straight appressed dense hairs, floral leaves shorter than bracteoles, orbicular-triangular, all equal in length to bracteoles or shorter than them, bracteoles ovate, herbaceous above, chaffy margined laterally. Flowers sessile, with only 2 bracteoles and a floral leaf, tepals glabrous below wings, conical-connivent and densely hairy above wings. Jan. ?Habitat, SN (Lüderitz). **(ece)**

sp. P (= *Salsola ruschii* Aellen) Laxly branched, scaly leaved shrub, ± 600 mm tall, with alternate branches, leaves and flowers. Leaves short-pubescent, of crisped or flexuose, entangled hairs, floral leaves ovate, shorter than bracteoles. Flowers sessile, with only 2 bracteoles and a floral leaf, tepals conical-connivent and pubescent throughout above wings. Fruit winged. Mar. Desert mountains, G (southern Namibia: near Witpütz). **(ece)**

sp. Q (= *Salsola schreiberae* Botsch.) Like **S. gemmifera** but upright branches obliquely ascending, floral buds densely compact, and stigma branches ± twice as long as style and papillose (vs. stigma branches ± equal to style and smooth). July. In gullies on clayey, brackish soils, SN (Sperrgebiet: S of Grillenthal). **(ece)**

sp. R (= *Salsola sericata* Botsch.) Whitish, ± erect shrub, 300–750 mm tall, with alternate branches, leaves and flowers. Leaves and bracteoles silky, with long flexuose hairs, bracteoles broadly

chaffy margined laterally and apically, floral leaves all equal in length to bracteoles or shorter, herbaceous above. Tepals conical-connivent above wings, glabrous below wings. Sept. Succulent shrublands on flats, NS (N of Soebatsfontein). **(ece)**

sp. S (= *Salsola squarrosula* Botsch.) Branched shrub, ± 200 mm tall. Leaves scale-like, reniform, gibbose at base, pubescence squarrose. Perianth pubescent below wing over whole upper surface, bracteoles herbaceous at apex, chaffy-margined at edges. Dec. Succulent shrublands in dry ravines, NH (central Namaqualand: near Alewynsfontein). **(ece)**

sp. T (= *Salsola tetramera* Botsch.) Branched, scaly leaved shrub, ± 200 mm tall, with alternate branches, leaves and flowers. Flowers at branchlet apices with several imbricate inward-folded scale-like leaves below bracteoles, tepals and stamens 4(5), tepals conical-connivent and shortly pubescent above wings, sometimes glabrous, wings leathery. Sept. Succulent shrublands on quartz patches, KV (near Koekenaap). **(ece)**

[**Taxonomic note** *Caroxylon* is in dire need of a full taxonomic revision and accompanying molecular-phylogenetic studies to reassess the circumscription of some of the poorly known species listed above.]

CHENOLEA 2 spp., southern Africa and southern Mozambique

diffusa Thunb. (= *Bassia diffusa* (Thunb.) Kuntze) Prostrate, mat-forming, succulent perennial, with rooting stems. Leaves sessile, elliptic to lanceolate, spreading to imbricate, succulent, silky, silvery often with reddish tints. Flowers 1 per axil, inconspicuous, perianth greenish yellow. Fruiting perianth smooth, fleshy, ± cowl-shaped. Feb.–Apr. Coastal salt marshes, inland lagoons and pans close to the sea and coastal cliffs under salt-spray influence, SN, CCR (Lüderitz to southern Mozambique).

CHENOPODIUM ± 100 spp., cosmopolitan

mucronatum Thunb. Erect, annual herb, up to 400 mm tall. Leaves oblong, pinnately divided, sessile, yellow glands present. Flowers very small, in much-branched axillary compound cymes arranged in large terminal panicles. Nov.–Sept. Disturbed habitats, NH, TS, CCR (widespread native of southern Africa).

***murale** L. NETTLE-LEAF GOOSEFOOT Erect, annual herb, 0.5–1.5 m tall, usually with grooved stems. Leaves ovate to triangular, long-petiolate in lower parts, upper ones almost sessile, coarsely and unequally toothed, minutely hairy above. Flowers small, in dense panicles in axils of upper leaf-like bracts, perianth lobes green with reddish tips. May–Sept. Usually in disturbed places, SN, G, NS, NH, CCR (widely-distributed weed of Mediterranean origin).

***strictum** Roth STRIPED GOOSEFOOT Erect annual herb, up to ± 1 m tall, stems longitudinally yellow- or red-striped. Leaves sessile, oblong-ovate to ovate-lanceolate in lower parts, finely serrate, upper ones lanceolate, entire. Flowers small, greyish, in globose glomerules arranged in terminal spikes, perianth lobes mealy. Dec.–Jan. KV, ?TS, CCR (nearly cosmopolitan weed of Eurasian origin).

[**Insufficiently known introduced species**: **Chenopodium glaucum** L., native to Eurasia, is only known from one record made in 1974 from Goegap Nature Reserve, near Springbok. **Chenopodium foliosum** (Moench) Asch., known also as **Blitum virgatum** L. and probably native to Eurasia, has only been collected once on the Roggeveld Escarpment in 1920. Neither of these species appears to have been naturalised in the Extra Cape Subregion.]

EXOMIS 1 sp., southern Africa

microphylla (Thunb.) Aellen Much-branched, short-lived herb, 0.5–1.5 m tall, with red-striped stems. Leaves ovate or oblong, shortly petiolate, usually entire, glaucous-green, often mucronate at tip. Flowers in dense panicles, green, somewhat mealy. May–Jan. Disturbed places, often coastal NS, CCR (Namibia to E Cape).

HALOPEPLIS 4 spp., warm-temperate Old World

sp. A (= *Halopeplis amplexicaulis* sensu auct.) Glaucous, bluish, succulent, annual herb, up to 250 mm tall. Leaves scale-like, amplexicaul, fleshy. Flowers minute, in clusters in axils of spirally arranged

bracteal scales. Feb.–Apr. Supratidal terraces in coastal salt marshes and dry bottoms of coastal lagoons, NS, CCR (Atlantic Ocean coast from southern Namaqualand to Cape Peninsula). **(gce)**

HERMBSTAEDTIA ± 15 spp., tropical and southern Africa

glauca (J.C.Wendl.) Rchb. ex Steud. BLOUBOS Rounded, broom-like shrub or dwarf shrub, up to 700 mm tall, with glaucous grey stems and leaves. Leaves sparse, linear, ascending. Flowers in terminal heads, pink to white, with membranous bracts. July–Oct. Dry sandy beds of intermittent rivers and desert washes, SN, G, NS, NH (southern Namibia to northern Namaqualand to Bushmanland).

KALI (= *SALSOLA* in part) SALTWORT ± 10 spp., Eurasia, also southern Africa and Australia

sp. A (= *Salsola kali* L. subsp. *austroafricana* Aellen) ROLBOSSIE Slender, regularly branched, annual, up to 600 mm tall, stems and leaves for the most part glabrous. Flowering stems elongate, for the lesser part branched. Flowers 1 per axil, equidistant from each other, slightly exceeded by short bracts and bracteoles, perianth lobes membranous, flat, without a midrib. Mainly Sept.–Nov. Succulent shrublands on nutrient-rich soils, weedy in places, SN, NS, NH, KV, WM, TS, CCR (central Namibia to Little Karoo).

*MAIREANA ± 60 spp., Australia

***brevifolia** (R.Br.) Paul G.Wilson Shrub, up to 1 m tall, with longitudinally streaked, sparsely woolly stems. Leaves obovoid, short, fleshy, glabrous. Flowers 1 per leaf axil, without bracteoles. Fruiting perianth enlarging into 5 prominent papery fan-shaped wings with radiating brown veins, contrasting with thick fleshy perianth lobes. Aug.–Mar. Roadsides and disturbed areas, NS, TS, CCR (NW of Komaggas, eastern Tanqua, Worcester-Robertson Karoo, western Little Karoo, Israel and Canary Islands, native to Australia).

MANOCHLAMYS HONDEBOSSIE 1 sp., southern Africa

albicans (Aiton) Aellen Monoecious, grey-mealy, white-stemmed shrub, up to 2 m tall, with horizontally spreading branches. Leaves rhomboid to sagittate. Flowers crowded in terminal spikes, minute, yellowish. Fruit fleshy, yellowish green. Sept.–Jan. Succulent shrublands on sandy, nutrient-rich soils, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to western Karoo, West Coast and Little Karoo).

SALICORNIA GLASSWORT ± 25–30 spp., N hemisphere, southern Africa and Madagascar

uniflora Tölken Jointed annual, up to 200 mm tall, with main stem up to 10 mm diam., lateral branches clustered, segments 2–3(–4) mm diam., often turning bluish red. Flowers 1 per cyme, if rarely 2 or 3 per cyme, then central one much larger than lateral ones, congested in terminal spike-like inflorescences. Dec.–Jan. Coastal salt marshes, SN, CCR (Atlantic Ocean seaboards near Lüderitz and in Langebaan Lagoon). **(gce)**

sp. A (= *Salicornia dagmarae* Mucina *ms.*) Jointed annual, up to 400 mm tall, with main stem up to 10 mm diam., base often becoming S-shaped, lateral branches opposite, segments fleshy, 2–3 mm diam., glaucous to deep bluish red. Flowers 3 per cyme, arranged in a triangle, ± hidden by bracts, congested in terminal spike-like inflorescences. Mar.–Apr. Sheltered saline marshes and estuaries, NS, CCR (seaboards of Atlantic Ocean from mouth of Groenrivier in Namaqualand to West Coast). **(gce)**

SARCOCORNIA 20–24 spp., cosmopolitan in saline habitats

A. Shrubs

littorea (Moss) A.J.Scott KORAALBOS, LIDJIESBOS Erect, jointed shrub, up to 1 m tall, with several, erect, ± equally long branches, 30–80 mm thick at base, segments cylindrical, strongly suc-

culent, 2–5 mm diam. when fresh, not adhering to stem when dead, leaf apex distinctly keeled. Flowers in solitary, dense, terminal, tapering, spike-like thyrses, wider than vegetative segments. Mainly Sept.–May. Salt-sprayed coastal cliffs and upper zone of estuarine salt marshes, NS, CCR (seaboards of both Atlantic and Indian Oceans from Port Nolloth to near Port Elizabeth). **(gce)**

pillansii (Moss) A.J.Scott BRAKBOS, KLEINLIDJIESBOS, SOUTBOSSIE Erect or rarely decumbent, woody, jointed shrub, up to 700 mm tall, branches up to 30 mm thick, segments cylindrical to obconical, strongly succulent, 2–4 mm diam. when fresh and dried, sometimes becoming corky with age, leaf margin concave, spreading when dry. Flowers minute, in terminal and lateral, tapering, spike-like thyrses, slightly wider than vegetative segments. Jan.–June. Edges of estuarine marshes and also inland on saline clayey alluvia of intermittent rivers, rarely also in inland salt pans, SN, G, NS, NH, KV, CCR (mouth of the Gariep to E Cape).

terminalis (Tölken) A.J.Scott Erect, jointed, woody shrub, up to 1 m tall, with lateral branches clustered and ± as long as main stem, bark smooth, segments succulent, 2–3 mm diam. when dry, leaf apex keeled, leaf margin spreading, shrinking regularly when dry to show faint longitudinal grooves, dead cortex not adhering to stem. Flowers in terminal and lateral, cylindrical, spike-like thyrses, wider than vegetative segments. Feb.–Apr.(Sept.). Clayey saline alluvia and dry riverbeds, NS, NH, KV, TS (central Namaqualand, Soutrivier near Vanrhynsdorp, and Doringrivier in Tanqua Karoo). **(ece)**

xerophila (Tölken) A.J.Scott Erect, jointed, dwarf shrub, up to 500 mm tall, with several, erect, woody branches, 30–80 mm thick at base, with gnarled soft bark, segments cylindrical to barrel-shaped, highly succulent, 4–6 mm diam. when fresh, shrinking to form distant discs or cylinders, leaf margin not spreading. Flowers 3 per cyme in a horizontal row, arranged in cylindrical, terminal and lateral spike-like thyrses, hardly wider than vegetative segments. Aug.–Dec. Succulent shrublands of quartz fields, KV (near Bitterfontein to vicinity of Vredendal). **(ece)**

A.' Subshrubs or perennial herbs with prostrate or decumbent branches

dunensis (Moss) S.Steffen, Mucina & G.Kadereit Like **S. pillansii** but a creeping subshrub, segments mostly corky, and stigmas longer (3–4 vs. 1–2 mm) and persistent. Jan.–Feb. Edge of estuaries on small, sandy dunes in desert zone, SN (Lüderitz Bay, Radford Bay and Guano Bay in southern Namib Desert). **(ece)**

natalensis (Bunge ex Ung.-Sternb.) A.J.Scott SEEKORAAL Decumbent or prostrate, jointed perennial, up to 200 mm tall, hardly woody or woody at base, occasionally rooting at nodes, segments obconical to cylindrical, strongly succulent, 2–5 mm diam. when fresh, dead cortex usually adhering to stem, leaf apex slightly keeled. Flowers in terminal and lateral, tapering, spike-like thyrses, not wider than vegetative segments, concealed by subtending bract. Sept.–May. Coastal lagoons and inland salt pans and sub-saline alluvia and edges of brackish lakes, SN, G, NS, KV, CCR (from mouth of Kunene River on Angola-Namibia border to southern Mozambique).

tegetaria S.Steffen, Mucina & G.Kadereit (= *S. perennis* sensu auct.) Mat-forming, jointed, woody subshrub, up to 200 mm thick, often rooting at nodes, stems mostly 1–3(–6) mm diam. when fresh, lateral branches often in pairs at nodes, segments barrel-shaped to obconical, strongly succulent, 2–5 mm when fresh, dead cortex adhering to stem, leaf margin truncate, rarely spreading. Flowers in solitary, terminal or rarely lateral, tapering, spike-like thyrses, slightly wider than vegetative segments. Dec.–July. Tidal zones of estuarine salt marshes, SN, CCR (Atlantic and Indian Ocean seaboards from the mouth of the Gariep to Delagoa Bay in Mozambique).

[**Taxonomic note** Many specimens of **Sarcocornia** have intermediate features between the species recognised above and these are considered to be putative hybrids.]

SERICOCOMA 3 spp., southern Africa

avolans Fenzl KATSTERT Shrub, up to 500 mm tall. Leaves opposite below, linear to lanceolate, pungent-mucronate. Flowers in terminal spikes, bracteoles with short awns, tepals silky, pink to purple. Jan.–Apr. Stony slopes and flats, G, TS, CCR (Namibia to Richtersveld, Bushmanland, Tanqua Karoo, Great and Little Karoo to Baviaanskloof Mountains).

pungens Fenzl Dwarf shrub, up to 250 mm tall, lateral branches ± spreading, young stems covered with short, white hairs. Leaves mostly alternate, narrowly to broadly lanceolate. Flowers in ± globose heads, floral bracteoles unequal, with a prominent awn in longer one, tepals silky, creamy pink. Aug.–Sept. On rocky slopes and rock outcrops, G (southern Namibia to Richtersveld to Bushmanland).

SUAEDA SEA-BLITE ± 110 spp., cosmopolitan

caespitosa Wolley-Dod (including **Suaeda inflata** Aellen) Pale green, creeping, short-lived perennial, ± 500 mm tall. Leaves linear, swollen below. Flowers minute, in sessile glomerules. Jan. Coastal lagoons and estuaries, SN, NS, CCR (Lüderitz to southern E Cape). **(gce)**

plumosa Aellen (= *Suaeda fruticosa* sensu auct. non (L.) Forssk.) INKBOS Softly woody, erect, grey-blue, glabrous shrublet, often rooting at nodes, up to 1 m tall. Leaves fleshy, ovoid–ellipsoid. Flowers in axillary clusters, minute, each with 2 or 3 bracteoles, succulent. Aug.–Dec. Subsaline clayey alluvia of intermittent rivers and edges of inland pans, SN, G, NH, KB, KV, WM, TS, CCR (central Namibia to Port Elizabeth).

ANACAMPSEROTACEAE (= *PORTULACACEAE* in part)

by D.A. Snijman

ANACAMPSEROS ± 30 spp., NE, E and southern Africa

A. Leaves concealed beneath papery, whitish, stipular scales

albissima Marloth Small, tuberous perennial, with sprawling branches, ± 40 mm tall. Leaves succulent, hidden by broadly ovate, truncate, stipular scales, sometimes with a dark blotch at tip. Flowers solitary at branch tips, enclosed in apical scales, white, stamens ± 10. Seeds slightly colliculate. Dec.–Mar. On rock outcrops, SN, G, NS, NH (southern Angola through Namibia to Richtersveld, northern Namaqualand, Bushmanland and Griqualand West).

gariepensis (G.Will.) Snijman (= *Avonia gariepensis* G.Will.) Tuberous perennial, with numerous, spreading branches, up to 25 mm long. Leaves inconspicuous, covered by white, papery, broadly ovate, stipular scales. Flowers solitary at branch tips, subsessile, shiny pale pink or occasionally white, stamens up to 12. Sept. On schistose outcrops on low hills of windblown sand, G (lower Gariep Valley). **(ece)**

herreana Poelln. Dwarf, tuberous perennial, with decumbent, divided, slender branches up to 100 mm long. Leaves partly exposed by stipular scales, scales broadly ovate to lanceolate, slightly hooded with recurved tip, often with darker midvein. Flowers solitary at branch tips, subsessile, white, stamens ± 10. Summer. On quartzite outcrops, G (Richtersveld). **(ece)**

mallei (G.Will.) G.Will. Small, tuberous perennial, 40–80 mm tall, with several, branched stems. Leaves hidden, stipular scales on new growth broadly ovate, with black to brown veins and lacerated, black, apical margin with fine recurved apical projections. Flowers solitary at branch tips, subsessile, white, petals reflexed, stamens 8. Feb.–Mar. Between pegmatite and quartz pebbles, NH (northern Namaqualand: Harasberg). **(ece)**

papyracea E.Mey. ex Fenzl GANSMIS Low perennial, up to 80 mm tall, with sprawling, stout, succulent branches. Leaves minute, hidden by white, papery, overlapping scales, scales broadly ovate to tongue-shaped, serrate to dentate (in N) or entire (elsewhere). Flowers solitary at branch tips, subsessile, whitish, stamens ± 20. Oct.–Nov. In quartz pebble patches, TS, CCR (southern Namibia, Richtersveld and Bushmanland, and Little Karoo to southern Karoo). **(gce)**

perplexa (G.Will.) Snijman (= *Avonia perplexa* G.Will.) Tuberous perennial, with up to 6 spreading branches, ± 35–45 mm long. Leaves inconspicuous, hidden by white, papery, obovate, stipular scales, bearing minute horizontal striae. Flower solitary at branch tips, subsessile, white, stamens ± 19. Nov. Quartz-strewn pavements and dolomite outcrops, G (Richtersveld, SW of Bloed Drif). **(ece)**

prominens G.Will. Like **A. albissima** but plants larger and shrublet-like, and seed with flattened, white, bristle-like hairs. Nov.–Dec. SW-facing slopes among quartz pebbles, G (southern Richtersveld). **(ece)**

quinaria E.Mey. ex Fenzl Dwarf, many-branched, succulent perennial, up to 30 mm tall, many-branched from a flat-topped, underground caudex. Leaves hidden by ± triangular to broadly ovate stipular scales, darkening towards tip. Flowers solitary at branch tips, subsessile, white, cream or pink, stamens 40–80. Oct.–Dec. On rock outcrops, NH (SE Namibia, NE Namaqualand and Bushmanland).

recurvata Schönland Tuberous perennial, with decumbent branches, up to 70 mm long. Leaves hidden by truncate, stipular scales, scales tongue-shaped to lanceolate, with tips ± recurved or turned

in, median line brownish yellow to yellowish green. Flowers solitary at branch tips, subsessile, white, stamens ± 15. Dec. ?Habitat, G, NH (Richtersveld: Helskloof, Steinkopf to Bushmanland).

ustulata E.Mey. ex Fenzl Dwarf, much-branched perennial, up to 30 mm tall. Leaves hidden by small, broad, triangular-ovate, stipular scales with a brown pointed tip, often curving outwards, scale margins faintly lacerated, brownish grey. Flowers solitary at branch tips, subsessile, white, stamens ± 10. ?Flowering time. Among small scattered stones, TS (Klein Roggeveld to Great Karoo to Free State).

variabilis Poelln. Like **A. papyracea** but stipular scales broadly oblong, with an acute apical projection and flowers yellow to pale yellow. Oct. On quartz, pebbly pavement depressions, G (lower Gariep Valley). **(ece)**

A.' Leaves visible between short to long hair-like axillary bristles
B. Leaves woolly or felted

albidiflora Poelln. Short-stemmed, clump-forming, erect, succulent perennial, up to 120 mm tall, with axillary bristles longer than leaves. Leaves small, clavate, apex truncate, rough, covered with felt-like hairs. Flowers on branched peduncles, shiny white to pale pink, stamens ± 25. Oct.–Jan. Stony slopes, TS, CCR (Worcester to Oudtshoorn to southern Karoo to Beaufort West).

arachnoides (Haw.) Sims Like **A. albidiflora** but axillary bristles shorter than leaves, leaves ovoid and acuminate, and flowers white, tinged or lines pale purple or pink. Nov.–Jan. Under shrubs or rock ledges, ?TS, CCR (Little to Great Karoo).

baeseckei Dinter Upright, clump-forming, succulent perennial, up to 200 mm tall, with axillary bristles as long as or longer than leaves. Leaves obovate, apex truncate, rough, covered with white hairs, at least when young. Flowers bright pink, often white underneath, stamens ± 25. Oct.–Jan. In rocky places, G, NH (southern Namibia, Richtersveld to Bushmanland and northern Namaqualand).

karasmontana Dinter ex Poelln. Short-stemmed, tightly tufted, succulent perennial, up to 120 mm tall, with bristles as long as or longer than leaves. Leaves obovate to ± clavate, apex truncate, downturned pustulate, tomentose at least when young. Flowers 1–3 per peduncle, pale pink, stamens ± 25. Seeds smoothly colliculate. Summer. Granitic sand, SN, G (southern Namibia, northeastern Richtersveld and Bushmanland).

namaquensis H.Pearson & Stephens (= *Anacampseros filamentosa* (Haw.) Sims subsp. *namaquensis* (H.Pearson & Stephens) G.D.Rowley Short-stemmed, erect, succulent perennial, up to 100 mm tall, with axillary bristles shorter than leaves. Leaves ovoid to subglobose, apex truncate and wrinkled, covered with fine hairs. Flowers pink, stamens 25. Seeds ± bluntly spiky. Nov.–Dec.(–Mar.). On rocks, G, NH, KV, TS (Richtersveld, Namaqualand and Tanqua Karoo). **(ece)**

B.' Leaves glabrous (but sometimes hidden by axillary hairs)

bayeriana S.A.Hammer Dwarf, succulent perennial, up to 10 mm tall, with a spindle-shaped underground caudex and axillary bristles longer than leaves. Leaves few, ovate, 2–2.5 mm long, channelled above, with a thin raised margin, finely papillate. Flower 1, ivory white, suffused greyish pink, petals finely striate, stamens 5–7. Late summer. On quartz outcrops, G, NS (southeastern Namibia, Richtersveld to Kleinsee and Bushmanland).

lanceolata (Haw.) Sweet Like **A. telephiastrum** but leaf bristles often longer than leaves, leaves ovate-lanceolate or lanceolate, flowers large, white or pink and seeds winged on angles. Oct.–Dec. Rock outcrops, G, NH, WM, CCR (Richtersveld and western Karoo to Langkloof). **(gce)**

pisina G.Will. Like **A. retusa** but leaves spreading to suberect, ± ovate, ± acute, slightly decurved at apex, pea-green, glabrous, flowers satiny white, occasionally tinged greenish. Oct.–Nov. On steep SW-facing slopes, between quartz pebbles, G (Umdaus N of Steinkopf). **(ece)**

retusa Poelln. Short-stemmed, clumped, succulent perennial, up to 120 mm tall, bristles and hairs well-developed, shorter or longer than leaves. Leaves spreading at right angles to stem, flattish obovoid, apex blunt and mostly rough with minute hooks, seldom papillate. Flowers on branched peduncles, pale to dark pink, stamens ± 25, seeds ± bluntly spiky. Oct.–Dec.(–Mar.). Rocky slopes and flats, G, NS, KV, CCR (southern Namibia, Richtersveld, Namaqualand to Worcester and Ceres Karoo). **(gce)**

scopata G.Will. Like **A. bayeriana** but with several, low, very short, truncate branches with dense, numerous, upright leaves radiating horizontally from stem, leaves hidden among white axillary bristles, flowers white to pale pink. Feb.–Apr. In cracks of E-facing quartzite cliffs, NS (Oograbies Mountains). **(ece)**

telephiastrum DC. GEMSBOKSURING Short-stemmed, clump-forming, succulent perennial, up to 150 mm tall, with hairs and bristles always shorter than leaves. Leaves ovate, acute, 10–30 mm long, papillate. Flowers large, on stout peduncles, carmine, stamens (25–)30–45. Seeds colliculate. Nov.–Dec. Rocky flats and slopes, TS, CCR (Worcester through southern Great Karoo to E Cape).

vanthielii G.Will. Tightly tufted, tuberous, succulent perennial, up to 20 mm tall. Leaves in a dense rosette, ± ovate, with a flat, triangular, papillose apex, brown-maroon towards apex, axillary hairs white. Flowers 2–4 on stout downwardly curved peduncles, bright shiny pink. ?Flowering time. In shallow pans and crevices on granitic rocks, NH (S of Steinkopf). **(ece)**

[**Taxonomic note** The acceptance here of the classification of *Anacampseros* and related genera by Gerbaulet (Gerbaulet 1992; Gerbaulet & Struck 1995) necessitates the following nomenclatural changes:

Anacampseros gariepensis (G.Will.) Snijman, comb. nov.

Avonia gariepensis G.Will. in *Aloe* 43,1: 14 (2006). Type: South Africa, Northern Cape, Richtersveld, NE of Alexander Bay, Beauvallon, ± 50 m, Sept. 2005, *G. & F. Williamson 6027* (BOL, holotype).

Anacampseros perplexa (G.Will.) Snijman, comb. nov.

Avonia perplexa G.Will. in *Aloe* 43,1: 15 (2006). Type: South Africa, Northern Cape, Richtersveld, E of Augasloop and SW of Bloeddrif, ± 1 km from Orange River, ± 70 m, Nov. 2005, *G. & F. Williamson 6024* (BOL, holotype).]

ANACARDIACEAE

by D.A. Snijman from Coates Palgrave (2002) and Moffett (1993)

1. Leaves simple ..... **Ozoroa**
1.' Leaves compound with 3 leaflets ..... **Searsia**

OZOROA ± 40 spp., Africa and Arabian Peninsula, and possibly Madagascar

concolor (C.Presl ex Sond.) De Winter GREEN RESIN-TREE, GROENHARPUISBOOM Small, deciduous tree, up to 4 m tall. Leaves crowded at branch tips, dark shiny green on both surfaces, midrib and parallel veins yellow and dividing in 2 well before margin, hairless, margin wavy. Flowers creamy yellow, sweetly scented. Fruit fleshy, up to 10 mm wide, reddish or black. Sept.–Oct. Dry watercourses, SN, G (inselbergs of Sperrgebiet S to Richtersveld). **(ece)**

crassinervia (Engl.) R.Fern. & A.Fern. NAMIBIAN RESIN-TREE, NAMIBIESE HARPUISBOOM Evergreen, small tree, up to 9 m tall. Leaves clustered at branch tips, obovate, dark green and hairy above, undersurface with matted grey felt-like hairs and prominently ridged lateral veins that divide well before margin, margin entire or ± scalloped. Flowers small, whitish. Fruit 5–9 mm wide, on stalks 6–9 mm long, turning blackish. Nov.–Feb. On rocky slopes, SN, G (through western Namibia to near Steinkopf).

dispar (C.Presl) R.Fern. & A.Fern. NAMAKWA-HARPUISBOOM, NAMAQUA RESIN-TREE Evergreen, hard-leaved tree, up to 5 m tall. Leaves crowded at branch tips, elliptic, bright green and smooth above, covered with matted fine grey hairs with yellow tinge below, midrib thick, lateral veins ± equally conspicuous on both surfaces, dividing just before margin and then slightly less evident. Flowers small, creamy white. Fruit kidney-shaped, 10–13 mm wide, turning black and wrinkled. May. On granite rocks and stony hillsides, SN, G, NH, KB (southern Namibia and Bushmanland through to near Garies).

SEARSIA (= *RHUS* in part) KAREE, KORENTEBOS, TAAIBOS 111 spp., Mediterranean, Africa and Asia

*A. Leaflets toothed (see also **S. undulata**), undersurface whitish with felt-like matted hairs*

incisa (L.f.) F.A.Barkley (= *Rhus incisa* L.f.) BAARDBESSIE, RUB-RUB BERRY Dioecious, deciduous shrub, up to 3 m tall. Leaves trifoliolate, leaflets sessile, ovate, dark green above, with whitish-grey

matted hairs below, margins deeply lobed or shallowly dentate. Flowers greenish yellow. Drupe ellipsoid, hairy and cream-coloured. June. Clay soils, G, NH, KV, CCR (Richtersveld to Komga and Graaff-Reinet).

populifolia (E.Mey. ex Sond.) Moffett (= *Rhus populifolia* E.Mey. ex Sond.) SUURTAAIBOS Dioecious, much-branched, deciduous shrub, up to 2.5 m tall. Leaves trifoliate, leaflets sessile, ± widely elliptic, dark shiny green above, greyish to yellowish green below, margin with small round teeth, rarely entire. Flowers greenish yellow. Drupe asymmetric, lens-shaped, with 3 persistent styles, yellowish brown. May–Sept.(–Feb.) Along watercourses and in rock fissures, SN, G, NS, NH (near Lüderitz to Kakamas and through to Komaggas).

A.' Leaflets mostly entire, smooth or hairy but not forming a whitish, felt-like undersurface

burchellii (Sond. ex Engl.) Moffett (= *Rhus burchellii* Sond. ex Engl.) Dioecious, much-branched, evergreen shrub, up to 5 m tall. Leaves trifoliate, crowded on spurs, leaflets sessile, obtriangular to obcordate, olive-green on both surfaces, apex notched. Flowers pale yellow. Drupe ellipsoid, shiny chestnut-brown. Apr.–May. Rocky hills, WM, TS (arid interior of southern Africa).

horrida (Eckl. & Zeyh.) Moffett (= *Rhus horrida* Eckl. & Zeyh.) Dioecious, much-branched, evergreen shrub, up to 1.7 m tall, with straight rigid spinous branchlets. Leaves trifoliate, leaflets sessile, linear-oblanceolate to spathulate, densely covered with minute stellate hairs, dull grey-green, but russet when young. Flowers greenish yellow, crowded on dwarf outgrowths of often leafless spines. Drupe asymmetrically oblong, dark reddish-brown, drying black. May–July. Granite outcrops, NH, KB (Anenous Pass to southern Kamiesberg Mountains). **(ece)**

laevigata (L.) F.A.Barkley (= *Rhus laevigata* L.) DUINETAAIBOS, UMHLAKOTHI Dioecious or rarely monoecious, deciduous shrub, up to 2.5 m tall. Leaves trifoliolate, leaflets sessile, obovate, with translucent net-like veins, dark green above, slightly paler below, smooth or hairy. Flowers greenish yellow. Drupe round, shiny, dull yellow to reddish. Oct.–Dec. Coastal flats and slopes, NS, CCR (near Komaggas and Lambert's Bay to East London).

lancea (L.f.) F.A.Barkley (= *Rhus lancea* L.f.) KAREE, UMHLAKHOTSHANE Dioecious, semi-evergreen, large shrub or tree, up to 12 m tall, with dark fissured bark. Leaves trifoliolate, leaflets sessile, linear to lanceolate, dark olive-green above, pale yellowish green below, ± glutinous. Flowers greenish yellow. Drupe round, shiny, dull yellow to brown. Apr.–July. Watercourses in karroid areas, WM, TS, CCR (Hantamsberg, Roggeveld Escarpment to Little Karoo and arid interior of southern Africa).

longispina (Eckl. & Zeyh.) Moffett (= *Rhus longispina* Eckl. & Zeyh.) DORINGTAAIBOS Dioecious, dense, rounded, evergreen shrub, up to 4 m tall, with pale spinous branches. Leaves ± crowded on spurs, trifoliolate, leaflets sessile, oblanceolate, olive-green above, ± paler below, smooth, shiny. Flowers pale yellow, sweetly scented. Drupe lens-shaped, brown, shiny. May–July. Karroid scrub, NS, WM, TS, CCR (S of Alexander Bay to southern Great Karoo through to southern KwaZulu-Natal).

pallens (Eckl. & Zeyh.) Moffett (= *Rhus pallens* Eckl. & Zeyh.) BLEEKKOENIEBOS Dioecious, much-branched, unarmed, evergreen shrub, up to 3 m tall. Leaves trifoliate, leaflets sessile, submembranous, oblanceolate, both surfaces olive-green. Flowers yellow. Drupe lens-shaped, shiny, pale to chestnut-brown. Mar.–July. Karroid scrub, TS, CCR (Robertson through southern Great Karoo to KwaZulu-Natal and to Zeerust).

pendulina (Jacq.) Moffett (= *Rhus pendulina* Jacq.) WITKAREE Dioecious, evergreen shrub or tree, up to 12 m tall, with occasional spines on trunk. Leaves trifoliolate, leaflets sessile, lanceolate, dull green above, slightly paler below, smooth. Flowers greenish yellow. Drupe round, smooth, drying black. Feb.–Mar. Stream and riverbanks, SN, G, WM, CCR (Richtersveld and Gariep Valley from Oranjemund to Free State, and Bokkeveld Escarpment to SW Cape).

undulata (Jacq.) T.S.Yi, A.J.Mill. & J.Wen (= *Rhus undulata* Jacq.) GHARRABOS, KOENIEBOS, KUNI-BUSH Dioecious, many-stemmed, evergreen shrub, up to 3 m tall, with spinous branchlets (except in SW Cape). Leaves trifoliolate, leaflets sessile, oblanceolate, olive-green, sticky, aromatic. Flowers yellowish. Drupe lens-shaped, shiny, dull yellow to cream-coloured. Apr.–May. Stony slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to Ladismith). **(gce)**

APIACEAE

by A.R. Magee

1. Fruit strongly compressed laterally; without vittae (oil canals between the ribs) or large rib oil ducts associated with the vascular tissue in the ribs . . . . . **Centella**
1.' Fruit isodiametric, dorsally compressed or only slightly laterally compressed; with vittae or large rib oil ducts:
2. Plants woody or suffrutescent (at least the base woody), not dying down to ground level after fruiting; leaves persistent or deciduous:
3. Fruit heteromericarpic, with marginal wings developed on one mericarp only:
4. Plants leafless at flowering; margins of leaflets toothed; fruit with wing cavities and without vittae. . . . . **Polemanniopsis**
4.' Plants leafy at flowering; margins of leaves or leaflets entire; fruit without wing cavities and with prominent vittae . . . . . **Heteromorpha**
3.' Fruit homomericarpic:
5. Suffrutices with leathery-fleshy leaves:
6. Fruit covered with stellate hairs; mericarps without vittae. . . . . **Marlothiella**
6.' Fruit glabrous; mericarps with prominent vittae . . . . . **Dasispermum**
5.' Shrubs or suffrutices without leathery-fleshy leaves:
7. Fruit (and ovaries) hairy or tuberculate . . . . . **Deverra**
7.' Fruit (and ovaries) glabrous:
8. Leaves simple, grass-like. . . . . **Bupleurum**
8.' Leaves compound:
9. Inflorescence composed of racemously arranged, ± equally sized umbels; fruit without marginal wings; leaves usually dimorphic, laminate below and often needle-like above, never flat-topped in outline . . . . . **Anginon**
9.' Inflorescence with a large terminal umbel and 0–3 smaller lateral umbels; fruit marginally winged (or if marginal wings rarely absent then leaves uniform and flat-topped in outline with terete leaflets). . . . . **Notobubon**
2.' Plants herbaceous, either low creeping herb or dying down to ground level after fruiting; leaves deciduous:
10. Plants acaulescent; dioecious; involucel bracts large and enveloping the fruit; fruit with one mericarp aborted. . . . . **Arctopus**
10.' Plants caulescent; monoecious or hermaphroditic; involucel bracts not as above; fruit with both mericarps developed:
11. Body of fruit dorsally compressed; commissure broad, extending along the entire length of the fruit from rib tip to rib tip:
12. Perennial herb with thick underground root; leaves radical and scrambling; umbels very large and borne on a long peduncle. . . . . **Cynorhiza**
12.' Annual herb, leaves mostly cauline, umbels small and leaf-opposed:
13. Involucral and involucel bracts absent; rays and raylets scabrous; fruit with indistinct median and lateral ribs; additional vittae in the marginal wings; commissural vittae close together; ultimate leaflet segments > 1.5 mm broad (never subterete), green . . . . . **Scaraboides**
13.' Involucral and involucel bracts present; rays and raylets glabrous; fruit with prominent median and lateral ribs; additional vittae in the marginal wings absent; commissural vittae widely separate; ultimate leaflet segments < 1 mm broad (often subterete), glaucous. . . . . **Capnophyllum**
11.' Body of fruit isodiametric; commissure narrow, not from rib tip to rib tip:
14. Foliage leaves all radical, those on stem reduced to a sheath with or without a vestigial blade; leaves usually dead or dying during flowering:
15. Fruit oblong, ≥ 5 mm long . . . . . **Annesorhiza**
15.' Fruit ovoid or flask-shaped, ≤ 4 mm long . . . . . **Chamarea**
14.' Foliage leaves both radical and cauline; leaves not dead or dying during flowering:
16. Leaves pilose . . . . . **Torilis**
16.' Leaves glabrous:
17. Plants stoloniferous. . . . . **Berula**
17.' Plants not stoloniferous:
18. Fruit without vittae in mature fruit . . . . . **Conium**
18.' Fruit with conspicuous vittae in mature fruit:
19. Leaflets broad, ≥ 3 mm wide; fruit with corky ribs. . . . . **Apium**
19.' Leaflets narrow, ≤ 1 mm wide; fruit without corky ribs . . . . . **Dasispermum**

ANGINON (= *RHYTICARPUS*) WILDESELDERY, WILDEVINKEL 12 spp., southern Namibia to E Cape

difforme (L.) B.L.Burtt Stiff-leaved, sparsely-branched shrub, up to 3 m tall. Leaves ± uniform, basal leaves biternate with toothed leaflets, upper leaves needle-like, not grooved. Umbels racemously arranged, ± equal in size, fertile. Flowers yellow, petals with branched resin ducts. Fruit obovoid, rugose, mericarps isodiametric, vittae present, rib oil ducts inconspicuous. Dec.–Apr. Rocky granite and sandstone slopes, G, NH, KB, CCR (Richtersveld Mountains to Kamiesberg Mountains and Tulbagh to E Cape).

fruticosum I.Allison & B.-E.van Wyk Like **A. difforme** but plants well-branched, upper leaves shortly and unevenly 2- or 3-sect, petiole and/or rachis adaxially grooved. Jan.–Apr. Clay soils along streams, WM, TS, CCR (Calvinia, Hantamsberg, Laingsburg and Hex River Pass to Uniondale). **(gce)**

intermedium I.Allison & B.-E.van Wyk Well-branched shrub, up to 2.5 m tall. Leaves variable, basal ones biternate with toothed leaflets, upper ones undivided to ± 2- or 3-sect, laminate or needle-like, adaxially grooved. Umbels usually racemously arranged, ± equal in size, fertile. Flowers yellow, petals with unbranched resin ducts. Fruit unknown. Dec.–Feb. Shaley slopes, G, NH, KB, WM (Richtersveld Mountains, Nababeepsberg, Kamiesberg Mountains and Hantamsberg). **(ece)**

verticillatum (Sond.) B.L.Burtt Like **A. intermedium** but upper leaves much divided and invariably laminate. Fruit widely ovate, somewhat rugose. Dec.–Feb. On S-facing slopes, SN, G, NH, KB, WM (southern Namibia: Obib Mountain, Richtersveld Mountains to Nababeep, Kamiesberg Mountains, Kubiskouw Mountain, and Roggeveld Mountains). **(ece)**

ANNESORHIZA (including *PEUCEDANUM* in part) ANYSWORTEL ± 20 spp., southern Africa

altiscapa Schltr. ex H.Wolff BOKLAMVINKEL Perennial herb, up to 1.5 m tall; roots numerous, ± fleshy. Leaves usually green at flowering, spreading, pinnately divided, scabrous, segments triangular, acute. Umbels on long branched peduncles. Flowers cream-coloured to yellow. Fruit 6–7 mm long, oblong, mericarps isodiametric, ribbed, homomorphic, vittae present, rib oil ducts inconspicuous. Aug.–Oct. Granite or dolerite slopes, NH, KV, WM, CCR (Springbok to Nieuwoudtville, Gannaga Pass). **(gce)**

grandiflora (Thunb.) M.Hiroe (including **A. latifolia** Adamson) HARIGE-ANYSWORTEL Perennial herb, up to 2 m tall, roots numerous, ± fleshy. Leaves dying at flowering, coarsely dissected, scabrous to pilose, segments oblong, obtuse. Umbels on long, branched peduncles. Flowers yellow. Fruit 5–7 mm long, oblong, mericarps isodiametric, ribbed, homomorphic, vittae present, rib oil ducts inconspicuous. Sept.–Feb. Flats and sandstone, granite or dolerite slopes, often seasonally damp areas, G, NH, WM, TS, CCR (Richtersveld Mountains, Nababeep, Bokkeveld Mountains, Calvinia, Tanqua National Park, Sutherland to Caledon). **(gce)**

lateriflora (Eckl. & Zeyh.) B.-E.van Wyk Perennial, up to 0.8 m tall; roots up to 3, fleshy, finger-like. Leaves dead or dying at flowering, ternately divided, glabrous, segments linear, flat or terete, bases persisting as papery fibres. Umbels on long, branched peduncles. Flowers unknown. Fruit 3 mm long, oblong, mericarps isodiametric, homomorphic, vittae present, rib oil ducts inconspicuous. Jan. Rock crevices or gravel plains, KB, KV, WM, TS (Kamiesberg Mountains, Vanrhynsdorp, Sutherland, Tanqua Karoo). **(ece)**

APIUM CELERY ± 6 spp., N and S temperate regions

decumbens Eckl. & Zeyh. Sprawling or erect, annual or short-lived perennial herb, up to 0.3 m tall. Leaves pinnate below, leaflets broadly toothed, upper digitate with leaflets oblanceolate. Flowers white, in leaf-opposed often sessile umbels. Fruit subglobose, mericarps isodiametric, ribbed, ribs corky, vittae present, rib oil ducts inconspicuous. Mainly Jan.–Mar. Vlei edges and wet places, SN, ?NS, WM, CCR (Gariep Estuary to Cape Peninsula to KwaZulu-Natal).

ARCTOPUS PLATDORING 3 spp., Namaqualand to E Cape

dregei Sond. Like **A. echinatus** but leaves without conspicuous marginal teeth and with at most only rudimentary inflexed spines in leaf recesses. Involucel bracts obovate, lateral margins rolled

inwards. Fruit with one mericarp aborted, mericarps, slightly rugose, white, not separating when mature. June–July. Deep sands and gravel flats, NS, CCR (coastal S Namaqualand: Koekenaap and St Helena Bay to Paarl). **(gce)**

echinatus L. Dioecious, acaulescent perennial; root large, tuberous, resinous. Leaves large, prostrate, ± orbicular, lobed to lacerate, toothed, with inflexed spines in leaf recesses. Male flowers pedunculate, cream-coloured. Female flowers sessile, greenish. Involucel bracts prominent, ovate, apex acute, keeled. Fruit slightly dorsally compressed, usually with one mericarp aborted, mericarps spiny, brown, separating when mature, homomorphic, vittae absent, rib oil ducts small. May–Aug. Sand and granite flats and slopes, WM, CCR (Bokkeveld Mountains, Roggeveld, to Alexandria).

BERULA TANDPYNWORTEL, WATER PARSNIP 6 spp., cosmopolitan

thunbergii (DC.) H.Wolff (= *Berula erecta* (Huds.) Coville subsp. *thunbergii* (DC.) B.L.Burtt) Erect or spreading, stoloniferous perennial, up to 1 m tall. Leaves pinnate, leathery, leaflets sessile, paired, elliptic to ovate, finely toothed. Flowers white, in leaf-opposed umbels. Fruit subglobose, mericarps isodiametric, ± ribbed, homomorphic, vittae present, rib oil ducts inconspicuous. Jan.–Mar. Streamsides, WM, TS, CCR (Sutherland to Cape Peninsula to N Africa).

BUPLEURUM ± 150 spp., cosmopolitan

mundii Cham. & Schltdl. Tufted perennial, up to 0.6 m tall, base woody. Leaves simple, linear to oblanceolate, grass-like. Flowers yellow. Fruit narrowly oblong in dorsal view, mericarps isodiametric, ribbed, homomorphic, vittae present, 3 or 4 between each rib, rib oil ducts inconspicuous. Aug.–Feb. Moist slopes, KB, WM, CCR (Kamiesberg Mountains, Calvinia, Cape Peninsula to Mpumalanga).

CAPNOPHYLLUM 4 spp., N and W Cape **(gce)**

leiocarpon (Sond.) J.C.Manning & Goldblatt Sprawling annual, up to 0.5 m tall, mature parts glaucous. Leaves finely dissected, soft. Flowers white, in leaf-opposed, few-rayed umbels. Fruit elliptic to broadly ovate, mericarps dorsally compressed, smooth, marginal ribs slightly involute, winged, dorsal ribs prominent, flexuose, homomorphic, vittae present, rib oil ducts inconspicuous. Sept.–Nov. Deep coastal sands, NS, CCR (Port Nolloth to Langebaan). **(gce)**

CENTELLA PENNYWORT, VARKOORTJIES 45 spp., largely southern African, 1 sp. pantropical

cochlearia (Domin) Adamson (including **C. recticarpa** Adamson) Virgate perennial, up to 0.2 m tall. Leaves linear to narrowly lanceolate, sessile or rarely ± petiolate, glabrous. Umbels either male or bisexual on separate plants. Male umbellules 3-flowered, bracts 2. Bisexual umbellules 1-flowered, bracts 2. Flowers purplish, with a well-developed stylopodium. Fruit oblong, mericarps laterally compressed, distinctly ribbed, smooth between ribs, prominently bulging on either side of commissure, homomericarpic. Sept.–Apr. Rock crevices, KV, CCR (Klawer to Cederberg Mountains). **(gce)**

fusca (Eckl. & Zeyh.) Adamson Like **C. cochlearia** but leaves indistinctly petiolate, shortly and variably hairy. Male umbellules 5-flowered, bracts 2. Bisexual umbellules 1-flowered, bracts 4. Flowers greenish, without a well-developed stylopodium. Mericarps slightly ribbed. Aug.–Jan. Middle to upper slopes, KB, CCR (Kamiesberg Mountains to Worcester). **(gce)**

linifolia (L.f.) Drude Like **C. cochlearia** but leaves sessile, glabrous to sparsely hairy. Flowers yellowish, without a well-developed stylopodium. Fruit obovate, mericarps inconspicuously ribbed, wrinkled between ribs. Sept.–Dec. Rocky slopes, TS, CCR (Worcester to Swartberg Mountains, Karookop and Mossel Bay). **(gce)**

tridentata (L.f.) Drude ex Domin Decumbent annual or short-lived perennial, up to 0.2 m tall. Leaves cuneate, petiolate, densely to sparsely hairy, usually 3–5-toothed. Umbels bisexual, male flowers 4, shortly pedicellate, bisexual flowers 1, sessile, central, bracts 4. Flowers whitish. Fruit obovate, mericarps laterally compressed, ribbed, wrinkled between ribs, thinly hairy, shorter than bracts. Aug.–Dec. Mainly coastal flats and lower slopes, NS, CCR (Hendriksvlei to Cape Peninsula and Port Elizabeth). **(gce)**

CHAMAREA CAPE CARAWAY, VINKELWORTEL ± 6 spp., southern Africa

capensis (Thunb.) Eckl. & Zeyh. Perennial, up to 0.5 m tall; roots 1 or 2, fleshy, pencil-like. Leaves absent at flowering, uniform, all much-dissected, ultimate segments glossy green, acute. Umbels on relatively long, slender, often branched peduncles, raylets relatively stout, < 5 mm long. Flowers yellow, sepals obtuse. Fruit 2.5–3 mm long, ovoid, mericarps isodiametric, ribbed, homomorphic, vittae present, rib oil ducts inconspicuous. Jan.–Apr. Rocky slopes, KB, CCR (Kamiesberg Mountains, Gifberg to Cape Peninsula and E Cape).

longipedicellata B.L.Burtt Like **C. capensis** but roots 4–6, only tip fleshy and prominently expanded, ovate, laterally flattened, ultimate leaf segments less finely divided, green, raylets wiry, > 7 mm long and sepals semi-lunar. Mar. In loose sand between boulders, KV, WM (southeastern Knersvlakte, Roggeveld Escarpment). **(ece)**

snijmaniae B.L.Burtt Like **C. capensis** but root 1, with up to 2 shrivelled roots from previous season, fleshy, greatly expanded from base, ovate, isodiametric, ultimate leaf segments less finely divided, green, sharply toothed with thickened midrib, sepals semi-lunar and fruit flask-shaped. Mar. Clay flats, WM (Nieuwoudtville). **(ece)**

[**Taxonomic note** Several new species may yet be described.]

CONIUM HEMLOCK 6 or 7 spp., southern and tropical Africa, Eurasia

chaerophylloides (Thunb.) Sond. Like **C. sphaerocarpum** but flowers yellowish green, and mericarps ribbed, square in cross section. Sept.–Nov. Rocky slopes and disturbed forest margins, WM, CCR (near Fraserburg to Oudtshoorn and Stanford to Mpumalanga).

sphaerocarpum Hilliard & B.L.Burtt Robust biennial, up to 2 m tall. Leaves finely divided, leaflets soft. Flowers white, in flat-topped umbels. Fruit broadly ovoid, mericarps isodiametric, ribs inconspicuous, elliptic to round in cross section, homomorphic, vittae absent, rib oil ducts inconspicuous. Aug.–Dec. Rocky slopes, NH, KB, WM, TS, CCR (Steinkopf to Cederberg Mountains, Roggeveld, Karoopoort, Matjiesfontein to Riversdale). **(gce)**

CYNORHIZA (= *PEUCEDANUM* in part) BIERWORTEL, GATAGAAI, HONDEWORTEL 3 spp., Richtersveld to SW and E Cape

typica Eckl. & Zeyh. (= *Peucedanum sulcatum* Eckl. & Zeyh. ex Sond., *P. typicum* (Eckl. & Zeyh.) B.L.Burtt) BIERWORTEL, HONDEWORTEL Tufted, herbaceous perennial, up to 1 m tall. Leaves dying at flowering, scrambling, finely divided, soft, lobes linear-oblong. Umbels on a long, slightly branched peduncle, terminal one large, fertile, lateral ones 0–4, smaller, functionally male. Flowers yellowish. Fruit large, obovate, mericarps dorsally compressed, marginally winged, dorsally ribbed, homomorphic, vittae present, rib oil ducts inconspicuous. Oct.–Jan. Coastal and karroid scrub and thicket, G, NS, NH, KB, CCR (Richtersveld Mountains to SW Cape, Graaff-Reinet to Port Alfred).

DASISPERMUM (= *SONDERINA, STOIBRAX* in part) 7 spp., N Cape to KwaZulu-Natal

capense (Lam.) Magee & B.-E.van Wyk (= *Stoibrax capense* (Lam.) B.L.Burtt) Like **D. hispidum** but usually sprawling and prostrate, fruit transversely oblong (broader than long) and mericarps with marginal ribs strongly concave in lateral view, scabrous to warty. Sept.–Nov. Sandy flats, usually coastal, NS, NH, TS, CCR (Port Nolloth to Agulhas Plain). **(gce)**

hispidum (Thunb.) Magee & B.-E.van Wyk (= *Sonderina caruifolia* (Sond.) H.Wolff, *S. hispida* (Thunb.) H.Wolff) Erect or occasionally ± sprawling annual, up to 0.6 m tall. Leaves finely dissected, herbaceous to leathery, leaflets linear-oblong. Umbels leaf-opposed, involucel bracts leathery, some often leaf-like. Flowers white. Fruit elliptic to broadly ovate, mericarps isodiametric, ribbed, marginal ribs parallel to very slightly concave in lateral view, scabrous to densely pilose, homomorphic, vittae present, rib oil ducts inconspicuous. Sept.–Nov. Sandy flats, usually coastal, G, NS, KV, CCR (Richtersveld to Port Elizabeth). **(gce)**

suffruticosum (P.J.Bergius) B.L.Burtt DUINESELDERY Sprawling to prostrate short-lived perennial, up to 0.4 m tall, woody at base. Leaves bipinnatisect, leathery-fleshy, leaflets turgid, often

curling inward. Umbels leaf-opposed, involucral and involucel bracts turgid. Flowers white. Fruit ovate to broadly ovate, mericarps isodiametric, ribbed or winged, corky, homo- or heteromorphic, vittae present, rib oil ducts inconspicuous. Mainly Aug.–Nov. Coastal dunes, NS, CCR (N side of Olifants River Mouth to KwaZulu-Natal).

DEVERRA 7 spp., southern and tropical Africa, Asia

denudata (Viv.) Pfisterer & Podlech Twiggy, greyish green shrub, up to 2 m tall, woody at base. Leaves bi- or tripinnatisect, usually withered or absent at flowering. Flowers yellow. Fruit ovoid, mericarps isodiametric, densely covered in flat, white hairs, homomorphic, vittae present, rib oil ducts inconspicuous. Nov.–Feb. Dry karroid scrub, often along seasonal watercourses, SN, G, KV, WM, TS, CCR (Namibia to Little Karoo, E Cape, and N Africa).

HETEROMORPHA PARSLEY TREE, WILDEPIETERSIELIEBOS 7 spp., sub-Saharan Africa and southern Arabia

arborescens (Spreng.) Cham. & Schltdl. Shrub or small tree, 2–9 m tall, with reddish or translucent, peeling bark. Leaves palmately or pinnately 1–3(–9)-foliolate, leaflets elliptic-lanceolate, crenulate. Flowers greenish white. Fruit elliptic, mericarps isodiametric, heteromorphic, one with 2 marginal and 1 median wing, the other with only 2 lateral wings, sometimes pilose, vittae present, rib oil ducts inconspicuous. Dec.–Jan. Riverine scrub, forest margins and rocky woodland, WM, CCR (near Fraserburg, Tulbagh and Bredasdorp to southern Arabia).

MARLOTHIELLA 1 sp., southern Namibia **(ece)**

gummifera H.Wolff Gnarled, compact, evergreen shrublet, up to 0.4 m tall. Leaves bipinnatisect, leathery-fleshy, long-petiolate, leaflets subterete. Umbel covered with stellate hairs. Flowers greenish yellow with ± large sepals. Fruit ovate, covered in stellate hairs, mericarps isodiametric to slightly laterally compressed, inconspicuously ribbed, slightly heteromorphic, vittae absent, rib oil ducts large. Mar.–June. Coastal sands, often between rocks, SN (Lüderitz to Baker's Bay). **(ece)**

NOTOBUBON (= *PEUCEDANUM* in part) 12 spp., southern Africa

capense (Eckl. & Zeyh.) Magee (= *Peucedanum polyactinum* B.L.Burtt, *P. kamiesbergense* B.L.Burtt) Slender, few-branched, glaucous shrub, up to 3 m tall. Leaves 3-pinnate, leaflets weakly pinnatisect or usually 3-sect, lobes linear. Umbels orbicular, on a usually short peduncle, terminal one large, multiradiate, fertile, lateral ones usually absent. Flowers yellow. Fruit mostly rotund, mericarps dorsally compressed, dorsally slightly ribbed, marginally narrowly-winged, homomorphic, vittae present, with additional rib vittae, rib oil ducts inconspicuous. Oct.–Feb. Granite boulders or rocky sandstone slopes, KB, CCR (Kamiesberg Mountains, Matsikamma Mountains to Betty's Bay). **(gce)**

pearsonii Adamson (= *Peucedanum pearsonii* Adamson) Lax, erect, shrub, up to 1 m tall, branches remaining simple-stemmed. Leaves finely dissected, flat-topped, green to glaucous, leaflets weakly pinnatisect or 2- to 3-sect, lobes linear. Umbels flat-topped, on a long persistent peduncle, terminal one relatively large, fertile, lateral ones 0–3, smaller, functionally male. Flowers yellow. Fruit elliptic, mericarps dorsally compressed, dorsally ribbed, marginal ribs not winged, homomorphic, vittae present, without additional rib vittae, rib oil ducts inconspicuous. Oct.–Jan. Granite slopes, KB (Kamiesberg Mountains). **(ece)**

POLEMANNIOPSIS 2 spp., southern Namibia to W Cape **(gce)**

marlothii (H.Wolff) B.L.Burtt Much-branched, woody, summer-deciduous shrub, up to 4 m tall, leafless at flowering, branches reddish brown. Leaves mostly 5-digitate, leaflets obovate, toothed. Flowers yellow. Fruit oblong to obovate in dorsal view, body of mericarps isodiametric, heteromorphic, one with 2 marginal and 1 median wing, the other with only 2 lateral wings, vittae absent, oil ducts present as hollow cavity in wings. Dec.–Jan. Sandstone slopes, G, CCR (Richtersveld and Pakhuis Mountains). **(gce)**

namibensis B.-E.van Wyk, A.Burke & Mannh. Like **P. marlothii** but shrublet only up to 0.6 m tall, with white or greyish branches and 3-foliolate leaves. Gravel plains or S- to E-facing gentle slopes, SN (Sperrgebiet). **(ece)**

SCARABOIDES 1 sp., N Cape **(ece)**

manningii Magee & B.-E.van Wyk Erect annual, up to 0.4 m tall. Leaves cauline, pinnate, glabrous. Umbels leaf-opposed, sessile or rarely short pedunculate, involucre bracts absent. Flowers white, stylopodium flat, level with or sunken below fruit apex, styles remaining short. Fruit broadly elliptic, dark brown to black, mericarps dorsally compressed, smooth, dorsal ribs indistinct, marginal ribs winged, prominently involute, homomorphic, vittae present, with additional solitary vittae in marginal wings, rib oil ducts inconspicuous. July–Aug. Damp dolerite or clay soils, KV, TS (Mauwerskop, Tanqua National Park). **(ece)**

TORILIS HEDGE PARSLEY 15 spp., Mediterranean to Asia, also Africa

arvensis (Huds.) Link Sprawling, softly hairy annual, up to 0.4 m tall. Leaves finely divided, leaflets softly hairy, toothed. Umbels leaf-opposed. Flowers white to pinkish, outer petals larger. Fruit burr-like, with barbed prickles, mericarps isodiametric, homomorphic, vittae absent, rib oil ducts prominent. Aug.–Nov. Flats and rocky slopes, WM, CCR (Roggeveld Escarpment to Cape Peninsula and E Cape, Europe).

APOCYNACEAE (= *ASCLEPIADACEAE*)

by P.V. Bruyns

1. Pollen-grains not enclosed in waxy masses, remaining loose in anthers or falling from ripe anthers onto translator alongside them:
2. Style head with well-developed translators in grooves between anthers; translators consisting of sticky end on outside (which adheres to pollinator for removal), a spoon- to cornet-shaped receptacle into which pollen grains fall from anthers, and a short neck joining the two parts ..... **Ectadium**

2.' Style head without well-developed translators between anthers, pollen removed directly from sides of anthers by adhering to part of pollinator:
3. Anthers free from style head and without hardened margins; floral parts overlapping towards left in bud; fruit indehiscent and fleshy; seeds not flattened and without hairs **Carissa**

3.' Anthers fixed to style head and with hardened margins at least towards base; floral parts overlapping towards right in bud; fruit in pairs, dehiscent and dry; seeds somewhat flattened and with hairs at one end:
4. Plant not spiny and stems not fleshy; flowers with a corolline corona at mouth of tube and just below base of lobes ..... ***Nerium**

4.' Plant spiny and with fleshy stems; flowers without a corolline corona. ..... **Pachypodium**

1.' Pollen-grains gathered into and enclosed in waxy masses (pollinia):
5. Pollinia pendulous in anthers:
6. Sap clear:
7. Corona present (in 3 series of lobes) ..... **Eustegia**

7.' Corona absent:
8. Corolla lobes closing the tube (if not, then lobes folded inwards lengthwise or concave above); anther appendages covering the long, conical style apex ..... **Microloma**

8.' Corolla lobes not closing the tube, spreading, margins and apex folded back to give a convex shape above; anther appendages much shorter than the long conical style apex. ..... **Astephanus**

6.' Sap milky:
9. Lobes of inner and outer coronas subequal in length, together forming a more-or-less continuous cup around anthers ..... **Cynanchum**

9.' Lobes of outer corona much smaller than inner (behind anthers) or absent and not forming a more-or-less continuous cup around anthers, inner dominating gynostegium:
10. Leafless succulent with cylindrical, grey-green stems; outer corona enclosing gaps between bases of much larger tapering inner lobes; apex of style head conical ..... **Sarcostemma**

10.' Leafy climber, herb or shrub, stems not succulent; outer corona minute and present as a small tooth between larger and not tapering inner lobes and beneath guide rails or absent; apex of style head concave:
11. Leaves cordate; corolla lobes in bud forming a broad cone seated on a much narrower, short corolla tube; corona in two series, with outer series arising at or above mouth of corolla tube; pollinia with fine insertion crest on inner edge (relative to anther) ..... **Pergularia**
11.' Leaves not cordate; buds not as above; corona not fused to corolla near mouth of tube; pollinia without insertion crest:
12. Corona lobes entire, without cavity on upper surface; plant not exceeding 300 mm tall, with ascending ± annual stems arising from a carrot-like rootstock ..... **Xysmalobium**
12.' Corona lobes folded around a deep vertical cavity, sometimes with a horn inside cavity; plant a free-standing, perennial shrub, 0.5–2 m tall, arising from a small above-ground trunk ..... **Gomphocarpus**

5.' Pollinia horizontal to ascending in anthers:
13. Pollinia without an insertion crest:
14. Plant an inconspicuous twiner or with only short erect shoots up to 30 mm long, arising from a large tuber, with milky sap; flowers with a conspicuous, white tubular corona filled inside with sterile appendages of anthers ..... **Fockea**
14.' Plant a much-branched shrub with woody brown stems and thick fleshy leaves, without a tuber, with clear sap; flowers without corona; anthers with inconspicuous sterile appendages ..... **Rhyssolobium**
13.' Pollinia with insertion crest along the outer edge (relative to anther):
15. Stems herbaceous or sometimes succulent, without tubercles and not angled; leaves with a blade and petiole (rarely rudimentary), not borne at tips of tubercles; flowers not fleshy:
16. Corolla tube at least three times as long as broad in middle ..... **Ceropegia**
16.' Corolla tube less than twice as long as broad in middle. ..... **Brachystelma**
15.' Stems very succulent, with fleshy tubercles arranged into angles along stems; leaves absent or reduced to minute rudiments at tips of tubercles; flowers fleshy:
17. Stems with 6 or more angles:
18. Stems with 10 or more angles:
19. Each tubercle tipped with a sharp spine, tubercles laterally flattened into clear rows up stem ..... **Hoodia**
19.' Each tubercle tipped by a soft, grey-green leaflet, somewhat sunken into apex of tubercle, tubercles not laterally flattened, rows often indistinct. ..... **Larryleachia**
18.' Stems with 6–8 angles:
20. Inflorescences with a single flower and single bract; pollinaria with very small caudicles ..... **Pectinaria**
20.' Inflorescences with 2–many flowers and several bracts; pollinaria with conspicuously winged caudicles:
21. Stems rhizomatous with erect apices, 20–25 mm thick; tubercles tapering to an acute tooth; corolla 12–17 mm diam. ..... **Richtersveldia**
21.' Stems procumbent with prostrate apices, 9–15 mm thick; tubercles flat with an obtuse tooth in middle; corolla 6–10 mm diam. ..... **Notechidnopsis**
17.' Stems with 4 or 5 angles:
22. Stems, pedicels and sepals pubescent ..... **Stapelia**
22.' Stems, pedicels and sepals glabrous:
23. Young tubercles rounded, not tipped by an acute tooth or small leaf:
24. Inner surface of corolla rough with columnar papillae (each tipped with a bristle) or covered with fine crinkled hairs ..... **Quaqua**
24.' Inner surface of corolla with tiny unicellular papillae, otherwise smooth and not hairy. ..... **Tromotriche**
23.' Young tubercles tapering into a tooth or small acute leaf:
25. Inflorescence(s) arising from upper half of stem towards apex, usually many:
26. Outer corona present; tubercles each tipped with a hardened sharp tooth; flowers arising in many, vertically-arranged, small clusters along grooves between angles ..... **Quaqua**
26.' Outer corona absent; tubercles without a sharp and hardened tooth; flowers arising in few inflorescences, not vertically arranged ..... **Piaranthus**
25.' Inflorescence arising from lower half of stem towards base, solitary:

27. Corolla urceolate to cylindrical; outer corona sometimes tubular; inner corona lobes laterally flattened, touching backs of anthers only at base, rising above anthers to form a cage over them ..... **Stapeliopsis**
27.' Corolla not urceolate or cylindrical; outer corona never tubular; inner corona lobes dorsiventrally flattened, touching backs of anthers for most of their length and not forming a cage over them:
28. Inner and outer coronal series well separated on gynostegium; pollinium elliptic-rectangular:
29. Corolla with fine ridges on exterior; corolla tube not formed by raised annulus; corolla lobes flat or slightly concave above ..... **Huernia**
29.' Corolla without fine longitudinal ridges on exterior; corolla tube entirely formed by raised annulus around corona; corolla lobes convex above, usually tightly folded down lengthwise along midrib into rather long, narrow plates ..... **Duvalia**
28.' Inner and outer coronal series not separated on gynostegium and laterally at least partly fused to each other; pollinium D-shaped:
30. Young tubercles each bearing a small, acute, differentiated leaf-rudiment **Tridentea**
30.' Young tubercles without a differentiated leaf ..... **Orbea**

ASTEPHANUS 2 spp., South Africa

triflorus (L.f.) Schult. (= *A. marginatus* Decne., *A. neglectus* Schltr.) Slender climber, up to 1 m tall, with fibrous roots, stems up to 1 mm thick. Leaves ± elliptic, 10–20 × 2–5 mm, grey-green, minutely pubescent to glabrescent. Flowers 2–9, opening together in lax, often sessile clusters along stem, pedicels < 5 mm long. Corolla campanulate, 5–7 mm diam., whitish outside, inside pinkish to whitish, glabrous, except for 5 hairy patches in tube, lobes spreading, ± 2 mm long. June–Sept. Rocky S- or W-facing slopes, among large shrubs, G, NS, NH, KB, CCR (N of Steinkopf to Cape Peninsula to George). **(gce)**

BRACHYSTELMA ± 100 spp., tropical to southern Africa, India to Australia

theronii Bruyns Dwarf, tuberous geophyte, up to 1 m tall, sap clear. Leaves narrowly elliptic, 15–50 × 3–10 mm, grey-green, sparsely pubescent. Flowers 3–20, opening nearly simultaneously, pedicel 10–18 mm long. Corolla slightly campanulate, 30–45 mm diam., green, faintly mottled with brown outside, inside cream mottled with maroon, with shaggy, white, spreading hairs around mouth of and inside tube; tube 2–3 mm deep; lobes spreading, 15–20 × 4–6 mm. Oct. Rocky slopes with sparse low bushes, WM, TS (Williston to Fraserburg to Moordenaars Karoo).

CARISSA NUM-NUM ± 7 spp., South Africa to Arabia to Myanmar

bispinosa (L.) Merx. Much-branched, woody shrub, up to 3 m tall, armed with simple or forked spines, sap milky. Leaves elliptic, leathery and shiny. Flowers salver-shaped, in terminal, subumbellate cymes, white, fragrant, corolla lobes 2 mm long. Fruits black, 14–16 mm long. Jan.–Apr. Karroid scrub on stony slopes, G, NH, CCR (Namibia: Keetmanshoop through to Rosh Pinah and S to Worcester to Port Elizabeth and to Malawi).

CEROPEGIA ± 160 spp., Canary Islands, Africa, Madagascar, Asia, Australasia

A. Leaves rudimentary, dropping off early, plants arising from thick, spindle-shaped roots

fimbriata E.Mey. Like **C. namaquensis** but corolla tube whitish, heavily veined with green, with short and broad lobes forming a broad cage over the tube and remaining fused at tips. Oct.–Mar. Stony slopes, TS, CCR (Fraserburg and Worcester to Klaarstroom and E Cape).

namaquensis Bruyns Glabrous, succulent climber, up to 1 m tall, from swollen roots, stems 2–3 mm diam., glabrous. Leaves fleshy, elliptic, 6–10 × 2 mm. Flower solitary, extra-axillary, pedicel 5–10 mm long. Corolla 50–60 mm long, maroon to black, with grey mottling, tube ± 40 mm long, with ellipsoidal basal swelling, contracted above, then expanding to 7–8 mm diam. at mouth, lobes 20–25 mm long, free at tips and often pendant. Corona yellow and maroon, outer lobes forming

5 pockets between bases of inner lobes, inner lobes incumbent on backs of anthers then erect, 2 mm tall, dorsiventrally flattened. Oct.–Mar. Under bushes on gravelly flats, G (Lekkersing). **(ece)**

A.' Leaves well developed and persistent
B. Leaves and stem non-succulent, plants arising from thick spindle-shaped roots

filiformis (Burch.) Schltr. Slender climber, up to 0.8 m tall, stems 1 mm diam. Leaves linear. Flowers 1–3, opening in succession in extra-axillary clusters, on peduncles up to ± 10 mm long. Corolla 50–60 mm long, grey mottled with purple outside, lobes white with blackish margins, fused and twisted together at tips. Corona white, outer lobes bifid into erect lobules with swollen tips, inner erect in a central slender column. Oct.–Mar. Gravelly flats, WM (Great Karas Mountains and Griqualand West to Sutherland and E Cape).

B.' Leaves and stem succulent, plants with one or more basal tubers

africana R.Br. Like **C. occidentalis** but flowers grey to green with purplish veins, outer corona lobes erect and fused into a deep, cupular structure around anthers, inner lobes laterally flattened above. Oct.–Mar. Stony slopes, TS, CCR (Cape Peninsula to KwaZulu-Natal).

occidentalis R.A.Dyer Small, glabrous, succulent climber, up to 300 mm tall, from flattened tubers, stems 1–3 mm diam. Leaves oblong to lanceolate, ± 20 × 5 mm, fleshy. Flowers 1–5, opening in succession, in sessile, extra-axillary clusters, pedicels 5–8 mm long. Corolla 25–30 mm long, green with purplish veins, tube 20–25 mm long, with ellipsoidal basal swelling, contracted above then expanding to ± 7 mm diam. at mouth, lobes 6–9 mm long, fused at tips. Corona whitish, outer lobes forming 5, low pockets between bases of inner lobes, inner lobes incumbent on backs of anthers then erect, 2 mm tall, dorsiventrally flattened. Oct.–Mar. In crevices and under bushes on low rock outcrops, SN, NS (Witpütz, Kleinsee, Olifants River Mouth). **(ece)**

CYNANCHUM BOKHORING ± 100 spp., ± cosmopolitan

africanum (L.) Hoffmanns. BOBBEJAANTOU, KLIMOP Climber, up to 500 mm tall, pubescent, sap milky. Leaves somewhat fleshy, ovate to elliptic-oblong, up to 25 × 18 mm, dark green above, paler below. Flowers 5–10, opening together in extra-axillary, umbel-like clusters, on peduncles 5–30 mm long, pedicels up to 5 mm long. Corolla rotate, lobed to near base, lobes ascending, twisted in upper half, 5–8 × 2 mm, brown. Corona tubular, with 10 spreading lobules at mouth, 5–8 × 3 mm, white, staminal column ± as long as corona, with long stipe. June–Dec. Sandy flats among bushes, NS, NH, WM, CCR (Kleinsee to Cape Peninsula to E Cape).

meyeri (Decne.) Schltr. Shrub, up to 300 mm tall, stems woody, non-twining, covered with white, adpressed hairs, sap milky. Leaves somewhat fleshy, orbicular to ovate, up to 12 × 10 mm. Flowers 1–3, clustered on a short, extra-axillary peduncle, pedicels up to 5 mm long. Corolla campanulate, lobed to 2/3 of way down, lobes erect or spreading, ± 2 × 1 mm, green. Corona cup-shaped, with 5 spreading lobes at mouth opposite anthers, ± 1 × 2 mm, white, staminal column not quite 2 mm tall, without a stipe. June–Aug. Rocky slopes to gravelly flats, SN, G (Lüderitz to Grootderm). **(ece)**

zeyheri Schltr. Small, mat-forming, rhizomatous herb, up to 150 mm tall, sap milky. Leaves fleshy, ovate to suborbicular, 8–15 × 5–10 mm. Flowers 1–5, opening together in extra-axillary clusters, on peduncles 0.5–5 mm long, pedicels 5–10 mm long. Corolla rotate, lobed to base, lobes spreading, 1–2 mm long, brown. Corona shortly tubular, 1.5–2 mm long, white, staminal column 0.7–0.8 mm tall. May–Nov. Shale slopes and limestone flats, TS, CCR (Cape Peninsula to Riversdale, Matjiesfontein). **(gce)**

DUVALIA GORTJIE, KOPSEER 16 spp., Africa, Arabia

caespitosa (Masson) Haw. (= *D. pubescens* N.E.Br.) Dwarf, mat-forming, glabrous succulent, up to 50 mm tall, stems leafless, 4- or 5-angled, tuberculate, 10–50 mm long. Flowers 1–3, developing in succession, in sessile clusters. Corolla rotate, 18–30 mm diam., dark brown, with raised annulus defining tube, lobes spreading, linear with down-turned margins, 9–15 × 3–5 mm. Corona pale brown, outer lobes disc-like, level with top, but not completely covering annulus, inner adpressed to anthers, with prominent, erect, dorsal appendage. Mar.–Oct. Stony slopes under small bushes, G, NS, NH, KV, WM, TS, CCR (Aus to Vanrhynsdorp, widespread in Karoo).

maculata N.E.Br. Like **D. caespitosa** but annulus whitish speckled with brown, outer corona in base of tube formed by annulus, corona yellow. Oct.–Apr. Stony slopes under bushes, WM (Helmeringhausen to Middelpos, Kenhardt and Free State).

ECTADIUM 3 spp., Namibia along coast to lower Gariep Valley in South Africa

latifolium (Schinz) N.E.Br. Spineless shrub, up to 3 m tall, sparsely branched, stems rigid. Leaves narrowly ovate, 40–70 × 8–14 mm, glabrescent. Flowers in branched, extra-axillary inflorescences, 2–5 per branch, peduncle 10–20 mm long. Corolla yellow, 12–16 mm diam., tube 4–5 mm long, with corolline corona erect around mouth, lobes 5–7 × 2–3 mm, spreading. Sept.–Mar. Sand near dunes or gravelly slopes, SN (Spencer Bay to Bogenfels).

virgatum E.Mey. Like **E. latifolium** but leaves linear, 60–80 × 3–4 mm. Mar.–May. Riverbeds and gravelly flats, SN, G (Oranjemund to Sendelingsdrif and Fish River Mouth). **(ece)**

EUSTEGIA 1 sp., Namaqualand to W Cape **(gce)**

minuta (L.f.) Schult. (= *E. filiformis* (L f.) Schult., *E. fraterna* N.E.Br.) Annual, up to 150 mm tall, with slender branches. Leaves filiform to linear-hastate, glabrous. Flowers 3–10, in small, extra-axillary clusters, on peduncles up to 10 mm long. Corolla lobed to base, 6–8 mm diam., lobes ± 3.5 mm long, oblong, convex above, green to reddish, glabrous. Corona in 3 series of small, narrow, white to pink lobes, arising at base of gynostegium. Fruits smooth, glabrous. Aug.–Oct. Gravelly flats, NH, KB, CCR (Kamiesberg Mountains to Cape Peninsula to Matjiesfontein). **(gce)**

FOCKEA 6 spp., Kenya to South Africa

capensis Endl. GWARRIEKOE Like **F. comaru** but erect or twining herb from large tuber, up to 0.5 m diam., stems grey, 2–4 mm diam. Leaves ovate, 15–30 × 6–12 mm, grey-green, margins crisped, but not recurved. Feb.–May. Karroid scrub on rocky slopes, TS, CCR (Little Karoo to Klaarstroom). **(gce)**

comaru (E.Mey.) N.E.Br. BERG-KAMBROE, KAMBROE Small herb, stems brown, erect or twining, up to 1 m × ± 1 mm, sap milky, from underground tuber. Leaves nearly sessile, linear to narrowly elliptic, 25–65 × 1.5–2 mm, dark grey-green, pubescent, margins recurved. Flowers 1–6, in several sessile clusters, on young growth. Corolla 8–27 mm diam., lobes linear, 4–12 × 1–2 mm, brown to green, sparsely pilose. Corona white, slightly exceeding corolla tube, tubular, with numerous fine processes around mouth, in several series. Anthers with swollen, white, apical appendages reaching to mouth of corona tube and blocking it. Aug.–May. Rocky slopes or summits, G, NH, KV, WM, TS, CCR (Rosh Pinah to Piketberg, Worcester to E Cape).

GOMPHOCARPUS 20 spp., Arabia to South Africa

A. Leaves filiform, 1–1.5 mm broad, margins strongly revolute; fruit 5–7 mm diam., smooth

filiformis (E.Mey.) D.Dietr. Shrub, up to 2 m tall, stems erect, branching from base, slender, grey with waxy layer, tomentose on younger parts, sap milky. Leaves filiform, 40–100 × 1–1.5 mm, usually weeping. Flowers 4–9, in extra-axillary clusters, pedicels ± 12 mm long. Corolla yellow. Corona white above, green towards base, seated on short stipe, with apex slightly produced, with a laterally flattened horn projecting from cavity. Fruit wax-covered, with few hairs, 20–30 × 5–7 mm, beaked. Whenever rain falls. Ruderal on calcareous flats, SN, G, NH, KV (Swakopmund to Beaufort West).

A.' Leaves 4–30 mm broad, margins not revolute; fruit 15–30 mm diam., covered with soft, filiform bristles

cancellatus (Burm.f.) Bruyns KATOENBOS, WILD COTTON Shrub, up to 1 m tall, stems erect, branching mostly from base, velvety, sap milky. Leaves oblong to elliptic, mostly sessile, 25–50 × 12–30 mm, leathery, nearly glabrous. Flowers 12–30, in extra-axillary umbels, on peduncles 5–20 mm long, pedicels 18–25 mm long. Corolla white, faintly suffused with pink. Corona yellowish white, without a stipe, flat-topped and flush with style head, without a horn in cavity. Fruit ovoid,

40–70 × 18–30 mm, beaked, covered with soft bristles. May–Sept. Rocky hills, G, NH, KB, WM, TS, CCR (Rosh Pinah to Cape Peninsula to Grahamstown).

fruticosus (L.) W.T.Aiton KAPOKBOS Like **G. cancellatus** but leaves linear to lanceolate, 50–150 × 4–15 mm, ± glabrous, pedicels 10–18 mm long, corolla pale yellow, corona white, on a conspicuous stipe, with apex truncate. July–Sept. Ruderal on roadsides, around mud dams and in dry streambeds, SN, G, NS, NH, KV, WM, TS, CCR (widespread in arid areas of Africa and Arabia).

HOODIA 13 spp., southern Africa, Angola

A. Flowers 40–100 mm diam., flesh-pink, corona 4–6 mm diam., purple-black

gordonii (Masson) Sweet ex Decne. GHOBBA, JAKKALSGHAAP, MUISHONDGHAAP Spiny, glabrous, succulent shrub, up to 1 m tall, stems leafless, 25–50 mm diam., greyish, 11–17-angled, with stout spines 6–12 mm long. Flowers 1–4, in sessile, subterminal clusters, pedicels 8–30 mm long. Corolla rotate, 40–100 mm diam., inside flesh-coloured and smooth to papillate, tube 1–1.5 mm deep, lobes up to 15 × 50 mm, ovate with subulate point. Corona purple-black, outer lobes cupular, inner lobes 1 mm long. Jan.–May. Stony slopes to gravelly flats in lower areas, SN, G, NH, KV, WM, TS (E of Swakopmund to Free State, Upper and Great Karoo, marginal to CCR).

A.' Flowers 8–20 mm diam., shades of yellow, reddish brown or purple-black, corona < 4 mm diam., yellow to nearly black

alstonii (N.E.Br.) Plowes GHAAP Spiny, glabrous, succulent shrub, up to 1 m tall, stems leafless, 40–80 mm diam., greyish, with 20–22 angles, with stout spines 8–10 mm long. Flowers 1–8, in sessile, subterminal clusters, pedicels 1–2 mm long. Corolla campanulate 10–18 mm diam., inside yellow and smooth, tube 2–3 mm deep, funnel-shaped, lobes 6–8 × 4–5 mm, ovate-acute. Corona pale yellow, outer lobes deeply divided into 2, erect teeth 1–1.5 mm long, inner lobes 0.75 mm long. Apr.–May. Stony schist to quartz slopes, SN, G (Hauchab to Haalenberg, lower Gariep Valley and Pofadder District).

flava (N.E.Br.) Plowes GHAAP Like **H. alstonii** but plant up to 0.5 m tall, stems brown-green with weak spines, flowers 1–3 per cluster, corolla rotate, 11–13 mm diam., inside greenish yellow, without tube, lobes 2.5–4 × 3.5–6 mm, outer corona lobes broadly spreading. Oct.–Dec. Gravelly slopes with *Ruschia spinosa,* WM, TS (Great Karas Mountains to Prince Albert).

grande (N.E.Br.) Plowes (= *H. colei* Plowes) GHAAP Like **H. alstonii** but plant up to 0.6 m tall, stems brown-green with weak spines, flowers 1–3 per cluster, corolla 8–20 mm diam., inside pale yellow and densely papillate, lobes 3.5–9 × 3–7 mm, outer corona lobes erect. Oct.–Dec. Stony slopes, TS, CCR (Matjiesfontein to Merweville and Calitzdorp).

officinalis (N.E.Br.) Plowes GHAAP Like **H. alstonii** but plant up to 0.5 m tall, stems brown-green with weak spines, flowers 1–3 per cluster, corolla shallowly campanulate, 12–20 mm diam., inside reddish brown and with scattered papillae, tube broadly saucer-shaped, lobes 4–6 × 5–7 mm, outer corona lobes cupular, deeply indented in middle. Sept.–Dec. Stony slopes, SN (central Namibia and Sperrgebiet to Phillipstown).

pilifera (L.f.) Plowes GHAAP Like **H. alstonii** but plant up to 0.8 m tall, stems brown-green with weak spines, flowers 1–3, corolla campanulate, 16–20 mm diam., inside purple-black and densely papillate, tube cupular, lobes 4–6 × 6–7 mm, outer corona lobes spreading to suberect. Oct.–Dec. Stony slopes, TS, CCR (Montagu to near Jansenville).

HUERNIA 50 spp., South Africa to Arabia

A. Corolla with a conspicuous raised annulus around the mouth of the tube

guttata (Masson) Haw. (= *H. reticulata* (Masson) Haw.) KOPSEER Like **H. barbata** but corolla with a broad, shiny, raised, annular area around mouth of tube, inside cream, with prominent maroon spots, tube ± 6 mm long. Mar.–Apr. Stony slopes under bushes, NH, CCR (Garies to Citrusdal, Calitzdorp, E Cape).

humilis (Masson) Haw. (= *H. thudichumii* L.C.Leach) KOPSEER Like **H. guttata** but annular area dull, inside cream, with small, maroon spots, tube 4–5 mm long, inner corona lobes nearly equal-

ling anthers, tapering to bristly acute apex. Oct.–Mar. Stony slopes under bushes, WM (Middelpos to De Aar to Willowmore).

A.' Corolla without a conspicuous shiny annulus around the mouth of the tube
B. Corolla held facing horizontally or nodding, papillae of inner surface tipped with a short, acute bristle, inner corona lobes only slightly exceeding anthers, tapering to a subobtuse apex

namaquensis Pillans Like **H. barbata** but stems reddish, 5-angled, pedicels ascending with spreading apex, corolla campanulate, 20–30 mm diam., inside with low papillae. May–Oct. Stony quartzite or gravel-covered slopes in crevices among rocks, G, NH (Helskloof to Komaggas and Eenriet). **(ece)**

B.' Corolla held facing upwards, papillae on inner surface tipped with a long, clavate bristle, especially in mouth of tube, inner corona lobes much exceeding anthers, slender or clavate, recurved

barbata (Masson) Haw. (= *H. campanulata* (Masson) Haw., *H. clavigera* (Jacq.) Haw.) KOPSEER Densely clump-forming, glabrous succulent, up to 60 × 300 mm, stems 4- or 5-angled, tuberculate, up to 20 mm diam. Flowers 1–5, in a solitary, sessile cluster near stem base, pedicels 4–12 mm long, spreading. Corolla tubular-campanulate, 14–60 mm diam., inside papillate and glabrous, each papilla tipped with a much longer, clavate bristle, cream with maroon spots and rings, tube 5–20 mm long, lobes deltate, 3–18 × 6–17 mm, without marginal cilia. Corona maroon, outer lobes rectangular and fused to base of tube, inner rising in centre then recurved, tapering to slender tip, with laterally broadened base. Feb.–May. Stony slopes under bushes and crevices in rocks, KV, WM, TS, CCR (Pofadder and Vanrhynsdorp to Karoopoort, Montagu to E Cape).

pillansii N.E.Br. KOPSEER Like **H. barbata** but stems cylindrical, with tubercles arranged into 10–16 rows, tubercles tapering into a slender bristle 2–8 mm long, corolla campanulate, inside with conspicuous papillae, each with a minute, apical bristle, inner corona lobes with bristly, clavate tips. Oct.–Apr. Stony slopes under bushes, TS, CCR (Matjiesfontein and Merweville to Willowmore).

LARRYLEACHIA 5 spp., Namibia, South Africa

A. Corolla lobes reflexed to pressed against stem, margins folded back, papillae on inside each tipped with a horizontally-spreading cylindrical appendage

perlata (Dinter) Plowes BOBBEJAANSEEP, HONDEBAL Like **L. cactiformis** but stems up to 300 mm tall, corolla rotate-reflexed, lobes 3–4.5 × 2–2.5 mm. Feb.–Apr. Stony slopes often wedged into crevices in boulders, SN, G (Klinghardt Mountains to Goodhouse).

A.' Corolla campanulate with spreading lobes, papillae if present, without an apical appendage or appendage erect and very minute
B. Corolla without papillae inside, inner corona lacking dorsal projection

marlothii (N.E.Br.) Plowes BOBBEJAANSEEP, HONDEBAL Like **L. cactiformis** but stems often branching from base to form clumps of up to 30, corolla smooth inside. May–July. Stony flats with windblown sand, SN, G (Skeleton Coast to Gariep Mouth to Upington).

B.' Corolla papillate inside at least in mouth of tube, inner corona with conspicuous dorsal projection confluent with outer lobes

cactiformis (Hook.) Plowes BOBBEJAANSEEP, HONDEBAL, PERDEPIEL Dwarf, glabrous, often single-stemmed succulent, up to 150 mm tall, stems leafless, cylindrical-clavate, 12–16-angled, tuberculate, up to 60 mm diam. Flowers 1–5, in sessile clusters, congregated near apex, pedicels 1–2 mm long. Corolla campanulate, 6–15 mm diam., inside papillate and glabrous, each papilla tipped with a small, apical bristle, cream, with maroon bars and rings, tube 1–3 mm long, lobes deltate, 2–3.5 × 2.5–5.5 mm, without marginal cilia. Corona spotted with red on yellow, outer

lobes bifid, inner adpressed to anthers and not exceeding them. Feb.–Apr. Stony, often N-facing slopes, G, NH (S of Eksteenfontein to Pofadder).

picta (N.E.Br.) Plowes Like **L. cactiformis** but corolla spotted with red on yellow, tube distinctly pentagonal, inner corona lobes exceeding anthers and rising in a column in centre. Oct.–Apr. Stony slopes, G (Aus to near Rosh Pinah, Great Karas Mountains to Douglas and Williston).

MICROLOMA 10 spp., Namibia and South Africa

A. Corolla 2–4 mm long, gynostegium 0.7–2 mm tall, tubercles absent from wall of corolla tube, pollinia < 0.5 mm long

armatum (Thunb.) Schltr. ex Gilg BOKHORING Dwarf, rigid, densely branched, spiky shrub, up to 200 mm tall, branches 1–2.5 mm diam., pubescent to tomentose, whitish grey to green, tips spinescent. Leaves ± cordate-deltoid, 2–8 × 1–4 mm, grey-green. Flowers 1–6, in sessile, extra-axillary clusters, pedicels 2–4 mm long. Corolla urceolate-truncate, 1.5–3 mm diam., pubescent outside, greenish yellow, lobes 0.6–1 mm long, folded inwards lengthwise, bent at right angles to tube into mouth to close it, converging in centre. July–Sept. Gravelly flats and crevices in rock slabs on mountains, SN, G, NH, CCR (southern Namibia, Free State to E Cape).

longitubum Schltr. Like **M. armatum** but corolla 6–9 mm long. Oct.–Mar. Gravelly flats, NH (Nauchas, Namibia to E of Springbok to Vanwyksvlei).

poicilanthum H.Huber Climber up to 1 m tall, or shrub up to 150 mm tall, stems 1–1.5 mm diam., finely pubescent. Leaves oblong to narrowly elliptic, 4–17 × 1.5–4 mm, finely pubescent, grey-green. Flowers 1–8 per extra-axillary cluster, peduncle 1–2 mm long, pedicels 2–3 mm long. Corolla campanulate, glabrous, except for 5 patches of yellow hairs in tube, tube ± 2.5 mm broad, pure white (fading to yellow and brown), lobes up to 2 mm long, folded inwards lengthwise, erect to slightly spreading, pea-green. July–Aug. Gravelly flats, often with spiny species of *Ruschia*, G, NH (Tiras Mountains to Steinkopf and NE of Kliprand).

A.' Corolla tube with five tubercles protruding from walls on inside near level of guide rails, gynostegium at least 3.5 mm tall, pollinium > 1 mm long
B. Corolla urceolate with suborbicular-reniform lobes, lobes more-or-less flat and smooth outside; plant with spindle-shaped roots

namaquense Bolus Climber, up to 1 m tall, stems ± 1 mm diam., finely pubescent, deciduous. Leaves linear, 10–35 × 1–2 mm, pubescent, dark grey-green. Flowers 3–6, in extra-axillary clusters, peduncle 4–7 mm, pedicels 6–9 mm long. Corolla uniformly bright red, not shiny, tube urceolate, 5–6 mm long, 4 mm broad at base narrowing to 2–2.5 mm at mouth, lobes ± 2.5 × 3 mm, suborbicular-reniform, erect, closely overlapping towards bases and forming a rosette, closing mouth of tube. June–Aug. Stony renosterveld, NH (Steinkopf to Spektakelberg). **(ece)**

B.' Corolla fluted-cylindrical, lobes lanceolate, folded lengthwise, converging above and closing the tube completely, minutely bristly outside; plant with fibrous roots

calycinum E.Mey. BOKHORING Climber, up to 1 m tall, or small, densely branched, spinescent shrublet, up to 0.2 m tall, ± glabrous, stems 1–2 mm diam., with fine waxy bloom. Leaves linear, 6–18 × 2–4 mm, glabrous, grey-green. Flowers 3–10, in extra-axillary clusters, peduncle 1–7 mm long, pedicels 3–9 mm long. Sepals 4–16 mm long, ± glabrous, often bright red. Corolla tube 5–8 mm long, ± 2.5 mm broad, bright pink-red with green towards base, lobes 2–3 mm long. June–Sept. Dry schist, quartz or gneiss slopes, G, NS, NH, KV (Aus to near Vredendal). **(ece)**

incanum Decne. BOKHORING Like **M. sagittatum** but free-standing shrub, up to 1 m tall, stems densely covered with small, white, adpressed hairs, sepals pubescent above, corolla pink below, whitish above. July–Sept. Arid rocky slopes and flats, G, NH (Helmeringhausen to Eksteenfontein, Richtersveld and to Carnarvon)

penicillatum Schltr. Like **M. sagittatum** but free-standing shrub, up to 1.5 × 2 m, stems rigid, 1.5–3 mm diam., with spinescent tips, bright green, glabrescent. July–Sept. Stony slopes, SN (Lüderitz to Klinghardt Mountains). **(ece)**

sagittatum (L.) R.Br. BOKHORING Climber, up to 1.5 m tall, stems 1–2 mm diam., pubescent. Leaves linear to linear-oblong, sagittate at base, 7–35 × 1.5–7 mm, pubescent, and grey-green.

Flowers 3–10 per extra-axillary cluster, peduncle 2–9 mm long, pedicels 4–10 mm long. Sepals 3.5–9 mm long, pubescent below, glabrous above, reddish green. Corolla tube 5–11 mm long, 2.5–5 mm broad, white to deep red-pink, lobes 2–3 mm long. June–Sept. Sandy to gravelly flats or slopes, G, NS, NH, KB, KV, WM, TS, CCR (Rosyntjieberg to Cape Peninsula to Willowmore). **(gce)**

[**Species excluded** Insufficiently known and probably conspecific with one of above: **M. lanatum** Wanntorp]

*NERIUM 3 spp., Mediterranean to E Asia

***oleander** L. Erect, woody, poisonous shrub, up to 2 m tall, branching mainly from base, spineless. Leaves lanceolate, 50–150 × 15–25 mm, opposite to whorled, leathery, transversely feather-veined. Flowers in lax, terminal cymes. Corolla salver-shaped, 30–50 mm diam., tube cylindrical, abruptly widened around middle, lobes spreading, 15–20 mm long, pink, red or white, with laciniate, corolline corona attached to base of lobes. Aug.–Feb. Declared weed, in watercourses among rocks, TS, CCR (eastern Cederberg Mountains to Mpumalanga).

NOTECHIDNOPSIS 1 sp., Namaqualand. **(ece)**

tessellata (Pillans) Lavranos & Bleck KOPSEER Mat-forming, glabrous succulent, stems leafless, horizontal, tessellated, green, 9–15 mm diam., 6–8-angled, with low tubercles. Flowers 1–5 per sessile cluster, congregated near stem tips, pedicels 3–5 mm long. Corolla rotate, 6–10 mm diam., inside rose-purple speckled with yellow, minutely bristly, tube minute, lobes spreading-reflexed, 2–4 × 1.5–3 mm, ovate-deltoid, convex above. Corona bright yellow, 2–2.5 mm diam., outer lobes erect, bifid above, below cupular, inner initially adpressed to backs of anthers, then erect, dorsiventrally flattened, linear. Apr.–May. Shale slopes, creeping among stones and under small bushes, NH, KV, WM (Nuwerus to Loeriesfontein and Vanrhynsdorp). **(ece)**

ORBEA 56 spp., South Africa to Arabia

ciliata (Thunb.) L.C.Leach Mat-forming, glabrous succulent, up to 80 × 500 mm, stems leafless, purple-mottled, 4-angled, tuberculate, up to 25 mm diam. Flower solitary near base of stem, pedicel 10–25 mm long. Corolla rotate, with funnel-shaped annulus 8–11 mm tall around corona, 70–110 mm diam., inside densely rugulose and glabrous, cream, tube shallow, lobes spreading, deltate, 28–32 × 14–20 mm, with white marginal cilia. Corona cream, outer lobes subquadrate, spreading, up to 2 mm long, inner adpressed to anthers, but shorter than them, without a dorsal horn. Apr.–Nov. Loamy flats, WM, TS (Loeriesfontein to Karoopoort to Prince Albert area, marginal to CCR). **(gce)**

miscella (N.E.Br.) Meve Minute, glabrous, rhizomatous succulent, up to 70 × 100 mm, stems leafless, tuberculate, 4–8 mm diam. Flowers 1–3 near stem base, pedicels erect, 4–18 mm long. Corolla rotate with low annulus around corona, 10–18 mm diam., inside faintly rugulose and glabrous, purple-brown, tube shallow, lobes spreading, lanceolate, 4–7 × 2.5–3 mm. Corona blackish, outer lobes subquadrate, spreading, up to 0.5 mm long, inner adpressed to anthers, but shorter than them, without a dorsal horn. Jan.–May. Loamy flats, TS (Beaufort West to Klaarstroom to Cradock).

namaquensis (N.E.Br.) L.C.Leach Like **O. ciliata** but spreading up to 100 mm × 1 m, stems up to 40 mm diam., pedicels 25–40 mm long, corolla with broad, recurved annulus, inside densely rugulose and glabrous, yellow, spotted and lined with purple-brown, lobes 20–25 mm broad, with short, marginal cilia, corona yellow, spotted with brown, outer lobes linear, 6–8 mm long, inner rising beyond anthers and recurved, with clavate tips. Mar.–Aug. Gravelly slopes or loamy flats and disturbed areas with *Galenia africana*, G, NS, NH (Helskloof to Okiep to Soebatsfontein and Pella).

PACHYPODIUM ± 18 spp., Angola, Namibia, South Africa, Madagascar

namaquanum (Wyley ex Harv.) Welw. HALFMENS Swollen-stemmed tree, up to 3 m tall, stems 1–few, up to 300 mm diam., tapering towards tip, covered with spirally arranged tubercles, each

tipped with 3 spines up to 70 mm long. Leaves in an apical rosette, ± lanceolate, 30–120 × 10–40 mm, stiffly pubescent, deciduous. Flowers in many, small cymes around apex. Corolla tubular, 25–50 × 6–10 mm, purple-brown around mouth, yellow below, lobes erect. Aug.–Nov. Rocky arid slopes, G (Rosh Pinah to near Goodhouse, Pella and Steinkopf).

succulentum (L.f.) A.DC. Small shrub, up to 0.6 m tall, arising from large tuber, stems 5–8 mm diam., with paired spines. Leaves lanceolate, 15–30 × 2–6 mm, soon falling. Flowers few, in compact, apical cymes. Corolla salver-shaped, 10–20 × 18–40 mm, white, tinged pink on midribs, tube 15–20 × 2–3 mm, lobes spreading, 8–20 mm long. Sept.–Mar. Stony slopes, TS (Laingsburg to Kimberley and E Cape).

PECTINARIA (= *VADULIA*) 3 spp., Richtersveld to Little Karoo **(gce)**

articulata (Aiton) Haw. (= *P. borealis* (Bruyns) Plowes, *P. flavescens* Plowes, *P. namaquensis* (N.E.Br.) Plowes) GHAAP Dwarf, mat-forming, glabrous succulent, up to 70 mm tall, stems leafless, 6-angled, tuberculate, 10–150 mm long. Flower solitary, sessile, in grooves around branch tips. Corolla bud-like, with lobes joined at tips, 5–8 × 5–11 mm, maroon to cream, inside densely covered with papillae, tube up to 5 mm long, lobes deltate, 4–6 mm long. Corona maroon to yellow, outer lobes bifid into slender, terete lobules and continuing with ridge of similar lobules behind inner lobes, inner adpressed to anthers, ± equalling them. May–Nov. Loamy to gravelly flats under bushes, G, NH, WM, TS, CCR (Vandersterrberg to Springbok, Loeriesfontein to Sutherland and Barrydale). **(gce)**

longipes (N.E.Br.) Bruyns Like **P. articulata** but corolla rotate, 6–16 mm diam., inside yellow, without papillae, lobes less than twice as long as broad, corona yellow to red, inner lobes reduced, leaving most of anthers exposed. Aug.–Nov. Loamy flats under bushes, WM (Loeriesfontein to near Fraserburg). **(ece)**

maughanii (R.A.Dyer) Bruyns Like **P. longipes** but corolla lobes more than twice as long as broad, corona dark purple-black, inner lobes covering anthers. Aug.–Nov. Loamy flats under bushes, WM (Nieuwoudtville to Calvinia). **(ece)**

PERGULARIA 2 spp., Arabia and India through Africa to South Africa

daemia (Forssk.) Chiov. Herbaceous, sparsely pubescent to glabrous climber, up to 2–3 m tall, with milky sap. Leaves cordate 20–50 × 15–50 mm. Flowers in lax, pedunculate, extra-axillary umbels. Corolla rotate with short tube, 12–20 mm diam., lobes spreading 5–10 × 2–4 mm, yellow. Corona white, in 2 series, outer tubular and basally fused to mouth of corolla tube, with short quadrate lobes beneath guide-rails, inner series of 5 sagittate lobes behind anthers and projecting towards centre over them. Follicles paired, densely covered with fleshy bristles 5–12 mm long. Aug.–Nov. Climbing on bushes in watercourses, G (widespread in Arabia and Africa southwards to near Sendelingsdrift and Kakamas).

PIARANTHUS KOPSEER 7 spp., Botswana, Namibia, South Africa

A. Corolla with a cupular tube containing the corona

punctatus (Masson) Schult. (= *P. framesii* Pillans) Like **P. geminatus** but corolla campanulate, 17–28 mm diam., with tube 4–7 mm long containing entire corona. Apr.–June. Flats and gentle slopes under small bushes on loam, NS, NH, KV, WM, TS, CCR (Garies to Klawer, Loeriesfontein to Ceres Karoo, marginal to CCR). **(gce)**

A.' Corolla without a tube

comptus N.E.Br. Like **P. geminatus** but corolla 14–17 mm diam., spotted with red on white, lobes 6–10 × 3–5 mm. Feb.–May. Gravelly flats under bushes, TS (Beaufort West to Laingsburg and Willowmore).

cornutus N.E.Br. (= *P. nebrownii* Dinter, *P. ruschii* Nel) Like **P. geminatus** but corolla 20–28 mm diam., much paler and often spotted with red on white, lobes slender, 8–12 × 3–5 mm, corona-lobes erect in centre. Mar.–May. Gravelly flats under bushes, G, NH, WM (Aus to Springbok, Williston to Free State).

geminatus (Masson) N.E.Br. (= *P. decorus* (Masson) N.E.Br.) Dwarf, mat-forming, glabrous succulent, up to 50 mm tall, stems leafless, 4- or 5-angled, tuberculate, 10–30 mm long. Flowers 1–5, opening together at branch tips, peduncle absent, pedicels up to 15 mm long. Corolla rotate, 15–42 mm diam., white to yellow, barred with red to brown, tube absent, lobes spreading, 8–18 × 3–5 mm. Corona bright yellow, lobes apparently in 1 series, adpressed to anthers, with broad, warty, emarginated, ± erect, dorsal appendage. Jan.–Apr. Gravelly and loamy flats under bushes, WM, TS, CCR (Calvinia to Montagu, Oudtshoorn to E Cape).

parvulus N.E.Br. Like **P. geminatus** but corolla 6–13 mm diam., usually pale yellow, lobes 3–7 × 1.8–2.2 mm, corona lobes erect in centre. Feb.–May. Loamy flats under bushes, TS, CCR (Karoopoort and Touwsrivier to Laingsburg). **(gce)**

QUAQUA AROENA 19 spp., Aus, Namibia, to E Cape

A. Corolla face lightly rugulose and not raised into discrete papillae, covered with fine, crinkled, white hairs

pruinosa (Masson) Bruyns Diffuse, glabrous succulent, up to 300 × 600 mm, stems leafless, obtusely 4-angled, obscurely tuberculate, up to 15 mm diam. Flowers 1–3, opening in succession, in many, sessile groups in grooves of stem, pedicels 2–8 mm long. Corolla rotate, 7–13 mm diam., inside dark maroon, tube absent, lobes spreading, deltoid, 3–5 × 2.5–3 mm. Corona black, outer lobes erect, shallowly bifid, inner adpressed to anthers, with short, dorsal appendage. May–July. Stony slopes on schist or quartzite, G, NH (Rosh Pinah to near Garies). **(ece)**

A.' Corolla face smooth or papillate but not rugulose, glabrous or nearly glabrous
B. Corolla uniformly yellow, cream or white within

aurea (C.A.Lückh.) Plowes Like **Q. incarnata** but corolla nearly rotate, tube shallow (± 1 mm deep) and broadly V-shaped, with stiff bristles over whole of inner surface. Aug.–Oct. Gravelly slopes under bushes, WM, TS (Loeriesfontein to Bidouw, marginal to CCR). **(ece)**

framesii (Pillans) Bruyns AROENA Like **Q. incarnata** but corolla bright yellow, lobes parallel-sided for most of their length, apex obtuse, incurved. Apr.–Aug. Firm red sand among bushes, KV (Vredendal to Soutrivier). **(ece)**

incarnata (L.f.) Bruyns AROENA Clump-forming, glabrous succulent, up to 300 mm tall, stems leafless, 4-angled, tuberculate, up to 32 mm diam. Flowers ± 3–10, opening together in many, sessile clusters along grooves of stem, pedicels 1–3 mm long. Corolla campanulate, glabrous except for stiff bristles around mouth of tube, smooth, 7–25 mm diam., inside white to pale yellow or pinkish, tube 1–2.5 mm long, lobes spreading, lanceolate, 3–10 × 2–2.5 mm. Corona yellow, outer lobes shortly bifid and pouch-like below, inner adpressed to anthers, without dorsal appendage. May–Sept. Stony slopes and loamy flats, SN, G, NS, NH, KV, WM, CCR (Aus to Bokbaai). **(gce)**

B.' Corolla lobes green to dark purple or mottled with purple, brown or red
C. Corolla lobes folded back lengthwise, without marginal cilia, pedicel 1–2 mm thick

arenicola (N.E.Br.) Plowes Like **Q. mammillaris** but mat-forming and rooting on branches, stems 15–25 mm diam., with 4, very clear angles, flowers mainly on the lower half of stems. Sept.–Apr. Loamy flats, WM, TS, CCR (Middelpos to Rietbron and Willowmore).

armata (N.E.Br.) Bruyns AROENA Like **Q. mammillaris** but mat-forming and rooting on branches, stems 20–30 mm diam., with fewer and blunter teeth and mottled with purple, flowers often brown to yellowish. May–June. Gravelly and sandy flats and slopes, NS, NH, KV (Holgatrivier to Olifants River Mouth). **(ece)**

mammillaris (L.) Bruyns AROENA Robust, clump-forming, glabrous succulent, up to 0.5 × 0.6 m, stems leafless, very irregularly 4- or 5-angled, spiky-tuberculate, up to 40 mm diam. Flowers ± 3–15, opening together in many sessile clusters along grooves of stem, pedicels 2–3 mm long. Corolla campanulate, with many, bristle-tipped papillae around mouth of tube, 20–27 mm diam., inside purple-black, white in tube, tube 3–5 mm long, lobes spreading, narrowly lanceolate, 10–20 × 4–7 mm. Corona purple-brown, outer lobes bifid into erect teeth, inner adpressed to anthers and rising up in centre, with an erect, dorsal appendage. May–July. Stony slopes and sandy flats,

usually in open, SN, G, NS, NH, KV, WM, TS, CCR (Klinghardt Mountains to Warmbad and Pofadder, to Worcester and Oudtshoorn).

multiflora (R.A.Dyer) Bruyns Like **Q. mammillaris** but mat-forming and rooting on branches, stems 20–30 mm diam., with fewer teeth and sometimes mottled with purple, flowers in dense clusters of up to 30, with larger papillae around mouth of tube, lobes parallel-sided or widening slightly to incurved tips. Oct.–Nov. Stony slopes among bushes, NH, WM, TS (Springbok to Matjiesfontein). **(ece)**

ramosa (Masson) Bruyns Like **Q. mammillaris** but densely branched shrub, up to 300 × 300 mm, stems 15–30 mm diam., with obtuse tubercles joined into 4, obtuse angles. Mar.–May. Stony shale slopes, TS, CCR (Laingsburg and Koup to Little Karoo).

C.' Corolla lobes not folded back lengthwise, often with marginal cilia, pedicel 0.5–1 mm thick

acutiloba (N.E.Br.) Bruyns AROENA Small, clump-forming, glabrous succulent, up to 120 mm tall, stems leafless, 4- or 5-angled, tuberculate, up to 20 mm diam. Flowers 1–3, developing in succession, in many sessile clusters in grooves of stem, pedicels 1–2 mm long. Corolla rotate, glabrous, smooth, 9–14 mm diam., inside darkly mottled on yellow, tube lacking, lobes spreading, deltoid, 3–6 × 2–3.5 mm. Corona purple-black, outer lobes bifid into erect, deltoid teeth, inner adpressed to anthers, without a dorsal appendage. Apr.–July, also at other times depending on rain. Flats in loam, especially with gregarious *Ruschia,* SN, G, NH, KV, WM, TS (Aus to Laingsburg). **(ece)**

arida (Masson) Plowes (= *Q. marlothii* (N.E.Br.) Bruyns) Like **Q. parviflora** but pedicels 3–15 mm long, corolla 5–6 mm diam., inside pale purple near tips of lobes, breaking into purple bars on pale green, with stiff, erect hairs, corona bright yellow. Sept.–Dec. Loamy flats under bushes, WM, TS, CCR (Loeriesfontein to Warmwaterberg). **(gce)**

bayeriana (Bruyns) Plowes Like **Q. parviflora** but pedicels 2–4 mm long, corolla 6–8 mm diam., inside pale green, mottled with red to purple, with fine, twisted hairs, corona purple-black. Apr.–June. Rocky slopes, NH (Wildeperdehoek to Komaggas). **(ece)**

cincta (C.A.Lückh.) Bruyns Small, clump-forming, glabrous succulent, up to 250 mm tall, stems leafless, 4-angled, tuberculate, up to 20 mm diam. Flowers 1 or 2 together, arranged along grooves from near middle of stem, peduncle absent, pedicels 4–12 mm long. Corolla rotate, glabrous except for marginal cilia, smooth, 14–21 mm diam., inside dark purple-lined on ± white, tube 1.5–2 mm long, lobes spreading, ovate, 5–8 × 3–5 mm. Corona purple, outer lobes bifid into slender, spreading teeth, inner adpressed to anthers, with truncate dorsal appendage. Dec.–Apr. Stony slopes among bushes, NH (Concordia to Wildeperdehoek). **(ece)**

inversa (N.E.Br.) Bruyns AROENA Like **Q. cincta** but corolla nodding, inside yellow at tips of lobes and deep red below, corona red with linear outer lobes. Apr.–June. Sandy and gravelly flats, NS, NH, KV (Port Nolloth to Nuwerus). **(ece)**

pallens Bruyns Like **Q. parviflora** but stems somewhat mottled, pedicels 3–5 mm long, corolla 4–8 mm diam., inside pale green, without markings, hairs or cilia, corona pale green to white. Jan.–May. Rocky slopes inside bushes, NH (Garies). **(ece)**

parviflora (Masson) Bruyns AROENA Clump-forming, glabrous succulent, up to 300 × 300 mm, stems leafless, 4-angled, tuberculate, up to 25 mm diam. Flowers 1–3, opening in succession, in many, sessile groups in grooves along stem, pedicels 1–10 mm long. Corolla rotate, glabrous or with marginal cilia, smooth, 4–18 mm diam., inside transversely mottled with purple, tube absent, lobes spreading, deltoid, 2.5–8 × 1.5–3.5 mm. Corona purple-brown, outer lobes bifid into fine, spreading teeth, inner lobes adpressed to anthers, without a dorsal appendage. Apr.–July. Stony slopes and loamy flats, among bushes, NS, NH, KV, WM, TS, CCR (Steinkopf to Clanwilliam and Ceres Karoo). **(gce)**

pulchra (Bruyns) Plowes AROENA Like **Q. parviflora** but pedicels 2–4 mm long, corolla 8–16 mm diam., inside yellow near tips of lobes, elsewhere cream, dotted and ringed with red, covered with fine hairs and marginal cilia, corona reddish. Apr.–July. Firm red sand and loam, KV (Soutrivier to Lutzville). **(ece)**

RHYSSOLOBIUM 1 sp., Namibia and South Africa around Gariep Mouth **(ece)**

dumosum E.Mey. Dwarf, densely branched, woody shrub, stems puberulous. Leaves oblong, 5–15 × 2–5 mm, fleshy, pubescent, with revolute margins. Flowers 1–5, in extra-axillary, sessile

clusters. Corolla campanulate, 6–10 mm diam., inside pink to whitish, densely pubescent, tube including gynostegium, ± 2 mm deep, lobes spreading and recurved near apex, ± 1.5 × 1.5 mm. Corona absent, gynostegium ± 1.5 mm tall. July–Aug. Barren stony flats and gentle slopes, SN, G (Pomona to Grootderm). **(ece)**

RICHTERSVELDIA 1 sp., Richtersveld **(ece)**

columnaris (Nel) Meve & Liede (= *Notechidnopsis columnaris* (Nel) Lavranos & Bleck, *Trichocaulon columnare* Nel) Rhizomatous, glabrous succulent, stems prostrate then erect, leafless, tessellated, green, 20–25 mm diam., 8-angled, with prominent acute tubercles. Flowers in many, subterminal, sessile, clusters of 5–20, pedicels 2–4 mm long. Corolla 12–17 mm diam., inside green-yellow, speckled with red and minutely bristly, tube minute, lobes spreading, 3.5–4.5 × 2.5–3.5 mm, ovate-deltoid, convex above. Corona yellow, spotted with red, 2–2.5 mm diam., outer lobes erect, truncate, inner adpressed to backs of anthers, dorsiventrally flattened, linear. Apr.–Oct. Stony slopes among bushes on mountains, G (Kodaspiek to Ploegberg and Modderfontein near Eksteenfontein). **(ece)**

SARCOSTEMMA ± 10 spp., South Africa to Arabia, India to Australia

viminale (L.) R.Br. (= *S. aphyllum* (Thunb.) Schult., *S. thunbergii* G.Don) MELKTOU Much-branched, trailing to shrubby succulent, up to 1 × 5 m, sap milky, stems terete, slightly articulated at nodes, grey-green, pubescent at tips, otherwise glabrous. Leaves scale-like, adpressed to stems, pubescent, soon falling. Flowers opening together in ± sessile, extra-axillary umbels of 5–20, sweetly scented. Corolla lobed nearly to base, rotate, 10–20 mm diam., yellow, lobes 4–8 × 2–3 mm, ovate-oblong. Corona white, outer series low and ring-like around base of gynostegium, inner of 5 fleshy swollen lobes adpressed to and slightly exceeding anthers. Fruits narrowly spindle-shaped, 4–6 mm diam., glabrous, erect. July–Dec. Rocky, especially N-facing slopes, on schist, SN, G, NH, KV, WM, TS, CCR (widespread in Africa, Arabia, India, Nepal and Australia).

STAPELIA 29 spp., South Africa to Malawi

A. Flowers at least 45 mm diam. when fully spread out

hirsuta L. (= *S. gariepensis* Pillans, *S. pulvinata* Masson) Clump-forming, pubescent succulent, up to 0.3 × 1 m, stems leafless, 4-angled, softly tuberculate, up to 20 mm diam. Flowers developing in succession in one, ± sessile group of 1–3, on spreading pedicels 20–70 mm long. Corolla rotate, resting on the ground, 50–140 mm diam., pubescent outside, inside long-pubescent, with low, pale, transverse rugosities, purple with yellow bands, tube ± lacking, lobes spreading, deltoid, 15–55 × 8–35 mm. Corona purple-red, glabrous, outer lobes linear, spreading and channelled above, inner adpressed to anthers then erect and recurved above them, with a spreading dorsal wing. May–Sept. Stony slopes and disturbed areas with *Galenia africana*, G, NH, KV, CCR (Rosh Pinah to Vredendal, Malmesbury to E Cape).

pillansii N.E.Br. Like **S. hirsuta** but corolla wider, 150–210 mm diam., uniformly dark purple or yellow, lobes 70–95 mm long, ciliate, attenuated into long, slender, often twisted tails. May–Nov. Stony slopes among bushes, TS, CCR (Touwsrivier to Ladismith). **(gce)**

villetiae C.A.Lückh. Like **S. hirsuta** but pedicels erect, holding the flower upwards, corolla 45–65 mm diam., lobes 15–20 × 13–15 mm. May–Nov. Stony slopes among bushes, WM (Loeriesfontein to Calvinia). **(ece)**

A.' Flowers < 45 mm diam. when fully spread out
B. Inner and outer corona lobes finely pubescent

arenosa C.A.Lückh. Clump-forming, pubescent succulent, up to 200 × 300 mm, stems leafless, 4-angled, softly tuberculate, up to 15 mm diam. Flowers developing in succession, in 1–6 subterminal, ± sessile clusters of 2–8, pedicels 2–6 mm long. Corolla rotate and distinctly thickened around corona, pubescent outside, densely rugulose and ± glabrous inside, 25–35 mm diam., inside purple with white on ridges, tube ± lacking, lobes spreading, ovate, 10–15 × 5–7 mm. Corona ± orange, pubescent, outer lobes subquadrate, spreading, inner adpressed to anthers then recurved above them, with a spreading dorsal wing. Apr.–Oct. Stony slopes among bushes, WM, TS, CCR (Loeriesfontein to Karoopoort). **(gce)**

rubiginosa Nel Like **S. arenosa** but stems taller and thicker, up to 300 × 20 mm, corolla smaller, 20–25 mm diam., lobes 6 mm long, inner corona lobes without a dorsal wing. Apr.–May. Stony slopes, G (Kubus to Eksteenfontein). **(ece)**

rufa Masson Like **S. arenosa** but flower cluster one per stem near base, corolla campanulate, 30–40 mm diam., inside finely transversely rugulose, tube ± 7 × 10 mm, lobes 15–20 mm long, acuminate, inner corona lobes bifid to truncate without a dorsal wing. Sept.–Dec. Stony slopes, WM, TS, CCR (Loeriesfontein to Vanwyksdorp). **(gce)**

B.' Inner and outer corona lobes glabrous
C. Inside of corolla with club-shaped hairs

erectiflora N.E.Br. Like **S. arenosa** but flowers facing upwards on erect pedicels 20–120 mm long, corolla 9–15 mm diam., with lobes tightly folded back behind corolla, inside covered with adpressed hairs, lobes 5–6 mm long, inner corona lobes long and slender, with a small dorsal ridge. Jan.–June. Rocky slopes, WM, TS, CCR (Clanwilliam to Botterkloof, a doubtful record from Springbok). **(gce)**

flavopurpurea Marloth Like **S. arenosa** but flowers facing upwards on erect pedicels 15–30 mm long, corolla 25–40 mm diam., inside heavily rugulose with hairs around corona, yellow to green and sweetly scented, lobes 10–23 mm long, inner corona lobes long and slender, with a dorsal wing. Feb.–Apr. Calcareous stony slopes, G, NH (central Namibia to eastern Kamiesberg Mountains to Britstown).

C.' Inside of corolla glabrous or with fine hairs

acuminata Masson Like **S. arenosa** but corolla not thickened around centre, inside with fine, low, yellow to white ridges, often pubescent, lobes more acuminate, corona glabrous. Apr.–Oct. Stony slopes, NH, KV (Springbok to Vanrhynsdorp). **(ece)**

engleriana Schltr. Mat-forming, pubescent succulent, up to 300 mm diam., stems leafless, 4-angled, square and rhizomatous, softly tuberculate, up to 22 mm diam. Flowers developing in succession in 1–6, ± sessile clusters of 1–3 along stem, on spreading pedicels 10–18 mm long. Corolla rotate, 18–22 mm diam., with lobes tightly folded back behind tube, pubescent outside, finely rugulose and ± glabrous inside, purple-brown to yellow within tube, tube 10 mm broad, pentagonal, lobes ovate, 10–12 × 10–12 mm. Corona purple-brown, outer lobes subquadrate, spreading, inner adpressed to anthers then recurved above them, with a spreading dorsal wing. Oct.–Apr. Stony slopes under bushes, TS, CCR (Worcester to Beaufort West).

similis N.E.Br. Like **S. arenosa** but flowers 3–6, in a solitary cluster, on spreading pedicels 30–80 mm long, corolla rotate, resting on ground, 15–28 mm diam., inside coarsely rugulose, glabrous, brown, lobes 6–10 mm long, inner corona lobes ± equalling anthers, without a dorsal wing. Mar.–July. Stony slopes or gravelly flats, often under small bushes, SN, G (Rehoboth to Richtersveld to Upington).

surrecta N.E.Br. Like **S. arenosa** but flowers facing upwards on ascending pedicels 20–35 mm long, corolla shallowly campanulate, 22–40 mm diam., inside ± smooth, glabrous, lobes 9–14 mm long, inner corona lobes with a dorsal wing. Feb.–Apr. Stony slopes under bushes, TS (from foot of Bloukrans Pass to Toorberg NW of Matjiesfontein and Ceres Karoo). **(ece)**

STAPELIOPSIS (= *HERMANSCHWARTZIA, NEOPECTINARIA*) KOPSEER 8 spp., southern Namibia to E Cape

A. Stems smooth and uniformly coloured, outer corona lobes reduced to small teeth, not forming a tube

exasperata (Bruyns) Bruyns Like **S. saxatilis** but stems rhizomatous, erect and pyramidal above ground, up to 15 mm diam., flowers arising below ground, corolla cylindrical, 16–28 × 18–25 mm, often subterranean, cream outside, inside pink above, red and bristly below, lobes fused at tips or spreading, lanceolate, 6–16 × 2–4.5 mm, corona maroon. Sept.–Apr. Loamy flats under bushes, WM, TS, CCR (Loeriesfontein to Barrydale). **(gce)**

saxatilis (N.E.Br.) Bruyns Mat-forming succulent, up to 150 × 300 mm, stems leafless, 4-angled, prostrate, tuberculate, up to 25 mm diam. Flowers 1–10, developing in succession, in a cluster on a short, knobbly peduncle near stem base, pedicels 3–12 mm long, spreading. Corolla ellipsoidal, 8–21 × 6–11 mm, glabrous and red outside, inside red and bristly below, lobes erect, fused at tips,

deltoid, 4–9 × 4–7 mm. Corona maroon to yellow, outer lobes bifid, minute and pouch-like at base of inner lobes, inner laterally flattened, erect above anthers, with a dorsal tooth. Feb.–June. Stony slopes under bushes, WM, TS, CCR (Loeriesfontein to Worcester to Cockscomb). **(gce)**

A.' Stems papillate and mottled, outer corona forming a tube containing at least lower half of staminal column

khamiesbergensis Bruyns Like **S. urniflora** but corolla dull and papillate outside, inside yellow on lobes and around mouth of tube, purple below, outer corona forming a broadly vase-shaped tube ± 3 mm tall and nearly equalling inner lobes. Apr.–Nov. Gneiss outcrops in *Polymita* clumps, NH (Springbok to NE of Kamiesberg Mountains). **(ece)**

neronis Pillans Clump-forming, papillate succulent, up to 150 × 300 mm, stems leafless, 4-angled, purple-mottled, softly tuberculate, up to 35 mm diam. Flowers 1–3, developing in succession in one group, on a short, knobbly peduncle near stem base, pedicels 5–10 mm long, spreading. Corolla ellipsoidal, 17–28 × 11–16 mm, pubescent and purple outside, inside white on lobes and around mouth, purple and bristly below, lobes erect, deltoid, 4–5 × 3 mm. Corona purple, outer lobes cylindrical, 7–11 mm tall, inner laterally flattened, erect above anthers, dorsally broadened. Nov.–May. Rocky SW- to W-facing slopes among dense succulent cover, G (Rosh Pinah to Lekkersing). **(ece)**

urniflora Lavranos Like **S. neronis** but up to 70 × 150 mm, stems up to 20 mm thick, often rhizomatous, corolla ovoid, with flattened base, 9–18 × 5–11 mm, glabrous and shiny outside, inside purple-red, outer corona basally tubular, bifid above, ± 1.5 mm tall, much exceeded by broader inner lobes. Mar.–May. Stony slopes under short bushes, G (Helmeringhausen to Richtersveld).

TRIDENTEA GORTJIE 8 spp., Botswana, Namibia, South Africa

A. Flower 45–100 mm diam., dark purple to red-black, inner corona lobes terete above

gemmiflora (Masson) Haw. Clump-forming, glabrous succulent, up to 150 mm × 1 m, stems 4-angled, tuberculate, up to 15 mm diam., with 5–10 mm long, finely-pointed rudimentary leaves. Flowers 1–3, developing successively near base of stem, on a peduncle up to 20 mm long, pedicels 30–50 mm long. Corolla rotate, 45–100 mm diam., inside densely papillate-rugulose and glabrous, purple-black, with yellow mottling, tube shallow, lobes spreading, deltate, 20–35 × 20–30 mm, with marginal cilia. Corona yellow mottled with purple, outer lobes deeply trifid, spreading, 7–8 mm long, inner adpressed to anthers then recurved and terete above, with a dorsal horn. Feb.–Apr. Loamy flats, WM, TS, CCR (Fraserburg to Worcester to Free State).

pachyrrhiza (Dinter) L.C.Leach Like **T. gemmiflora** but up to 60 × 300 mm, rudimentary leaves 1–2 mm long, outer corona lobes 4–5 mm long, with very short lateral teeth. Apr.–July. Sandy and gravelly flats, SN, G, NS (Boegoeberg to Holgatrivier). **(ece)**

A.' Flower 20–40 mm diam., background colour yellow, reddish-brown or greenish, inner corona lobes dorsiventrally flattened

jucunda (N.E.Br.) L.C.Leach Like **T. peculiaris** but corolla 20–35 mm diam., inside not thickened around corona, faintly rugulose to smooth, cream, with purple spots (often with dark border), lobes 6–10 × 60–10 mm, rarely with marginal cilia, outer corona lobes deltoid to bifid, inner recurved above and much longer than anthers, with a dorsal horn. Sept.–Apr. Loamy flats under bushes, NH, WM (Helmeringhausen to E of Springbok to Sutherland and to Free State).

parvipuncta (N.E.Br.) L.C.Leach Like **T. jucunda** but pedicels 20–60 mm long, outer corona lobes broadening towards tips, inner lobes not rising above anthers, with only a small, dorsal swelling. Sept.–Apr. Loamy flats under bushes, WM, TS, CCR (Botterkloof to Ceres Karoo, Beaufort West to Klaarstroom, marginal to CCR). **(gce)**

peculiaris (C.A.Lückh.) L.C.Leach Clump-forming, glabrous succulent, up to 120–300 mm, stems 4-angled, tuberculate, up to 15 mm diam., with 1–3 mm long, finely pointed rudimentary leaves. Flowers 1–3 developing successively near stem base, on a peduncle up to 20 mm long, pedicels 20–25 mm long. Corolla rotate, 30–40 mm diam., inside obscurely papillate-rugulose and glabrous, thickened around corona, green to brown with darker mottling, tube shallow, lobes spreading, deltate, 9–12.5 × 10–14 mm, with marginal cilia. Corona brown, outer lobes deeply

trifid, spreading, 2 mm long, inner adpressed to anthers and ± equalling them, with a small dorsal horn near base. Mar.–May. Loamy flats, KV (Lutzville to southern base of Langberg). **(ece)**

TROMOTRICHE KOPSEER 9 spp., southern Namibia to E Cape

A. Outer corona forming a crenulate-edged cup joining the backs of the inner corona lobes, limb absent

aperta (Masson) Bruyns Clump-forming, glabrous succulent, up to 100 × 300 mm, stems obtusely 4-angled and tuberculate, without rudimentary leaves, up to 15 mm diam. Flowers 1 or 2 near stem base, on a peduncle up to 5 mm long, pedicels 60–140 mm long, spreading. Corolla shallowly campanulate, 30–40 mm diam., inside obscurely rugulose and glabrous, with small, clavate papillae around corona, red-brown, mottled with white, tube 5–8 mm deep, lobes spreading, deltate, 12–25 × 7–10 mm, without marginal cilia. Corona blackish, outer lobes cupular, crenulate-edged, inner adpressed to anthers and rising centrally in a column, with a papillate, dorsal crest near base. May–July. Gravelly to stony N-facing slopes and flats, SN, G, NS, NH (Aurus Mountains to Garies). **(ece)**

umdausensis (Nel) Bruyns Like **T. aperta** but flowers borne all along stem, corolla 15–30 mm diam., often nodding on an ascending pedicel 20–30 mm long, lobes 9–12 mm long, inner corona lobes shorter than to equalling anthers. May–July. Gravelly slopes and quartz-gravel patches, often in open, G, NH (Eksteenfontein to Warmbad and Pofadder).

A.' Outer corona consisting of 5, free lobes
B. Inner corona lobes slender with slightly thickened apex, nowhere more than half as thick as breadth of outer lobes, plants extensively rhizomatous, with minute deltoid rudimentary leaves

revoluta (Masson) Haw. Clump-forming, rhizomatous, glabrous succulent, up to 0.5 × 1 m, stems 4-angled, obscurely tuberculate, grey, up to 30 mm diam. Flowers 1 or 2 near stem apex, peduncle lacking, pedicels 5–15 mm long, spreading. Corolla rotate with lobes folded behind tube, 40–50 mm diam., inside smooth and glabrous, with small, acute papillae around corona, red-brown to yellow, tube ± 5 mm long, lobes broadly ovate, 14–18 × 14–18 mm, with marginal cilia. Corona brown, outer lobes rectangular, inner rising in centre then recurved, narrowly clavate, with flattened dorsal horn. May–Mar. Sandy flats and stony slopes, KV, WM, TS, CCR (Soutrivier and Loeriesfontein to Clanwilliam). **(gce)**

thudichumii (Pillans) L.C.Leach Like **T. revoluta** but up to 100 × 150 mm, stems obtusely 4-angled, brown-green, up to 15 mm diam., corolla rotate-reflexed, 20–30 mm diam., tube up to 2.5 mm long, lobes 8–10 × 10–13 mm, inner corona lobes ± meeting in centre. Mar.–May. Loamy flats and stony slopes, WM, TS (Calvinia to Karoopoort). **(ece)**

B.' Inner corona lobes massively club-shaped, very much thicker towards apex than breadth of outer corona lobes, plants not rhizomatous, without rudimentary leaves

herrei (Nel) Bruyns Like **T. pedunculata** but stems very irregularly angled, flowers borne towards apex of stem, corolla campanulate, with urceolate tube 8–15 mm long, without small clavate papillae around corona, lobes 12–20 mm long, deeply and coarsely rugulose, without cilia. May–June. Gentle stony slopes and quartz-gravel patches, G (Helskloof to Jakkalswater).

pedunculata (Masson) Bruyns (= *T. longipes* (C.A.Lückh.) Bruyns) Clump-forming, glabrous succulent, up to 100 × 300 mm, stems obtusely 4-angled, obscurely tuberculate, up to 15 mm diam. Flowers 1 or 2, near stem base, on a peduncle up to 10 mm long, pedicels 45–190 mm long, erect to spreading. Corolla rotate, 30–70 mm diam., inside smooth to obscurely rugulose and glabrous, with small, clavate papillae around corona, red-brown to yellow, mottled with white, tube up to 2 mm long, lobes spreading, narrowly ovate, 17–30 × 11–16 mm, with marginal cilia. Corona shiny blackish, outer lobes rectangular, channelled above, inner rising centrally in column, clavate, with similar clavate dorsal horn. May–June. Quartz-gravel patches and firm red loam under bushes, SN, G, NS, NH, KV, WM, TS (Witpütz to Vredendal to near Touwsrivier).

ruschiana (Dinter) Bruyns Like **T. pedunculata** but with cupular, 8–10 mm long tube containing gynostegium and more slender inner lobes. May–Sept. Stony slopes with wind-blown sand, SN (Klinghardt Mountains). **(ece)**

XYSMALOBIUM ± 30 spp., tropical to South Africa

fluviale Bruyns Like **X. pearsonii** but corona lobes oblong-spatula-shaped, abruptly narrowed at base and broadest a little above this, gynostegium ± twice as broad as tall. Oct.–Feb. Gravelly flats, TS (E of Prince Albert). **(ece)**

pearsonii L.Bolus KAMBROE Perennial herb, branching from base, up to 400 mm tall, with a carrot-like rootstock, sap milky. Leaves linear-lanceolate, 60–150 × 3–6 mm, margins undulate. Flowers 3–5 in extra-axillary or terminal clusters, on a peduncle up to 20 mm long, pedicels 11–18 mm long. Corolla rotate and lobed to base, ± 15 mm diam., with spreading, ± lanceolate, 6 × 3 mm, glabrous lobes. Corona of 5 ovate, ascending, swollen lobes, arising from base of gynostegium, without keels on either surface, gynostegium slightly taller than broad. Fruit broadly spindle-shaped, beaked, covered with soft processes, glabrous. Jan. Gravelly flats among shrubs, KB (Kamiesberg Mountains near Leliefontein). **(ece)**

ASTERACEAE

by P.P.J. Herman[1] & J.C. Manning[2], **Arctotis** by R.J. McKenzie with P.P.J. Herman, **Cotula** by L. Mucina & D.A. Snijman, **Gazania** by A.R. Magee & J.S. Boatwright, **Pentzia** with A.R. Magee, **Senecio** and **Othonna** with P.V. Bruyns, **Ursinia** by A.R. Magee & L. Mucina

Key[2]

1. Corollas all strap-shaped (ligulate) with the blades equally 5-toothed; annual plants with milky latex:
2. Flowerheads sessile in pseudo-spikes; florets blue, rarely white or pink; pappus of small rounded scales up to 2 mm long . . . . . **Cichorium**
2.' Flowerheads in corymbs; florets yellow; pappus of mixed downy hairs and bristles at least 4 mm long . . . . . **Sonchus**
1.' Corollas not all ligulate with the blades 5-toothed, if radiate then ray florets 3- or 4-toothed at apex:
3. Style of disc florets thickened or broadened near apex and often hispid at thickening, rarely not conspicuously thickened, but then ray florets either 4-toothed or with a filiform lobe in sinus of tube; style branches convex, sometimes partially cohering, minutely downy on outer surface:
4. Anthers long-tailed; involucral bracts many, regularly imbricate; corolla of all florets generally bilabiate or irregularly cleft:
5. Acaulescent, tufted perennials; heads solitary, scapose, heterogamous and obscurely radiate; involucral bracts erect and not pungent . . . . . **Perdicium**
5.' Branched perennials or shrubs, often spiny; heads not scapose, mostly homogamous, discoid, disciform or radiate; involucral bracts often recurved and pungent:
6. Involucral bracts with prominent median vein and dark longitudinal stripes, usually hairy; disc corolla lobes recurved at apex; style branches long, with sweeping hairs forming a subapical tuft; cypselas conspicuously ribbed . . . . . **Dicoma**
6.' Involucral bracts without conspicuous median vein or dark longitudinal stripes, glabrous; disc corolla lobes erect or suberect; style branches short, ± evenly hairy; cypselas ± smooth . . . . . **Macledium**
4.' Anthers minutely tailed; corolla of all or disc florets equally toothed; corollas never bilabiate, disc florets equally toothed:
7. Involucral bracts separate, outer herbaceous, inner obtuse with papery tips and margins; ray florets 3-toothed:
8. Ray florets with filiform lobe in sinus of tube; pappus of stout, scabrid, bristle-like scales in 2 rows . . . . . **Heterolepis**
8.' Ray florets without such a lobe; pappus of scales or lacking:
9. Ray florets sterile; cypselas without cavities; pappus short, crown-like or 0 . . . . . **Arctotheca**
9'. Ray florets female; cypselas dorsally with 3–5 strong ribs or wings enclosing grooves, other face convex and tubercled, usually with a basal tuft of hairs; pappus of 1 or 2 rows of scales . . . . . **Arctotis**

7.' Involucral bracts at least partially fused and pungent; ray florets 4-toothed:
10. Pappus 0; shrublets, stems densely leafy up to sessile heads ..... **Cullumia**
10.' Pappus present:
11. Involucral bracts in 2 rows, outer largest and foliaceous; receptacle with outer honeycomb cavities thick-walled and inner ones membranous, breaking up at maturity, outer parts adnate to outer bracts; pappus of linear, acuminate, ciliate scales **Didelta**
11.' Receptacle uniformly honeycombed; pappus scales various:
12. Involucral bracts shortly connate basally, pungent ..... **Berkheya**
12.' Involucral bracts connate in lower half to form smooth cup:
13. Annuals; involucre becoming woody and enclosing cypselas after anthesis:
14. Most disc florets functionally male and not setting seed; pappus of minute scales hidden among cypsela hairs ..... **Gorteria**
14.' All disc florets bisexual and setting seed; pappus scales narrow. ..... **Cuspidia**
13.' Perennials; involucre not becoming woody and enclosing cypselas:
15. Outer pappus scales broad and overlapping, inner scales smaller or absent; shrublets without milky sap ..... **Hirpicium**
15.' Outer pappus scales narrow and not overlapping, inner subequal; perennial or annual herbs, usually scapose, with milky sap ..... **Gazania**

3.' Styles filiform, terete or linear, not thickened above:
16. Style branches of all florets filiform or terete and gradually attenuate-acute, usually much exserted; capitula homogamous; pappus of scabrid bristles:
17. Spiny shrubs or shrublets; florets yellow; pappus of many long, scabrid bristles .... **Hoplophyllum**
17.' Unarmed herbs or shrubs; florets white to purple; pappus biseriate, outer series of short bristles or scales and inner of many, long, scabrid bristles. ..... **Orbivestus**
16.' Style branches of disc florets linear or lanceolate; capitula and pappus various:
18. Style branches minutely and equally downy on outer surface, mostly acute:
19. Anther bases acute or tailed:
20. Florets mauve, outer row sterile; receptacle densely setose ..... **Centaurea**
20.' Florets yellow or mauve but then receptacle not setose; marginal florets female or bisexual:
21. Silvery-felted shrublets with conspicuously radiate, sessile or subsessile flowerheads ..... **Eremothamnus**
21.' Plants otherwise:
22. Receptacle bristly; flowerheads conspicuously radiate ..... **Geigeria**
22.' Receptacle smooth or honeycombed but not bristly; flowerheads discoid or obscurely radiate:
23. Heads homogamous, discoid; shrublets with leaves tapering below or petiolate; pappus bristles many, barbellate or plumose ..... **Pegolettia**
23.' Heads heterogamous, disciform or obscurely radiate:
24. Pappus biseriate, outer series of small scales often connate into toothed crown, inner of few smooth, caducous bristles; perennial with lanceolate leaves auriculate at base ..... **Pulicaria**
24.' Pappus 0 or uniseriate and of barbellate bristles:
25. Pappus bristles 0; disc florets functionally male ..... **Litogyne**
25.' Pappus bristles present; disc florets bisexual ..... **Laggera**
19.' Anther bases obtuse:
26. Flowerheads conspicuously radiate, ray florets mostly white, mauve or blue (rarely discoid in *Felicia* but see details of this genus):
27. Pappus 0; twiggy shrublet with pinnatisect leaves ..... **Garuleum**
27.' Pappus present in some or all florets; leaves not pinnatisect:
28. Receptacle paleate; pappus biseriate, of bristles and scales ..... **Amellus**
28.' Receptacle epaleate; pappus uniseriate, of bristles only ..... **Felicia**
26.' Flowerheads discoid or disciform with outer florets unilabiate (rarely radiate in *Chrysocoma* but see details of this genus):
29. Heads homogamous or outer florets ligulate:
30. Pappus bristles free, outer series of small scales or reduced or lacking; fruits apically with 2 resin sacs in ribs; mostly ericoid shrublets with heads often solitary on slender peduncles. ..... **Chrysocoma**
30.' Pappus bristles usually connate basally, of many bristles; fruits without resin sacs; shrublets, often viscid, mostly with opposite leaves with heads never solitary on slender peduncles ..... **Pteronia**
29.' Heads heterogamous with some outer florets tubular-filiform or unilabiate:
31. Outer female florets in 1 row ..... **Nolletia**
31.' Outer female florets in several rows:
32. Annual herbs or shrubs; heads in dense, often subglobose corymbs; florets yellow, readily visible within pappus ..... **Nidorella**

32.' Annual herbs; heads in panicles or loose, few-headed corymbs; florets whitish, more-or-less concealed within pappus:
33. Style appendages larger than stigmatic area . . . . . **Aster**
33.' Style branches shorter than stigmatic area . . . . . **Conyza**
18.' Style branches linear and truncate, with bristly apex or tipped by a short, bristly cone; male florets with style unbranched or lacking:
34. Pappus 0; receptacle epaleate; mostly herbaceous; heads radiate; disc florets usually sterile, with simple style; anthers acute or cuspidate:
35. Style of disc florets deeply bifurcate with linear lobes, covered with papillae to well below point of bifurcation . . . . . **Garuleum**
35.' Style of disc florets shortly bilobed with an annular collar of hairs:
36. Ray florets purple, lilac, white or cream-coloured to pale orange above and usually purplish beneath, never bright yellow, 2 or 3 times as long as the involucre; involucral bracts ± uniseriate; disc florets functionally male or fertile and disc achenes laterally flattened with thickened margins . . . . . **Dimorphotheca**
36.' Ray florets bright yellow, sometimes coppery beneath, usually less than twice as long as the involucre; involucral bracts mostly in 2 or 3 rows; disc florets always functionally male:
37. Fruit fleshy, ± globose . . . . . **Chrysanthemoides**
37.' Fruit dry:
38. Cypselas 3-winged with apical fenestrate air chamber . . . . . **Tripteris**
38.' Cypselas various if 3-winged then without a fenestrate chamber . . . . . **Osteospermum**
34.' Not as above:
39. Involucre uniseriate, bracts cohering by overlapping margins, with or without several bracteoles near base:
40. Peduncles or scapes bracteate; involucres usually calyculate, with at least 1 outer small basal bract, cylindrical or cup-shaped; involucral bracts always free to base:
41. Cypselas dimorphic, peripheral cypselas flattened, winged or ribbed, disc cypselas terete or angular:
42. Ray cypselas glabrous, 5- or 6-winged with caducous pappus . . . . . **Phaneroglossa**
42.' Ray cypselas pubescent with caducous or persistent pappus:
43. Flowerheads always radiate; ray cypselas flattened with persistent pappus; leaves usually auriculate . . . . . **Cineraria**
43.' Flowerheads sometimes discoid; ray cypselas banana-shaped with glabrous inner surface; pappus bristles on all cypselas caducous; leaves never auriculate . . . . . **Bolandia**
41.' Cypselas monomorphic (although ray cypselas may be epappose), ribbed and striate-puberulous:
44. Plants highly succulent; capitula discoid; style arms with conical to elongated terminal appendage . . . . . **Kleinia**
44.' Plants variously succulent to herbaceous; capitula discoid or radiate; style arms truncate, without apical appendage:
45. Involucral bracts 5(6); glabrous shrublets with ± orbicular, petiolate leaves and discoid heads . . . . . **Dauresia**
45.' Involucral bracts 8 or more:
46. Pappus 0 in ray florets; delicate annual with lyrate to deltoid leaves and disciform or sparsely radiate heads with 3 ray florets . . . . . **Stilpnogyne**
46.' Pappus present in all florets, sometimes caducous in ray florets:
47. Involucral bracts each with 3 resin ducts, the inner bracts with the lateral ducts very wide and covering most of the bract margins; cypselas with 3 lines of hairs; glabrous annual with shortly radiate heads. . . . . **Mesogramma**
47.' Involucral bracts not as above; cypselas with 5–10 lines of hairs; habit variable; flowerheads radiate, disciform or discoid. . . . . **Senecio**
40.' Peduncles or scapes naked; involucres ecalyculate; bracts ± fused below to form a smooth cup:
48. Annual herbs; pappus 0 in disc or all florets:
49. Pappus 0 in all florets; plants not succulent . . . . . **Steirodiscus**
49.' Pappus present in ray florets; plants ± succulent with rosulate leaves . . . . . **Gymnodiscus**
48.' Perennial herbs or shrubs, rarely annual herbs but then pappus present in all florets:
50. Annual herb with basal and cauline, pinnatisect leaves and radiate flowerheads on leafy stems . . . . . **Emilia**
50.' Perennials or shrubs, rarely annual but then leaves rosulate and flowerheads on naked, wiry scapes and pappus bristles short and caducous:

51. Heads radiate, the disc florets usually bisexual; pappus caducous and usually shorter than the fruit body or 0; pappus bristles usually flexuous, with teeth diverging in one plane . . . . . **Euryops**
51.' Heads discoid or radiate with disc florets functionally male; pappus usually persistent, often elongating conspicuously in fruit; pappus bristles straight, with teeth diverging in several directions:
52. Disc floret styles undivided (or minutely bifid), with ring of sweeping hairs below apical cone; heads radiate or discoid . . . . . **Othonna**
52.' Disc floret styles divided, with branches hairy outside; heads discoid or disciform:
53. Style branches with long, filiform, papillose appendages. . . . . **Lopholaena**
53.' Style branches with small appendages or none . . . . . **Hertia**

39.' Involucre 2- to several-seriate, rarely uniseriate but then bracts not cohering by overlapping margins:
54. Anther bases usually obtuse, sometimes minutely tailed but then pappus of scales only or 0:
55. Annuals or small, rhizomatous perennials; disc florets mostly 4-lobed; receptacle epaleate:
56. Cypselas flattened and often winged; pappus 0; ray florets usually stalked or peduncle conspicuously inflated in fruit . . . . . **Cotula**
56.' Cypselas not flattened; pappus present, of scales; ray florets and peduncle not as above:
57. Heads radiate; cypselas flattened with broad wings; leaves entire and fleshy. . . . . **Adenoglossa**
57.' Heads radiate or discoid; cypselas not flattened or winged; leaves bipinnatisect, herbaceous:
58. Corolla tube of disc florets swollen and brittle, 4-ribbed . . . . . **Oncosiphon**
58.' Corolla tube not swollen and brittle:
59. Involucral bracts linear, narrow, almost needle-like. . . . . **Myxopappus**
59.' Involucral bracts broader and blunt. . . . . **Foveolina**
55.' Shrubs; disc florets 5-lobed or receptacle paleate:
60. Heads homogamous, discoid:
61. Pappus 0, or a pseudopappus of glandular hairs present:
62. Leaves opposite; heads solitary and sessile. . . . . **Asaemia**
62.' Leaves alternate; heads corymbose and pedunculate. . . . . **Athanasia**
61.' Pappus of scales:
63. Receptacle paleate, rarely epaleate; heads narrow, few-flowered (6–10 florets), in terminal corymbs; indumentum of stellate hairs; pappus of basally united, fringed scales . . . . . **Hymenolepis**
63.' Receptacle epaleate; heads several-flowered, solitary or corymbose; hairs simple; pappus obliquely cup-shaped or divided into 3–5 scales. . . . . **Pentzia**
60.' Heads heterogamous, disciform or radiate:
64. Receptacle epaleate; shrublets with simple, narrow leaves; flowerheads with white to pinkish ray florets:
65. Erect, twiggy shrublets with leathery, erect or adpressed leaves and flowerheads on sparsely leafy stems; pappus 0; cypselas with white, slime-producing hairs . . . . . **Phymaspermum**
65.' Decumbent, often gnarled shrublets with subsucculent leaves and flowerheads on naked peduncles; pappus of 3 scales; cypselas strongly compressed. . . . . **Leucoptera**
64.' Receptacle paleate; annuals, perennials or shrublets, often with dissected leaves; flowerheads various, with white or yellow ray florets:
66. Cypselas glabrous or with basal tuft of hairs; pappus of 5 large, white scales; ray florets numerous, yellow or white. . . . . **Ursinia**
66.' Cypselas densely silky or woolly; pappus 0; ray florets lacking or few, white to pink:
67. Heads disciform, outer female florets filiform; annuals or tufted perennials with solitary flowerheads . . . . . **Lasiospermum**
67.' Heads radiate, outer 2 or 3 florets ligulate, ray florets sometimes minute; ericoid shrublets with flowerheads aggregated . . . . . **Eriocephalus**

54.' Anthers tailed; pappus of bristles and sometimes scales; involucral bracts mostly dry, shiny (everlasting):
68. At least some heads radiate, with ligulate outer florets:
69. Ray florets white, pink, mauve or blue:
70. Leaves ericoid with involute margins, often twisted, upper surface more densely hairy than lower; ray florets few; pappus bristles plumose throughout . . . . . **Amphiglossa**
70.' Leaves sometimes ericoid but margins flat or revolute, lower surface more densely hairy than upper; ray florets in 1 row; pappus bristles winged **Alatoseta**

69.' Ray florets yellow, often coppery beneath, rarely whitish; pappus of scales only, or biseriate of scales and bristles:
71. Pappus bristles distinctly plumose . . . . . **Leysera**
71.' Pappus bristles barbellate or absent:
72. Annual herbs:
73. Ovary densely hairy with long, apically coiled hairs . . . . . **Rhynchopsidium**
73.' Ovary glabrescent . . . . . **Nestlera**
72.' Perennials or shrublets:
74. Pappus of bristles only; leaves linear, fasciculate, and cobwebby above **Antithrixia**
74.' Pappus of some florets at least with scales and also sometimes bristles; leaves usually broader or glabrous:
75. Leaves toothed, hairy, often alveolate-reticulate. . . . . **Pentatrichia**
75.' Leaves not toothed, sometimes with harsh marginal cilia:
76. Disc florets with pappus of scales plus 1–4 bristles; plants glabrous or felted; heads usually solitary . . . . . **Rosenia**
76.' Disc florets without pappus bristles although scales sometimes needle-like; plants glabrous (rarely hairy); heads generally corymbose or clustered in secondary glomerules . . . . . **Oedera**
68.' Heads discoid or heterogamous and disciform but without developed ray florets:
77. Leaves dimorphic, cauline leaves linear and involute but peduncles closely covered by imbricate, clasping, scale-like leaves; heads large (20–30 mm long), solitary, conspicuous . . . . . **Edmondia**
77.' Leaves not dimorphic; heads mostly smaller:
78. Leaves mostly involute, ericoid, often twisted, rarely weakly involute and granular, upper surface densely white-woolly:
79. Involucral bracts cartilaginous or herbaceous throughout, at most with small papery tips; pappus bristles 0 or plumose throughout:
80. Heads 1-flowered, in spikes or glomerules . . . . . **Stoebe**
80.' Heads 2- or more-flowered:
81. Heads aggregated in glomerules or spikes; fruits without a lateral wing; ericoid shrublets but never spiny or wiry . . . . . **Elytropappus**
81.' Heads 1 or 2, not aggregated; fruits with a lateral wing; spiny or wiry shrublets . . . . . **Amphiglossa**
79.' Involucral bracts conspicuously papery; pappus bristles barbellate or plumose only above:
82. Outer involucral bracts each subtending single outer, female floret; heads heterogamous; outer florets usually with pappus 0, or of 1 or 2 bristles **Ifloga**
82.' Outer involucral bracts not subtending individual florets; heads homogamous:
83. Heads mostly crowded; petals glabrous; pappus bristles with flattened, more-or-less clavate tips . . . . . **Metalasia**
83.' Heads mostly solitary; petals hairy; pappus bristles not clavate . **Lachnospermum**
78.' Leaves flat or with margins revolute (rarely weakly involute), both surfaces equally woolly or lower more densely covered:
84. Pappus bristles plumose or barbellate, fused below into smooth ring; style branches often rounded or truncate; silver- or grey-felted perennials with showy, everlasting heads. . . . . **Syncarpha**
84.' Not as above:
85. Involucral bracts without translucent strip in the lower part:
86. Leaves linear to spathulate, sessile; heads on non-filiform peduncles **Gnaphalium**
86.' Leaves ovate or elliptic, petiolate; heads on filiform peduncles . . . . . **Troglophyton**
85.' Inner involucral bracts at least with translucent central strip in lower part:
87. Heads in prostrate glomerules surrounded by involucre of leaves . . . . . **Galeomma**
87.' Heads not in prostrate glomerules surrounded by leafy involucre:
88. Involucral bracts very obtuse or truncate, usually biseriate, or if in 3 series then pappus bristles expanded towards base and fused below into smooth ring . . . . . **Lasiopogon**
88.' Involucral bracts usually in at least 3 series; pappus bristles never dilated below and fused into ring:
89. Annual or weakly perennial, grey-woolly herbs; heads small, up to 4 × 3 mm; involucral bracts with opaque white tips; pappus bristles subplumose above. . . . . **Vellereophyton**
89.' Usually perennial herbs or shrublets, but if annual then either bracts without opaque white tips or pappus not subplumose above:

90. Female flowers at least 5 times as many as hermaphrodite; heads campanulate with involucral bracts equalling flowers; perennial herb with lanceolate leaves expanded and clasping below and decurrent on stem ..... **Pseudognaphalium**
90.' Not as above ..... **Helichrysum**

ADENOGLOSSA[1] 1 sp., southern Africa; Richtersveld and northern Namaqualand **(ece)**

decurrens (Hutch.) B.Nord. Annual, 40–200 mm tall. Leaves opposite or upper ones often alternate, narrowly linear, succulent. Flowerheads radiate, terminal, solitary, distinctly pedunculate; involucre broadly campanulate-hemispherical, bracts imbricate with bluntly rounded tips; ray florets female, (3)4 or 5(–8), apex shallowly 3-lobed, yellow; disc florets 15–25, bisexual, yellow. Cypselas obovate, compressed and winged, with a flap-like projection apically; pappus of 5 or 6 scales. Aug.–Sept., apparently growing only in favourable years. Quartz pebble fields, rocky, sandy slopes, quartzite hills, G, NS (Richtersveld to Port Nolloth to near Soebatsfontein). **(ece)**

ALATOSETA[2] 1 sp., W Cape **(ece)**

tenuis Compton Wiry-stemmed, thinly woolly annual, up to 50 mm tall, branching from base, branches divaricately spreading. Leaves linear, pungent, 10–20 mm long, with margins rolled under, minutely glandular-hairy, thinly white-woolly when young, especially beneath. Flowerheads solitary at branch tips, radiate, 10–15 mm diam.; involucral bracts with wide membranous margins, pungent, outer sharply reflexed; ray florets magenta or white with purple reverse; disc florets yellow. Cypselas densely hairy; pappus of 5 awns, with membranous wings at base. Oct. Stony flats and washes in Succulent Karoo, TS (Tanqua Karoo to Matjiesfontein). **(ece)**

AMELLUS[1] ASTERTJIE 12 spp., western southern Africa with a few spp. in Botswana, Free State and E Cape

*A. Flowerheads uniformly coloured; ray florets absent or reduced; disc florets pale yellow or white (see also **A. tenuifolius**)*

flosculosus DC. Annual or perennial herb, 150–400 mm tall, densely covered with short and occasional long hairs. Leaves alternate, linear, entire or rarely 1- or 2-dentate. Flowerheads discoid, solitary, shortly pedunculate; involucre cup-shaped, bracts linear-lanceolate, imbricate, shortly hairy and glandular; disc florets numerous, bisexual, pale yellow. Cypselas oblanceolate, hairy; pappus of scales and barbellate bristles. Aug.–Oct. Sandy soils, SN, G, NS, NH (Klinghardt Mountains through to Springbok). **(ece)**

microglossus DC. Roughly hairy, sprawling annual, up to 150 mm tall. Leaves opposite below, alternate above, oblanceolate. Flowerheads disciform, solitary or in lax corymbs, sessile or shortly pedunculate; involucre cup-shaped, bracts linear, imbricate, bristle-haired and glandular, often red-tipped; outer female florets with reduced rays, white; disc florets few, bisexual, white. Cypselas obovate to cordate, hairy; pappus of scales and barbellate bristles. July–Oct. Sandy flats and washes, G, NS, NH, KV, WM, TS, CCR (Richtersveld to near Calvinia, S to Klawer and Little Karoo). **(gce)**

A.' Flowerheads bicoloured; ray florets blue, mauve or white; disc florets yellow

alternifolius Roth Roughly hairy annual or short-lived perennial, up to 0.6 m tall, with spreading hairs. Leaves alternate, linear, entire or 1–3-dentate. Flowerheads radiate, solitary; peduncle occasionally swollen above; involucre hemispherical, bracts linear-lanceolate, imbricate, roughly hairy and glandular; ray florets female, bluish mauve, rarely white; disc florets numerous, bisexual, yellow often tinted reddish. Cypselas obovate, hairy; pappus of scales and barbellate bristles. Aug.–Nov. Sandy flats, NS, NH, KB, CCR (Steinkopf to Lambert's Bay). **(gce)**

coilopodius DC. Softly hairy annual, 100–250 mm tall. Leaves alternate, linear to oblanceolate, entire or 1- or 2-dentate, appressed pubescent. Flowerheads radiate, solitary; peduncle short, swollen above; involucre hemispherical, bracts linear-lanceolate to lanceolate, imbricate with

softly appressed hairs amongst a few longer bristles, glandular; ray florets female, bluish mauve; disc florets numerous, bisexual, yellow. Cypselas obovate, hairy; pappus of scales and barbellate bristles. Aug.–Sept. In heuweltjieveld, NH (Komaggas to Soebatsfontein). **(ece)**

epaleaceus O.Hoffm. Annual, 10–100 mm tall, covered in short white hairs. Leaves alternate, oblanceolate. Flowerheads radiate, solitary, sessile; involucre hemispherical, urn-shaped in fruit, bracts linear-lanceolate, imbricate; ray florets female, mauve to blue; disc florets numerous, bisexual, yellow. Cypselas obovate, hairy; pappus of scales and barbellate bristles. May–Oct. In sand, G (southern Namibia, Richtersveld and along Gariep Valley to near Kakamas).

nanus DC. Annual, 40–300 mm tall, appressed pubescent. Leaves alternate, linear-oblanceolate. Flowerheads radiate, solitary, sessile or shortly pedunculate; involucre cup-shaped to hemispherical, bracts lanceolate, imbricate, bristle-haired, often purplish-tipped; ray florets female, purple to pale blue, occasionally white; disc florets bisexual, numerous, yellow. Cypselas obovate to cordate, hairy; pappus of scales and barbellate bristles. Aug.–Oct. Sandy soils, SN, G (Aurus Mountains S to Richtersveld). **(ece)**

tenuifolius Burm. GRYSASTERTJIE Grey-silky, much-branched, perennial herb or shrublet, up to 0.5 m tall. Lower leaves opposite, upper alternate, opposite again after each branching, linear, appressed pubescent. Flowerheads radiate or apparently disciform, solitary or in loose corymbs, shortly to distinctly pedunculate; involucre funnel- to cup-shaped, bracts linear-lanceolate, imbricate, often purplish-tipped, hairy; ray florets female, occasionally reduced, mauve; disc florets bisexual, numerous, yellow. Cypselas obovate, hairy; pappus of scales and barbellate bristles. Aug.–Dec. Sandy flats, usually near coast, NS, CCR (S of Alexander Bay to SW Cape). **(gce)**

tridactylus DC. Annual, 20–150 mm tall, with spreading pubescence. Leaves alternate, linear-oblanceolate, entire or 1- or 2-dentate. Flowerheads radiate, solitary, pedunculate; involucre hemispherical or cup-shaped, bracts linear-lanceolate to lanceolate, imbricate, hairy; ray florets female, blue to blue-purple; disc florets bisexual, numerous, yellow. Cypselas obovate to cordate, hairy; pappus of scales and barbellate bristles. July–Oct. Dry washes and streambeds, KV, WM, TS, CCR (Namibia, SE to Calvinia, Vanrhynsdorp, Laingsburg, Great Karoo and Free State).

AMPHIGLOSSA (= *PTEROTHRIX*) KOPSEERBOSSIE 11 spp., South Africa and Namibia, mostly western Karoo

*A. Flowerheads radiate (see also **sp. A**)*

corrudifolia DC. Erect, rhizomatous, chaffy-green shrub, up to 0.4 m tall, producing roots from decumbent branches and many short shoots. Leaves adpressed, small, triangular, woolly above. Flowerheads small, radiate 1, terminal on branchlets; inner involucral bracts green around midrib, hyaline towards apex; ray florets 4 or 5, white. Jan.–Apr. Sandy riverbeds, ?WM, TS (Onder Bokkeveld and near Prince Albert).

tomentosa (Thunb.) Harv. (= *Pterothrix flaccida* Schltr. ex Hutch. & E.Phillips) Wiry-stemmed, thinly woolly shrublet, up to 0.6 m tall. Leaves involute-ericoid, suberect, sometimes twisted. Flowerheads radiate, few in loose terminal groups; inner involucral bracts reddish above; ray florets 3 or 4(5), pink or white. Nov.–Feb. Dry karroid slopes, G, NH, KB, WM, CCR (Namibia to Little Karoo).

A.' Flowerheads discoid

celans Koekemoer Scrambling, wiry-stemmed, shrublet, up to 0.3 m tall, with lower part of branches ± leafless. Leaves few, ± spreading, elliptic to linear, twisted, involute, woolly above. Flowerheads discoid, small, 1 in 3 or 4 upper leaf axils; inner involucral bracts tinged dark wine-red near ± recurved, mucronate apex; florets white or pink. Feb.–Apr. In deep sand, NS (between Garies and Kotzesrus). **(ece)**

thuja (Merxm.) Koekemoer Erect, woody, single-stemmed, strongly aromatic shrublet, up to 0.2 m tall, with main branches becoming prostrate with age; secondary branches many and fine. Leaves scale-like, adpressed, greyish green, woolly above. Flowerheads discoid, small, terminal on branchlets; inner involucral bracts membranous above; florets white. Jan.–Mar. In sand on granite, SN (Kovis Mountains). **(ece)**

triflora DC. Erect, woody, densely entangled, greyish shrub, up to 0.4 m tall, with an underground rootstock and ± spinescent terminal branches. Leaves basally adpressed otherwise ascending,

narrowly triangular, woolly above, margins inrolled. Flowerheads discoid, terminal 1 or in groups of up to 8; inner involucral bracts hyaline in upper part; florets white. Sandy soils often on limestone or sandstone outcrops, WM (dry interior of southern Africa).

sp. A Scrambling shrub, up to 0.15 m tall, with trailing stems up to 0.5 m long. Leaves ± clustered on short shoots, elliptic, woolly to glabrous above, velvety below. Flowerheads 1 or few in upper leaf axils, discoid; inner involucral bracts dark in upper half; florets white. Nov. Quartzite scree, KV (northern Knersvlakte, near Nuwerus). **(ece)**

ANTITHRIXIA[1] 1 sp., Namaqualand, in the Kamiesberg Mountains and surrounding uplands **(ece)**

flavicoma DC. Shrub or dwarf shrub, up to 0.5 m tall. Leaves in 4 rows, or crowded on short shoots, sessile, linear, furrowed and thickly hairy above. Flowerhead radiate, solitary, terminal, almost sessile; involucre cup- to bell-shaped, bracts imbricate, glabrous; ray florets female, short, yellow and ± brownish purple on back, apically 3-lobed; disc florets bisexual, yellow. Cypselas terete, glabrous or with a few scattered twin hairs; pappus of many, ± fused, barbellate bristles in 1 or 2 rows. Aug. Granite derived soil, in seepage areas, NH, KB (Grootvlei W of Kamieskroon to Kamiesberg Mountains). **(ece)**

ARCTOTHECA[1] 5 spp., southern Africa, some species naturalised in several parts of the world

calendula (L.) Levyns BOTTERBLOM, CAPE MARIGOLD, CAPE WEED, GOUSBLOM, SOETGOUSBLOM, TONTELDOEK Erect, creeping or rosulate annual, up to 200 mm tall, with a tap root or adventitious roots from base, never along stems. Leaves oblong, lyrate-pinnatifid, rarely sinuate or entire, margin slightly sinuate and obscurely toothed, glabrous or pubescent above, thinly white-felted below. Flowerheads radiate, solitary, on a white-woolly peduncle; ray florets yellow above, occasionally greenish grey below, neuter; disc florets bisexual, yellow. Cypselas covered in pinkish brown, silky wool; pappus of minute, delicate, pointed scales. June–Nov. Coastal areas or disturbed places, sandy soil, NS, NH, KB, KV, WM, TS, CCR (Namaqualand to Cape Peninsula and Karoo).

populifolia (P.J.Bergius) Norl. POPLAR GOUSBLOM, SEA PUMPKIN, SEEPAMPOEN, STRANDGOUSBLOM Decumbent, trailing or suberect perennial herb, up to 300 mm tall. Leaves white felted, thick-textured, usually broadly ovate or elliptic above, abruptly narrowed below, base occasionally lobed, margins ± entire to shallowly dentate with callose-tipped teeth, strongly 5–7-nerved from base. Flowering heads radiate, pedunculate, a few sub-corymbosely arranged in leaf axils; ray florets yellow, neuter; disc florets bisexual, yellow. Cypselas thinly white silky-woolly; pappus of broad, partly fused scales. Oct. In shifting sand on coastal dunes, NS, CCR (southern Namaqualand to Cape Peninsula and E to Mozambique).

prostrata (Salisb.) Britten Like **A. calendula** but perennial, sprawling and rooting at nodes, softly hairy, leaves auriculate below, involucral bracts white-tipped, cypselas softly hairy, pappus wanting. Mainly Sept.–Nov. Sandy slopes and flats, coastal and near streams, WM, CCR (Cape Peninsula to E Cape).

ARCTOTIS ± 50–60 spp., southern Africa

A. Ray florets neuter

dregei Turcz. Annual, up to 150 mm tall, stems short or absent. Leaves petiolate, elliptic-obovate to lyrate-pinnatifid, glabrescent to softly hairy above, felted below. Involucre base rounded; outer involucral bracts with shortly reflexed apex, softly hairy. Ray floret limb yellow; disc florets hermaphrodite, yellow or dark. Cypsela obovoid-ellipsoid, bilaterally flattened, 1 broad obovate-elliptic abaxial cavity, wings shortly dentate, pubescent, basal ring of rigid hairs shorter or longer than cypsela; pappus biseriate, inner whorl of 8 scales much longer than outer whorl, outer whorl of usually 6 (rarely 8) scales. July–Nov.(–Jan). Flats in clay or stony soils, WM, TS, CCR (mainly S of Great Escarpment, from Sutherland to Worcester to E Cape).

sulcocarpa K.Lewin Annual, up to 150 mm tall, stems short or absent. Leaves petiolate, lowermost lyrate-pinnatisect, upper leaves pinnatisect, glabrescent above, densely felted below. Invo-

lucre base rounded; outer involucral bracts with shortly reflexed apex, softly hairy. Ray florets neuter, limb pale yellow; disc florets hermaphrodite, dark. Cypsela obconical, 1 linear-triangular abaxial cavity, wings dentate, glabrous or pubescent, basal hairs when present shorter than cypsela; pappus absent or biseriate, both whorls of 8 scales, inner whorl much longer than outer whorl. Aug.–Oct. Flats in clay, WM (Bokkeveld Plateau to Roggeveld). **(ece)**

A.' Ray florets female
B. Ray and fertile disc floret cypselas heteromorphic; filaments papillose

dimorphocarpa R.J.McKenzie Annual, up to 200 mm tall, stems short or absent. Leaves petiolate, obovate to lyrate-pinnatisect, softly hairy to glabrescent above, densely felted below, margins revolute. Involucre base truncate; outer involucral bracts with apex erect, densely woolly-hairy. Ray florets female, yellow; disc florets hermaphrodite, yellow. Cypselas dimorphic, obovoid-obconical, 2 dentate abaxial wings; ray cypsela glabrous; pappus absent; disc cypsela minutely pubescent, with basal ring of rigid hairs; pappus of 2 whorls each of 8 scales, inner whorl much longer than outer whorl and similar length to cypsela. July–Oct. Flats in red-brown sandy or sandy-loam soil, NH, WM (Springbok to Carnarvon and Loxton).

B.' Ray and fertile disc floret cypselas homomorphic; filaments smooth
C. Cypselas without a basal ring of rigid hairs; pappus scales shorter than cypsela or absent

arctotoides (L.f.) O.Hoffm. Tufted, prostrate or decumbent perennial, up to 300 mm tall. Leaves radical or caulescent, petiolate, entire to lyrate-pinnatifid or pinnatisect, glandular-hairy on both surfaces, or glabrescent above and felted below, petiolate. Outer involucral bracts woolly, apex acute, erect, inner leaf-like. Ray and disc florets yellow. Cypsela obovoid, smooth or rugose, 1 oblong dorsal furrow, glabrous; pappus absent. Year-round, mainly Sept.–Mar. Shale slopes or clay soils, WM (central Namibia, southern Botswana, Roggeveld Mountains to Free State to KwaZulu-Natal).

erosa (Harv.) Beauverd Erect annual, up to 500 mm tall. Leaves petiolate, lyrate-pinnatifid, both surfaces glandular and roughly hairy. Outer involucral bracts glandular, softly hairy, with a short, ± reflexed, apical appendage. Ray floret limb orange or yellow, usually with dark blotch at base; disc florets black. Cypsela obovoid, 1 linear-undulate dorsal cavity, not rugose, adaxial side straight or strongly convex; pappus absent or up to 8 minute scales. Aug.–Oct. Stony or sandy slopes and flats, seasonal watercourses, NH, KV, WM, TS, CCR (Bitterfontein to Vanrhynsdorp to Roggeveld Mountains and northern Little Karoo). **(gce)**

fastuosa Jacq. BITTERGOUSBLOM, NAMAKWAGOUSBLOM Erect annual, up to 500 mm tall, stems hollow. Leaves petiolate, obovate to lyrate-pinnatifid to pinnatisect, both surfaces glandular, roughly hairy or loosely felted; upper leaves sessile, auriculate. Outer involucral bracts glandular, softly hairy, with a reflexed, broadly linear, apical appendage. Ray floret limb orange, sometimes yellow, with dark band at base; disc florets black, sometimes yellow. Cypsela obovoid, rugose, glabrous or papillose, 1 linear-undulate cavity; pappus absent. June–Nov. Sandy flats, gravel slopes, seasonal watercourses, G, NS, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

flaccida Jacq. (= *A. gowerae* E.Phillips, *A. leucanthemoides* Jacq., *A. pusilla* DC., *A. venidioides* DC., including **sp. 1** in Goldblatt & Manning (2000a)) Erect annual, up to 300 mm tall. Lower leaves petiolate, elliptic to lyrate-pinnatifid, middle and upper leaves sessile, upper leaves ovate-oblong to oblong-linear, base broad and semi-amplexicaul; ± glabrous or lightly felted on both surfaces. Outer involucral bracts with shortly reflexed, softly hairy appendage. Ray floret limb orange, yellow, or cream with yellow basal band; disc florets black. Cypsela obovoid, 2 linear cavities, minutely pubescent, rugose; pappus uniseriate, 8 minute scales. July–Sept. Sandy soil on flats and gravel slopes, NS, CCR (Brand-se-Baai to Elandsbaai). **(gce)**

sp. F Erect annual, up to 500 mm tall, stems hollow. Leaves petiolate, obovate to lanceolate, lyrate-pinnatifid or pinnatisect, both surfaces glandular, roughly hairy, sometimes felted; upper leaves sessile, auriculate, semi-amplexicaul. Outer involucral bracts with subulate-linear, glandular, roughly hairy appendage. Ray floret limb yellow or orange, usually with dark band at base; disc florets black or yellow. Cypsela obovoid, constricted at base, rugose, minutely pubescent, 1 linear-undulate cavity; pappus uniseriate, up to 10 minute scales. May–Oct. Sandy flats and at foot of granite or quartzite hills, SN, G (Sperrgebiet and Huib-Hoch Plateau to Holgatrivier and Richtersveld).

C.' Cypselas with basal ring of rigid hairs; pappus scales at least as long as cypsela
D. Acaulescent, prostrate or rhizomatous perennial herbs

acaulis L. RENOSTERGOUSBLOM Tufted perennial with woody underground rootstock, up to 300 mm tall. Leaves petiolate, lyrate-pinnatifid to pinnatisect or oblanceolate, apex obtuse, felted below, roughly hairy above. Capitula solitary, scapose; peduncle woolly-hairy. Involucral bracts glabrous, but outer bracts with linear, woolly, reflexed apical appendage. Ray floret limb orange, yellow or white above, with black or dark red blotch at base, red-purple below; disc florets black. Cypsela constricted at base, 2 rounded cavities, densely woolly, basal ring of rigid hairs as long or longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. Aug.–Jan. Flats on clay, granite-derived soil or sand, WM, CCR (Calvinia and Bokkeveld Plateau to Cape Peninsula to Langkloof). **(gce)**

campanulata DC. Tufted or prostrate perennial, shortly caulescent, up to 300 mm tall. Leaves petiolate, lyrate-pinnatisect to cordate, apex obtuse to rounded, lightly felted equally on both surfaces. Involucral bracts glabrous, often dark red-purple, but outer bracts with linear, densely felted, reflexed apical appendage. Ray floret limb orange with dark band at base; disc florets black. Cypsela obovoid, 2 oblong dorsal cavities, densely hairy, basal ring of rigid hairs as long as cypsela; pappus scales biseriate, inner whorl longer than cypsela. July–Oct. Sandy loam soil often near granite hills, NH, KB, WM (Anenous Pass to Kamieskroon). **(ece)**

canescens DC. Rhizomatous perennial, up to 250 mm tall, forming dense mat, stems thick and woody. Leaves petiolate, lyrate-pinnatisect to -pinnatifid, both sides densely felted, apex rounded. Peduncle up to 100 mm long. Involucral bracts ± glabrous, but outer bracts with linear, reflexed, woolly, apical appendage up to 9 mm long; inner bracts straw-coloured. Ray floret limb orange with dark blotch near base; disc florets dark. Cypsela obovoid, 2 oblong dorsal cavities, densely hairy, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. June–Oct. Well-drained sandy or gravelly soil, NH, KB (Springbok to Kamiesberg Mountains). **(ece)**

diffusa Thunb. Rhizomatous perennial, up to 100 mm tall, with long, fibrous, unbranched roots, forming diffuse patches. Leaves in a compact rosette, petiolate, lyrate-pinnatifid to -pinnatisect, apex truncate-incised to obtuse, both sides densely felted. Capitula solitary, scapose. Involucral bracts ± glabrous, but outer bracts with linear, densely felted apical appendage up to 4 mm long; inner bracts dark purple-red. Ray floret limb white or pale salmon above, apricot-pink below; disc florets brownish maroon. Cypsela obovoid, 2 rounded cavities, densely hairy, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. Aug.–Oct. Heavy clay soil, WM (Hantamsberg to Roggeveld to Murraysburg).

sp. A Rhizomatous perennial, up to 200 mm tall. Lower leaves lyrate-pinnatisect, densely woolly-lanate on both surfaces, erose-dentate, sometimes shortly auriculate; upper leaves lanceolate, apex acute. Outer involucral bracts triangular-linear with long, linear, reflexed, felted, apical appendage, base sparsely woolly. Ray floret limb yellow, with dark blotch at base; disc florets dark. Cypsela obconical, 2 oblong cavities, dorsally glabrous, ventrally lightly woolly, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. Aug.–Sept. Flats and gentle slopes in deep white sand, NH, KB (Kamieskroon, Kamiesberg Mountains). **(ece)**

sp. C Tufted, shortly caulescent perennial, up to 400 mm tall. Leaves pinnatisect, sometimes lyrate-pinnatisect, basal leaves often with small secondary lobes on midrib between primary lobes, densely felted on both surfaces, erose-dentate, semi-amplexicaul. Outer involucral bracts with linear, densely felted, reflexed appendage, apex acute. Ray floret limb orange; disc florets black. Cypsela obovoid, base constricted, 2 oblong-rounded cavities, densely hairy, basal ring of rigid hairs as long as cypsela; pappus scales biseriate, inner whorl longer than cypsela. In sandy or stony soil, NH (Komaggas Plateau). **(ece)**

sp. G Shortly caulescent perennial, up to 300 mm tall. Leaves petiolate, lyrate-pinnatisect, apex acute, moderately felted on both sides. Involucral bracts ± glabrous, outer bracts with linear, reflexed, felted, apical appendage. Ray floret limbs dark red, disc florets dark. Cypsela obovoid, 2 oblong cavities, densely hairy, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. July–Sept. Sandy loam soil, NH (Garies, Bitterfontein). **(ece)**

sp. H (including **sp. 2** in Goldblatt & Manning (2000a)) Tufted, shortly caulescent perennial, up to 400 mm tall. Leaves petiolate, lyrate-pinnatisect to oblanceolate, uppermost narrowly lanceolate, apex acute to obtuse, densely felted on both sides. Capitula 1 or 2 per stem. Involucral bracts

glabrous, margins dark red-purple, but outer bracts with short, felted, slightly reflexed, apical appendage. Ray floret limb orange, sometimes white, with dark band at base; disc florets dark. Cypsela obconical, 2 oblong cavities, densely hairy, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. July–Sept. In sand on rocky slopes in arid fynbos, TS, CCR (Bokkeveld Plateau to Karoopoort and Witteberg Mountains). **(gce)**

D.' Caulescent, ± erect annual and perennial herbs and subshrubs

argentea Aiton Rounded, silvery felted shrub, up to 1 m tall. Leaves linear, margins involute. Capitula solitary on elongate peduncles. Outer involucral bracts appressed, smooth or initially thinly hairy, apical appendage absent. Ray floret limb yellow above, mauve below; disc florets black. Cypsela obovoid, 2 elongate-undulate cavities, densely hairy, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. Oct.–Mar. Sandstone slopes and plateaux, WM, TS, CCR (Swartruggens and Roggeveld). **(gce)**

auriculata Jacq. Silvery felted shrub or subshrub, up to ± 1 m tall. Leaves lyrate-pinnatifid to -pinnatisect, base auriculate; upper leaves linear, denticulate. Capitula axillary and terminal, on elongate peduncles. Outer involucral bracts with densely felted, reflexed appendages. Ray floret limb orange, yellow or cream; disc florets black or yellow. Cypsela obovoid, 2 oblong cavities, densely hairy, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. July–Dec. Sandy soil and rocky granite slopes, NS, NH, WM (Komaggas to Brand-se-Baai and Botterkloof Pass). **(ece)**

decurrens Jacq. (= *A. merxmuelleri* Friedrich, *A. scullyi* Dümmer) Erect or spreading subshrub, up to 1 m tall. Leaves lyrate to oblong-obovate, broadly petiolate, densely glandular, softly or roughly hairy on both surfaces, margin coarsely dentate; upper leaves smaller, oblanceolate to lanceolate, sessile. Capitula axillary and terminal. Involucral bracts glabrous, but outer with long, woolly, apical appendage, margins ciliate. Ray floret limb white, blackish-maroon at base, red-purple below; disc florets black. Cypsela obovoid, 2 oblong cavities, wings entire and occluding cavities, densely hairy, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. July–Dec. Sandy plains on coastal dunes and inland dune plumes, NS (Port Nolloth to Brand-se-Baai). **(ece)**

frutescens Norl. Silvery tomentose suffrutex or dwarf shrub, up to 500 mm tall. Leaves petiolate, semi-amplexicaul, lyrate-pinnatifid or pinnatilobate, to almost entire. Outer involucral bracts without an apical appendage. Ray floret limb yellow; disc florets blackish apically, rarely yellowish brown. Cypsela obovoid, 2 oblong cavities, dorsal side glabrous, ventral side densely hairy, basal ring of rigid hairs longer than cypsela; pappus of 8 acuminate scales, longer than cypsela. Aug.–Sept. Rocky granite slopes, SN (Sperrgebiet). **(ece)**

revoluta Jacq. (= *A. crispata* Hutch., *A. cuprea* Jacq., *A. laevis* Thunb.) KRULBLAARGOUSBLOM Erect subshrub or shrub, up to 2 m tall. Leaves bipinnatisect to linear-lobate, segments linear and finely dissected, glandular and aromatic when crushed, some forms discolorous and felted below, other forms glabrescent or roughly hairy, margins revolute, base auriculate. Capitula solitary, on elongate peduncles. Outer involucral bracts glandular, outer bracts with narrowly lanceolate to subulate, reflexed, apical appendage. Ray limb yellow to orange; disc florets black or yellow. Cypsela obovoid, 2 oblong cavities, densely woolly, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, outer whorl longer than cypsela. Mainly Aug.–Nov. Rocky slopes, G, NH, KB, KV, WM, CCR (Steinkopf to Calvinia to Langebaan to Worcester). **(gce)**

spinulosa Jacq. Spreading annual up to 600 mm tall, stem roughly glandular-hairy. Basal leaves elliptic-lanceolate, pinnatifid or simple, thinly felted, dentate, petiolate, not auriculate; upper leaves oblong or oblanceolate, acute, glandular-hairy, sometimes thinly felted below, dentate, base auriculate. Outer involucral bracts glandular with linear, reflexed apical appendage. Ray limb orange or yellow, disc florets black. Cypsela obovoid, 2 oblong cavities, ventral surface densely hairy, dorsal surface glabrous, basal ring of rigid hairs longer than achene; pappus scales biseriate, inner whorl longer than cypsela. July–Sept. Gentle slopes in deep, white sand, KV, CCR (Vanrhynsdorp, Oorlogskloof). **(gce)**

sp. B Glabrescent to lightly felted, annual herb, initially rosulate then branched and tufted, up to 300 mm tall, stem hollow. Basal leaves lyrate to lyrate-pinnatisect, lightly felted above, densely felted below, major veins ± glabrous, apex obtuse to acute, upper leaves lyrate-pinnatifid to oblanceolate, sessile, auriculate. Involucral bracts ± glabrous, outer bracts with subulate-linear, shortly reflexed, moderately felted, apical appendage. Ray floret limb yellow to orange-yellow, dark band at base; disc florets dark. Cypsela obconical, 2 linear cavities acute at base, moderately

hairy, basal ring of rigid hairs ± equal in length to cypsela; pappus scales biseriate, ± equal in length to cypsela. Aug.–Oct. Flats in deep red sand, NS (Port Nolloth to Oubees-se-Sand). **(ece)**

sp. D Silvery tomentose subshrub, up to 400 mm tall, stems shortly decumbent, branching at base, densely woolly. Leaves shortly petiolate, lowermost narrow lyrate-pinnatisect, upper leaves linear-lobate to lanceolate-lobate, densely felted on both surfaces, auriculate. Involucral bracts sparsely to moderately woolly, outer bracts with linear, densely woolly, reflexed apical appendage. Ray floret limb yellow or yellow-orange, basal blotch absent; disc florets black. Cypsela obovoid-obconical, wings with acute, inflexed teeth occluding cavities, densely hairy, basal ring of rigid hairs longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. July–Oct. Sandy loam on rocky slopes and plateaux, NH (Steinkopf to Garies). **(ece)**

sp. E Erect, tufted perennial, up to 400 mm tall, stems branching at base, densely felted. Leaves fleshy, petiolate, linear to linear-lobate, sometimes pinnatisect, up to 180 mm long, both surfaces densely felted, involute. Involucral bracts triangular-ovate, appressed, usually glabrous but sometimes moderately felted, apical appendage absent. Ray floret limb white with black blotch at base; disc florets purple-black. Cypsela obovoid, 2 elongate cavities, densely hairy, basal ring of rigid hairs as long or longer than cypsela; pappus scales biseriate, inner whorl longer than cypsela. Sept.–Oct. Coastal dunes and sandveld, G, NS (Alexander Bay to Kleinsee to Richtersveld). **(ece)**

[**Notes on *Arctotis* treatment** *Arctotis* is a paraphyletic genus (McKenzie & Barker 2008) and the taxonomy is currently under revision. Designation of undescribed *Arctotis* taxa in the present treatment follows the notation of Beyers (2000; spp. 1 and 2) and of McKenzie and Barker (2008; spp. A to E). The taxon designated sp. B is superficially similar to *A. leiocarpa*, but its taxonomic distinction is supported by cypsela morphology and molecular data (R.J. McKenzie, unpublished data). Species E has been placed previously in *A. argentea* or *A. auriculata*, but is morphologically distinct from both species and might introgress with *A. decurrens*. Species F has previously been included within *A. fastuosa*, but differs in cypsela morphology and occurs principally north of the Gariep Valley. *Arctotis dimorphocarpa* is a recently described species (McKenzie *et al.* 2011).

The enigmatic *A. gumbletonii* Hook.f. was described from a plant cultivated in the British Isles with no record of its original provenance. The type of the species shows the strongest morphological resemblance to *A. canescens* but with some inconsistencies. The possibility that the name was based on a plant of hybrid origin cannot be discounted.

Studies on numerous taxonomically difficult *Arctotis* species complexes are ongoing. *Arctotis auriculata* is an ill-resolved and variable species complex. The northernmost, yellow-rayed form is designated sp. D. Further investigation is required to clarify the taxonomic status of southern forms.

Numerous taxa in the *A. aspera–revoluta* species complex have been segregated largely based on leaf morphology and pubescence, but owing to within-population variability and occurrence of numerous combinations of the character states, delimitation of taxa is highly problematic. As delimited here, *A. revoluta* encompasses shrubby forms with pinnatisect leaves with narrow pinnae and numerous combinations of pubescence types on the leaves and involucral bracts, but the species might be best treated as an intraspecific taxon in *A. aspera* L.]

ASAEMIA[2] 1 sp., W Cape, Karoo and southern Namibia

minuta (L.f.) K.Bremer (= *Athanasia minuta* (L.f.) Källersjö) VUURSIEKTEBOSSIE Divaricately branched, twiggy shrublet, up to 0.5 m tall, often thorny. Leaves scattered or clustered on short shoots, opposite and fused into a sheath at base, linear, 5–30 mm long, rarely shortly lobed. Flowerheads solitary and sessile, scattered or terminal on short shoots, urn-shaped, discoid, epaleate, florets 18–35, yellow, without basal ring of glandular hairs. Cypselas basally tufted with hairs. Aug.–Dec. Stony clay flats, NH, KV, WM, TS (southern Namibia and Bushmanland through Karoo to Graaff-Reinet).

*ASTER[1] ± 180 spp., mainly N hemisphere, America, Europe and Asia

***squamatus** (Spreng.) Hieron. SWAMP ASTER Annual, up to 2 m tall. Leaves alternate, lanceolate, entire or obscurely toothed. Flowerheads disciform, small, many in compound panicles; involucral bracts variegated, imbricate; outer female florets filiform, whitish or very pale mauve; disc florets bisexual, white or yellow. Cypselas subcylindric, slightly compressed, appressed pu-

bescent; pappus of scabrid bristles. Feb.–Sept. Damp places and riverbanks, G, CCR (introduced weed, widespread in southern Africa, also in other countries).

ATHANASIA[2] (= *STILPNOPHYTON*) KLAASLOUWBOS 40 spp., southern Africa

flexuosa Thunb. Densely leafy shrub, 1–2 m tall, grey-mealy on young parts. Leaves spreading or reflexed, linear-oblanceolate, 6–40 mm long, rarely lobed apically, glabrous or grey-mealy. Flowerheads mostly in simple, terminal corymbs, narrowly urn-shaped, discoid, paleate; florets 35–55, yellow, with basal ring of glandular hairs. Cypselas ribbed. Mainly Sept.–Nov. Stony clay or sandstone slopes, roadsides and dry riverbeds, NH, KB, WM, TS, CCR (Springbok to Kamiesberg Mountains, Bokkeveld Mountains to Touwsrivier). **(gce)**

microcephala (DC.) D.Dietr. Sparsely leafy shrub, up to 1.5 m tall, glabrous. Leaves spreading to suberect, sword-like to ellipsoid, 7–22 mm long, green, glabrous. Flowerheads in compound terminal corymbs, ovoid, discoid, paleate; florets 10–15, yellow, without basal ring of glandular hairs. Cypselas ribbed. Nov.–Dec. Stony slopes, NH, KB, WM, TS (Springbok to Kamiesberg Mountains, Calvinia through Roggeveld to Graaff-Reinet).

trifurcata (L.) L. KOUTERBOS Densely leafy shrub, 1–2 m tall, sometimes grey-mealy on young parts. Leaves ascending, cuneate-obovate, 7–30 mm long, mostly 3–5-toothed above, glabrous to grey-mealy. Flowerheads in simple terminal corymbs, urn-shaped, discoid, paleate; florets 50–100, yellow, with basal ring of glandular hairs. Cypselas ribbed. Mainly Oct.–Nov. Dry flats and rocky slopes, roadsides and fallow lands, NH, CCR (Springbok to Garies (probably weedy here), Bokkeveld Escarpment to Port Elizabeth). **(gce)**

BERKHEYA[2] DISSEL ± 75 spp., southern and tropical Africa.

A. Leaves mostly opposite

schinzii O.Hoffm. Shrublet or subshrub, up to 1 m tall, stems cobwebbed when young, glabrescent, with pale, papery bark. Leaves mostly opposite but uppermost alternate, decussate, pinnatisect, linear-subulate, blade 30–70 × 2–4 mm, with 1 or 2 pairs of subulate lobes near base, cartilaginous-striate, cobwebbed on both surfaces, margins revolute, apex and teeth tipped with 5–8 mm long, pale spines and with deflexed spines in distal angles of lobes. Flowerheads solitary, shortly radiate, yellow; ray florets scarcely longer than disc florets; disc florets cobwebbed, mostly 40–50 mm diam.; outer bracts spreading, resembling foliage leaves, twice as long as inner, 15–35 mm long, inner bracts lanceolate, with spiny margins and tips, felted, 8–15 mm long. Pappus scales 10 + 10, lanceolate, denticulate, 1–2 mm long. Mar.–July. Riverbeds and stony places, SN (Lüderitz: Huib-Hoch Plateau). **(ece)**

spinosissima (Thunb.) Willd. Subshrub, up to 1.5 m tall, stems glandular-haired and cobwebbed when young, glabrescent, usually tinged purplish. Leaves mostly opposite but uppermost alternate, decussate, pinnatifid, ovate to oblong, shallowly lobed, blade 20–90 × 10–50 mm, thin-textured, thinly or thickly cobwebbed on both surfaces, usually glabrescent, lobes toothed and with 5–8 mm long, pale spines. Flowerheads in cymes, radiate, yellow; disc florets cobwebbed, mostly 40–60 mm diam.; outer bracts resembling leaves but narrower, ± subulate, 3–8 mm wide, inner bracts lanceolate, spine-tipped with denticulate margins, ± glabrous, 8–15 mm long. Pappus scales 10 + 10, lanceolate, denticulate, 1–1.5 mm long. Rocky places, SN, G, NH, KB (Namibia and Gordonia to Kamiesberg Mountains).

A.' Leaves alternate
B. Shrublets or shrubs
C. Leaves entire or toothed

canescens DC. Shrublet, up to 1.5 m tall, branches white-felted when young. Leaves alternate, subsessile or petiolate, elliptic, mostly 10–30 mm long, sinuate or pinnately toothed and spine-tipped, with spines 2–7 mm long, glabrous or both surfaces felted. Flowerheads in corymbs, radiate, yellow, 20–40 mm diam.; involucral bracts subulate with spiny margins and tip, 6–10 mm long. Pappus scales ± 40, linear, bristle-like, up to 6 mm long. Aug.–Oct. Rocky slopes, SN, G, NH (Lüderitz to Kamiesberg Mountains and Gordonia).

fruticosa (L.) Ehrh. VAALDISSEL Shrublet or shrub, up to 1.5 m tall, branches white-felted when young. Leaves alternate, petiolate, base of petiole with spiny auricles, elliptic, mostly 20–50 mm long, toothed and spine-tipped, with spines 1–4 mm long, discolorous, upper surface thinly felted or glabrous and shining, lower surface white-felted. Flowerheads 1–few in corymbs, radiate, yellow, 35–50 mm diam.; involucral bracts linear-lanceolate with spiny margins and tip, 10–20 mm long. Pappus scales 10 + 10, lanceolate or oblanceolate, denticulate, 1–2 mm long. July–Oct. Stony slopes and plateaux, G, NS, NH, KB, KV, CCR (Steinkopf to Citrusdal). **(gce)**

spinosa (L.f.) Druce BOKDISSEL Glabrous shrublet, up to 1 m tall. Leaves alternate, obovate, 2- or 3-toothed and spine-tipped, mostly 15–30 mm long, with spines 2–3 mm long, both surfaces glabrous. Flowerheads solitary or in lax cymes, radiate, yellow, 35–40 mm diam.; involucral bracts lanceolate with spiny margins and tip, 10–15 mm long. Cypselas densely silky; pappus scales 10 + 10, subulate, denticulate, 3–7 mm long. Mainly Sept.–Nov. Dry rocky shale slopes, WM, TS, CCR (western Karoo and Montagu to Willowmore). **(gce)**

C.' Leaves pinnatifid
D. Leaf lobes triangular; flowerheads distinctly radiate

chamaepeuce (S.Moore) Roessler Twiggy shrublet, up to 2.5 m tall, stems minutely glandular-haired when young. Leaves alternate, sessile, woolly in axils, ± 4-pinnatifid with additional lobes between, mostly 20–40 mm long, glabrous and glossy above, cobwebbed beneath, lobes triangular and spine-tipped, with spines 3–8 mm long. Flowerheads solitary at branch tips, radiate, yellow, 30–45 mm diam.; outer bracts stiffly spreading, subulate with sparsely spiny margins, thinly hairy beneath, inner closely and finely ciliate-spiny, 15–20 mm long. Cypselas densely silky; pappus scales 10 + 10, oblong-lanceolate, denticulate, 1–1.5 mm long. Aug.–Dec. Dry hillsides and cliffs, SN (central and southern Namibia and Gordonia).

D.' Leaf lobes subulate; flowerheads shortly radiate or discoid

annectens Harv. Shrublet, up to 0.5 m tall, young stems thinly cobwebbed, glabrescent. Leaves alternate, 2–5 pinnatisect, 40–80 mm long, felted and glandular-haired but glabrescent above, lobes subulate and spine-tipped, with spines 0.5–3 mm long. Flowerheads in small panicles, discoid, yellow, 15–30 mm diam.; involucral bracts spreading, connate into a distinct cup, outer small, median lanceolate with spiny margins, 10–15 mm long. Pappus scales ± 20, linear-oblong, denticulate, 0.3–1 mm long. Nov.–Jan. Stony flats and slopes, SN (southern Namibia to Gordonia).

cardopatifolia (DC.) Roessler Rigid, densely leafy shrublet, up to 1.2 m tall, stems white-woolly when young. Leaves alternate, stiffly spreading, 4–6-pinnatifid, 40–80 mm long, cobwebbed and glabrescent above, thickly cobwebbed beneath, lobes linear and spine-tipped, with spines 1.5–3 mm long, margins revolute. Flowerheads in paniculate cymes, sparsely and shortly radiate or discoid, yellow, 20–30 mm diam.; outer bracts stiffly spreading, subulate with spiny margins, 8–15 mm long, inner smaller. Pappus scales 10 + 10, oblong-ovate or inner bilobed, denticulate, 0.2–0.5 mm long. Oct.–Dec. Dry hillsides and cliffs, WM, TS (Roggeveld foothills and Laingsburg to Upper Karoo).

ferox O.Hoffm. Shrublet, up to 1.5 m tall, young stems densely cobwebbed or felted, or glandular-haired, glabrescent. Leaves alternate, 2- or 3-pinnatisect, mostly 40–80 mm long, glabrescent above, cobwebbed or felted beneath, lobes subulate and spine-tipped, with spines 2–3 mm long, margins revolute. Flowerheads on very short peduncles in upper axils, discoid, yellow, 10–25 mm diam.; involucral bracts erect-spreading, connate into a distinct cup, outer short and ovate, median lanceolate with spiny margins, 10–17 mm long. Pappus scales ± 20, subulate, fimbriate, 2–3 mm long. Sept.–Dec. Stony flats and slopes, SN, G (central Namibia to Okiep).

B.' Tufted perennials
E. Leaf upper surface with appressed, bristle-like hairs

pinnatifida (Thunb.) Thell. Perennial or subshrub, up to 0.5 m tall, stems glandular-haired, cobwebbed when young, glabrescent, often flushed purple. Leaves alternate, 5–8-pinnatifid to -pinnatisect, blade 20–100 mm long, upper surface glabrescent but set with upturned, bristle-like hairs, lower surface felted, lobes toothed and spine-tipped, with pale spines 1–3 mm long. Flowerheads in cymes, discoid, yellow, 15–50 mm diam.; outer bracts lanceolate with spiny margins

and tip and margins curved under, vestiture as for leaves, 8–15 mm long, inner progressively smaller. Pappus scales 10 + 10, ovate-lanceolate, denticulate, 1–2 mm long. Oct.–Dec. Stony clay flats, ?KB, WM (?Kamiesberg Mountains, Bokkeveld Mountains across Upper Karoo and Free State to Mpumalanga).

E.' Leaf upper surface without bristle-like hairs
F. Leaf underside tomentose or felted

eriobasis (DC.) Roessler Woolly perennial, up to 1 m tall, upper part of stem branching and glabrescent and purplish. Leaves alternate, deeply 6–10-pinnatifid, basal ones 80–100 mm long, upper smaller, thinly woolly above and glabrescent, woolly beneath, lobes narrow and spine-tipped, with spines 1–3 mm long, margins revolute. Flowerheads in panicles, clustered on lateral branches, discoid, yellow, 15–30 mm diam.; involucral bracts lanceolate-subulate with spiny margins, median 12–15 mm long. Pappus scales ± 20, oblong, obtuse, denticulate, ± 0.3 mm long. Oct.–Dec. Rocky slopes, WM, TS, CCR (Cederberg Mountains, Hantam and western Karoo to Upper Karoo).

heterophylla (Thunb.) O.Hoffm. GRAWEELWORTEL Tufted perennial or subshrub, up to 1 m tall, stems cobwebbed and glabrescent, often flushed purple. Leaves alternate, oblanceolate, pinnatifid, basal ones 50–200 mm long, upper smaller and cordate-auriculate, glabrescent or woolly above, felted beneath, lobes triangular, toothed and spine-tipped, with spines 2–3 mm long. Flowerheads in panicles, radiate or discoid, yellow, 20–35 mm diam.; involucral bracts lanceolate with spiny margins, median 8–15 mm long. Pappus scales ± 20, oblong, obtuse, denticulate. Sept.–Jan. Stony waste places, WM, TS, CCR (Hantam to Worcester to E Cape).

F.' Leaf underside glandular-haired

carlinifolia (DC.) Roessler Tufted perennial, up to 2 m tall, stems glandular-haired, glabrescent, often flushed purple. Leaves alternate, narrowly oblong, 4–8-pinnatifid, basal ones 80–150 mm long, upper smaller and semi-amplexicaul, both surfaces glabrescent, lobes toothed and spine-tipped, with pale spines 3–6 mm long. Flowerheads in paniculate cymes, discoid, yellow, 30–50 mm diam.; outer and median involucral bracts lanceolate with spiny margins, median longest, 12–20 mm long. Pappus scales 10 + 10, oblong, denticulate, ± 1 mm long. Oct.–Dec. Dry watercourses and slopes, NH, WM, TS, CCR (Namaqualand through western Karoo to Free State, Cape Peninsula).

glabrata (Thunb.) Fourc. Tufted perennial, up to 1 m tall, stems thinly cobwebbed, glabrescent. Leaves narrowly obovate, ± 10-pinnatifid, basal ones up to 0.2 m long, upper smaller and amplexicaul, thinly cobwebbed and glabrescent, minutely glandular-haired beneath, lobes multiple-toothed and spine-tipped. Flowerheads in open cymes, discoid, yellow, 60–100 mm diam.; involucral bracts lanceolate with spiny margins, thinly cobwebbed and glabrescent, median longest, 25–40 mm long. Pappus scales 10 + 10, oblong-obovate, ± obtuse, ± 2 mm long. Oct.–Nov. Stony flats, WM (Nieuwoudtville). **(ece)**

onobromoides (DC.) O.Hoffm. & Muschl. RUIKDISSEL Tufted perennial, up to 1 m tall, stems glandular-haired, often flushed purple. Leaves alternate, oblong, 8–10-pinnatifid, basal ones 100–400 mm long, upper smaller and cordate-auriculate, both surfaces glandular-haired but glabrescent, lobes toothed and spine-tipped, with pale spines 3–7 mm long. Flowerheads in paniculate cymes, discoid, yellow, 30–70 mm diam.; outer and median involucral bracts ovate-lanceolate with spiny margins, convex, median longest, 15–30 mm long. Pappus scales ± 20, oblong, denticulate, 0.5–0.8 mm long. Oct.–Dec. Dry watercourses and slopes, NH, WM, TS, CCR (Namaqualand and western Karoo to Montagu and Langkloof). **(gce)**

[**Excluded species B. viscosa** (DC.) Hutch. recorded in Percy Sladen Expedition from Brakdam. *Annals of South African Museum* 9,6: 426 (1917) is probably a misidentification for the closely allied **B. onobromoides**.]

BOLANDIA[2] 5 spp., South Africa and Lesotho

glabrifolia (DC.) J.C.Manning & Cron (= *Senecio glabrifolius* DC.) Tufted subshrub, up to 400 mm tall, thinly white-woolly or subglabrous. Leaves clustered, petiolate, blade equaling or longer than petiole, narrowly ovate to lanceolate, pinnatifid or pinnatisect, lobes often rhombic and

toothed, 20–70 mm long. Flowerheads solitary on long, scaly peduncles, discoid, yellow; involucre campanulate, 7–12 mm diam., bracts 12–15, 7–10 × 1–2 mm. Aug.–Sept.(Oct.). Granite hills, NH, KB (Springbok to Garies). **(ece)**

pedunculosa (DC.) Cron (= *Cineraria pedunculosa* DC.) Tufted subshrub, up to 300 mm tall, thinly to densely white-woolly. Leaves basal, petiolate, blade ovate to lanceolate, incised to pinnatifid, 10–40(–70) mm long. Flowerheads solitary on bracteate peduncles, radiate (rarely discoid), yellow, ± 15 mm diam.; involucre narrowly campanulate, bracts 10–15. Sept.–Oct. Rocky mountain slopes at high altitude, WM, CCR (Roggeveld and Cederberg Mountains to Swartberg and Drakensberg Mountains).

pinnatifida (Thunb.) J.C.Manning & Cron (= *Doria pinnatifida* Thunb., *Senecio diversifolius* (DC.) Harv.) Tufted subshrub, up to 600 mm tall, thinly white-woolly or subglabrous. Leaves clustered, petiolate, blade equaling or longer than petiole, linear-oblanceolate to lanceolate, mostly lyrate pinnatifid, pinnatisect or bipinnatisect, lobes often rhombic and toothed, 20–70 mm long. Flowerheads solitary on long, scaly peduncles, discoid, white to mauve or pale yellow; involucre campanulate, 7–12 mm diam., bracts 12–20, 7–10 × 1–2 mm. Aug.–Oct. Stony hills and flats, KB, WM, CCR (Kamiesberg Mountains, Kubiskou and Hantam to Malmesbury). **(gce)**

*CENTAUREA[2] CENTAURY ± 450 spp., mainly Mediterranean and Near East

***repens** L. BITTERBOS Thinly grey-felted perennial with erect stems, up to 0.5 m tall. Leaves oblanceolate, denticulate or lower leaves subpinnatifid, thinly grey-felted but more densely beneath, margins lightly rolled under. Flowerheads solitary at branch tips, arranged in corymbs, disciform, urn-shaped, mauve, 10 mm diam.; involucral bracts with broad, membranous tips. Nov.–Jan. Roadsides and fallow fields, WM, TS, CCR (near Eastern native).

CHRYSANTHEMOIDES[1] BIETOU 3 spp., southern to central Africa

incana (Burm.f.) Norl. GRYSBIETOU, VAALSANDBIETOU Shrub or dwarf shrub, procumbent or erect, up to 2 m tall, covered with dense white-woolly hairs, at least on new growth, branches spinescent. Leaves ovate to elliptic, toothed or entire. Flowerheads radiate, solitary or few in terminal corymbs; inner involucral bracts oblong-ovate, margins broadly scarious; ray florets female, yellow; disc florets female-sterile, yellow. Fruit fleshy, obovoid or ellipsoid; pappus absent. Feb.–Dec. Coastal dunes or sandy inland slopes, SN, NS, KV, WM, TS, CCR (Lüderitz through to Bokkeveld Escarpment, SW Cape, Tanqua Karoo and Laingsburg). **(gce)**

monilifera (L.) Norl. BIETOU, BOSLUISBESSIE, SANDBIETOU, WESKUSBIETOU Shrub or dwarf shrub, 1–3 m tall, young parts thinly woolly. Leaves obovate to elliptic, toothed, dark green, leathery. Flowerheads radiate, few in terminal corymbs on short peduncles; inner involucral bracts broadest above or at middle, obovate to broadly oblanceolate or elliptic-oblong, blunt and mucronate; ray florets female, yellow; disc florets female-sterile, yellow. Fruit fleshy, obovoid or ellipsoid; pappus absent. Mainly Oct. Stony slopes and flats, SN, G, NS, NH, KB, CCR (near Oranjemund and Ploegberg through Namaqualand to SW Cape and tropical Africa).

CHRYSOCOMA[1] BEESBOS 21 spp., southern Africa to Mozambique

A. Leaves entire and glabrous or margins ciliate with a few hairs

ciliata L. BEESBOS, BITTERBOS, BITTERKARROO, DONKIEBOS Glabrous, slender-stemmed, closely leafy, ericoid shrublet, up to 0.6 m tall. Leaves alternate, linear or needle-shaped, ascending, 1–14 mm long, glabrous or with a few short cilia. Flowerheads discoid, solitary, sessile or shortly pedunculate; disc florets yellow. Cypselas obovate, hairy on margin; pappus of small acute outer scales and barbellate inner bristles. Aug.–Dec. Rocky slopes and flats, SN, G, NS, NH, KB, KV, WM, TS, CCR (widespread throughout southern Africa).

longifolia DC. HANDJIESBOS Densely leafy, dwarf shrub, up to 1 m tall. Leaves alternate, linear-filiform, 12–30 mm long, glabrous. Flowerheads discoid, in dense corymbs, sessile or very shortly pedunculate; disc florets yellow. Cypselas obovate, long-haired; pappus of small outer scales and barbellate inner bristles. Aug.–Oct. Rocky lower slopes, NS, NH, KB, KV, CCR (near Port Nolloth to SW Cape). **(gce)**

microphylla Thunb. Dwarf, ericoid shrub, 250–300 mm tall. Leaves alternate, linear, 3–6 mm long, glabrous, appressed to stem. Flowerheads discoid, indistinctly pedunculate; disc florets

yellow. Cypselas obovate, densely long-haired; pappus of small outer scales and barbellate inner bristles. Mar.–Dec. Rocky hillsides, SN, NH, KB (high lying areas of southern Namibia and Namaqualand).

obtusata (Thunb.) Ehr.Bayer Dwarf, ericoid shrub, up to 0.55 m tall. Leaves alternate, narrowly oblanceolate, spathulate, distinctly broadened towards apex, flat, 5–17 mm long, glabrous. Flowerheads discoid, solitary, shortly to distinctly pedunculate; disc florets yellow. Cypselas obovate, shortly hairy; pappus of small outer scales and barbellate inner bristles. Aug.–Oct. In sandy soils, NH, WM (Namibia, eastern Namaqualand, Roggeveld, Karoo through to Limpopo Province).

sparsifolia Hutch. Sparsely leafy shrublet, up to 0.6 m tall. Leaves alternate, ovoid, fleshy, recurved, 2–7 mm long, glabrous. Flowerheads discoid, solitary, shortly pedunculate; disc florets yellow to yellowish brown. Cypselas narrowly obovate, long-haired; pappus of small outer scales and barbellate inner bristles. Mar.–May. Rocky slopes on granite or sandstone, NH, KB, WM, CCR (Kamiesberg Mountains to Hantam, Roggeveld, Cederberg Mountains and Worcester). **(gce)**

valida Ehr.Bayer Slender-stemmed shrublet, up to 350 mm tall. Leaves alternate, linear, thick, ascending, 3–15 mm long, glabrous or with a few short cilia. Flowerheads discoid, solitary, large, shortly pedunculate; disc florets yellow. Cypselas broadly obovate to heart-shaped, long-haired; pappus of small outer scales and barbellate inner bristles. Mainly Aug. Flats and lower slopes, TS, CCR (southern Tanqua Karoo, Laingsburg, Worcester to Ladismith). **(gce)**

*A.' Leaves entire (except in **C. hantamensis**) and densely hairy or margins coarsely ciliate with broad-based hairs*

cernua L. Diffuse shrublet, up to 350 mm tall. Leaves alternate, linear, 8–25(30) mm long, shortly hairy or glabrous, margins ciliate. Flowerheads discoid, solitary, large, pedunculate; disc florets yellow. Cypselas obovate with long hairs; pappus of small outer scales and barbellate inner bristles. July–Sept. Rocky flats and slopes, G, NH, TS, CCR (Richtersveld National Park through Namaqualand to Karoopoort). **(gce)**

hantamensis J.C.Manning & Goldblatt Subshrub, up to 250 mm tall. Stems partly subterranean and woody below, producing partly decumbent annual flowering shoots. Lower leaves in 4 rows, with connate bases, upper leaves alternate, trifid or pinnatisect, 10–14 mm long, margins strigose. Flowerheads discoid, solitary, large; peduncles long, densely hairy apically; disc florets yellow with reddish tips. Cypselas obovate, densely covered with short appressed hairs; pappus of small outer scales united in a ring and barbellate inner bristles, subplumose basally. Aug.–Sept. Dolerite clays, WM (Nieuwoudtville area and northern Roggeveld Escarpment). **(ece)**

oblongifolia DC. SELDERYBOSSIE Twiggy subshrub, up to 300 mm tall. Lower leaves in 4 rows, upper leaves alternate, oblanceolate, 4–12(–20) mm long, margins ciliate. Flowerheads discoid, large, solitary, pedunculate; disc florets yellow. Cypselas obovate to heart-shaped, shortly hairy; pappus of outer small scales and inner barbellate bristles. Aug.–Oct. Rocky slopes, KV, WM, TS, CCR (Nuwerus to Calvinia and Karoopoort to near Laingsburg). **(gce)**

puberula Merxm. Dwarf shrub, 100–300 mm tall. Leaves alternate, oblanceolate-spathulate, 10–40 mm long, covered with spreading hairs. Flowerheads discoid, solitary, large, distinctly pedunculate; disc florets yellow. Cypselas narrowly heart-shaped to obovate, densely hairy; pappus of small outer scales and barbellate inner bristles. Aug.–Nov. Mountain sides on quartzite ridges, G (Rosh Pinah to Richtersveld National Park and Steinkopf). **(ece)**

schlechteri Ehr.Bayer Dwarf shrub, up to 250 mm tall. Leaves alternate, narrowly oblanceolate, 4–23 mm long, hairy all over. Flowerheads discoid, solitary, pedunculate; disc florets yellow. Cypselas obovate, densely long-haired; pappus of small outer scales and barbellate inner bristles. July–Oct. Rock outcrops or sand plains, G, NH (Oograbies Mountains to Bushmanland and to E of Kamiesberg Mountains).

tomentosa L. Dwarf shrub, up to 200 mm tall. Stems thickly white-appressed pubescent. Leaves alternate, linear, 4–13(–20) mm long, thickly white-pubescent. Flowerheads discoid, solitary, shortly to distinctly pedunculate, densely white-pubescent; disc florets yellow. Cypselas obovate, densely long-haired; pappus of small outer scales and barbellate inner bristles. Sept. Granite derived soils, NH, KB (Killians Pass to Kamiesberg Mountains). **(ece)**

*CICHORIUM[2] CHICORY 8 spp., Mediterranean and N Africa

***intybus** L. Robust perennial with divaricate branches, up to 1.2 m tall. Leaves mainly in a basal rosette, large and irregularly lobed or toothed, with stem leaves smaller and clasping. Flower-

heads subsessile, solitary or in clusters in axils of upper leaves forming false-spikes, ligulate, pale blue (rarely white or pink), 25–30 mm diam.; involucral bracts in 2 unequal rows. Nov.–Feb. Roadsides and cultivated lands, WM (northern European native).

CINERARIA[2] CINERARIA ± 35 spp., Africa, Arabia, Madagascar

A. Soft annual

platycarpa DC. Glabrous or subglabrous annual, up to 200 mm tall. Leaves reniform to lyrate with cordate terminal lobe, blade 6–25 mm long, crenate to toothed, upper petioles eared at base. Flowerheads few to many in corymbs, radiate and yellow or sometimes discoid and cream-coloured, 5 mm diam.; involucral bracts 7 or 8(–12), glabrous. Aug.–Sept. Sheltered rocky slopes in shade, TS, CCR (Cold Bokkeveld and Tanqua Karoo through Little Karoo to E Cape).

A.' Tufted perennial with subradical leaves

mollis E.Mey. ex DC. Tufted, almost stemless, grey-felted perennial, 150–300 mm tall. Leaves subradical, lyrate-pinnatisect, blade 5–50 mm long, erose or toothed, thinly or thickly grey-felted, especially beneath, petioles not eared at base, 50–100 mm long. Flowerheads solitary or subsolitary on scape-like peduncles, radiate, yellow, 15–20 mm diam.; involucral bracts 12–20, subglabrous to felted. (May)Aug.–Sept.(Jan). Rock crevices and sandstone cliffs, WM (Sutherland along Escarpment to southern KwaZulu-Natal Drakensberg Mountains).

A." Sprawling perennials or shrublets with cauline leaves

alchemilloides DC. Thinly cobwebby to glabrescent, sprawling perennial, up to 400 mm tall. Leaves palmately lobed, 8–30 mm long, lobes irregularly toothed, glabrescent above but cobwebby beneath, with large or small basal auricles. Flower in lax corymbs, radiate, yellow, 10–15 mm diam.; involucral bracts 7–10, glabrescent. Sept.–Nov. Damp slopes and gullies, NH, WM, CCR (Namibia, Namaqualand and Hantamsberg to Tulbagh).

canescens J.C.Wendl. ex Link Cobwebby perennial or shrublet, 300–600 mm tall. Leaves palmately lobed, blades 6–30 mm long, lobes toothed, often crisped, ± cobwebby or felted, with basal auricles; hairs tapering smoothly from base. Flowerheads in corymbs, radiate, yellow, 10 mm diam.; involucral bracts 8, subglabrous to felted. Sept.–Nov. Rocky among boulders, often granite, G, NH, KB, KV, CCR (Namibia through Namaqualand to Ceres and Graaff-Reinet).

erosa (Thunb.) Harv. Cobwebby, sprawling shrublet, up to 500 mm tall. Leaves irregularly subbipinnatisect to multifid, blades 6–35 mm long, lobes toothed, cobwebby above, sometimes glabrescent beneath, with large or small basal auricles; hairs with pedestal-like base. Flowerheads in corymbs, radiate, yellow, 5–10 mm diam.; involucral bracts 6–8, cobwebby. Sept.–Oct. Lower rocky slopes, KB, CCR (Kamiesberg Mountains, Cederberg Mountains to Swartberg Mountains). **(gce)**

***CONYZA**[1] 60–100 spp., pantropical and subtropical

***bonariensis** (L.) Cronquist FLEABANE, HORSEWEED Erect, roughly hairy annual, up to 1.2 m tall, lateral branches equalling or overtopping main stem. Leaves sessile, lanceolate to elliptic, ± 50(–100) mm long, twisted near base, margins entire or toothed, often undulate. Flowerheads disciform, pedunculate, arranged in a compound, paniculate synflorescence, pale yellow; outer female flowers filiform; disc florets bisexual. Cypselas narrowly elliptic, compressed, thinly hairy; pappus of numerous dirty white or pinkish scabridulous bristles. Nov. Floodplains in sand, SN (native of S America, weedy throughout South Africa).

COTULA (= *CENIA, SPHAEROCLINIUM*) BUTTONS, KNOPPIES ± 55 spp., mainly in S hemisphere, mostly southern Africa

anthemoides L. Prostrate or ascending annual, with leafy stems up to 150 mm long. Leaves alternate, pinnatisect, with very acute lobes, margins entire or few-toothed, glabrous or nearly so. Flowerheads disciform, solitary, terminal or in upper leaf axils, yellow; peduncles not or scarcely

exceeding leaves, glabrous or woolly; outer female florets filiform, in 5 or 6 series; disc florets bisexual. Cypselas of female florets winged, of bisexual florets margined, wingless; pappus absent. Aug.–Mar. Damp muddy banks of streams, clayey river alluvia and pans, SN, G (through Africa to lower Gariep Valley and E Cape, NW India and SW China).

***australis** (Sieb. & Spreng.) Hook.f. Prostrate or ascending annual, up to 250 mm long. Leaves bipinnatifid, oblanceolate in outline, thinly pubescent. Flowerheads disciform, solitary, on long peduncles; outer florets female, in 3 series, corolla absent; disc florets bisexual, white or yellow-green. Cypselas of female florets elliptic, winged, of disc florets obovoid, not winged; pappus absent. Apr.–Oct. In disturbed, often trampled habitats and lawns, NH, WM, TS, CCR (widespread weed, especially in warm-temperate and subtropical regions of Old and New Worlds, native to Australia and New Zealand).

barbata DC. GANSOGIES, KLEINGANSKOS Softly hairy annual, up to 150 mm tall. Leaves in a crowded basal tuft, clasping at base, pinnatipartite above middle, lobes few, linear, softly villous. Flowerheads discoid, solitary on slender, naked peduncles; involucral bracts glabrous, widely membrane-edged; all florets bisexual, yellow or white. Cypselas narrowly obovate, with a narrow, white margin; pappus absent. July–Oct. On sandy soils in open succulent shrublands, NH, KB, ?CCR (Springbok to Kamiesberg Mountains to ?Clanwilliam). **(gce)**

bipinnata Thunb. KLEINKNOPPIES Sparsely pilose annual, up to 300 mm tall, with densely leafy stems, at length glabrous. Leaves alternate, clasping at base, pinnatipartite, with lobes linear-subulate, rigid, pungent-mucronate, often hook-pointed. Flowerheads disciform, solitary, shortly pedunculate; outer female florets in 1 row, corolla absent; disc florets bisexual, yellow to white. Cypselas of female florets flattened and winged, hairy on body, of disc florets turbinate, glabrous; pappus absent. Aug.–Sept. In coarse sandy and loamy soils in seasonally wet depressions and ditches, NH, KB, WM, CCR (Namaqualand uplands to Hantam to SW Cape). **(gce)**

coronopifolia L. EENDEKOS, GANSGRAS Erect or sprawling perennial, up to 300 mm tall, often rooting at nodes, stems thick. Leaves alternate, sheathing at base, irregularly toothed to bipinnatisect, ± succulent. Flowerheads disciform, solitary on slender, minutely leafy peduncles; outer female florets in 1 row, corolla absent; disc florets bisexual, bright yellow. Cypselas of outer female florets winged and notched, of disc florets top-shaped; pappus absent. Mar.–Dec. Seasonal wetlands (pans, lakes) and along riverbanks, SN, G, NS, NH, KB, KV, WM, TS, CCR (Swakopmund to SW and E Cape to Gauteng; also Australia and New Zealand where its native status remains uncertain).

filifolia Thunb. Erect or decumbent annual, up to 300 mm tall. Leaves alternate, linear or filiform, sheathing at base. Flowerheads disciform, solitary on slender peduncles; outer female florets in 1 row, corolla absent; disc florets yellow. Cypselas of outer female florets winged and stipitate, of disc florets top-shaped; pappus absent. Oct. Muddy, often saline soils and also on beaches influenced by salt spray, NS, CCR (near Hondeklipbaai to Cape Peninsula to Jeffrey's Bay). **(gce)**

laxa DC. (including **C. affinis** Schltr. ex Hutch., **C. tenella** E.Mey. ex DC.) Sparsely pilose to glabrescent, delicate, spreading annual, up to 200 mm across. Leaves sparse, alternate, scarcely half-clasping at base, lowest petiolate, upper subsessile; pinnatipartite, lobes broadly linear, mucronate. Flowerheads disciform, small, solitary on slender, naked peduncles; outer female florets in 1 row, corolla absent; disc florets bisexual, pale yellow to white. Cypselas of outer female florets winged, of disc florets turbinate; pappus absent. Aug.–Oct.(–Dec.) Partly shaded microhabitats below large boulders and dense shrubs on rocky slopes covered with sandy-loamy soils, G, NH, KB, CCR (northern Namaqualand to E of Kamiesberg Mountains to Montagu). **(gce)**

leptalea DC. Thinly villous annual, 40–100 mm tall. Leaves alternate, half-clasping at base, pinnatisect, lobes few, linear-lanceolate, acute, mucronate. Flowerheads disciform, small, solitary on long, filiform, nearly nude peduncles; outer female florets in 1 row, corolla absent; disc florets bisexual, yellow, cream or white. Cypselas of outer female florets broadly winged, glandular, of disc florets margined, wingless. Aug.–Oct. Open succulent shrublands and abandoned, sandy, seasonally soaked old fields, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

loganii Hutch. Dwarf, tufted annual, up to 30 mm tall. Leaves pinnatipartite, lobes linear, softly pilose. Flowerheads several, upper part of peduncle covered with spreading long hairs, involucral bracts ± 8, ± uniseriate, broadly ovate-elliptic, whitish- to rusty-sericeous. Sept.–Oct. Seepage habitats on clayey soils, WM (Hantam and Roggeveld: Nieuwoudtville area and Komsberg Pass). **(ece)**

microglossa (DC.) O.Hoffm. & Kuntze ex Kuntze (= *Cenia microglossa* DC.) KNOPPIES Diffuse, sprawling annual, up to 300 mm tall, branching from below. Leaves mostly in lower half, alternate, bipinnatisect, lobes linear. Flowerheads disciform or obscurely radiate, solitary on long, naked peduncles that become inflated above in fruit, tawny-haired when young; involucral bracts

in 2 rows, 1-nerved, glabrous; outer female florets with reduced corolla or corolla shorter than involucral bracts; disc florets bisexual, yellow or orange. Cypselas oblong-obovate. Aug.–Nov. On sandy soils in open succulent shrublands and also along disturbed dirt roads, NH, KV, WM, TS, CCR (central Namaqualand to Touwsrivier and Roggeveld to ?Nuweveld Mountains). **(gce)**

nudicaulis Thunb. WITEENDEKOS Softly hairy to nearly glabrous annual, up to 150 mm tall. Leaves crowded in lower half, opposite, clasping at base, bipinnatisect, sparsely pilose or glabrous, lobes linear. Flowerheads discoid, solitary on slender, naked peduncles; involucral bracts large and round; all florets bisexual, tubular, white. Cypselas winged. Aug.–Oct. Open shrublands and abundantly in old fields on clayey soils, WM, TS, CCR (Bokkeveld Escarpment through Roggeveld and Tanqua Karoo to Worcester). **(gce)**

pedicellata Compton Like **C. thunbergii** but up to 300 mm tall, involucral bracts thinly pilose, florets markedly pedicellate and cypselas membrane-winged. July–Oct. Open succulent shrublands on sandy soils, NS, KV, CCR (central Namaqualand, Knersvlakte and Olifants River Valley). **(gce)**

thunbergii Harv. Tufted annual, up to 150 mm tall. Leaves alternate, clasping at base, trifid or pinnatisect in upper half, lobes linear or forked, densely silky. Flowerheads discoid, large, solitary on long naked peduncles; involucral bracts narrow-oblong, silky, brown-edged; all florets bisexual, corolla tube forming a short frill on top of ovary, yellow. Cypselas wingless. Aug.–Oct. Open shrublands on sandy, nutrient-poor soils, ?NH, ?KB, WM (?northern Namaqualand, Roggeveld Escarpment). **(ece)**

[**Species insufficiently known C. dielsii** Muschl., from between Nieuwoudtville and Calvinia, is possibly conspecific with **C. microglossa,** treated here as a large, variable complex. The genus is poorly understood and in need of broad taxonomic revision.]

CULLUMIA[1] STEEKHAARBOS 15 spp., Namaqualand, W and E Cape **(gce)**

rigida DC. Prickly, densely leafy, shrublet, to over 1 m tall, occasionally cobwebby. Leaves sessile, half clasping stem at base, small, ovate to narrowly elliptic, stiff and leathery, recurved, margins yellowish, thickened and spiny, extended into a ± straight, apical spine. Flowerheads radiate, solitary and sessile at branch tips; involucral bracts spine-tipped, margins ciliate; ray and disc florets yellow. Aug.–Dec. Granite and sandstone slopes up to 1500 m, KB, CCR (Kamiesberg and Bokkeveld Mountains and Little Karoo). **(gce)**

CUSPIDIA[2] WORTELBOSSIE 1 sp., E Cape, Karoo

cernua (L.f.) B.L.Burtt Sprawling, thinly cobwebby, prickly leaved annual, up to 300 mm tall, branching from base; germinating within old involucre. Leaves oblanceolate, 10–30 mm long, toothed and pungent, glabrescent or cobwebby. Flowerheads solitary at branch tips, radiate, 20–30 mm diam.; involucral bracts fused into a cup below, spreading above, leaf-like and pungent; ray florets pale yellow; disc florets yellow. Cypselas silky; pappus of barbellate scales. July–Sept. Dry rocky flats and lower slopes, WM, TS, CCR (western and Great Karoo, Laingsburg, Little Karoo to Port Elizabeth).

DAURESIA[2] 2 spp., Namibia

flava B.Nord. Softly woody shrublet, up to 300 mm tall, with pale, whitish bark, glabrous. Leaves on slender petioles 15–30 mm long, blades reniform-orbicular, coarsely toothed, leathery, mostly 15–20 mm diam. Flowerheads in dense, axillary corymbs, terminating branches, discoid, yellow; involucre campanulate, 3–4 mm diam., bracts 5(6), 3 × 1–1.5 mm, bracteoles 1 or 2, subulate. Cypselas ± 2 mm long, with 5 rows of papillae. Apr.–July. Rocky slopes, G (southern Namibia: Rosyntjieberg and SE Namibia).

DICOMA[1] (see also **MACLEDIUM**) WILDEKARMEDIK ± 30 spp., mainly Africa, also Madagascar and India

capensis Less. Prostrate or low spreading perennial, with decumbent stems, up to 600 mm long. Leaves narrowly elliptic to oblanceolate, subsessile, thinly greyish cobwebby above, paler and woolly

below, margins finely undulate. Flowerheads disciform, solitary, subsessile, terminal on branches; involucral bracts lanceolate to linear-lanceolate, pointing outwards in upper half, pungent; florets pale mauve; pappus of outer bristles and inner broad white scales. May–Oct. Sandy soil, G, NH, WM, TS (Namibia, Richtersveld, northern Namaqualand and Bushmanland through to Free State).

nachtigalii O.Hoffm. Densely leafy, dwarf shrub. Leaves spathulate, densely silvery white-haired. Flowerheads discoid, sessile, solitary at ends of branches; involucral bracts rigid, narrowly lanceolate to linear, acuminate, tips ± abruptly spreading; florets ?purple; pappus of many bristles, inner broader than outer. Nov.–Jan. Rocky slopes, SN (Lüderitz). **(ece)**

obconica S.Ortiz Subshrub with striate, greenish to ± white-tomentose branches. Leaves sparse, linear to linear-elliptic, greenish to ± densely hairy, margins ± serrulate-callose towards apex. Flowerheads solitary on bracteate peduncles, inconspicuously radiate; involucral bracts pungent, straw-coloured with 2 darker stripes, slightly shorter than pappus; florets white. Dec. ?Habitat, SN (southern Namibia near Witpütz). **(ece)**

picta (Thunb.) Druce KNOPPIESDORINGBOSSIE Sparsely leafy, rigid, twiggy shrublet, up to 0.6 m tall, branches felted-striate, often almost leafless. Leaves spathulate, grey-mealy. Flowerheads distinctly pedunculate, radiate, in lax corymbs; involucral bracts stiffly acuminate, erect with 2 purple lines, slightly longer than pappus; florets white, with pink to mauve rays. Sept.–Dec. Dry stony slopes or sandy soil, TS, CCR (eastern Cederberg Mountains to Prince Albert, Uitenhage and Karoo).

DIDELTA[1] SLAAIBOS 2 spp., Namibia to W Cape

carnosa (L.f.) Aiton DUINGOUSBLOM, KUSSLAAIBOS, PERDEBLOM, SEEGOUSBLOM Rounded, thinly or densely cobwebby shrublet, up to 1 m tall. Leaves fleshy, alternate, linear-oblong or oblanceolate. Flowerheads radiate, large, solitary, pedunculate, yellow; outer involucral bracts large, leafy. 'Seeds' germinating in old, fragmented flowerheads. Jan.–Dec. Coastal dunes and sandy flats, SN, G, NS, NH, KV, WM, CCR (southern Namibia, Bushmanland, Richtersveld, Namaqualand to southern Cape).

spinosa (L.f.) Aiton PERDEBOS, SLAAIBOS Shrub or tree, up to 2 m tall, cobwebby on young parts. Leaves opposite, ovate- to elliptic-cordate, margins ± rolled back, occasionally prickly. Flowerheads radiate, large, solitary at branch tips, yellow; outer involucral bracts large, leafy. May–Nov. Dry granite and sandstone slopes, rarely in dolerite soils, SN, G, NS, NH, KV, WM, TS, CCR (southern Namibia through Namaqualand to Loeriesfontein and S to Piketberg). **(gce)**

DIMORPHOTHECA[1] (= *CASTALIS*) MARGRIET ± 23 spp., Namibia and Karoo to W Cape, also in summer rainfall areas

cuneata (Thunb.) Less. BOSMARGRIET, SPEKBOS Rounded, glandular-hairy, viscid shrublet or shrub, up to 1 m tall. Leaves cuneate-oblanceolate, toothed to lobed or pinnatifid. Flowerheads radiate, solitary, pedunculate; ray florets shiny white or rarely yellow to orange (KB), darker on reverse; disc florets yellow. Cypselas of ray florets trigonous, glandular, of disc florets flat, winged, notched. Aug.–Oct. Stony and shale ridges and sandy flats, KB, WM, TS, CCR (Kamiesberg Mountains, Roggeveld Escarpment and Ceres to Karoo, Uitenhage and Free State).

nudicaulis (L.) DC. JAKKALSBLOM Perennial herb, up to 300 mm tall. Leaves crowded basally, obovate, glandular-hispid, margins dentate, upper leaves narrowly obovate to oblanceolate with ± entire margins. Flowerheads radiate, large, single on long peduncles; ray florets white, yellow or orange; disc florets yellow. Cypselas of ray florets vestigial, of disc florets flat, winged, notched, with a thickened rim. Aug.–Sept. Sandy soils or tillites WM, CCR (Nieuwoudtville, Calvinia, Roggeveld Escarpment to SW Cape and E to Uniondale). **(gce)**

pinnata (Thunb.) Harv. JAKKALSBIETOU Sprawling, many-branched, glandular-hairy annual, up to 200 mm tall. Leaves alternate, pinnatisect, lobes linear to filiform, entire or dentate. Flowerheads radiate, solitary at branch tips, pedunculate; ray florets long or short, white or creamy white above, black at base, blue to violet below; disc florets yellow. Cypselas obpyramidal or obconical-triangular, shortly spiky. June–Oct. Rocky or dry sandy slopes and flats, and dry riverbeds, SN, G, NS, NH, KV, WM, TS, CCR (southern Namibia to Klawer, Bushmanland, Upper Karoo, Roggeveld, Tanqua Karoo and Little Karoo).

pluvialis (L.) Moench CAPE RAIN DAISY, REËNBLOMMETJIE, WITBOTTERBLOM, WIT-SOË Erect to sprawling, glandular-hairy annual, up to 500 mm tall. Leaves oblong to oblanceolate, sinuate-dentate, lobed or toothed, upper leaves sublinear and subentire. Flowerheads radiate, solitary,

pedunculate; ray florets white above with a dark purple or violet zoned-base, often copper-tinted, less often brown or white below; disc florets white with yellow tips. Cypselas of ray florets obpyramidal triangular, transversely wrinkled or tuberculate with crenate or entire angles, occasionally smooth, of disc florets flat, winged, obovate or obcordate. Mainly Aug.–Oct. Sandy and clay flats and slopes, G, NS, NH, KV, WM, CCR (SE Namibia, Richtersveld, Gordonia through to SW Cape and E to Gouritsmond). [Hybridises naturally with **D. sinuata**.]

polyptera DC. T'NAAI OPSLAG Sticky annual or rarely perennial herb, up to 250 mm tall, erect then spreading. Leaves pinnatipartite to bipinnatipartite, lobes entire or few-toothed, glandular-hairy. Flowerheads radiate, pedunculate, at ends of branches; ray florets short, 1–3 mm long, yellow; disc florets yellow. Cypselas of ray florets straight or slightly incurved, ± conspicuously trigonous, inner angle blunt or occasionally winged, outer angles with 3–5 wing-shaped processes, of disc florets flat, winged, obovoid, 3–4 mm long. Mar.–Oct. Sandy soil, SN, G, NS, NH, WM (southern Namibia, Bushmanland, Gordonia, northern and eastern Namaqualand to Loeriesfontein).

sinuata DC. JAKKALSBLOM, NAMAQUALAND DAISY Annual, like **D. pluvialis** but often less hairy, 100–300 mm tall. Leaves oblong or oblanceolate, sinuate-dentate, upper leaves subentire, sparsely hairy to glabrous. Flowerheads radiate, solitary, pedunculate; ray florets yellow to orange on both sides; disc florets yellow. Cypselas of ray florets obpyramidal triangular, wrinkled and tuberculate, of disc florets flat, winged, obcordate or suborbicular, 6–7 mm long. July–Oct. Sandy flats and ridges, SN, G, NS, NH, KB, KV, WM, CCR (Klinghardt Mountains and Gordonia through to Saldanha).

tragus (Aiton) B.Nord. JAKKALSBOS, OX-EYE DAISY Glabrescent to glandular-hairy shrublet, up to 300 mm tall, with soft annual stems. Leaves linear to linear-oblanceolate or narrowly spathulate, glaucous, ± glabrous, margins entire or toothed (dentate-pinnatifid), thickly ciliate. Flowerheads radiate, solitary on long peduncles, sparsely leafy below; ray florets orange or yellow, rarely white; disc florets purple. Cypselas of ray florets vestigial, of disc florets large, flat, obcordate or suborbicular. July–Oct. Rocky shale slopes, stony clay or sandy soils, G, NS, NH, KB, KV (Richtersveld to Knersvlakte). **(ece)**

?EDMONDIA[1] SEWEJAARTJIE 3 spp., ?Namaqualand and W Cape **(gce)**

[**Uncertain record** **E. sesamoides** (L.) Hilliard. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

ELYTROPAPPUS RENOSTERBOS 10 spp., W to E Cape, Karoo

rhinocerotis (L.f.) Less. RENOSTERBOS Thinly grey-woolly, viscid shrub, up to 2 m tall, with short whip-like branches. Leaves scale-like, adpressed. Flowerheads discoid, few at tips of lateral branches, purple, mostly 3-flowered. Feb.–Apr. Dry shale and sandstone slopes and flats, G, NS, NH, KB, WM, CCR (southern Namibia to E Cape and Karoo).

scaber (L.f.) Druce Wiry-stemmed, glandular-hairy shrub, up to 1 m tall. Leaves involute ericoid, adpressed. Flowerheads discoid, few in axillary clusters scattered along upper stems, 2- or 3-flowered. Feb.–May. Sandstone slopes and plateaux, KB, CCR (Kamiesberg and Bokkeveld Mountains to Bredasdorp). **(gce)**

EMILIA[2] ± 100 spp., subtropical Africa and Asia

hantamensis J.C.Manning & Goldblatt Glabrescent annual, 150–300 mm tall, branching from base. Leaves mainly basal, oblanceolate, 30–70 × 6–30 mm, papillate-scabridulous, lower leaves coarsely dentate, upper leaves becoming pinnatifid to pinnatisect. Flowerheads radiate, solitary on long, sparsely bracteolate peduncles, yellow; involucre 6–10 mm diam., of 10–13 bracts, glabrous but apically puberulous. Sept.–Nov.(Dec.). Seasonally moist doleritic clays, WM (Kubiskou Mountain to Nieuwoudtville and Roggeveld to Gannaga Pass). (ece)

EREMOTHAMNUS[2] 1 sp., southern Namibia **(ece)**

marlothianus O.Hoffm. Rounded, densely leafy, silvery-felted shrublet, up to 200 mm tall. Leaves spathulate-oblanceolate, 10–20 mm long, entire or apically 3–5-toothed and pungent, silvery-

felted. Flowerheads solitary, sessile and nested among leaves at branch tips, radiate, 20 mm diam.; involucre cylindrical, bracts dry and papery, pungent; ray and disc florets yellow. Cypselas densely brown-silky; pappus of barbellate bristles. Mar.–May. Coastal on rocks, SN (Lüderitz). **(ece)**

ERIOCEPHALUS[2] KAPOKBOSSIE, WILD ROSEMARY ± 34 spp., southern Africa

A. Flowerheads radiate
*B. Mature leaves felted or silky (see also **E. scariosus**)*

africanus L. WILD ROSEMARY, KAPOKBOSSIE Twiggy shrub, up to 1 m tall. Leaves alternate on flowering shoots, opposite on short-shoots, linear to 3–7-fid, (5–)8–20(–40) mm long, silvery to bluish green, felted or silky to glabrescent. Flowerheads umbellate-racemose-paniculate on peduncles 1–26 mm long, radiate, 3.5–4 mm long; involucral bracts 4–6, silky or glabrous; ray florets white to pale purple, 2–5 mm long; disc florets purplish; marginal paleae connate into a tube, silky. Mainly Jan.–June. Mostly clay or granite hillsides, NH, WM, CCR (Nuwerus, Hantam and Roggeveld to E Cape).

brevifolius (DC.) M.A.N.Müll. Erect, conical shrub, up to 1.2 m tall. Leaves ± alternate on flowering shoots, opposite on short-shoots, linear-clavate, 3–5(–15) mm, grey-green felted. Flowerheads solitary or umbellate on peduncles 5–10(–20) mm long, radiate, 4–5 mm long; involucral bracts 5, shortly silky; ray florets 2 or 3, white, ± 3 mm long; disc florets purplish; marginal paleae partially connate, long-silky. Mainly July–Sept. Rocky slopes, NH, WM, CCR (Springbok to Swartruggens, Klein Roggeveld and Swartberg Mountains). **(gce)**

eximius DC. Rigid shrublet, 0.3–0.6 m tall. Leaves on short-shoots, linear-triangular, 2–9 mm long, silvery silky. Flowerheads mainly solitary, subsessile, radiate, 5–7 mm long; involucral bracts 4, silky; ray florets 3 or 4, white or pale to dark maroon, 5–8 mm long; marginal paleae ± connate into a tube, glabrous except for margin. July–Aug. Stony slopes, often in renosterveld, WM (Hantamsberg and Roggeveld to E Cape Drakensberg Mountains).

grandiflorus M.A.N.Müll. Rigid, divaricately branched, spinescent shrublet, 0.2–0.45 m tall. Leaves mostly decussate on flowering and short-shoots, linear-concave, 5–9 mm long, densely silvery white-silky. Flowerheads solitary or umbellate on peduncles 4–10 mm long, radiate, 5–6 mm long; involucral bracts 4 or 5, appressed-silky; ray florets 2–4, white or pale to dark purple, ± 3.5 mm long; marginal paleae connate in a tube, silky. June–Sept. Rocky slopes, WM, TS, CCR (Sutherland to Witteberg Mountains to near Ladismith). **(gce)**.

klinghardtensis M.A.N.Müll. Like **E. africanus** but leaves opposite throughout and densely felted. Mainly June–Aug. Stony slopes, SN (Klinghardt Mountains). **(ece)**

macroglossus B.Nord. Shrub, 0.5–1.2 m tall. Leaves alternate on flowering shoots, opposite on short-shoots, linear or rarely 3-fid, 3–20 mm long, densely appressed silvery silky. Flowerheads umbellate-racemose on peduncles 4–8 mm long, radiate, 5–12 mm long; involucral bracts 4, silky; ray florets 2 or 3, cream-coloured, 6–7 mm long; disc florets light brown to cream-coloured; marginal paleae connate basally, long-silky. June–Aug. Rocky slopes, mostly sandstone, G, NH (Richtersveld, Spektakel Pass). **(ece)**

*B.' Leaves glabrescent (see also **E. africanus**)*

pedicellaris DC. Slender shrublet, 0.4–0.9 m tall. Leaves alternate on flowering shoots, opposite on short-shoots, linear or 3-fid, 12–30 mm long, blue-green, glabrescent with sunken glands. Flowerheads umbellate-racemose on peduncles 10–30(–40) mm long, radiate, 4–5 mm long; involucral bracts 5, glabrous to sparsely hairy; ray florets white, ± 3 mm long; disc florets reddish purple; marginal paleae connate into a tube, silky. (June)July–Sept.(Oct.). Sandy and rocky flats and slopes, G, NH, KV, WM (Richtersveld to Loeriesfontein). **(ece)**

punctulatus DC. BOEGOEKAPOKBOSSIE Slender shrubs, 0.5–1.5 m tall. Leaves alternate on flowering shoots, opposite on short-shoots, linear or 3-fid, (2–)4–7 mm long, bright green, glabrescent. Flowerheads umbellate-racemose on peduncles (3–)5–8(–16) mm long, radiate, 3–4 mm long; involucral bracts 4 or 5, glabrous; ray florets 1–3, white or pale purplish, ± 2 mm long; marginal paleae connate into a tube, woolly. Aug.–Oct. Rocky slopes, NH, KB, WM, TS, CCR (Springbok to Moorreesburg, Hantam and Roggeveld to Witteberg Mountains). **(gce)**

purpureus Burch. Twiggy shrublet, up to 0.6 m tall. Leaves alternate on flowering shoots, opposite on short shoots, linear, bright green, 2–6 mm long, glabrescent with sunken glands. Flowerheads

solitary and umbellate-racemose on peduncles 6–12 mm long, radiate, 6–12 mm long; involucral bracts 5, glabrous with sunken glands; ray florets 2 or 3, pale to dark purple; disc florets reddish purple; marginal paleae connate into tube, silky below. July–Aug. Dry, rocky karroid slopes, NH, WM, TS, CCR (Garies, Bokkeveld, Hantam and Roggeveld to Cederberg Mountains). **(gce)**

scariosus DC. Slender shrub, 0.5–1.5 m tall. Leaves alternate on flowering stems and short-shoots, linear-lanceolate, 4–12 mm long, ± succulent, silvery to bright green, densely silky to glabrous with sunken glands. Flowerheads solitary or racemose on peduncles 6–12 mm long, radiate, 3–6 mm long; involucral bracts 4 or 5, ± entirely membranous with narrow green centre; ray florets white, up to 6 mm long; marginal paleae ± connate, densely woolly. June–Sept. Rocky hills, SN, G, NH (central Namibia and Bushmanland to Komaggas).

A.' Flowerheads disciform
C. Mature leaves felted or silky

ambiguus (DC.) M.A.N.Müll. Twiggy, spinescent shrublet, 0.3–0.6 m tall. Leaves alternate on flowering and short-shoots, 4–15 mm long, concave, silver- or green-felted. Flowerheads solitary on short-shoots on peduncles 1–11 mm long, disciform, 4 mm long, yellow; involucral bracts 4 or 5, appressed silky; marginal paleae free, silky. Jan.–Apr. Sandy and clay flats, SN, G (Namibia and Gordonia through Richtersveld and Bushmanland to Upper Karoo).

decussatus Burch. Divaricately branched, sometimes spinescent shrub, 0.6–1.5 m tall. Leaves often alternate on flowering stems, decussate on short shoots, scale-like, 1–2 mm long, densely appressed silver-silky. Flowerheads mostly solitary on short shoots on peduncles 2–6 mm long, disciform, 3.5–4 mm long; involucral bracts 4(5), silver-silky; marginal paleae connate into a tube, silky. July–Sept. Stony and sandy flats, WM (Hantam and Roggeveld Escarpment and Upper Karoo).

kingesii Merxm. & Eberle Twiggy, spreading shrublet, 0.3–0.6 m tall. Leaves decussate on flowering and short-shoots, imbricate, linear-ellipsoid, 6–12 mm long, silky. Flowerheads solitary on short-shoots or racemose on stiff peduncles 3–12 mm long, disciform, 4–8 mm long, cream-coloured to yellow; involucral bracts 4 or 5, appressed silky; marginal paleae free, woolly. Jan.–Dec. Coastal sands, SN (Lüderitz to Rosh Pinah). **(ece)**

namaquensis M.A.N.Müll. Spinescent shrublets, 0.25–0.45 m tall. Leaves decussate on flowering and short-shoots, linear-triangular, 1–3(–5) mm long, densely silvery-silky. Flowerheads solitary or racemose on peduncles 3–12 mm long, disciform, 3–4 mm long, cream-coloured; involucral bracts 4, thinly hairy; marginal paleae free, silky. July–Oct. Stony flats and slopes, KV, WM, TS (Knersvlakte and Loeriesfontein through Roggeveld to Laingsburg). **(ece)**

racemosus L. KAPKOPPIE Slender, erect shrub, up to 1.5 m tall. Leaves alternate on flowering stems and short shoots, linear-lanceolate, 3–30 mm long, grey- or silver-felted. Flowerheads racemose-paniculate, nearly sessile or on peduncles up to 15 mm long, disciform, 2.5–5 mm long, white to pink; involucral bracts 4, felted; marginal paleae connate into a tube, woolly. July–Sept. Coastal dunes, sand plumes and hills, NS, KV, CCR (near Hondeklipbaai to just N of Vanrhynsdorp through to Humansdorp). **(gce)**

C.' Leaves glabrescent

ericoides (L.f.) Druce GEWONE KAPOKBOSSIE Twiggy, conical or broom-like shrub, up to 1 m tall. Leaves usually opposite on flowering and short-shoots, minute, linear, 1–5(–7) mm long, glabrescent with pitted glands. Flowerheads spicate-racemose or solitary on peduncles 1–5.5 mm long, disciform, 1.5–2.5 mm long, purplish; involucral bracts 4, glabrescent; marginal paleae free, silky. July–Nov. Stony clay and sandy flats, WM, TS, CCR (central Namibia, Upper Karoo through Roggeveld and Little Karoo).

microcephalus DC. Slender, many-stemmed shrub, 0.4–1.2 m tall. Leaves decussate on flowering and short-shoots, scale-like and triangular, 0.8–1.6(–4.5) mm long, glabrescent with pitted glands. Flowerheads racemose or solitary on peduncles 2–3.5(–7) mm long, disciform, 3 mm long, cream-coloured; involucral bracts 4, glabrescent; marginal paleae free, woolly. Mainly June–Sept. Mountain tops, NH, KB (Springbok to Bitterfontein). **(ece)**

microphyllus DC. Stiffly branched shrublet, 0.4–0.8 m tall. Leaves usually decussate on flowering and short-shoots, linear-triangular, 2–4(–7) mm long, glabrescent with pitted glands. Flowerheads racemose or solitary on peduncles 2–11 mm long, disciform, 4–6 mm long, white; involucral bracts 4, glabrescent; marginal paleae free, woolly. (June)July–Aug.(Sept.). Stony flats and slopes, G, NH, WM (Richtersveld through central Namaqualand to Hantam and Roggeveld). **(ece)**

pauperrimus Merxm. & Eberle Like **E. ericoides** but leaves alternate and flowerheads sessile in terminal spikes. June–Sept. Stony flats and slopes, WM, TS (S central Namibia through Gordonia through Hantam and Roggeveld to Touwsrivier).

EURYOPS[2] HARPUISBOS ± 100 spp., southern and tropical Africa, S Arabia

A. Annuals

annuus Compton Tufted annual, up to 0.4 m tall. Leaves rosulate, fleshy, pinnatifid or bipinnatifid, 20–100 mm long, segments subterete. Flowerheads solitary on wiry peduncles 50–400 mm long, radiate, yellow; involucre urn-shaped, 5–20 mm diam., bracts 8–20, connate to ± ½. Cypselas hairy. May–Sept. Gravelly and sandy flats, often in washes, G, TS (Richtersveld, Tanqua Karoo to Prince Albert). **(ece)**

A.' Shrubs or shrublets
B. Gnarled subshrubs with pinnatisect leaves and solitary, apparently terminal peduncles

mirus B.Nord. Compact, gnarled subshrub, up to 0.5 m tall, with partly subterranean stem and taproot. Leaves crowded on branchlets, pinnatipartite, 7–30 mm long, segments linear and thinly pilose with margins setulose. Flowerheads solitary at branch tips on long peduncles 50–220 mm long, radiate, yellow; involucre campanulate, 7–14 mm diam., bracts 8–12, connate to ½. Cypselas ± flattened, densely velvety. July–Sept. Edge of tillite flats, WM (Nieuwoudtville). **(ece)**

rosulatus B.Nord. Like **E. mirus** but leaves glabrous with linear-filiform lobes and disc florets fertile. Aug.–Sept. Dolerite outcrops, WM (Nieuwoudtville). **(ece)**

B.' Shrubs or shrublets with peduncles obviously axillary
C. Leaves crowded on short-shoots

cuneatus B.Nord. Shrub, up to 1.5 m tall, with stiffly erect branches. Leaves crowded on short-shoots, greyish-glaucous, cuneate and trifid, 5–20 × 10 mm, lobes broad and flattened. Flowerheads solitary in upper axils on peduncles 15–45 mm long, radiate, yellow; involucre hemispherical, 8–10 mm diam., bracts 6–9, free almost to base. Cypselas hairy. July–Sept. Dry stony slopes, WM, TS (Hantam and Roggeveld to Matjiesfontein). **(ece)**

dregeanus Sch.Bip. Shrublet, 0.15–0.9 m tall. Leaves at branch tips and crowded on short-shoots, spathulate-cuneate and apically 3–9-toothed or -lobed, (5–)10–40 mm long, densely grey-velvety. Flowerheads solitary in upper axils on peduncles (20–)50–250 mm long; involucre cup-shaped, (5–)8–15 mm diam., bracts 8–16, connate basally only. Cypselas densely white-woolly, mucilaginous when wet. July–Oct.(–Dec.). Rocky slopes and outcrops, mainly granite and quartzite, SN, G, NH (southern Namibia and Bushmanland to Koekenaap).

mucosus B.Nord. Shrublet, up to 0.5 m tall. Leaves crowded on short-shoots, cuneate, mostly apically 3–5-lobed, 10–25 mm long, bright green. Flowerheads solitary in upper axils, radiate, yellow; involucral bracts 8–10, connate basally. Cypselas densely white-woolly, mucilaginous when wet. ?Flowering time. ?Habitat, SN (southern Namibia: Witpütz). **(ece)**

multifidus (Thunb.) DC. HANEPOOTHARPUISBOS Shrub, up to 1.5 m tall, with stiffly erect branches. Leaves crowded on short shoots, mostly trifid with forked lateral lobes, 6–35 mm long, lobes subterete. Flowerheads solitary in upper axils on peduncles 5–30 mm long, radiate, yellow; involucre campanulate, 3–6 mm diam., bracts 5–9, connate to ± ½. Cypselas hairy. June–Sept. Rocky slopes, often on outcrops, G, NH, WM, CCR (Richtersveld through Hardeveld to Hantam, Cederberg Mountains to Worcester). **(gce)**

namaquensis Schltr. Much-branched shrublet, up to 0.5 m tall. Leaves crowded on short-shoots, mostly trifid with forked lateral lobes, 10–20 mm long, lobes linear, white-apiculate. Flowerheads solitary in upper axils on peduncles 50–130 mm long, radiate, yellow; involucre hemispherical, 8–12 mm diam., bracts 7–11, connate to ½. Cypselas hairy. July–Sept. Rocky outcrops, mainly quartzite, NH (Nuwerus). **(ece)**

namibensis (Merxm.) B.Nord. Shrub, up to 1 m tall, woolly in leaf axils. Leaves crowded at branch tips and on short-shoots, linear-oblanceolate and mostly trifid or pinnatifid, 5–25 mm long. Flowerheads numerous, solitary in upper axils on peduncles 20–60(–100) mm long, radi-

ate, yellow; involucre hemispherical, 7–12 mm diam., bracts 7–14, connate at base only. Cypselas densely hairy. June–Nov. Stony and rocky slopes in succulent karoo, SN, G (southern Namibia and Richtersveld). **(ece)**

pleiodontus B.Nord. Shrublet. Leaves at branch tips and crowded on short-shoots, cuneate and apically closely 7–20-fid, 5–13 mm long, lobes with distinct, firm, white tips. Flowerheads solitary in upper axils on peduncles 30–60 mm long, radiate, yellow; involucre hemispherical, ± 10 mm diam., bracts 9–11, connate at base only. Cypselas shortly hairy, mucilaginous when wet. June. Rocky outcrops, NH (Steinkopf). **(ece)**

subcarnosus DC. SOETHARPUISBOS Twiggy shrub, up to 1 m tall. Leaves crowded at branch tips and on short-shoots, terete, linear or with 3–5 linear lobes, 2–30 mm long. Flowerheads solitary in upper axils on elongated peduncles 20–160 mm long, radiate, yellow; involucre hemispherical, 3–12 mm diam., bracts 5–12, connate at base only. Cypselas densely hairy or woolly. Jan.–Dec. Varied habitats, SN, G, NH, KB, WM, TS, CCR (Namibia and Botswana through Bushmanland and Namaqualand to Little Karoo).

C.' Leaves not on short-shoots
D. Leaf margins ciliolate-denticulate

empetrifolius DC. Lax shrublet, up to 1 m tall. Leaves crowded towards branch tips, suberect, lanceolate to elliptic-oblong, 3–16 mm long, leathery, margins stiffly ciliolate. Flowerheads solitary in upper axils on peduncles 5–40 mm long, radiate, yellow, fragrant; involucre hemispherical, 5–10 mm diam., bracts 5 or 6, connate to ¼. Cypselas densely hairy, mucilaginous when wet. (Feb.–)May–Sept.(–Dec.). Stony or rocky flats, sandstone and dolerite, WM (Roggeveld through Upper Karoo to Lesotho).

petraeus B.Nord. Much-branched, dwarf shrublet, 0.1–0.8 m tall, young branches sparsely woolly apically. Leaves crowded, spreading, oblong, semi-terete, 4–7 mm long, muricate with margins ciliolate-denticulate. Flowerheads solitary in upper axils on short peduncles 2–8 mm long, radiate, yellow; involucre campanulate, bracts 5 or 6, connate to ⅓. Cypselas glabrous, rugose. Dec.–Jan. Cliffs and rocky faces, WM (Nuweveld Escarpment, Sneeuwberg and Stormberg).

sulcatus (Thunb.) Harv. Robust shrub, up to 1.5 m tall, branching from base, sparsely woolly in upper axils. Leaves crowded towards branch tips, imbricate, oblong-oblanceolate, convex-sulcate beneath, 5–15 mm long, bright green, margins cartilaginous-ciliolate. Flowerheads solitary in upper axils on short peduncles 2–15 mm long, radiate, yellow; involucre campanulate, 4–9 mm diam., bracts 5 or 6, connate at base. Cypselas densely hairy, mucilaginous when wet. Dec. Rocky summit plateau in renosterveld, WM (Roggeveld and Nuweveld Escarpments). **(ece)**

D.' Leaves glabrous

imbricatus (Thunb.) DC. Lax shrub, to over 1 m tall, branching from base, sparsely woolly in axils. Leaves crowded towards branch tips, ascending, fleshy-spathulate, 3–17 mm long, rugulose, bright green. Flowerheads solitary in upper axils on peduncles 5–35 mm long, radiate, yellow; involucre hemispherical, 5–8 mm diam., bracts 5–9, connate to ⅓. Cypselas densely hairy, mucilaginous when wet. May–Dec. Rocky karroid flats and slopes, WM, TS, CCR (Hantam through Roggeveld to Nuweveld Escarpment, Hex River Pass to Witteberg Mountains). **(gce)**

lateriflorus (L.f.) DC. SOETHARPUISBOS Viscid shrub, 0.3–1.5(–2.5) m tall, with stiffly erect branches. Leaves crowded toward branch tips, oblanceolate to obovate, 8–30 mm long, often 3-veined from base, grey. Flowerheads solitary on short, axillary peduncles 2–60 mm long, radiate, yellow; involucre hemispherical, 5–15 mm diam., bracts 5–11, connate to ½. Cypselas densely hairy, mucilaginous when wet. Mainly May–Aug. Dry sandstone and shale slopes, SN, G, NH, KB, WM, TS, CCR (southern Namibia through central Namaqualand, Bokkeveld, Hantam, Roggeveld and Cold Bokkeveld to Uniondale). **(gce)**

marlothii B.Nord. Rounded shrublet, 0.4–1.5 m tall. Leaves crowded towards branch tips, linear and mostly 3–5-fid, 5–15 mm long. Flowerheads solitary in upper axils on peduncles 10–40 mm long, radiate, yellow; involucre hemispherical, 5–8 mm diam., bracts 8–12, connate to ⅓. Cypselas densely papillate in lower half. July–Dec. Rocky slopes, WM (Hantamsberg and Roggeveld Escarpment). **(ece)**

microphyllus (Compton) B.Nord. Sparsely leafy, twiggy shrublet, up to 0.6 m tall. Leaves adpressed to ascending, oblong to ovate, fleshy, 1–6 mm long. Flowerheads solitary in upper axils on slender peduncles 15–80 mm long, radiate, yellow; involucre campanulate, 5–10 mm diam.,

bracts ± 8, connate to ½. Cypselas densely white-woolly. July–Oct. Rocky slopes in renosterveld, WM, CCR (Klein Roggeveld and Witteberg Mountains). **(gce)**

nodosus B.Nord. Like **E. oligoglossus** but leaves constricted basally and involucral bracts 7–10. Sept.–June. Stony flats and hillsides, often dolerite, in renosterveld, WM (Nuweveld Escarpment). **(ece)**

oligoglossus DC. WATERHARPUISBOS Moderately to much-branched, ± lax shrub, 0.4–1.5 m tall, sometimes sparsely woolly in axils. Leaves lanceolate to linear, spreading, 5–15 mm long. Flowerheads solitary in upper axils forming racemes or corymbs, on short peduncles 5–30 mm long, radiate, yellow; involucre hemispherical, 3–7 mm diam., bracts 5 or 6, connate < ¼. Cypselas densely white-hairy, mucilaginous when wet. Dec.–June. Rocky watercourses, WM, TS, CCR (Roggeveld to Hex River Mountains and Matjiesfontein to Lesotho).

rehmannii Compton Shrub, up to 1.5 m tall, with erect stems. Leaves crowded towards branch tips, linear-filiform, sometimes 3-partite, flattened, (5–)10–50 mm long, mealy when young. Flowerheads solitary in upper axils, forming corymbs, on wiry peduncles 10–100 mm long, radiate, yellow; involucre cup-shaped, 4–10 mm diam., bracts 7–15, connate > ½. Cypselas appressed-papillate. Mainly July–Oct. Karroid scrub or arid fynbos, TS, CCR (northern Cederberg Mountains to Worcester, Witteberg Mountains to Uitenhage). **(gce)**

tenuissimus (L.) DC. RESIN BUSH, GROOTHARPUISBOS Shrub, up to 2.5 m tall, with erect stems, often mealy on young parts. Leaves crowded at branch tips, linear-filiform, sometimes 3-partite, 15–150 mm long. Flowerheads solitary in upper axils, forming corymbs, on wiry peduncles 20–150 mm long, radiate, yellow or orange; involucre hemispherical, 5–13 mm diam., bracts 7–24, connate to ½. Cypselas appressed-hairy, mucilaginous when wet. Mainly Aug.–Oct. Stony karroid slopes, G, NS, NH, KB, KV, WM, CCR (Richtersveld to Hantam and through Cold Bokkeveld to George). **(gce)**

trifidus (L.f.) DC. Rounded shrublet, 0.5–1 m tall. Leaves lax or crowded, sometimes on short-shoots, linear and mostly 2- or 3-fid, 4–15 mm long. Flowerheads solitary in upper axils on peduncles 5–40 mm long, radiate, yellow; involucre hemispherical, 8–12 mm diam., bracts 6–9, connate at base only. Cypselas densely hairy. July–Nov. Stony and rocky slopes in renosterveld, WM (Hantam, Roggeveld and Nuweveld Escarpments). **(ece)**

sp. A Gnarled, dwarf shrublet, up to 0.1 m tall. Leaves crowded on short stems, subterete, (5–)10–20 mm long, woolly in axils. Flowerheads up to 3 per stem, solitary in upper axils (rarely apparently terminal) on elongated peduncles 40–80 mm long, radiate, yellow; involucre hemispherical, 7–8 mm diam., bracts 10–13, connate at base only. Cypselas densely hairy. Aug.–Sept. Quartz patches, KV (northern Knersvlakte). **(ece)**

FELICIA[1] (= *CHAREIS*) ASTERTJIE 85 spp., southern and tropical Africa to Arabia

A. Involucral bracts arranged strictly in 2 rows

bergeriana (Spreng.) O.Hoffm. Slender, hairy annual, up to 250 mm tall. Leaves opposite, lanceolate, elliptic to oblanceolate or obovate, entire or weakly denticulate, covered with long hairs. Flowerheads radiate, solitary on long peduncles; involucral bracts in 2 equally long rows, hairy and glandular-pubescent; ray florets blue or occasionally white; disc florets yellow. Cypselas of ray florets occasionally without pappus. Aug. Rocky lower slopes and flats, sandy soils, NH, KB, CCR (Namaqualand uplands near Garies and Bokkeveld Mountains through to SW Cape). **(gce)**

diffusa (DC.) Grau Thinly hairy, soft-stemmed perennial, up to 150 mm tall, from woody base. Leaves opposite, oblong to lanceolate, shortly hairy to scabrid, margins rolled back. Flowering heads radiate, solitary on slender, hairy, glandular-pubescent peduncles; involucral bracts in 2 equally long rows, hairy; ray florets blue or white; disc florets yellow. Cypselas glabrous; pappus absent in ray florets. Oct. Shady slopes, KB, CCR (subsp. **khamiesbergensis** Grau endemic to Kamiesberg Mountains, subsp. **diffusa** from CCR). **(gce)**

hispida (DC.) Grau Perennial herb, up to 300 mm tall, branches with dense, spreading, white hairs. Leaves opposite, lanceolate to obovate, with long, spreading hairs. Flowerheads radiate, relatively large, on peduncles with long, spreading hairs or glandular-pubescent; involucral bracts in 2 equally long rows; ray florets ivory-white; disc florets yellow. Cypselas relatively small, shortly hairy. Sept.–Dec. ?Riverbanks or rocky slopes, NH, CCR (northern Namaqualand to Cederberg Mountains). **(gce)**

martinsiana S.Ortiz Sparsely leafy annual, similar to **F. bergeriana** and **F. merxmuelleri**, but leaves always alternate, leaf hairs eglandular and short-glandular, and cypselas conspicuously wrinkled, with margins thickened and sinuate. Sept. On slopes near riverbed, TS (central Tanqua Karoo). **(ece)**

merxmuelleri Grau SAMBREELTJIES Softly hairy annual, up to 250 mm tall. Leaves alternate, except lowest pair, lanceolate to oblanceolate, hairy and glandular-pubescent. Flowerheads radiate, solitary on long hairy and glandular-pubescent peduncles; involucral bracts in 2 equally long rows, hairy and glandular-pubescent; ray florets blue; disc florets yellow. Cypselas of ray florets glabrous and without a pappus, of disc florets glabrous or shortly hairy. July–Oct. Rocky slopes and plateaux and sandy flats, G, NS, NH, KB, KV, WM, TS, CCR (Richtersveld through Namaqualand to Ceres and Western Mountain Karoo). **(gce)**

minima (Hutch.) Grau Softly hairy, spreading annual, 50–200 mm tall. Leaves alternate, oblanceolate, entire or weakly dentate, hairy, with ciliate margin. Flowerheads radiate, solitary, pedunculate; involucral bracts in 2 equally long rows, hairy; ray florets pale blue or cream-coloured; disc florets yellow. Cypselas hairy; pappus occasionally absent in ray florets. Aug.–Oct. Rocky slopes and flats or sandy flats, TS, CCR (Clanwilliam and Klein Roggeveld to Riversdale and Swartberg Mountains). **(gce)**

namaquana (Harv.) Merxm. PERS POUBLOM Glandular-hairy, often robust annual, up to 300 mm tall. Leaves alternate, except basal pair, narrowly to broadly oblanceolate, hairy and glandular-pubescent. Flowerheads relatively large, radiate, solitary on long, hairy peduncles; involucral bracts in 2 equally long rows, hairy and glandular-pubescent; ray florets light blue or rarely bright yellow (WM); disc florets yellow. Cypselas with short, robust hairs. May–Oct. Sandy or gravelly flats, SN, G, NS, NH, KB, KV, WM, TS, CCR (Namibia and Bushmanland through Namaqualand and Hantam to Worcester and Great Karoo).

puberula Grau Robust, scabrid annual, up to 300 mm tall. Leaves alternate, rarely basal ones opposite, lanceolate to oblanceolate, thickly short-haired, with longer spreading hairs. Flowerheads radiate, solitary on long, shortly hairy peduncles; involucral bracts in 2 equally long rows, uniformly velvety, with a few longer, spreading hairs; ray florets blue; disc florets yellow. Cypselas thickly short-haired, very small. July–Oct. Shale and sandy slopes, KV, WM, TS, CCR (southern Namaqualand to Hantam and Roggeveld Escarpment to Piketberg and Laingsburg). **(gce)**

stenophylla Grau Roughly hairy, straggling shrublet, up to 0.6 m tall. Leaves opposite up to middle of stems, alternate above, linear to narrowly oblanceolate, margins rolled back, glandular-pubescent, with long hairs on main vein and margins. Flowerheads radiate, solitary on densely white-haired to woolly peduncles; involucral bracts in 2 equally long rows, hairy; ray florets blue; disc florets yellow. Cypselas shortly hairy. Sept.–Oct. Loamy soils or hill slopes, NS, CCR (near Hondeklipbaai to Bokkeveld Escarpment and Saldanha). **(gce)**

A.' Involucral bracts in more than 2 rows, rarely in 2 rows with a few additional bracts
B. Annual or perennial herbs

australis (Alston) E.Phillips SAMBREELASTERTJIE, SAMBREELTJIES Thinly hairy, sprawling annual, 50–250 mm tall. Leaves alternate, linear, entire or occasionally slightly toothed, margins ciliate. Flowerheads solitary, radiate, pedunculate; involucral bracts in 3 rows, imbricate, hairy to glabrescent; ray florets blue to mauve; disc florets yellow. Cypselas hairy; pappus bristles equally long. July–Oct. Sand or clay flats, G, NS, NH, KB, WM, TS, CCR (Richtersveld through Namaqualand and Western Mountain Karoo to SW Cape). **(gce)**

dubia Cass. Diffuse, softly hairy annual, 50–400 mm tall. Lowest leaves opposite, upper leaves alternate, lanceolate, elliptic or obovate, weakly dentate, hairy. Flowerheads radiate, solitary on hairy peduncles bearing a few glandular-hairs; involucral bracts in 3 rows, outer row shorter than inner 2 equally long rows, hairy, rarely glandular-pubescent; ray florets blue; disc florets yellow. Cypselas shortly hairy, very small. June–Sept. Sand or gravel flats and slopes, G, NH, KB, KV, TS, CCR (Steinkopf to Cape Peninsula and Laingsburg). **(gce)**

microsperma DC. Roughly hairy, glandular-pubescent annual, up to 500 mm tall. Leaves alternate, linear, thickish, hairy and glandular-pubescent. Flowerheads radiate, solitary on hairy and glandular-pubescent peduncles; involucral bracts in 4 rows, imbricate, hairy and glandular-pubescent; ray florets light blue; disc florets yellow. Cypselas very small, shortly hairy. July–Oct. Sandy soil, often near water, SN, NH, CCR (Klinghardt Mountains to Clanwilliam). **(gce)**

tenera (DC.) Grau Hairy, branched annual, up to 400 mm tall. Leaves opposite in lower half of stems, alternate above, elliptic to ovate, margins 1–3-dentate, clearly 3-veined from base, hairy. Flowerheads radiate, solitary on hairy and glandular-pubescent peduncles; involucral bracts in 3 rows, outer row shorter than inner 2 equally long rows, hairy; ray florets blue; disc florets yellow. Cypselas with short hairs. Aug.–Sept. Sandy to stony soil on sides of hills and kloofs, G, NS, NH (Richtersveld to Springbok and near Soebatsfontein). **(ece)**

B.' Woody shrublets

*C. Flowerheads without ray florets (see also **F. filifolia** and **F. whitehillensis**)*

macrorrhiza (Thunb.) DC. ASPOESTERTJIE, DEURMEKAARBOSSIE Roughly hairy, gnarled, dwarf shrublet, up to 150 mm tall. Leaves alternate, linear to linear-spathulate, succulent, hairy, woolly in axils, recurved at tips. Flowerheads discoid, large, solitary on hairy peduncles; involucral bracts in 4 rows, imbricate, hairy; disc yellow. Cypselas shaggy; pappus bristles of 2 different lengths. July–Oct. Rocky slopes, KB, WM, TS, CCR (Kamiesberg Mountains and Hantam to Williston and S to Witteberg Mountains near Laingsburg).

C.' Flowerheads with ray florets

brevifolia (DC.) Grau Shrub or dwarf shrub, up to 1.5 m tall. Leaves alternate, elliptic to obovate, cuneate, dentate, hairy and occasionally glandular-pubescent, petiolate or subsessile, becoming smaller, entire and lanceolate above. Flowerheads radiate, solitary, pedunculate; involucral bracts in 3 or 4 rows, imbricate, hairy and glandular pubescent; ray florets blue-purple; disc florets yellow. Cypselas with long hairs; pappus bristles similar and equally long. May–Oct. In sandy or loamy soils on slopes of rocky outcrops, SN, G, NH, ?WM (near Aus to near Springbok and ?Roggeveld). **(ece)**

deserti Schltr. ex Grau Dwarf shrub, up to 200 mm tall. Leaves alternate, oblanceolate, thickly hairy, sessile. Flowerheads radiate, solitary on hairy peduncles; involucral bracts in 3 or 4 rows, imbricate, hairy; ray florets blue; disc florets yellow. Cypselas shortly hairy. Sept. ?Habitat, KB (Keimoes to Kamiesberg Mountains).

dregei DC. Upright shrub, up to 1.5 m tall. Leaves alternate, narrowly elliptic to lanceolate, up to 40 mm long, mostly entire but a few shortly denticulate, densely velvety and occasionally glandular-pubescent, smaller in upper parts. Flowerheads radiate, solitary on occasionally glandular-pubescent peduncles; involucral bracts in 3 or 4 rows, imbricate, occasionally glandular-pubescent; ray florets purple; disc florets yellow. Cypselas with long hairs. May–Aug. Slopes and dolerite koppies, NH, KB, WM, CCR (Namaqualand through to Western Mountain Karoo and Saldanha). **(gce)**

filifolia (Vent.) Burtt Davy DRAAIBOSSIE, GHOMBOS, PERSBERGDRAAIBOS, PERSDRAAIBOS Much-branched shrub or dwarf shrub, up to 1 m tall. Leaves alternate, in clusters on short shoots or spread out on long shoots, needle-like, glabrous or woolly-pubescent in leaf-axils. Flowerheads radiate, (ray florets occasionally absent in subsp. **bodkinii** (Compton) Grau and subsp. **schaeferi** (Dinter) Grau), solitary; peduncles, if present, glabrous; involucral bracts in 3 or 4 rows, imbricate; ray florets bright or pale violet, rarely white; disc florets yellow. Cypselas long-haired; pappus bristles of different lengths. Mainly Aug.–Oct. Rocky slopes or sandy or gravelly flats, SN, G, NH, KB, WM, TS, CCR (widespread from southern Namibia and Limpopo Province to SW Cape).

hirsuta DC. Rounded, roughly hairy shrublet, 0.1–0.6 m tall. Leaves alternate, linear, lanceolate to oblanceolate, white-haired, also glandular-pubescent when young. Flowerheads radiate, solitary on glandular-pubescent peduncles; involucral bracts in 3 or 4 rows, imbricate, hairy and glandular-pubescent; ray florets blue-violet; disc florets yellow. Cypselas all shortly hairy. Mar.–Oct. Dry flats and slopes, SN, G, NH, WM, TS, CCR (Namibia, Bushmanland, through Namaqualand to Swellendam, E Cape and Free State).

hirta (Thunb.) Grau KAROOASTERTJIE Rounded shrublet, up to 350 mm tall, branches covered with dense, white, appressed hairs. Leaves alternate, lanceolate to oblanceolate, rarely obovate, with short appressed hairs. Flowerheads radiate, solitary on peduncles with spreading hairs; involucral bracts in 3 rows, imbricate, hairy and glandular-pubescent; ray florets blue-violet; disc florets yellow. Cypselas shortly hairy. Aug.–Dec. Hillslopes, loamy flats or sandy or gravelly soils, NH, KV, WM, CCR (eastern Namaqualand and Upper Karoo through to Vanrhynsdorp, Nieuwoudtville and Robertson).

hyssopifolia (P.J.Bergius) Nees Thinly hairy to glabrous shrublet, up to 0.6 m tall. Leaves alternate, linear to lanceolate, upper shorter than lower, margins few-haired in lower leaves and thickly covered with 2 rows of glandular hairs near base in upper leaves. Flowerheads radiate, solitary, pedunculate; involucral bracts in 4 rows, imbricate, glabrous, except for hairs on margins; ray florets pale violet; disc florets yellow. Cypselas shortly hairy. May–Nov. Sandy or rocky flats or lower slopes, NS, KB, WM, CCR (near Kourkammaberg through to Kamiesberg Mountains, Port Elizabeth and Lesotho).

lasiocarpa DC. Dwarf shrub, up to 300 mm tall, with long white hairs in leaf axils. Leaves alternate, linear, margins rolled in, bases of lower leaves covered with long whitish hairs as in leaf axils, otherwise glabrous. Flowerheads radiate, solitary on peduncles with glands on upper parts; involucral bracts in 4 rows, imbricate, glandular; ray florets violet; disc florets yellow. Cypselas long, silky-haired; pappus of short scales and yellowish or occasionally reddish bristles. Aug.–Sept. Stony hills and flats, TS (near Touwsrivier to Laingsburg and Prince Albert). **(ece)**

muricata (Thunb.) Nees TAAI-ASTERTJIE Shrublet, up to 0.7 m tall, young branches hairy. Leaves alternate or tufted in axils of older leaves, linear, ascending, hairy or glandular and then shiny. Flowerheads radiate, solitary on hairy peduncles; involucral bracts in 4 rows, imbricate, hairy or glabrous; ray florets lilac or white; disc florets yellow. Cypselas shortly hairy. Aug.–Sept. Flats and mountains, WM, CCR (Hantamsberg and Roggeveld and from tropical Africa through Angola, Namibia, Botswana to W Cape).

odorata Compton Slender, branched shrub, ± 400 mm tall, with soft grey hairs on stem. Leaves alternate or ± opposite, spreading, elliptical to oblanceolate, with short rough broad-based white hairs on both surfaces. Flowerheads radiate, sweet-scented, solitary on softly hairy long peduncles; involucral bracts in 3 rows, imbricate, thinly hairy; ray florets mauve; disc florets yellow. Cypselas thinly long-haired; pappus of barbellate bristles. July–Sept. On low slopes, WM, TS (Hantamsberg to near Laingsburg). **(ece)**

ovata (Thunb.) Compton White-haired, diffuse shrublet, up to 300 mm tall. Leaves opposite, narrowly ovate to lanceolate, with long white hairs, tips acute and recurved, margins rolled back. Flowerheads radiate, solitary on glandular-pubescent peduncles with white spreading hairs; involucral bracts in 3 rows, hairy and glandular; ray florets blue; disc florets yellow. Cypselas short-haired. July–Oct. Mountain slopes, WM, TS, CCR (Bokkeveld Mountains through to Ladismith, Nuweveld Escarpment, Steytlerville and Free State).

rogersii S.Moore Low, thinly hairy, rigid shrublet, up to 300 mm tall. Leaves alternate, ascending, small, linear (subterete), scabrid. Flowerheads radiate, fragrant, solitary on peduncles with spreading hairs; involucral bracts in 4 rows, imbricate, hairy; ray florets lilac or violet; disc florets yellow. Cypselas long-haired. July–Oct. Stony or sandy lower slopes, WM, TS, CCR (Hantam and Roggeveld Escarpment to Hex River Valley and southern Great Karoo). **(gce)**

whitehillensis Compton Dwarf shrub, up to 400 mm tall, with long and short shoots. Leaves alternate, linear or broadly to narrowly lanceolate, slightly succulent, rarely 1–3-dentate, main vein near base ± prominent, axils woolly, upper leaves sparsely glandular. Flowerheads radiate, solitary, indistinctly pedunculate, on long shoots with upper part leafless and glandular-pubescent; involucral bracts in 4 rows, imbricate; ray florets purple, occasionally absent; disc florets yellow. Cypselas strikingly silky-hirsute; pappus bristles barbellate. Mainly Sept. Sandy flats, rock crevices or shale ridges, NH, WM, TS, CCR (northern Namaqualand through Calvinia to Worcester and Prince Albert). **(gce)**

FOVEOLINA[2] WILDEKAMILLE 4 spp., western southern Africa

burchellii (DC.) Magee (= *F. albidiformis* (Thell.) Källersjö) Like **F. dichotoma** but leaves sparsely pilose with linear-lanceolate lobes, involucral bracts with resin canals and often dark papery margins, flowerheads disciform; pappus absent, and cypselas dimorphic, outer ones tuberculate, inner ones 3-ribbed. Sept.–Oct. Dry sandstone valleys or stony flats, WM, CCR (northern Cederberg Mountains to Roggeveld Escarpment to Upper Karoo).

dichotoma (DC.) Källersjö) Sprawling, sparsely to densely silky annual, up to 250 mm tall, branching from base. Leaves bipinnatisect, 10–30 mm long, lobes elliptic. Flowerheads solitary on long naked peduncles, discoid, 8–15 mm diam.; disc florets yellow. Cypselas pitted on one side; pappus white, ear-like. Aug.–Nov. Sandy or sometimes stony flats and washes, SN, G, NS, NH, KB, WM, TS (southern Namibia and Bushmanland through Namaqualand and Roggeveld Escarpment to Laingsburg).

tenella (DC.) Källersjö LAZY DAISY Erect or sprawling, thinly hairy, aromatic annual, up to 250 mm tall. Leaves bipinnatisect, 10–40 mm long, lobes elliptic. Flowerheads solitary on long naked peduncles, radiate, 15–25 mm diam.; ray florets few, white, obovate; disc florets yellow. Cypselas pitted on one side; pappus white, ear- or crown-like. June–Sept. Sandy slopes and flats, mostly coastal, NS, KV, WM, CCR (Knersvlakte and Loeriesfontein to Yzerfontein). **(gce)**

GALEOMMA[2] CAT'S EYES 2 spp., western southern Africa

oculus-cati (L.f.) Rauschert Prostrate, white-woolly annual, with radiating, sparsely leafy stems up to 200 mm long. Leaves obovate-spathulate, 7–12 mm long, white-woolly. Flowerheads in terminal glomerules surrounded by a whorl of leaves, embedded in dense wool, discoid, 2 mm diam., yellow; pappus bristles tipped with swollen, balloon-like cells. Sept.–Dec. Moist clay flats, WM (Nieuwoudtville and Calvinia to Sutherland). (ece)

GARULEUM[1] 8 spp., South Africa and Namibia

bipinnatum (Thunb.) Less. GIFHOUTJIE, SLANGHOUTJIE Perennial herb or subshrub, up to 1.5 m tall, covered with scattered short-stalked glands. Leaves alternate, bipinnatipartite to pinnate, with linear lobes, ± aromatic. Flowerheads radiate, terminal, solitary or arranged in loose corymbs, pedunculate; ray florets blue, mauve, purple, violet, white or yellow; disc florets yellow. Cypselas of ray florets trigonous and warty, occasionally developing from outer disc florets, these flat, obovate and ± notched apically, surrounded by a stiff, thick-margined wing; pappus absent. July–Sept. Dolerite rocks, stony koppies and roadsides, WM, TS, CCR (near Nieuwoudtville and Loeriesfontein through to Witteberg Mountains and about Grahamstown).

GAZANIA GAZANIA 18 spp., southern and tropical Africa

A. Annuals

lichtensteinii Less. BOTTERBLOM, GEELGAZANIA, GEELGOUSBLOM, KOUGOED Tufted to sprawling annual, sometimes up to 300 mm tall. Leaves simple to pinnatilobed, oblanceolate, serrate or toothed, white-felted below, glabrous to sparsely cobwebby above. Flowerheads radiate, yellow to orange; involucre campanulate, 3–8 mm wide, connate, glabrous to sometimes cobwebby, collared below. Apr.–Oct. Gravel and sandy flats, SN, G, NS, NH, KB, KV, WM, TS, CCR (Lüderitz to Vanrhynsdorp and Beaufort West).

tenuifolia Less. Tufted annual, up to 150 mm tall. Leaves pinnatisect, lobes linear, white-felted below, glabrescent above. Flowerheads radiate, yellow to orange; involucre campanulate, 3–8 mm wide, bracteate to base, base ± fleshy, truncate. July–Sept. Dry flats or lower slopes, SN, NS, NH, KB, KV, WM, TS, CCR (Haalenberg Mountains to Clanwilliam and Loeriesfontein to Tanqua Karoo). **(gce)**

A.' Perennials

heterochaeta DC. Tufted, acaulescent perennial, up to 100 mm tall. Leaves simple to weakly pinnatilobed, white-felted below, sparsely echinate and also slightly cobwebby above. Flowerheads radiate, yellow to orange; involucre campanulate, 7–10 mm wide, connate, flat to slightly intrusive at base, glabrous to mealy. Mainly Sept.–Jan. Dry flats or lower slopes, G, NS, NH, KV, WM, TS (Richtersveld to Great Karoo to Willowmore).

jurineifolia DC. WITGOUSBLOM Tufted, acaulescent perennial, up to 100 mm tall. Leaves pinnatifid, lobes subtriangular, spine-tipped, white-felted below, sparsely echinate and sometimes also cobwebby above. Flowerheads radiate, white; involucre campanulate to broadly campanulate, 6–12 mm wide, connate, flat at base, glabrous to mealy or sometimes cobwebby. Mainly July–Mar. Dry sandy or gravelly plains, SN, G, NH (Walvis Bay to Springbok, E to Kimberley and S to Willowmore).

krebsiana Less. BOTTERBLOM, BRUINGOUSBLOM, ORANJEGOUSBLOM, ROOIGAZANIA Tufted, acaulescent perennial, up to 200 mm tall. Leaves simple to pinnatisect, white-felted below, glabrous to sparsely echinate and sometimes also cobwebby above. Flowerheads radiate, yellow to orange or rarely red; involucre campanulate, 5–8 mm wide, connate, flat to somewhat intrusive,

glabrous to mealy, sometimes glabrescent. Mainly Sept.–Jan. Roadsides, flats or lower slopes, KB, KV, WM, TS, CCR (throughout southern Africa to Tanzania).

leiopoda (DC.) Roessler Tufted, acaulescent perennial, up to 150 mm tall. Leaves regularly pinnatisect, white-felted below, densely echinate and sometimes also slightly mealy above. Flowerheads radiate, yellow to orange; involucre broadly campanulate, 10–18 mm wide, connate, flat at base, glabrous to densely echinate and sometimes also slightly mealy. Aug.–Oct. Gravelly or stony flats, NH (Springbok to Garies). **(ece)**

othonnites (Thunb.) Less. Acaulescent, mat-forming perennial, up to 250 mm tall. Leaves simple to pinnatilobed, glabrous below and above, margins roughly ciliate. Flowerheads radiate, yellow to orange; involucre campanulate, 4–8 mm wide, connate, collared below, glabrous. Aug.–Dec. Sandy and shale slopes, NS, NH, KV, WM, TS, CCR (Springbok to Laingsburg). **(gce)**

rigida (Burm.f.) Roessler KAROO-GAZANIA Tufted, acaulescent perennial, up to 250 mm tall. Leaves pinnatisect or sometimes simple, white-felted below, glabrescent to sparsely echinate above. Flowerheads radiate, yellow to orange; involucre campanulate, 8–10 mm wide, connate, flat at base, densely echinate and sometimes also slightly mealy. July–Nov. Flats and lower slopes, WM, CCR (Calvinia to Humansdorp). **(gce)**

schenckii O.Hoffm. Woody shrublet, up to 150 mm tall. Leaves simple, white-felted below and above. Flowerheads radiate, yellow; involucre campanulate, 3–6 mm wide, connate, flat to slightly intrusive at base, glabrescent or usually cobwebby. Aug.–Sept. Coastal plains, SN, NS (Lüderitz to just S of Alexander Bay). **(ece)**

splendidissima Mucina, Magee & Boatwr. Perennial subshrub, up to 200 mm tall. Leaves simple to pinnatilobed, semi-succulent, white-felted below, sparsely echinate and also densely mealy above. Flowerheads radiate, yellow to orange; involucre campanulate, 9–10(–15) mm wide, connate, flat at base, densely echinate and also mealy, bases of hairs black. Aug.–Oct. Coastal sands or granite, NS (Port Nolloth to Hondeklipbaai). **(ece)**

GEIGERIA[1] VERMEERBOSSE, VERMEERSIEKTEBOSSE 27 spp., southern part of Africa

filifolia Mattf. (alternatively treated as *G. ornativa* O.Hoffm. subsp. *ornativa* var. *filifolia* (Mattf.) S.Ortiz & Rodr. Oubina) Rosulate, perennial herb, 50–100 mm tall, ± coarsely woody at base. Leaves alternate, filiform, scabrid. Flowerheads small, radiate, sessile, congested together in leaf axils; involucral bracts pungent, erect, hairy; ray and disc florets yellow; pappus of scales, inner aristate. Oct. Rocky outcrops in sandy soils, G, WM (near Steinkopf through arid interior of South Africa to Zambia).

vigintisquamea O.Hoffm. Dwarf shrub or perennial herb, procumbent to erect, up to 250 mm tall, stems terete, woody, with a silvery sheen. Leaves alternate, acuminate, pungent-mucronate, linear-oblanceolate, entire or with some teeth towards apex. Flowerheads solitary, sessile, in widely-spaced leaf axils, radiate or discoid; involucral bracts erect; ray (if present) and disc florets yellow; pappus of scales, inner aristate. (May)Aug.–Nov. Sandy flats or rocky slopes, G (SE Namibia to eastern Richtersveld and Gordonia).

GNAPHALIUM[2] ± 50 spp., cosmopolitan

confine Harv. Erect or decumbent, tufted, grey-woolly annual, up to 200 mm tall. Leaves oblanceolate, mostly 8–30 mm long, grey-woolly. Flowerheads in corymbs surrounded by leaves, whitish, disciform, ± 3 mm long; involucral bracts opaque; florets 140–250; pappus of female florets scabrid, of hermaphrodite florets with subplumose tips. Mainly Sept.–Nov. Damp places along streams, seeps and cliffs, SN (Namibia to lower Gariep, eastern South Africa and Lesotho).

*__polycaulon__ Pers. Like **G. confine** but flowerheads ± racemose, involucral bracts with translucent tips and pappus ± monomorphic. Jan.–Dec. Sandy or muddy streambanks, SN (lower Gariep, palaeotropical weed).

GORTERIA[2] BEETLE DAISY 3 spp., S Cape to Namibia

corymbosa DC. Roughly hairy, sprawling annual, up to 100 mm tall, germinating in the old involucre. Leaves oblanceolate, harshly scabrid above, glabrous or white-felted beneath, margins revolute. Flowerheads clustered in corymbs of 3–5 at branch tips, radiate, 20–35 mm diam.,

ray florets yellow to orange with darker reverse but without dark markings; disc florets dark; bracts drawn into slender, flexible points. July–Sept. Stony flats and washes, SN, G (Gariep Valley: southern Namibia, Richtersveld and northern Bushmanland).

diffusa Thunb. Roughly hairy, sprawling annual, up to 100 mm tall, germinating in the old involucre. Leaves oblanceolate, sometimes pinnatifid, scabrid above, white-felted beneath, margins revolute. Flowerheads solitary at branch tips, radiate, 20–35 mm diam.; ray florets yellow, orange or red with dark, beetle-like markings at base and darker reverse; disc florets dark; bracts acuminate with bristly margins, silky. July–Oct. Clay and sandy flats or stony lower slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia through Namaqualand to Olifants River and Breede River Valleys). **(gce)**

GYMNODISCUS[2] GEELKRUID 2 spp., Namaqualand to W Cape

capillaris (L.f.) DC. Tufted, succulent annual, up to 200 mm tall. Leaves rosulate, oblanceolate-spathulate to lyrate, obscurely toothed to lobed, 10–50(–80) mm long, glaucous. Flowerheads in small corymbs on branched scapes, radiate, ± 5 mm diam.; ray and disc florets yellow. July–Oct. Sandy flats and lower slopes, G, NH, KB, KV, TS, CCR (Richtersveld through Namaqualand to Mossel Bay). **(gce)**

linearifolia DC. Like **G. capillaris** but leaves highly succulent and cylindrical or fusiform. July–Sept. Sandy flats, NH (Okiep to Garies, Aggenys).

HELICHRYSUM[2] STROOIBLOM ± 500 spp., Old World, mainly Africa

A. Involucral bracts bright canary yellow

moeserianum Thell. Erect annual, up to 300 mm tall, branching from base. Leaves oblanceolate, mostly 15–40 × 3–10 mm, greyish white-woolly. Flowerheads in terminal corymbs, discoid or disciform, campanulate, 3–4 mm long, bracts ± 5-seriate, obtuse, tips minutely spreading, bright canary yellow, outer woolly below, florets 12–30. Aug.–Feb. Sandy flats and slopes, KB, KV, WM, TS, CCR (Okiep, Knersvlakte and Hantam to Mossel Bay). **(gce)**

trilineatum DC. Rounded, twiggy shrub, up to 1 m tall, closely leafy on young parts but leafless on older parts. Leaves narrowly oblong, mostly 3–25 × 1–5 mm, apically hooked, glandular-haired and glabrescent above but white-felted beneath, with 3 parallel veins, margins revolute. Flowerheads in compact, rounded corymbs, disciform (rarely discoid), campanulate, 4–6 mm long, bracts 5-seriate, obtuse, bright canary yellow, outer silky below, florets 25–60. Mainly Aug.–Feb. Rocky slopes on inland plateau, WM (Hantamsberg, Graaff-Reinet to Mont-aux-Sources).

A'. Involucral bracts brownish, reddish, pink or white
B. Annuals or short-lived perennials
C. Flowerheads solitary or in clusters, bracts white or silvery pink

argyrosphaerum DC. Prostrate annual or short-lived perennial with leafy stems. Leaves spathulate-oblanceolate, up to 25 × 7 mm, thinly grey-woolly. Flowerheads solitary, subglobose, disciform, 7–10 mm long, bracts ± 9-seriate, obtuse, tips radiating, shining silvery, tipped pink, florets 160–300. June–Dec. Dry, sandy flats, G, NH (widespread through southern and tropical Africa).

jubilatum Hilliard Like **H. marmarolepis** but flowerheads 3.5–4 mm long and heterogamous with ± 12 female florets. Sept.–Nov. Sandy flats and washes, G (Lekkersing). **(ece)**

marmarolepis S.Moore Erect or sprawling, annual, up to 300 mm tall, from a woody taproot. Leaves linear to oblanceolate-spathulate, mostly 10–15 × 2–5 mm, greyish woolly. Flowerheads in terminal clusters, discoid (rarely 1 or 2 female florets), campanulate, ± 3 mm long, bracts 5- or 6-seriate, obtuse-truncate and crisped, minutely spreading above, white to cream-coloured, thinly woolly below, florets 15–25. Mainly Sept.–Oct. Coastal sands, G, NS, CCR (Gariep to Paternoster). **(gce)**

C.' Flowerheads in leafy glomerules, bracts mostly golden-brown or reddish
D. Involucral bracts in 4-series, inner 2 series caducous

dunense Hilliard Trailing, short-lived perennial with slender branches up to 600 mm long, from a woody caudex. Leaves spathulate, mostly 6–10 × 3–5 mm, grey-woolly. Flowerheads in dense,

leafy clusters, discoid, cylindric-campanulate, ± 4 mm long, bracts 4-seriate, acute, erect, inner caducous, translucent purplish, woolly below, florets ± 10. Oct.–Dec. Coastal sands, G, NS, CCR (Alexander Bay, Grootderm, Hondeklipbaai, Lambert's Bay). **(gce)**

leontonyx DC. Mat-forming annual, with slender, sparsely leafy branches except under flowerheads. Leaves oblong-elliptic to spathulate, folded, mostly 15–30 × 5–10 mm, apex recurved, loosely grey-woolly. Flowerheads in leafy, terminal glomerules, disciform, campanulate, ± 3–4 mm long, bracts 3- or 4-seriate, acuminate and squarrose, inner caducous, translucent golden or reddish, woolly below; florets 20–40. July–Oct. Sandy often disturbed flats, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia and western Karoo to Little Karoo and Uniondale). **(gce)**

micropoides DC. Like **H. leontonyx** but heads or glomerules crowded into more elongate, racemose, compound inflorescences, and florets 8–23. July–Nov. Sandy flats, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia and Central Karoo to Ceres).

tinctum (Thunb.) Hilliard & B.L.Burtt Like **H. leontonyx** but flowerheads 5–6 mm long, mostly homogamous, and pappus bristles in several series. Mainly Sept.–Dec. Sandy flats, NH, KB, TS, CCR (Springbok to Kamiesberg Mountains, Bokkeveld Mountains to Uniondale and Graaff-Reinet).

D.' Involucral bracts in more than 4 series

albertense Hilliard Prostrate annual with slender, reddish brown stems, sparsely leafy except under flowerheads. Leaves spathulate, mostly 4–11 × 2–3 mm, loosely grey-woolly, glabrescent. Flowerheads in leafy glomerules, disciform (rarely discoid), bracts ± 6-seriate, obtuse-emarginate, golden-brown, or whitish suffused red or brown, woolly below, florets 12–22, 0–4 female. Sept.–Dec. Stony flats and ridges, TS (Laingsburg to Jansenville). **(ece)**

alsinoides DC. Prostrate annual with slender, reddish brown stems, sparsely leafy except under flowerheads. Leaves spathulate, mostly 5–20 × 1–9 mm, grey-woolly. Flowerheads in small leafy clusters, discoid or disciform, bracts 4- or 5-seriate, obtuse, slightly concave apically, whitish to pale golden-brown, woolly below, florets 15–40. July–Oct. Washes and riverbanks, SN, G, NS, NH, KV (southern Namibia to Knersvlakte). **(ece)**

gariepinum DC. Like **H. herniarioides** but flowerheads 6–7 mm long, heterogamous, with 40–100 florets. Sandy and gravelly flats, SN, G (throughout southern Namibia and along the Gariep to Vryburg).

herniarioides DC. Prostrate or diffuse annual, with slender branches from a woody taproot. Leaves linear, obovate or spathulate, mostly 4–12 × 2–7 mm, mostly loosely woolly. Flowerheads in leafy glomerules, discoid or disciform, campanulate, 4–5 mm long, bracts 5- or 6-seriate, obtuse-cucullate and abruptly spreading above, white to reddish brown, woolly below, florets 10–40. (Mar.–)July–Sept. Open sandy flats, often along watercourses or washes, SN, G, NS, NH, WM, TS, CCR (Namibia and Karoo to Cold Bokkeveld).

leptorhizum DC. Like **H. alsinoides** but involucral bracts brown flushed crimson, inner tipped white. Sept. Gravelly flats, NH (Steinkopf and Garies). **(ece)**

B'. Subshrubs or shrubs
E. Flowerheads solitary on scaly peduncles, 15–20 mm long

stoloniferum (L.f.) Willd. Prostrate or straggling, closely leafy, silvery subshrub, up to 300 mm tall. Leaves imbricate, suberect or spreading, often recurved above, oblong-lanceolate, hooked, 7–15 × 2–6 mm, silvery silky with tissue paper-like hairs. Flowerheads terminal, solitary on scaly peduncles distinct from leafy shoots, disciform, top-shaped, mostly 15–20 × 30–40 mm, bracts ± 7-seriate, lanceolate, acute, shiny white to pink, outer often flushed brown, glabrous; florets ± 60–28. Nov.–Feb. Rocky slopes, KB, CCR (Kamiesberg Mountains, Bokkeveld to Riviersonderend Mountains and to Great Winterhoek Mountains).

E.' Flowerheads subsessile or in clusters, 3–7 mm long
F. Soft, bushy subshrubs up to 450 mm tall; involucral bracts 7- or 8-seriate, mostly cucullate or recurved

aureofolium Hilliard Bushy, grey-woolly subshrub, up to 150 mm tall. Leaves oblanceolate, ± undulate, mostly 10–30 × 2–5 mm, grey-woolly. Flowerheads clustered in branched corymbs, disciform, broadly campanulate, ± 5–7 mm long, bracts ± 7-seriate, acute and apically spreading,

recurved, golden-brown, florets ± 60–80. Sept. Sandy lower slopes, TS, CCR (eastern Cederberg Mountains). **(gce)**

cylindriflorum (L.) Hilliard & B.L.Burtt (= *H. fastigiatum* Harv.) Bushy, grey-woolly subshrub, up to 300 mm tall, often with short-shoots. Leaves oblong-lanceolate, flat or undulate, mostly 5–30 × 1–5 mm, grey-woolly. Flowerheads clustered in branched corymbs, disciform, rarely discoid, cylindric-campanulate, ± 4–5 mm long, bracts ± 7-seriate, acute to obtuse and apically cucullate, spreading, golden-brown but inner tipped yellow, white or red, florets ± 15–30. Sept.–Dec. Sandy and stony flats and slopes, NS, ?KB, CCR (?Kamiesberg Mountains, Koekenaap and Bokkeveld Mountains to Langkloof). **(gce)**

pulchellum DC. Bushy, grey-woolly subshrub, up to 300 mm tall. Leaves linear to lanceolate, undulate or crisped, mostly 10–20 × 1–5 mm, grey-woolly. Flowerheads clustered in branched corymbs, disciform, campanulate, ± 4–5 mm long, bracts ± 7-seriate, obtuse and apically cucullate, golden-brown or tipped reddish, florets 40–60. Sept.–Nov. Rocky slopes, NH, KB, KV, TS, CCR (Kamiesberg Mountains to Knersvlakte, Karoopoort to Laingsburg, Koo). **(gce)**

stellatum (L.) Less. Bushy, grey-woolly shrublet, up to 450 mm tall. Leaves oblanceolate-spathulate, mostly 10–40 × 2–6 mm, grey-woolly. Flowerheads in terminal corymbs, disciform, broadly campanulate, ± 7 mm long, bracts 7- or 8-seriate, golden-brown and white or pink, acute, florets 60–140. Mainly Sept.–Oct. Sandy flats and slopes, KV, CCR (Knersvlakte and Bokkeveld Mountains to Riviersonderend Mountains). **(gce)**

F.' Ericoid shrublets; leaves linear with strongly revolute margins, mostly < 10 mm long

asperum (Thunb.) Hilliard & B.L.Burtt Tangled, twiggy, shrublet, up to 400 mm tall. Leaves often tufted on short shoots, linear, apiculate, 2–6 × 0.5 mm, woolly or glabrescent, margins strongly revolute. Flowerheads 1–4 at branch tips, discoid, cylindric, ± 4 mm long, bracts 5- or 6-seriate, subacute, erect, light golden-brown, caducous, florets ± 10. Oct.–Jan. Stony slopes and flats, SN, NH, WM, TS, CCR (central Namibia, Lüderitz, Springbok, Bokkeveld Mountains and western Karoo to KwaZulu-Natal).

dregeanum Sond. & Harv. Dwarf, twiggy, mat-forming subshrub, up to 150 mm tall, often with short-shoots. Leaves linear or linear-lanceolate, strongly revolute, mostly 4–14 × 0.5–2 mm. Flowerheads few at branch tips, disciform, campanulate, 3.5–6 mm long, bracts ± 4-seriate, obtuse, crisped, straw-coloured or reddish brown, florets 20–40. Sept.–Feb. Stony flats and slopes, often along roadsides, NH (central Namaqualand, east-central South Africa and Lesotho).

hamulosum E.Mey. ex DC. Ericoid shrublet, up to 600 mm tall. Leaves imbricate, linear, mucronate-hooked, 6–25 × 1 mm, glabrous above, felted beneath, margins strongly revolute. Flowerheads in dense, rounded corymbs, discoid, cylindric, 6–7 mm long, bracts 5- or 6-seriate, straw-coloured, acute, florets 5–15. Dec.–Mar. Rocky slopes, KB, WM, TS, CCR (Kamiesberg and Bokkeveld Mountains through western Karoo to Little and Great Karoo).

oxybelium DC. Twiggy, divaricately branched shrublet, up to 300 mm tall. Leaves linear, apiculate-hooked, 4–10 × 0.75–1 mm, thickly grey-woolly when young, later mostly glandular-hairy, mostly margins revolute. Flowerheads solitary among reduced leaves, disciform, turbinate-campanulate, ± 4.5 mm long, bracts 4–6-seriate, acuminate, purplish with golden-brown tips, florets 20–30. Sept.–Oct. Rocky slopes, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

F." Closely branched dwarf shrublets; flowerheads 1–few

deserticola Hilliard Like **H. obtusum** but tips of involucral bracts opaque white, inner abruptly apiculate. July–Oct. Sandy and rocky flats, SN (Lüderitz District). **(ece)**

lucilioides Less. Dwarf, gnarled, intricately branched or more lax shrublet, up to 600 mm tall. Leaves thick, obovate, apex recurved and hooked, crisped-undulate, mostly 3–12 × 2–5 mm, thinly greyish-woolly. Flowerheads 2–several in small clusters nested among leaves, discoid, cylindric, 5–7 mm long, bracts 4-seriate, caducous, oblong, obtuse, pale yellow or straw-coloured, florets 9–18. Sept.–May. Rocky hills and stony flats, G, WM (Namibia, Richtersveld, western Karoo and Upper Karoo).

obtusum (S.Moore) Moeser Gnarled, cushion-forming, dwarf shrublet, up to 300 mm tall. Leaves oblong to suborbicular, undulate, apex recurved, mostly 4–10 × 2–5 mm, densely white-felted. Flowerheads solitary or few nested among leaves, disciform (rarely discoid), campanulate, ± 4 mm long, bracts 3- or 4-seriate, obtuse, whitish to brown or reddish, florets 12–40. Mostly Sept.

Stony or gravelly flats and slopes, SN, G (central and southern Namibia and along Gariep to western Free State).

pumilio (O.Hoffm.) Hilliard & B.L.Burtt Closely or more loosely branched, grey-woolly dwarf shrublet, up to 200 mm tall. Leaves linear-spathulate, mostly 4–20 × 3–7 mm, glandular and grey-woolly, margins subrevolute. Flowerheads solitary or in small, terminal corymbs, disciform, campanulate, ± 5–6 mm long, bracts ± 5-seriate, acute to acuminate and ± squarrose, flushed red, white or golden-brown above, woolly below, florets 30–100. Gravelly and rocky flats, G, NS, NH, WM, TS (Namibia, Richtersveld and northern Namaqualand through Bushmanland, western Karoo, Central and Great Karoo to Lesotho).

simulans Harv. & Sond. Gnarled, closely leafy shrublet, up to 150 mm tall. Leaves small, imbricate, ascending, linear-spathulate, 3–6 × 1–2 mm, felted with tissue paper-like hairs. Flowerheads 1–3, sessile at branch tips, discoid, cylindric, ± 5–6 mm long, bracts 5-seriate, obtuse, brownish, florets 10–15. Nov.–Dec. Sandy and quartzitic flats, KV, TS, CCR (Holrivier, Whitehill to Little Karoo). **(gce)**

F.''' Tangled or sprawling shrubs up to 2 m tall; leaf margins often revolute; flowerheads in compact cymes

dasyanthum (Willd.) Sweet Like **H. hebelepis** but stems and bracts with silky, spreading, often rufous hairs as well as woolly hairs. Mainly Sept.–Nov. Sandy flats and slopes, KB, CCR (Kamiesberg Mountains, Bokkeveld to Baviaanskloof Mountains). **(gce)**

hebelepis DC. Straggling shrub, up to 1.5 m tall. Leaves linear to elliptic-oblong, mostly 20–40 × 2.5–10 mm, grey-woolly, margins often undulate and slightly revolute. Flowerheads in compact terminal corymbs, disciform, campanulate, ± 4 mm long, bracts 6-seriate, straw-yellow, backs woolly, florets 15–30. Mainly Aug.–Sept. Stony slopes and flats, G, NS, NH, KB, WM, TS, CCR (Namaqualand to Little Karoo). **(gce)**

revolutum (Thunb.) Less. Sprawling or tangled shrub, up to 2 m tall. Leaves often with axillary tufts, linear-lanceolate, mostly 10–40 mm long, slightly auriculate, revolute, glabrescent above, white-woolly beneath. Flowerheads in compact corymbs, disciform, campanulate, 4.5–5 mm long, bracts 4- or 5-seriate, oblong, rounded, straw-coloured, florets 20–40, female florets campanulate above. July–Oct. Rocky or sandy flats and slopes, G, NS, NH, KB, WM, TS, CCR (southern Namibia to Cape Peninsula and Witteberg Mountains). **(gce)**

scabrum (Thunb.) Less. Tangled shrub, up to 1.5 m tall. Leaves often with axillary tufts, oblong, mostly 6–14 mm long, slightly auriculate, revolute, undulate-crisped, roughly glandular-hairy. Flowerheads in compact corymbs, disciform, campanulate, 4–5 mm long, bracts 4- or 5-seriate, oblong, rounded, straw-coloured, florets 17–24. Aug.–Dec. Rocky slopes, NH, CCR (Springbok to Garies, Bokkeveld Mountains to Ceres). **(gce)**

tricostatum (Thunb.) Less. Straggling shrub, up to 1.5 m tall. Leaves oblanceolate to oblong, mostly 15–30 × 5–8 mm, grey-woolly, margins slightly revolute, minutely petiolate. Flowerheads in compact corymbs, disciform, campanulate, ± 4 mm long, bracts 5-seriate, rounded, straw-yellow, bracts subglabrous, florets 15–30. Sept.–Dec. Coastal sands, NS, NH, KV, CCR (Hondeklipbaai to Bokbaai). **(gce)**

zeyheri Less. Twiggy shrublet with rod-like branchlets, mostly up to 700 mm tall. Leaves oblong to obovate, mostly 6–23 mm long, undulate or crisped, grey-woolly, larger leaves pseudopetiolate. Flowerheads in compact, terminal cymes, discoid, cylindric, ± 4 mm long, bracts 4- or 5-seriate, acute to truncate, opaque white or pinkish, florets 5. Mainly Nov.–May. Stony slopes, G, NH, WM, TS, CCR (dry parts of southern Africa).

[**Uncertain record H. felinum** Less. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

HERTIA[2] SPRINGBOKBOS ± 10 spp., South Africa to SW Asia

sp. A Slender subshrub, up to 300 mm tall. Leaves suberect, oblanceolate, 15–30 mm long, entire or rarely sparsely denticulate apically, leathery, glaucous. Flowerheads solitary on stiff, naked peduncles 100–150 mm long, disciform, 10–15 mm diam., yellow. July–Aug. Stony lower slopes, WM (Hantamsberg). **(ece)**

sp. B Gnarled, closely leafy subshrub, up to 100 mm tall, cushion-forming. Leaves suberect, ovate to obovate, ± 10 mm long, denticulate, leathery, glaucous. Flowerheads solitary on short terminal

peduncles up to 20 mm long, disciform, ± 10 mm diam., yellow. Sept. Stony flats, WM (Sutherland). **(ece)**

?HETEROLEPIS[1] ROTSGOUSBLOM 4 spp., ?Namaqualand, W Cape and E Cape

[**Uncertain record H. aliena** (L.f.) Druce. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

HIRPICIUM[1] HAARBOSSIE 12 spp., tropical and southern Africa

alienatum (Thunb.) Druce Twiggy shrublet, up to 0.5 m tall. Leaves sessile, rigid, linear or oblong-lanceolate, minutely bristly with edges ± long-bristly, woolly below but hidden by rolled back margins, tip finely pointed. Flowerheads radiate; outer involucral bracts short, ciliate or denticulate; ray florets yellow, brown on back; disc florets yellow. July–Jan. Gravelly or stony soils, sandy soils, rocky outcrops, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to Uitenhage and Karoo).

echinus Less. Procumbent to erect perennial herb, 50–400 mm tall. Leaves sessile, linear, entire or pinnatifid, shortly bristly, with scattered longer bristles on margins and apices; lower surface exposed. Flowerheads radiate, solitary; involucral bracts glandular-pubescent, shortly spine-tipped; ray florets yellow, brown on back; disc florets yellow. July–Sept. Sandy soils, SN, G, NH, WM (Namibia to northern Namaqualand and Langberg through to Free State).

HOPLOPHYLLUM[1] YLKARMEDIK 2 spp., southern Africa

spinosum DC. VOLSTRUISDORING Rigid, spiny shrub, up to 1 m tall, with finely grooved stems. Leaves linear, hard, widely spreading, spine-like. Flowerheads discoid, sessile, clustered in leaf axils near branch tips; involucral bracts glabrous, horny; disc yellow. Aug.–Nov. Sandy soils on flats and riverbeds, or stony slopes, NS, KV, WM, CCR (from Port Nolloth to Clanwilliam, Hantam and southern Karoo). **(gce)**

HYMENOLEPIS[2] BASTERKAROO 7 spp., W to E Cape

parviflora (L.) DC. Thinly grey-felted shrub, 1–3 m tall, with slender branches densely leafy at tips. Leaves pinnatisect in upper half, 30–100 mm long, leathery, segments linear with revolute margins, glabrescent or grey-felted. Flowerheads in dense, compound corymbs, cylindrical, discoid, 1–2 mm diam., florets 3–6, yellow; involucral bracts glabrous, rather dry. Cypselas ribbed; pappus of 5 fimbriate scales fused basally. Nov.–Dec. Rocky granite and sandstone slopes, NH, CCR (Steinkopf, Springbok, Bokkeveld Mountains to Swellendam). **(gce)**

IFLOGA[1] (= *TRICHOGYNE*) NAALDEBOS 15 spp., southern Africa to N Africa and Middle East

A. Annual herbs; hermaphrodite flowers with corolla cylindric; styles divided

anomala Hilliard Annual, with several erect stems from base, 15–150 mm tall. Leaves linear-filiform, occasionally twisted, upper surface white-tomentose, margins rolled in. Flowerheads disciform, few together in leaf axils; involucral bracts acuminate, golden-brown or whitish, occasionally tinged red, glabrous; outer female florets filiform, 18–23; bisexual florets 3–6, with sterile ovaries. Cypselas of female florets obovate, triangular, minutely hairy; pappus in female florets absent, in bisexual florets of bristles with scabrid or nude shaft and plumose tips, occasionally absent. Sept. Rocky soils, TS, CCR (Worcester to Karoopoort, Matjiesfontein and Mossel Bay). **(gce)**

molluginoides (DC.) Hilliard Annual, with prostrate or decumbent, occasionally suberect stems, 10–100 mm long. Leaves alternate, linear-oblong, obtuse to acute, conspicuously white-mucronate, margins rolled in, thinly white-woolly. Flowerheads very small, disciform, solitary or crowded together in leaf axils or terminally; involucral bracts whitish or straw-coloured, gla-

brous; outer florets female, filiform, 5–10; bisexual florets 5–10. Cypselas hairy; pappus of bristles with naked shaft and plumose tips. Flowering after rain, July–Oct. Mountain slopes, riverbeds and -banks, in sandy or gravelly soils, SN, G, NS, NH, TS (central Namibia to northern and eastern Namaqualand, E to Gordonia and Hay divisions and S to near Laingsburg).

thellungiana Hilliard & B.L.Burtt Small, erect or mat-like annual, stems up to 150 mm long. Leaves distant, linear-lanceolate, acuminate, white-mucronate, upper surface appressed white-woolly, margins rolled in. Flowerheads very small, disciform, 1–3 nested among leaves; involucral bracts straw-coloured, glabrous; outer female florets filiform, 11–35; bisexual florets 2–7. Cypselas hairy; pappus of naked bristles with plumose tips, occasionally absent in female florets. Sept. Sandstone flats and slopes, WM, TS, CCR (southern Roggeveld, Matjiesfontein, Cold Bokkeveld to Cape Peninsula). **(gce)**

A.' Annual herbs, shrubs of woody perennials; hermaphrodite flowers with corolla cylindric below and campanulate above; styles undivided
B. Shrubs and dwarf shrublets

ambigua (L.) Druce (= *Trichogyne ambigua* (L.) Druce) Erect or sprawling, greyish white-hairy, ericoid shrublet, up to 1 m tall, occasionally spiny. Leaves tufted, filiform or granular, thick and keeled, apex acute, margins rolled in, white-tomentose above. Flowerheads disciform, axillary, forming dense, spike-like racemes; involucral bracts cream-coloured or brown; 1 or 2 outer florets filiform and female, 3–8 bisexual florets with sterile ovaries. Cypselas glabrous, obovate, black; pappus absent in female florets, of bristles with nearly smooth shaft and shortly plumose apex in bisexual florets. Aug.–Sept. Sandy coastal flats and slopes, NS, CCR (Brand-se-Baai and Bokkeveld Escarpment to SW Cape). **(gce)**

decumbens (Thunb.) Schltr. (= *Trichogyne decumbens* (Thunb.) Less.) Erect or decumbent dwarf shrub, with branches ± 0.2 m long, occasionally rooting along prostrate stems. Leaves filiform, thick, closely set, margins rolled in, inconspicuously white-tomentose above. Flowerheads disciform, several in terminal clusters surrounded by leaves; outer involucral bracts brown, thinly hairy, inner bracts often with white tips, thinly hairy to glabrous; 3–7 outer florets filiform and female, 8–14 bisexual florets with sterile ovaries. Cypselas triangular, hairy; pappus absent in female florets, of bristles with upper half white plumose but otherwise naked in bisexual flowers. Aug.–Oct. Bare sandy or stony ground or on rock platforms, WM, TS, CCR (Roggeveld Escarpment, and Ceres through to E Cape, Free State, Lesotho and Mpumalanga).

pilulifera Schltr. (= *Trichogyne pilulifera* (Schltr.) Anderb.) Shrub, up to 1 m tall. Leaves in fascicles, linear-filiform, occasionally twisted, margins rolled in, white-tomentose above. Flowerheads disciform, crowded in dense, globose, terminal clusters; involucral bracts golden-brown or straw-coloured, glabrous or hairy, (0)1 outer floret filiform and female, 5–8 bisexual florets with sterile ovaries. Cypselas ?obovate and glabrous; pappus absent in female florets, of weakly barbellate bristles becoming plumose upwards in bisexual florets. Aug.–Sept. Sandy flats or slopes and beach dunes, NS, NH, CCR (near Hondeklipbaai through southern Namaqualand to Olifants River Valley and Ceres). **(gce)**

B.' Annual herbs

candida Hilliard (= *Trichogyne candida* (Hilliard) Anderb.) Erect or decumbent annual, with several stems from crown, branches 20–90 mm long. Leaves linear, occasionally ± twisted, apex acute, margins rolled in, thinly white-tomentose above. Flowerheads disciform, solitary or few together in axils of leaves or at tips of small axillary shoots; involucral bracts elliptic-lanceolate, shining white, glabrous; 8–15 outer florets filiform and female, 3–5 bisexual florets with sterile ovaries. Cypselas obovate, minutely hairy; pappus absent in female florets, of bristles with nearly smooth shaft and shortly plumose apex in bisexual florets. Aug.–Sept. Sandy or stony slopes and flats, NH, KV (southern Namaqualand and Knersvlakte). **(ece)**

lerouxiae (Beyers) N.G.Bergh (=*Trichogyne lerouxiae* Beyers) Subwoody annual, with few to several branches from crown, 40–150 mm tall. Leaves tufted, linear-filiform, usually twisted, margins rolled in, white-tomentose above. Flowerheads disciform, in axillary clusters; involucral bracts pale golden-brown, 3 outer florets filiform and female, 2(3) bisexual florets with sterile ovaries. Cypselas obovoid, minutely hairy; pappus absent in female florets, of bristles with smooth shaft and shortly plumose apex in bisexual florets. Aug.–Sept. Sandy to clay soils, G, NS (Richtersveld to Anenous Pass to near Soebatsfontein). **(ece)**

paronychioides (DC.) Fenzl (= *Trichogyne paronychioides* DC.) Prostrate annual, branches 5–40 mm long, several from crown. Leaves crowded around flowerheads, linear-filiform, keeled, margins rolled in, white-tomentose above, disciform, many, in terminal leafy clusters; involucral bracts whitish to pale golden-brown, 4–8 outer florets filiform and female, 1 or 2(3) bisexual florets with sterile ovaries. Cypselas narrowly ovate, hairy; pappus absent in female florets, of bristles with smooth shaft and shortly plumose apex in bisexual florets. July–Sept. Sandy flats or gravelly slopes, SN, NH, WM (southern Namibia through to Springbok, eastern Namaqualand, Calvinia and Roggeveld Escarpment). **(ece)**

polycnemoides Fenzl (= *Trichogyne polycnemoides* (Fenzl) Anderb.) Erect or decumbent annual, stems 40–150 mm long, several from a crown. Leaves linear-filiform, often twisted, margins rolled in, white-tomentose above. Flowerheads disciform, in axillary clusters; involucral bracts with reddish central patch and whitish margins, abruptly pointed, 5–10 outer florets filiform and female, 2–5 bisexual florets with sterile ovaries. Cypselas obovate, minutely hairy; pappus absent in female florets, of bristles with smooth shaft and shortly plumose apex in bisexual florets. Aug.–Sept. Sandy or rocky slopes, shale flats or slopes, NH, WM, TS, CCR (near Steinkopf to Hantamsberg to foothills of Roggeveld Escarpment and Worcester). **(gce)**

[**Species excluded** No authentic material of **I. glomerata** (Harv.) Schltr. has been found in Namaqualand.]

KLEINIA[2] ± 40 spp., mainly tropical Africa, extending to India

cephalophora Compton Succulent shrublet, up to 200 mm tall, leafy at flowering; stems up to 30 mm diam. Leaves lanceolate, mostly 30–100 × 10–13 mm, fleshy, convex above and concave beneath, with recurved margins, glaucous. Flowerheads solitary on stout, bracteate peduncles, nodding in bud but later erect, discoid, bright yellow, broadly cylindrical, ± 15 mm diam.; involucral bracts 6–8, mostly 15–30 mm long. Pappus bristles 15–20 mm long. May–Aug. Rocky slopes, SN, G, NH (southern Namibia to Springbok, Kourkammaberg, Bushmanland and eastern Namaqualand).

longiflora DC. SJAMBOKBOSSIE Many-stemmed, succulent shrub, up to 1(–3) m tall, leafless at flowering; stems erect or sprawling, terete or furrowed, jointed, glaucous, up to 10 mm diam. Leaves oblong-elliptic, fleshy, 15–80 × 15 mm. Flowerheads 1–8 in subsessile, terminal and lateral corymbs, discoid, white or yellow, narrowly cylindrical, ± 5 mm diam.; involucral bracts 5 or 6, mostly 15–20 mm long. Pappus bristles, ± 20 mm long. Aug.–Dec. Rocky slopes and open bushveld, G, TS (tropical Africa and drier parts of southern Africa to Richtersveld and Laingsburg).

LACHNOSPERMUM[2] 4 spp., W Cape (gce)

fasciculatum (Thunb.) Baill. Thinly felted shrublet, up to 600 mm tall. Leaves involute-ericoid, in tufts, 1–5 mm long. Flowerheads discoid, few at branch tips, yellow, ± 5 mm diam.; involucral bracts white-woolly, inner with ascending or weakly spreading, acuminate, papery tips. Jan.–Mar. Sandy lower slopes, NS, CCR (Brand-se-Baai to Vredendal to Greyton). **(gce)**

LAGGERA[1] 17 spp., tropical Africa, Arabian Peninsula, Asia, southern Africa

decurrens (Vahl) Hepper & J.R.I.Wood Silky-villous, aromatic, perennial herb, up to 2 m tall, with winged stems. Leaves small, alternate, with bases running down stem, secondary nerves often conspicuous below. Flowerheads discoid, terminal, on straight peduncles, in a leafy, narrowly pyramidal panicle or subcorymbose at ends of lateral branches; disc yellow. Sept.–Dec. Sandy parts, occasionally as a weed or pioneer on bare ground, G, NH (tropical W Africa and Sudan through Namibia to northern Namaqualand and northern regions of southern Africa).

LASIOPOGON[1] 8 spp., southern Africa, N Africa to Middle East

A. Pappus bristles delicately plumose

micropoides DC. Small, mat-forming, prostrate or decumbent annual, stems up to 100 mm long. Leaves spathulate, thin, loose woolly covering, greyish-white. Flowerheads small, discoid, con-

gested at branch tips; involucral bracts pale straw-coloured; disc whitish, occasionally tipped reddish. Cypselas with mucilage-producing hairs; pappus bristles delicately plumose from base, with barbs shortening towards tips. July–Oct. Open sandy places along water courses, G, NS, NH (central Namibia and Springbok to near Soebatsfontein). **(ece)**

muscoides (Desf.) DC. Dwarf, prostrate annual, up to 50 mm tall. Leaves spathulate or oblong-spathulate, greyish white-woolly. Flowerheads discoid, small, in dense, rounded, woolly clusters at ends of branchlets; involucral bracts pale straw-coloured; disc white, tips occasionally reddish. Cypselas with mucilage-producing hairs; pappus plumose from base. Mainly Aug.–Sept. Bare sandy or stony flats in seasonally wet areas, NH, WM, TS (Namibia, eastern Namaqualand to E Cape and Free State, also N hemisphere).

ponticulus Hilliard Small, prostrate or decumbent annual, stems up to 80 mm long. Leaves spathulate, greyish white cobwebby-woolly. Flowerheads discoid, small, in woolly glomerules at branchlet tips; involucral bracts colourless, whitish or pale straw-coloured; disc whitish, occasionally tipped reddish. Cypselas glabrous; pappus bristles plumose within upper half. July–Sept. In sand, SN, G (Lüderitz, Aus and Buchu Mountains to Richtersveld). **(ece)**

A.' Pappus bristles barbellate throughout

glomerulatus (Harv.) Hilliard Similar to **L. brachypterus** but pappus barbellate throughout and cypselas with mucilage-producing hairs. May–Oct. Stony and gravelly flats, SN, G, NH, KV, TS, CCR (through arid interior from Zambia to southern Namibia and S to Worcester and E Cape, Madagascar).

minutus (B.Nord.) Hilliard & B.L.Burtt Small, erect, tufted annual, 15–40 mm tall. Leaves oblanceolate, thinly white-woolly to cobwebby. Flowerheads discoid, small, clustered at branch tips; involucral bracts pale straw-coloured; disc yellow, tipped reddish. Cypselas with relatively large, elongate hairs; pappus bristles with barbellate tips and shafts, bases abruptly expanded and scale-like, fused into a smooth ring. Aug. Quartzite areas, NS (Koekenaap, only known from the type collection). **(ece)**

A." Pappus bristles barbellate in upper half only

brachypterus O.Hoffm. ex Zahlbr. Dwarf annual, up to 50 mm tall. Leaves oblanceolate, thin, greyish white-woolly covering loosely appressed. Flowerheads small, discoid, in terminal clusters; involucral bracts colourless or with a purplish spot, light golden-brown to straw-coloured towards apex; disc whitish, tipped purplish red. Cypselas glabrous; pappus shortly plumose above. Mainly Oct.–Dec. Damp sandy places, along streams, on ledges of cliffs or on rock platforms, KB, CCR (Kamiesberg Mountains and Matsikamma Plateau to Klein Swartberg Mountains). **(gce)**

debilis (Thunb.) Hilliard Mat-forming to suberect annual, up to ± 50 mm tall. Leaves ± fleshy, spathulate or oblong-spathulate, ± glabrous. Flowerheads discoid, small, congested at branch tips; involucral bracts pale straw-coloured, occasionally subopaque at extreme tip. Cypselas with mucilage-producing hairs; pappus bristles shortly plumose in upper half, upper barbs club-shaped and white, cilia at base weakly developed, spreading. July–Sept. In silt or sand, possibly seasonally damp places, KV, TS, CCR (just N of Vanrhynsdorp to southern Tanqua Karoo and near Calitzdorp). **(gce)**

volkii (B.Nord.) Hilliard Like **L. glomerulatus** but pappus bristles barbellate in upper half only. Feb.–Sept. Open flats and slopes, SN (Maltahöhe to southern Namibia).

LASIOSPERMUM[2] GIFKNOPPIES 4 spp., southern Africa

bipinnatum (Thunb.) Druce Glabrescent perennial, up to 600 mm tall, with erect to sprawling stems from woody rootstock. Leaves bipinnatisect, 30–80 mm long, lobes linear, sparsely hairy when young, soon glabrous. Flowerheads solitary on long, naked peduncles, radiate (rarely discoid), globose, (10–)15–25 mm diam.; involucral bracts subglabrous with membranous tips; ray florets white to pink; disc florets yellow. Cypselas white-woolly; pappus absent. Aug.–Dec. Rock outcrops, disturbed soil or grassland, KV, ?WM, CCR (northern Knersvlekte, ?Roggeveld and Cederberg Mountains through Little Karoo to Gauteng).

brachyglossum DC. Glabrescent annual with erect stems, up to 400 mm tall. Leaves pinnatisect to bipinnatisect, 15–50 mm long, lobes linear. Flowerheads solitary on long, naked peduncles, shortly radiate, globose, 6–10 mm diam.; involucral bracts subglabrous with membranous tips;

ray florets white and reddish; disc florets yellow and red. Cypselas white-woolly; pappus absent. July–Oct. Sandy or gravelly flats and slopes, SN, G, NS, NH, KV, WM, TS, CCR (southern Namibia and Bushmanland through Namaqualand and western Karoo to Little Karoo).

pedunculare Lag. Silvery silky, mat-forming perennial, up to 200 mm tall, with erect to sprawling stems from woody rootstock. Leaves bipinnatisect, 50–150 mm long, lobes linear, silvery-silky. Flowerheads solitary on sparsely leafy peduncles, discoid, globose, fragrant, 10–15 mm diam., yellow and red; involucral bracts silky with membranous tips. Aug.–Oct. Loamy and clay flats and roadsides in renosterveld, NH, KB, WM, CCR (Concordia, Kamiesberg and Bokkeveld Mountains to Middelpos and Ceres). **(gce)**

poterioides Hutch. Like **L. pedunculare** but involucral bracts glabrescent. Sept.–Oct. Clay flats in renosterveld, WM (Williston to Gannaga Pass to Komsberg).

LEUCOPTERA[1] 3 spp., winter rainfall region of South Africa **(gce)**

nodosa (Thunb.) B.Nord. Slender shrublet, up to 0.5 m tall. Leaves alternate, filiform, non-fleshy, entire to pinnatisect or 3-forked above middle with filiform lobes, bases persistent and nodular. Flowerheads radiate, terminal, solitary on long peduncles; involucre broadly campanulate-hemispherical, bracts imbricate, tips obtuse or rounded; ray florets 8–13, white, shallowly 3-lobed; disc florets yellow. Cypselas oblong-obovate, compressed and winged; pappus of 3 scales. July–Sept. Strandveld, NS, KV, CCR (Hondeklipbaai to Clanwilliam). **(gce)**

oppositifolia B.Nord. Shrublet, 0.2–0.6 m tall. Leaves opposite, rarely some subopposite or alternate, linear-oblanceolate, non-fleshy, seldom 3(4)-lobed below middle. Flowerheads radiate, terminal, solitary on long peduncles; involucre campanulate-hemispherical, bracts imbricate, tips obtuse or rounded; ray florets (6–)8(–11), white, becoming pink-reddish and reflexed when old, shallowly 3-lobed; disc florets yellow. Cypselas oblong-obovate, compressed and winged; pappus of 3 scales. Aug.–Sept. Quartzite outcrops, KV (NW Knersvlakte from Komkans and Kerskloof areas). **(ece)**

subcarnosa B.Nord. Low shrublet, stems short, branches often decumbent, up to 100 mm long. Leaves alternate, rarely subopposite, linear-oblanceolate, ± fleshy, entire to 2–4-toothed or lobed above middle. Flowerheads radiate, terminal, solitary on long peduncles; involucre broadly campanulate-hemispherical, bracts imbricate, tips obtuse or rounded; ray florets (6–)8(–11), white, eventually often pink or reddish and rolled back, 3-toothed or subentire; disc florets yellow. Cypselas oblong-obovate-rounded, compressed and winged; pappus of 3 scales. July–Sept. Quartzite outcrops, NS, NH, KV (near Bitterfontein S to Holrivier). **(ece)**

LEYSERA[2] TEEBOS 3 spp., southern Africa and Mediterranean to SW Asia

gnaphalodes (L.) L. SKILPADTEEBOSSIE, TERINGTEEBOSSIE Glabrescent or cobwebby shrublet with erect stems, up to 400 mm tall. Leaves linear, 2–25 mm long, glabrescent to cobwebby, especially beneath, and glandular-hairy, with margins rolled under. Flowerheads solitary on slender, wiry peduncles, radiate, yellow, 10–15 mm diam.; involucral bracts with papery, often brownish tips. Pappus bristles plumose from base. Mainly Sept.–Nov. Sandy and gravelly flats and slopes, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to E Cape).

tenella DC. VAALTEEBOSSIE Glabrescent to cobwebby annual, sometimes perennial, up to 200 mm tall. Leaves linear, 2–25 mm long, glabrescent to cobwebby, especially beneath, and glandular-hairy, with margins rolled under. Flowerheads solitary on slender, wiry peduncles, radiate, yellow, 6–10 mm diam.; involucral bracts with papery, often brownish tips. Pappus bristles barbellate in lower half and plumose above. Mainly Aug.–Oct. Sandy and stony flats and slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (Namibia through Namaqualand, Gordonia and Karoo to Willowmore).

LITOGYNE[2] 1 sp., Africa

gariepina (DC.) Anderb. Roughly hairy or rarely subglabrous subshrub, with erect stems, up to 500 mm tall, from a woody rootstock. Leaves narrowly elliptic, 15–25 mm long, denticulate, decurrent, roughly- and glandular-hairy. Flowerheads few, subsessile in terminal clusters or glomerules, disciform, mauve to purple, 3–5 mm diam.; involucral bracts apiculate, flushed purple at tips. Mainly Aug.–Dec. Sandy flats, often in washes and along rivers, SN, G (lower Gariep; widespread through subtropical Africa).

LOPHOLAENA[2] ± 20 spp., tropical and southern Africa

cneorifolia (DC.) S.Moore Succulent shrublet, up to 1 m tall, stems leafless below. Leaves crowded towards ends of branches, oblanceolate, 25–50 mm long, leathery or fleshy. Flowerheads few in corymbs at branch tips, nested among leaves, discoid, few-flowered, white or yellow, cylindrical, 5 mm diam.; involucral bracts recurved at tips. Aug.–Oct. Stony quartzite or granite koppies, SN, G, NH, KB (Namibia and Gordonia to Kamiesberg Mountains).

MACLEDIUM[2] ± 30 spp., Africa

relhanioides (Less.) S.Ortíz Densely leafy shrublet, with erect stems, up to 150 mm tall, from a woody rootstock. Leaves imbricate, lanceolate, sessile, 10–25 mm long, pungent, sometimes woolly above, margins involute. Flowerheads discoid, solitary at branch tips, mauve, 15 mm diam.; involucral bracts grading into leaves, with broad white margins. Dec.–Mar. Stony ?shale slopes, TS, CCR (Prince Albert, Swartberg Mountains). **(gce)**

spinosum (L.) S.Ortíz STEEKBLOM Often gnarled shrublet, up to 200 mm tall. Leaves obovate to oblanceolate, petiolate, blades ± 10 mm long, usually denticulate, apiculate, glabrescent or silvery-felted, margins weakly rolled under. Flowerheads obscurely radiate, solitary at branch tips, pink or white, 10–12 mm diam.; involucral bracts sharply differentiated from leaves, outer narrow and pungent, inner ovate, mauve with broad, white margins. Flowering erratically. Dry rocky shale slopes, TS, CCR (Du Toitskloof to Somerset East).

MESOGRAMMA[2] 1 sp., southern Africa

apiifolium DC. (= *Senecio apiifolius* (DC.) Benth. & Hook.f. ex O.Hoffm. Annual, up to 300 mm tall, glabrous. Leaves lanceolate, pinnatifid or pinnatisect, mostly 30–50 × 10–20 mm, lowermost petiolate. Flowerheads 1 or 2 in upper axils, forming lax corymbs, shortly radiate, yellow; involucre campanulate, 5–8 mm diam., bracts 10–20, 4–6 × ± 1 mm, resinous-striate, bracteoles 2–5, subulate. Cypselas 1–2 mm long with 3 lines of hairs. Aug. Sandy flats and seasonal riverbeds, SN (Angola, Botswana, Namibia and western South Africa).

METALASIA[2] BLOMBOS 52 spp., South Africa, mainly W Cape

adunca Less. Erect shrub, up to 1.5 m tall, young branches whitish-woolly. Leaves curved outwards, not twisted, linear-oblong, 2–10 mm long, hooked apically, without axillary tufts. Flowerheads discoid, few to many in terminal clusters, 8–20 mm diam., 5-flowered; involucral bracts erect, inner petaloid, concave, white. Mainly Aug.–Oct. Sandy flats and lower slopes up to 1 000 m, mostly coastal sandveld, NS, CCR (Hondeklipbaai; Botterkloof to McGregor). **(gce)**

densa (Lam.) P.O.Karis Erect shrub, up to 2.5(–4) m tall, young branches whitish-woolly. Leaves often reflexed, twisted, linear to ovate, 2–15 mm long, with axillary tufts. Flowerheads discoid, several in often branched, terminal clusters, 10–90 mm diam., 3–5-flowered; involucral bracts erect or rarely spreading, outer brown below, inner petaloid, white sometimes brown. Mainly June–Oct. Sandy or stony flats and slopes, NS, NH, KB, CCR (Steinkopf to Cape Peninsula then to N Province).

namaquana P.O.Karis & N.A.Helme Rounded shrublet, up to 0.4 m tall, young branches white-woolly. Leaves spreading, linear, not twisted, 5–6 mm long, with minute axillary tufts. Flowerheads discoid, many in branched, terminal clusters, 15–20 mm diam., 3-flowered; involucral bracts erect, inner petaloid, concave, white, outer tipped reddish. Oct.–Nov. Rocky granite summits, KB (Kamiesberg Mountains: Stalberg). **(ece)**

[**Uncertain record M. muraltiifolia** DC. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

MYXOPAPPUS[2] 2 spp., Namibia and western South Africa

acutilobus (DC.) Källersjö Roughly and glandular-hairy annual, up to 300 mm tall, foetid, branching above and from below. Leaves bipinnatisect, 10–20 mm long, hairy and glandular. Flowerheads terminal, solitary on naked peduncles, discoid, yellow, 8–15 mm diam., corolla lobes attenuate; involucral bracts narrow, needle-like. Cypselas white, ribbed, with myxogenic

hairs in the grooves between; pappus crown-like. June–Sept. Sandy places, SN, G (Namibia and Gordonia to Steinkopf).

NESTLERA[2] 1 sp., winter rainfall region of South Africa **(gce)**

biennis (Jacq.) Spreng. Erect, closely leafy annual, up to 350 mm tall, branching above. Leaves linear, (5–)10–30 mm long, thinly to thickly felted, glandular-hairy, with revolute margins. Flowerheads solitary, sessile at branch tips, radiate, yellow, 10–20 mm diam.; inner involucral bracts with dry, recurved or spreading apiculus. Sept.–Oct. Sandy flats and lower slopes, mainly coastal, NS, KV, CCR (Hondeklipbaai to Hopefield). **(gce)**

NIDORELLA[2] (= *CONYZA* in part) VLEIKRUID ± 23 spp., southern and tropical Africa

ivifolia (L.) J.C.Manning & Goldblatt (= *Conyza scabrida* DC.) BAKBESEMBOSSIE, BAKBOS, BAKOONDBOS, KOORSBOS, OONDBOS, OVEN BUSH, SAFOOIBOS Slender shrub, with willowy branches, up to 2 m tall. Leaves petiolate, elliptic to lanceolate, 3-nerved from base, margins sharply serrate. Flowerheads disciform, in dense terminal corymbs, cream-coloured to pale yellow; outer female florets filiform; disc florets bisexual. Cypselas narrowly obovate, compressed, pubescent; pappus of numerous, whitish, scabrid bristles. Feb.–Nov. Near streams and in sandy streambeds, SN, G, WM, TS, CCR (Namibia, northern Namaqualand, Clanwilliam to Zimbabwe).

resedifolia DC. Erect, roughly hairy annual, with ascending branches, up to 0.9 m tall. Leaves oblanceolate, 15–50 mm long, sometimes pinnatifid, half-clasping at base. Flowerheads disciform, clustered in small, dense corymbs, yellow, 3–5 mm diam. Sept.–Apr. Roadsides, alluvium and grassland, SN, G, CCR (lower Gariep; widespread through southern and tropical Africa).

[**Taxonomic note** Molecular analysis shows that all of the native African species of *Conyza* Less. (Astereae: Conyzinae) are misplaced here and that all, except *Conyza gouanii* (L.) Willd., belong in subtribe Grangeinae (Nesom & Robinson 2007; Brouillet *et al.* 2009). Here they are readily accommodated in the African genus *Nidorella* Cass., with which they conform in their heterogamous capitula with filiform, female-fertile marginal florets, epaleate receptacle, and numerous pappus bristles. Local treatments of the family have recognised the close similarity between African species of *Conzya* and *Nidorella* by relying solely on the colour of the marginal florets (whitish or pale yellow in *Conyza* vs. bright yellow in *Nidorella*) to separate them (Hilliard 1977; Herman *et al.* 2000). Manning & Goldblatt (2012) accordingly make the necessary transfers from *Conyza* to *Nidorella*.]

NOLLETIA[1] 10 spp., Africa

gariepina (DC.) Mattf. Dwarf shrub, up to 0.6 m tall, densely covered with spreading hairs and occasionally a few small glands. Leaves alternate, laxly arranged along stems, linear to oblong. Flowerheads disciform, solitary, terminal; ray florets short, flattened, yellow; disc florets yellow. Pappus of barbellate bristles. Aug.–Nov. Sandy or rocky upland areas, G (central Namibia through to Richtersveld and Gordonia).

OEDERA[2] (= *RELHANIA* in part) PERDEKAROO 18 spp., Namaqualand to E Cape

conferta (Hutch.) Anderb. & K.Bremer Much-branched, cushion-forming shrub, up to 0.25 m tall. Leaves spreading, crowded in upper parts, spathulate-obovate, 4–5 mm long, gland-dotted and sticky, margin ± shortly pubescent, tip shortly mucronate. Flowerheads terminal, 1(2), radiate, yellow, ± 5 mm diam., receptacle paleate, florets glandular hairy around middle. Dec. Rock crevices on granite slabs, KB (Kamiesberg Mountains: Sneeukop and Rooiberg). **(ece)**

genistifolia (L.) Anderb. & K.Bremer GOMBOSSIE, KLEINPERDEKAROO Erect shrub, up to 1 m tall, densely leafy on young parts. Leaves erect or spreading, often recurved at tips, linear-oblanceolate, (5–)8–14 mm long, glabrous or subglabrous, often gummy above. Flowerheads few to several in dense terminal umbels, radiate, yellow, 5–8 mm diam., receptacle paleate, florets glandular-hairy around middle. Aug.–Nov. Shale, clay and granite slopes in renosterveld, NH, KB, WM, TS, CCR (Steinkopf to Nuwerus, Hantam and Bokkeveld Mountains to E Cape).

nordenstamii (K.Bremer) Anderb. & K.Bremer Twiggy shrublet, up to 0.5 m tall, leafy on young parts. Leaves spreading, mostly tufted on short shoots, linear-oblong, 4–12 mm long, channelled, sometimes flat, glandular-punctate and gummy. Flowerheads few in terminal umbels, radiate, yellow, 5–8 mm diam., receptacle paleate, florets glandular-hairy around middle. Nov. Rocky mountain summit, G (Richtersveld). **(ece)**

sedifolia (DC.) Anderb. & K.Bremer Erect shrub, up to 1 m tall, leafy on young parts. Leaves suberect to spreading, linear or subterete, (5–)10–13 mm long, glabrescent, glandular-punctate and gummy. Flowerheads subsessile and solitary at branch tips, radiate, yellow, 10–15 mm diam., receptacle paleate, florets glandular-hairy around middle. Mainly Aug.–Dec. Rocky granite and sandstone slopes, NH, KB, TS, CCR (Steinkopf through Kamiesberg Mountains to Kliprand, Bokkeveld Mountains through Tanqua Karoo to Witteberg Mountains). **(gce)**

silicicola (K.Bremer) Anderb. & K.Bremer Shrublet, up to 0.5 m tall, leafy on young parts. Leaves spreading, oblong-triquetrous, 2–7 mm long, glabrescent or sparsely tomentose. Flowerheads subsessile and solitary or paired at branch tips, radiate, yellow, 5–8 mm diam., receptacle epaleate, florets glandular-hairy around middle. Sept.–Oct. Quartzite outcrops, KV (Koekenaap and Holrivier). **(ece)**

ONCOSIPHON[2] STINKKRUID 7 spp., southern Africa, mainly winter rainfall region

A. Involucral bracts woolly

grandiflorus (Thunb.) Källersjö GROOTSTINKKRUID Erect, aromatic annual, up to 450 mm tall. Leaves bipinnatisect, (10–)20–50 mm long, thinly hairy. Flowerheads solitary on stout peduncles, rarely few arranged subcorymbosely, discoid, yellow to orange-yellow, (8–)10–18 mm diam.; involucral bracts woolly. Aug.–Nov. Sandy and stony flats and lower slopes, SN, G, NS, NH, KV, WM, TS, CCR (southern Namibia through Namaqualand and western Karoo to Melkbosstrand).

A.' Involucral bracts ± glabrous

piluliferus (L.f.) Källersjö KAROOSTINKKRUID Erect, aromatic annual, up to 500 mm tall. Leaves bi- to tripinnatisect, 10–50 mm long, thinly hairy. Flowerheads solitary on slender peduncles, rarely few arranged subcorymbosely, discoid, yellow, 5–10 mm diam.; involucral bracts glabrous or subglabrous. Aug.–Dec. Dry stony or sandy slopes and flats, often disturbed soil, NS, NH, WM, TS, CCR (southern Namibia through Namaqualand and western Karoo to Ceres, Little and Great Karoo to E Cape and Free State).

sabulosus (Wolley-Dod) Källersjö (including **O. schlechteri** (Bolus) Källersjö) Erect or decumbent perennial, with densely leafy stems, up to 250 mm tall. Leaves leathery, oblanceolate, 10–20 mm long, entire or apically shortly lobed or toothed, thinly hairy. Flowerheads few in rounded terminal corymbs, discoid, yellow, 5–7 mm diam.; involucral bracts subglabrous. Oct.–Nov. Littoral sands, NS, CCR (Groenrivier Mouth to Lambert's Bay). **(gce)**

suffruticosus (L.) Källersjö STINKKRUID, WURMBOSSIE Erect or sprawling, often much-branched, aromatic annual, up to 500 mm tall. Leaves bi- to tripinnatisect, (10–)20–80 mm long, thinly or more densely hairy. Flowerheads several to many in dense rounded or flat-topped corymbs, discoid, yellow, 4–6 mm diam.; involucral bracts glabrous. Sept.–Dec. Sandy flats and slopes, often coastal, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia and western Karoo to George). **(gce)**

ORBIVESTUS[2] (= *VERNONIA* in part) 5 spp., Africa

obionifolius (O.Hoffm.) J.C.Manning (= *Vernonia obionifolia* O.Hoffm.) Silvery-grey, aromatic shrub, up to 1.5 m tall, leafy on young parts. Leaves petiolate, obovate-oblanceolate, 10–25 mm long, runcinate or irregularly toothed to lobed, silvery-felted. Flowerheads in umbellate corymbs at branch tips, discoid, purple, 8–10 mm diam. May–Sept. Rocky outcrops, G (Namibia to Richtersveld and Bushmanland).

[**Taxonomic notes** The genus *Vernonia* Schreb. has been recircumscribed to include only western hemisphere (New World) species, with the eastern hemisphere (Old World, including African)

taxa segregated among 14 other genera (Robinson 1999). This generic survey was admittedly preliminary and some of the transfers of names from *Vernonia* were not made. Among them is the single species from the Greater Cape Floristic Region, *V. obionifolia* O.Hoffm. This species is closely allied to *V. cinerascens* Sch.Bip., now treated in the small genus *Orbivestus* H.Rob. The relevant combinations for *V. obionifolia* in that genus are provided here:

Orbivestus obionifolius (O.Hoffm.) J.C.Manning, comb. nov.

Vernonia obionifolia O.Hoffm. in *Bot. Jahrb.* 272 (1889).

Orbivestus obionifolius subsp. **dentatus** (Merxm.) J.C.Manning, comb. nov.

Vernonia obionifolia subsp. *dentata* Merxm. in *Mitt. Bot. Staatssamml. München* 3: 608 (1960).]

OSTEOSPERMUM[1] (see also TRIPTERIS) BIETOU ± 48 spp., mainly Africa, Middle East (2 spp.)

A. Plants annual

acanthospermum (DC.) Norl. ONKRUIDBIETOU Prostrate or decumbent, thinly hairy annual, up to 150 mm tall. Leaves alternate, basal ones petiolate, upper ones sessile, oblanceolate, margins serrate-dentate to pinnatifid-dentate. Flowerheads shortly radiate, small, solitary at branch tips; ray and disc florets pale yellow. Cypselas spiny. Aug.–Oct. Gravel and sandy flats, NH, WM, TS, CCR (northern Namaqualand, Bokkeveld Plateau, Roggeveld Escarpment and ?Fraserburg to Hex River Valley).

calendulaceum L.f. (= *Oligocarpus calendulaceus* (L.f.) Less.) BOEGOEBOSSIE Sprawling, foetid annual, up to 400 mm tall. Leaves oblanceolate, toothed, 10–40 mm long. Flowerheads few at branch tips, radiate, yellow, 10 mm diam. Cypselas mostly irregularly warty. June–Dec. Dry rocky hills and flats, TS, CCR (Worcester through drier parts of South Africa to KwaZulu-Natal).

A.' Plants perennial
B. Branches rigid and usually spinescent at tips

armatum Norl. Spiny, intricately branched shrub, up to ± 300 mm tall. Leaves alternate, tightly arranged on stems, linear, apex pungent, under surface grooved and densely clothed with greyish wool. Flowerheads radiate, solitary, pedunculate; ray florets long, yellow; disc florets yellow. Cypselas 3-winged; pappus absent. Sept. Rocky places, G, NH (Richtersveld to northern Namaqualand and Bushmanland).

leptolobum (Harv.) Norl. Shrublet, up to ± 0.6 m tall, occasionally spinescent. Leaves alternate, 3–5-dentate or pinnate or 3–7-partite, axis and lobes linear and semi-terete, upper ones almost entire, densely glandular viscid. Flowerheads radiate, solitary, subsessile or shortly pedunculate; ray florets long, yellow, occasionally striped purplish below; disc florets yellow. Cypselas 3-winged. Aug.–Sept. Sandy situations, WM, TS (Namibia, Roggeveld through Karoo to NW Province and Free State).

spinescens Thunb. Much-branched, spinescent shrub or dwarf shrub, 0.5–1 m tall. Leaves alternate, glandular-viscid, glaucous, linear to linear-spathulate, apex (2)3-fid or dentate, occasionally entire. Flowerheads radiate, solitary, pedunculate; ray florets long, yellow, occasionally purple underneath; disc florets yellow. Cypselas 3-winged. Aug.–Nov. Dry riverbanks or riverbeds in sandy soils, NH, WM, TS, CCR (Namibia through eastern Namaqualand and Karoo to NW Province and Free State).

B.' Branches weak or rigid but never spinescent

bidens Thunb. Thinly woolly perennial from woody rootstock, up to 0.6 m tall. Leaves crowded at base, linear-oblanceolate, margins revolute, toothed, discolorous, densely woolly below. Flowerheads radiate, in lax corymbs, yellow. Cypselas smooth, oblong. Sept.–Dec. Rocky flats and slopes, ?G, CCR (?near Gariep Mouth and Bokkeveld Mountains to Worcester). **(gce)**

grandiflorum DC. STINKBIETOU Roughly hairy, foetid shrublet, up to 0.8 m tall. Leaves alternate, petiolate, ovate to oblong, margins remotely dentate to pinnatifid-dentate, occasionally ± entire, upper ones narrowly elliptic to linear, sparsely dentate to entire. Flowerheads radiate, in

lax terminal corymbs; ray florets showy, 3–4 times longer than involucre, orange or yellow. Cypselas broadly 3-winged, large; pappus absent. July–Oct. Rocky slopes, sandy patches between rocks and sandy flats, G, NH, KB, KV, CCR (Richtersveld through Namaqualand to SW Cape). **(gce)**

karrooicum (Bolus) Norl. Shrub or dwarf shrub, up to 1 m tall. Leaves alternate, densely set along stems, glandular-hirsute, linear to oblanceolate-linear, main vein and occasionally lateral veins conspicuous, tip acute. Flowerheads radiate, solitary, pedunculate; ray florets long, orange-yellow; disc florets yellow. Cypselas 3-winged, occasionally some wingless with a solid apical beak. Aug.–Sept. Hillsides in sandy soils amongst rocks, SN, G, TS (southern Namibia and Richtersveld to Bushmanland and near Prince Albert).

rigidum Aiton Roughly hairy or prickly, stiffly branched shrublet, up to 0.6 m tall. Leaves alternate, sessile and half clasping at base, foetid, linear-lanceolate to linear, margins sparsely dentate or dentate-pinnatifid or pinnatipartite, lobes acute and pungent. Flowerheads radiate, solitary or corymbosely arranged at branch tips, pedunculate; ray florets long, yellow; disc florets yellow. Cypselas triangular and 3-winged or globular. June–Nov. Rocky slopes or amongst boulders, WM, TS, CCR (Bokkeveld Mountains through to Paarl, Witteberg Mountains and Roggeveld). **(gce)**

[**Taxonomic note** Recent molecular studies (Nordenstam & Källersjö (2009) on the Calenduleae indicated that the boundaries between *Oligocarpus* and *Osteospermum* need further study. Following Hilliard (1977), *Oligocarpus calendulaceus* is included in *Osteospermum*.]

OTHONNA[2] BOBBEJAANKOOL ± 140 spp., W Cape to KwaZulu-Natal and Namibia

A. Flowerheads disciform
B. Stemless or short-stemmed geophytes with ± basal leaves

taraxacoides (DC.) Sch.Bip. (= *Doria taraxacoides* DC.) Stemless, tuberous geophtye, up to 100 mm tall, with a woolly crown. Leaves rosulate, ± petiolate, cuneate-obovate to subreniform, mostly 20–30 × 8–20 mm, crenulate or incised with obtuse lobes, leathery, woolly in axils. Flowerheads solitary on mostly short scapes, disciform, yellow; involucre shallowly cup-shaped or almost flat, 8–15 mm diam., bracts ± 12, 6–8 × ± 2 mm. Aug. Gravel or quartz patches, G, NH (Richtersveld to Kamieskroon). **(ece)**

B.' Caulescent geophytes with leafy stems

tortuosa (DC.) Sch.Bip Like **O. undulosa** but ± erect with lower leaves narrowed below and ± petiolate or only slightly stem-clasping. Disc florets without pappus. July–Aug. Sandy slopes and flats, KV, CCR (Nuwerus to Doringbaai). **(gce)**

undulosa (DC.) J.C.Manning & Goldblatt (= *O. filicaulis* auct. non Jacq. including **O. chromochaeta** (DC.) Sch.Bip. and **O. diversifolia** (DC.) Sch.Bip.) BOBBEJAANKOOLKLIMOP Tuberous geophyte, with straggling stems, up to 0.7 m tall, woolly at crown, accessory basal leaves suborbicular-cordate with wiry petioles. Leaves lanceolate to rotund, cordate and stem-clasping, 20–100 × 5–50 mm, upper leaves smaller, entire but often undulate and slightly revolute. Flowerheads disciform, solitary and terminal or axillary, white or yellow; involucre campanulate, bracts 10–12, 5–8 × 1–2 mm. Cypselas ± 4 mm long, pubescent; pappus 10–20 mm long, often reddish-banded. May–Aug. Sandy flats and slopes, often coastal, SN, G, NS, NH, KV, WM, TS (southern Namibia through Namaqualand and western Karoo to southern Great Karoo and Uniondale). **(gce)**

B." Shrublets
C. Leaves ± cylindrical

carnosa Less. (including **O. sparsiflora** (S.Moore) B.Nord.) Brittle-stemmed shrublet, with sprawling or shortly erect stems, leafless below, mostly up to 0.3 m tall. Leaves alternate or uppermost opposite, fusiform, ascending, 20–30 × 2–3 mm. Flowerheads solitary on peduncles 30–70 mm long, disciform, yellow; involucre cup-shaped, 5–8 mm diam., bracts 7–9, 4–7 × 1.5–2 mm. Cypselas ± 2 mm long, glabrous; pappus ± 3 mm long. May–Sept. Rocky slopes, SN, G, WM, TS, CCR (southern Namibia to E Cape).

C.' Leaves flat
D. Flowerheads smaller, involucre 4–7 mm long

cyclophylla Merxm. Lax, ± polytomously branching shrublet, up to 1 m tall, with smooth, slender stems leafless except at ends, branchlets felted when young. Leaves mostly clustered at branch tips (rarely scattered on vigorously growing branches), shortly petiolate, oblanceolate, coarsely 3–5-toothed each side, mostly 20–30 × 3–10 mm, felted in axils. Flowerheads 1–4 in subumbellate clusters at branch tips, solitary on short peduncles ± 5 mm long, disciform, yellow; involucre narrowly campanulate, 3–4 mm diam., bracts 5, 4–7 × 2 mm. Cypselas ± 2 mm long, glabrous; pappus ± 6 mm long. Granitic hills, NH, KB (Concordia, Kamiesberg Mountains to Garies and Bushmanland).

daucifolia J.C.Manning & Goldblatt (= *O. abrotanifolia* (Harv.) Druce not of L.) Lax, ± trichotomously branching shrublet, up to 1 m tall, with smooth, slender stems leafless except at ends, oozing reddish resin when broken. Leaves clustered at branch tips, petiolate, pinnatisect or bipinnatisect, mostly 20–30 × 8–10 mm, lobes linear. Flowerheads forming subumbellate clusters at branch tips, solitary on wiry peduncles ± 20 mm long, disciform, yellow; involucre narrowly campanulate, 2–3 mm diam., bracts 5, 4–7 × 1 mm. Cypselas ± 4 mm long, striate-pubescent; pappus ± 8 mm long. Granitic and quartzitic hills, G, NH, WM (Richtersveld to Springbok, Kamiesberg Mountains, Aggenys to Loeriesfontein).

euphorbioides Hutch. Succulent, mound-forming shrublet, up to 0.15 m tall, with swollen, caudiciform stem. Leaves crowded at branch tips, oblanceolate-obovate, narrowed to a petiole-like base, mostly 10–40 × 5–10 mm, woolly in axils. Flowerheads forming subumbellate clusters at branch tips, 1 or 2 on stiff peduncles that become spinescent to form simple or bifurcate thorns 15–30 mm long, disciform, greenish yellow; involucre campanulate, ± 5 mm diam., bracts 5, ± 4 × 1.5 mm. Cypselas 1.25 mm long, glabrous but striate-scabridulous; pappus 2–3 mm long. July–Nov. Cracks in granite domes, NH, KB (Steinkopf and Bushmanland to Kamiesberg Mountains).

graveolens O.Hoffm. Di- or trichotomously branched, brittle-stemmed shrublet, up to 0.6 m tall, with stems leafless below. Leaves obovate-cuneate, narrowed to a petiole-like base, mostly 15–40 × 5–15 mm, toothed or runcinate, yellowish green. Flowerheads in subumbellate clusters at branch tips, solitary on wiry peduncles 30–40 mm long, disciform, yellow; involucre narrowly campanulate, 3–5 mm diam., bracts 5, ± 5 × 1.5 mm. Cypselas ± 2.5 mm long, striate-puberulous; pappus ± 10 mm long. Feb.–May. Arid rocky, often quartz, ridges, SN, G (southern Namibia to Richtersveld). **(ece)**

D.' Flowerheads larger, involucre 5–12 mmm long

arbuscula (Thunb.) Sch.Bip. (including **O. divaricata** Hutch.) TRAAP Di- or trichotomously branched, brittle-stemmed shrublet, up to 2 m tall, with stems leafless below, thinly or densely woolly on young parts. Leaves obovate-oblanceolate, narrowed to a petiole-like base, mostly 15–40 × 5–13 mm, entire or coarsely toothed. Flowerheads solitary on short or longer peduncles 10–20(–70) mm long, usually several at each branch tip, disciform, yellow; involucre narrowly campanulate, 5–8 mm diam., bracts 5–8, 8–12 × 2–3 mm. Cypselas ± 2.5 mm long, appressed-hairy; pappus 10–15 mm long. Mainly May–Oct. Dry rocky slopes, NH, KB, KV, WM, TS, CCR (Springbok to Kamiesberg Mountains, Knersvlakte, Hantam to Worcester, Laingsburg to Hanover).

lasiocarpa (DC.) Sch.Bip. (including **O. furcata** (Lindl.) Druce) Shrublet, up to 0.5 m tall, with swollen, caudiciform stem. Leaves crowded at branch tips, oblanceolate-obovate, narrowed to a petiole-like base, mostly 15–40 × 5–10 mm, sometimes with a few teeth. Flowerheads solitary at branch tips on stout peduncles 20–70 mm, disciform, yellow; involucre campanulate, ± 8 mm diam., bracts 5–7, 7–12 × 2–3 mm. Cypselas 4–7 mm long, densely hairy; pappus 15–20 mm long. July–Sept. Clay and stony flats and lower slopes, SN, G, NS, NH (northern Namibia to Springbok).

retrofracta Jacq. (including **O. lobata** Schltr.) Shrublet, up to 0.2 m tall, with a tuberous, caudiciform stem and slender, spreading or recurved branches, leafless except at tips. Leaves clustered at branch tips, oblanceolate, mostly 20–40 × 5–20 mm, entire or more usually pinnatifid, often woolly in axils. Flowerheads 1–few on peduncles 20–50 mm long, disciform, yellow or tipped reddish; involucre cup-shaped, 5–8 mm diam., bracts ± 5, 5–8 × 1–2 mm. Cypselas ± 4 mm, striate-pubescent; pappus 12–15 mm long. May–Oct. Rocky slopes, G, NS, NH, KB, TS, CCR (Richtersveld and Bushmanland to Laingsburg and Little Karoo to Caledon).

rhamnoides Sch.Bip. (= *Doria rigida* (Thunb.) Harv., *Doria spinescens* DC.) Twiggy shrublet, up to 600 mm tall, branches pale grey, minutely fissured, becoming thorny. Leaves on short-shoots, often clustered, subsessile, minutely woolly in axils, obovate, 7–15 × 4–6 mm, entire or with 1 or 2 pairs of minute denticles distally. Flowerheads 1 at branch tips, on peduncles 10–15 mm long, disciform, yellow; involucre narrowly campanulate, ± 5 mm diam., bracts 5–7, 8–10 × 2–3 mm. Cypselas ± 5 mm long, striate-pubescent; pappus 12–15 mm long. Aug.–Sept. Stony calcrete flats, WM (Roggeveld to Sneeuberg).

sp. A Erect shrub with rod-like stems, up to 2 m tall, bearing numerous spur-shoots. Leaves clustered on spur-shoots, oblanceolate, narrowed to a petiole-like base, mostly 10–30 × 4–10 mm, leathery, margins slightly recurved. Flowerheads forming subumbellate clusters on spur-shoots, solitary on short peduncles 10–20 mm long, disciform, yellow; involucre cylindrical-campanulate, 6–8 mm diam., bracts connate in lower half, 7–10 × 2–3 mm. Cypselas ± 4 mm long, striate-pubescent; pappus ± 20 mm long. Apr.–May. Rocky slopes, NH (Concordia and Springbok). **(ece)**

A.' Flowerheads radiate
E. Geophytes; involucral bracts 6–14 mm long
F. Ray florets pink to purple

cakilifolia DC. Like **O. rosea** but leaves 'antler-like', deeply pinnatisect with narrow, obtuse lobes, very fleshy. July–Sept. Sandy flats or quartz outcrops, KV (Nuwerus to Vredendal). **(ece)**

rosea Harv. (= *O. incisa* Harv.) Tuberous geophyte, with erect or straggling stem, up to 0.6 m tall, woolly at crown. Leaves variously developed at flowering, oblanceolate to obovate, 30–100(–200) × 20–50(–100) mm, lower often narrowed below and with woolly axils, upper leaves smaller and becoming bract-like, sometimes stem-clasping, entire or with scattered small teeth or incised with the lobes apiculate. Flowerheads 1–4 in loose corymbs (up to 14-flowered if axillary buds develop), radiate; ray florets mauve to purple; disc florets mauve or yellow; involucre campanulate, 8–10 mm diam., bracts 8–12, 6–12 mm long. Cypselas 3–5 mm long, pubescent; pappus 5–8 mm long. May–Aug. Stony slopes and rocky crevices, G, NH (Richtersveld to Nuwerus). **(ece)**

F.' Ray florets yellow (rarely white)
G. Flowerheads solitary on unbranched peduncles; ray florets dark beneath; mature pappus >10 mm long

auriculifolia Licht. ex Less. Stemless or short-stemmed, tuberous geophyte, up to 150 mm tall, with a woolly crown. Leaves sometimes emergent at flowering, rosulate or basally congested, ± petiolate, oblanceolate to obovate-suborbiculate, mostly 30–60 × 10–40 mm, serrate or variously incised to pinnatifid, mostly with serrated lobes, leathery, rarely with bristles on upper surface, margins slightly revolute, woolly in axils. Flowerheads solitary on stiff, naked peduncles, radiate; ray florets yellow (rarely white) and usually with red or dark reverse; disc florets yellow or black; involucre shallowly cup-shaped, 10–15 mm diam., bracts 10–12, 8–10 × 1.5–2.5 mm. Cypselas 4–5 mm, pubescent; pappus 15–25 mm long. Apr.–Sept. Stony clay slopes and flats, KV, WM, TS, CCR (Vanrhynsdorp, Bokkeveld and Hantam through W Cape mountains and Roggeveld to Little Karoo and Graaff-Reinet).

G.' Flowerheads on branched peduncles; ray florets plain yellow; mature pappus 4–6 mm long

cuneata DC. Short-stemmed, tuberous geophyte, up to 0.3 m tall, with turnip-shaped root felted at apex. Leaves congested on a short-stem, cuneate-lyrate, narrowed to a petiole-like base and auriculate, mostly 30–70 × 20–40 mm, apex coarsely dentate or undulate-incised. Flowerheads on 1–4-branched terminal and axillary peduncles up to 200 mm long, radiate, yellow; involucre campanulate, 8–10 mm diam., bracts 10–15, 8–14 × 1.5–2 mm. Cypselas ± 4 mm, pubescent; pappus 5–6 mm long. Aug.–Sept. Stony flats, NH, KV (Garies to Vanrhynsdorp). **(ece)**

intermedia Compton Stemless or short-stemmed, tuberous geophyte, up to 0.15 m tall, with a woolly crown, often clump-forming. Leaves rosulate or basally congested, obovate-cuneate, entire, 15–70 × 12–40 mm. Flowerheads on short, leafy peduncles, solitary in axils of leafy bracts, up to 3 per peduncle, radiate, yellow; involucre campanulate, 8–10 mm diam., bracts 8–11, 8–10 × 1.5–2 mm. Cypselas ± 3 mm long, pubescent; pappus ± 4 mm long. (May)June–July(Sept.) Quartz patches, KV (Knersvlakte). **(ece)**

macrophylla DC. (including **O. ovalifolia** Hutch.) Short-stemmed, tuberous geophyte, up to 0.6 m tall, with turnip-shaped root felted at apex. Leaves congested, ovate-elliptic, sessile, mostly 50–200 × 50–150 mm, minutely and sparsely denticulate or coarsely runcinate. Flowerheads in lax corymbs on branched peduncles, radiate, yellow; involucre campanulate, 8–10 mm diam., bracts 10–15, 8–14 × 1.5–2 mm. Cypselas 5–7 mm long, striate-pubescent; pappus 5–6 mm long. July–Sept. Stony slopes, G, NH (Richtersveld to Nuwerus). **(ece)**

E.' Twiggy shrublets with stiff, woody stems; leaves often on short-shoots or in axillary tufts, lanceolate to oblanceolate; flowerheads 1(–3) per peduncle

coronopifolia L. SANDBOBBEJAANKOOL Shrublet or shrub, up to 1.5 m tall, sometimes gnarled and dwarfed, but usually erect and twiggy with smooth, pale brown or grey stems. Leaves usually in tufts on short branches, oblanceolate and narrowed to a petiole-like base, (10–)20–60 × 3–7 mm, entire or sparsely toothed, leathery, with woolly axils. Flowerheads 1(2) on naked peduncles mostly 50–150 mm long, at branch tips, radiate, yellow; involucre cup-shaped, 10–15 mm diam., bracts 8–10, 7–10 × 2 mm. Cypselas 4–5 mm long, pubescent; pappus ± 15 mm, tawny-banded. July–Nov. Sandy flats, mainly coastal, NS, KV, CCR (Kleinsee to Cape Peninsula). **(gce)**

leptodactyla Harv. Like **O. coronopifolia** but leaves narrowly lanceolate, often irregularly lobed, unlobed portion mostly 2–4 mm wide. Aug.–Sept. Rocky slopes and sandy flats, mainly inland, KB, KV, CCR (Kamiesberg Mountains, Knersvlakte to Piketberg). **(gce)**

pteronioides Harv. Divaricately branched, spinescent shrublet, up to 1 m tall, with twigs ending in thorns. Leaves scattered and in axillary tufts, ellipsoid, fleshy, 5–8 × 2–4 mm. Flowerheads solitary on the axillary tufts, subsessile or peduncles up to 5 mm long, radiate, yellow; involucre cup-shaped, ± 8 mm diam., bracts 6–8, ± 5 × 1.5–2 mm. Aug. Stony slopes, TS (southern Tanqua Karoo and Laingsburg). **(ece)**

ramulosa DC. (including **O. mucronata** Harv.) Like **O. coronopifolia** but usually densely branched with leaves mostly < 25 mm long, mucronate, and peduncles shorter, mostly < 50 mm long, usually becoming spinescent with age. May–Sept. Rocky karroid slopes, TS, CCR (Swartruggens to Touwsrivier and Little Karoo). **(gce)**

E." Brittle-stemmed shrublets or subshrubs with succulent, ovoid to fusiform leaves; bracts often purple-streaked; cypselas with appressed hairs thus appearing glabrous

cylindrica (Lam.) DC. Brittle-stemmed shrublet with woody stems leafless below, 0.3–1 m tall. Leaves alternate or uppermost opposite, fusiform, ascending, (20–)30–80 × 2–3 mm. Flowerheads mostly few to several in lax, pedunculate corymbs, radiate, yellow; involucre cup-shaped, 5–8 mm diam., bracts 7–9, 4–7 × 1.5–2 mm. Cypselas ± 2 mm long, appressed-hairy; pappus ± 3 mm long. Mainly July–Oct. Sandy (or gravelly) flats, mainly coastal, SN, NS, NH, KV, CCR (southern Namibia to Yzerfontein). **(gce)**

floribunda Schltr. Like **O. cylindrica** but leaves bright green and flowerheads deep orange-yellow. Mainly July–Sept. Stony slopes, NH (Garies to Bitterfontein). **(ece)**

opima Merxm. Multi-stemmed, rounded, succulent shrublets, up to 0.9 m tall. Leaves alternate, cylindrical, obtuse or apiculate, mostly 60–100 × 8–10 mm. Flowerheads several in lax corymbs on long, minutely scaly peduncles, radiate, yellow, trimorphic with a series of bisexual disc florets between the male-fertile central florets and the female-fertile rays; involucre cup-shaped, ± 8 mm diam., bracts 8–10, ± 8 × 2–3 mm. Cypselas ± 2 mm long, appressed-hairy; pappus ± 3 mm long. Sept. Rocky slopes, SN, G (southern Namibia to Richtersveld). **(ece)**

protecta Dinter (including **O. crassicaule** Compton) Pachycaul shrublet with cylindrical or barrel-shaped, succulent stems, up to 0.3 m tall, branching shortly above. Leaves crowded at branch tips, cylindrical, 40–100 × 2–3 mm. Flowerheads few in lax pedunculate corymbs, radiate, yellow; involucre cup-shaped, ± 8 mm diam., bracts 8–10, 6–8 × 1.5–2 mm. Cypselas 2.5 mm long, appressed-hairy; pappus ± 4 mm long. July–Aug. Gravelly flats under shrublets, especially spiny *Ruschia* spp., SN, G, NH, NS, WM, TS, CCR (central Namibia through Bushmanland, Namaqualand and western Karoo to Little Karoo).

rechingeri B.Nord. Tuberous-rooted perennial with globular tuber and erect flowering stems, up to 0.2 m tall and arching, stoloniferous vegetative stems that develop tubers at tips where they touch the ground. Leaves scattered on vegetative shoots, secund, cylindrical-fusiform, mostly 15–30 × 1–2 mm. Flowerheads few in lax corymbs on sparsely leafy peduncles, radiate, yellow;

involucre cup-shaped, ± 8 mm diam., bracts 8–10, 6–8 × 1.5–2 mm. Cypselas 2.5 mm long, appressed-hairy; pappus ± 4 mm long. July–Sept. Clay flats, quartz and gravel patches, G, NS, KV, WM (Richtersveld to Knersvlakte, Hantam and Roggeveld). **(ece)**

sedifolia DC. Brittle-stemmed shrublet, with slender stems, leafless below, up to 0.5 m tall. Leaves alternate or opposite, obovoid and shortly petiolate, 5–15 × 2–5 mm. Flowerheads mostly solitary on slender peduncles, radiate, yellow; involucre cup-shaped, 5–8 mm diam., bracts 7–9, 4–7 × 1.5–2 mm. Cypselas ± 2 mm long, appressed-hairy; pappus ± 3 mm long. (May)June–Aug.(Sept.). Rocky slopes, SN, G, NH (Klinghardt Mountains, Richtersveld to Garies and Bushmanland).

E.''' Subsucculent shrublets with obovoid or clavate leaves; heads solitary; cypselas evidently pubescent

clavifolia Marloth Dwarf, rounded or cushion-forming, caudiciform shrublet, with highly branched stem, up to 100 mm tall. Leaves crowded at branch tips, obovoid or clavate, 15–40 × 6–8 mm, highly succulent. Flowerheads solitary on peduncles 25–60 mm long, radiate, yellow; involucre campanulate, 6–8 mm diam., bracts 6–8, 5–6 × 1–1.5 mm. Cypselas ± 2 mm long, pubescent; pappus ± 3 mm long. Apr.–July. Gravelly and stony flats and slopes, SN, G (Lüderitz to Grootderm). **(ece)**

E.'''' Subsucculent shrublets with ± flattened leaves
H. Short-stemmed shrublets with knobbly stems covered in accrescent leaf bases that are hard, swollen, often shiny, and tubercle- or scale-like

armiana Van Jaarsv. Tuberous, cushion-forming shrublet, with a turnip-shaped root, stem well-branched, extending shortly above ground and flattened, covered with hard, conical, tubercle-like leaf bases. Leaves tufted, broadly obovate-cuneate, narrowed to a petiole-like base, 5–20 mm diam., leathery, entire or laxly serrate. Flowerheads on one or more branched peduncles up to 100 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts ± 8, 5–7 × 1–2 mm. Cypselas ± 1.5 mm long, pubescent; pappus ± 4 mm long. Feb.–May. Rock outcrops, G (Eksteenfontein: Rooiberg). **(ece)**

herrei Pillans Shrublet, with branched stem, up to 200 mm tall, covered with hard, conical, tubercle-like leaf bases. Leaves tufted, obovate-spathulate, narrowed to a petiole-like base, 40–70 × 15–30 mm, irregularly toothed and crispulate-undulate, thinly leathery or submembranous. Flowerheads on one or more branched peduncles up to 100 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts 6–8, 5–7 × 1–2 mm. May–July. Rock outcrops, G (Eksteenfontein area). **(ece)**

lepidocaulis Schltr. Shrublet, with branched stem, up to 200 mm tall, covered with hard, glossy, pale yellowish or ivory, scale-like leaf bases (resembling a maize-cob). Leaves tufted, oblanceolate, narrowed to a petiole-like base, 35–90 × 4–15 mm, entire or irregularly toothed, leathery. Flowerheads on one or more, branched peduncles up to 200 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts ± 8, ± 3 × 1 mm. May–July. Stony flats, NH, KV (Nuwerus and Knersvlakte). **(ece)**

pavelkae Lavranos Tuberous shrublet, with a turnip-shaped root, stem 1–3-branched and extending up to 120 mm above ground, covered with conical, tubercle-like leaf bases. Leaves tufted, broadly obovate-cuneate, narrowed to a petiole-like base, 40–60 × 30–50 mm, leathery. Flowerheads on one or more, well-branched peduncles up to 200 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts 5 or 6, ± 5 × 1.5 mm. Aug.–Oct. Rock outcrops, NH (Steinkopf). **(ece)**

H.' Dwarf caudiciform shrublets with leaf bases either fibrous, or smooth and encircling most of the stem but never tubercle- or scale-like
I. Flowerheads large, with bracts 6–8 mm long

cremnophila B.Nord. & Van Jaarsv. Succulent shrublet, 0.2–0.6 m tall, with a cylindrical, sparingly-branched stem, densely woolly at tips. Leaves in rosettes at branch tips, obovate, shortly petiolate, 30–80 × 25–40 mm, crispulate-undulate, glaucous. Flowerheads 6–15 in lax corymbs on naked peduncles up to 100 mm long, radiate, yellow; involucre campanulate, 8–10 mm diam., bracts 5–8, 6–8 × 2.5 mm. Cypselas 4–5 mm, striate pubescent; pappus 4–6 mm long. Nov.–Mar. Quartzite cliffs, 700–1 000 m, G (Richtersveld: Rosyntjieberg). **(ece)**

quercifolia DC. (including **O. macrosperma** DC., **O. obtusiloba** Harv., **O. pachypoda** Hutch.) Succulent shrublet, up to 0.4 m tall, with swollen, caudiciform stem and gnarled branches. Leaves crowded at branch tips, petiolate, oblanceolate, mostly 20–50 × 10–20 mm, variously toothed to lobed, woolly in axils. Flowerheads 1–few in lax, pedunculate corymbs, radiate, yellow; involucre campanulate, ± 8 mm diam., bracts 5, 8–10 × ± 3 mm. Cypselas 4–5 mm long, densely pubescent; pappus 15–20 mm long. May–Sept. Sandstone and granite outcrops, G, NH, KV, CCR (Richtersveld to Springbok, Cederberg Mountains and Swartruggens to Tygerberg). **(gce)**

I.' Flowerheads small, with bracts ± 5 mm long, usually dark-tipped

hallii B.Nord. Caudiciform, dwarf shrublet, with 1–few-branched caudex with a minutely woolly crown, shortly exserted and then covered with dry leaf remains. Leaves tufted, oblanceolate, 20–80 × 5–20 mm, entire, very fleshy. Flowerheads 1–few on naked peduncles up to 200 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts 5–8, dark tipped, ± 5 × 1–1.5 mm. Cypselas ± 2 mm long, pubescent; pappus ± 2 mm long. May–Aug. Gravel and quartz patches, KV (Knersvlakte). **(ece)**

retrorsa DC. (= *O. zeyheri* Sond. ex Harv.) Dwarf, cushion-forming shrublet, with many-headed caudex with a woolly crown and covered with leaf rosettes, shortly exserted and covered with accumulating dry leaf remains. Leaves rosulate, oblanceolate, 10–60 × (2–)6–15 mm, apiculate, leathery and striate-reticulate, margins slightly thickened and cartilaginous, sparsely to densely spinulate with patent or retrorse teeth, woolly in axils. Flowerheads (1)2–5 on elongated, minutely scaly peduncles up to 300 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts 5–8, dark tipped, ± 5 × 1–1.5 mm. Cypselas 2–3 mm long, pubescent; pappus ± 2 mm long. Aug.–Sept. Rocky slopes and gravel patches on granite sheets, NH, KB (Springbok to Kliprand to Toringberg S of Kotzesrus). **(ece)**

wrinkleana Lavranos Caudiciform, dwarf shrublet, with 1–few-branched caudex with a minutely woolly crown, extending above ground up to 50 mm and then sheathed with enlarged leaf-bases. Leaves tufted, broadly cuneate-spathulate, narrowed below to a petiole-like stalk, entire, 20–40(–60) × 15–20 mm. Flowerheads 1–few on wiry, naked or minutely scaly peduncles up to 100 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts 5–8, dark tipped, ± 5 × 1–1.5 mm. Cypselas 2–3 mm long, pubescent; pappus ± 2 mm long. Aug.–Oct. Quartz patches, KV (Knersvlakte). **(ece)**

sp. B Tuberous shrublet, with a turnip-shaped rootstock and minutely woolly crown, scarcely extending above ground and then sheathed with enlarged leaf-bases. Leaves tufted, broadly cuneate-reniform and distinctly petiolate with petiole ± 20 mm long, blade entire, 15–20 × 20–40 mm. Flowerheads on naked peduncles up to 200 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts 5, ± 5 × 1.5 mm. Aug.–Sept. Gravelly and loamy slopes, NH (Nigramoep: Langhoogte). **(ece)**

sp. C Dwarf, caudiform shrublet, with 1–few-branched caudex with a woolly crown covered with accumulating dry leaf remains. Leaves rosulate, oblanceolate, 15–80 × 5–20 mm, apiculate, leathery, glaucous, margins slightly thickened and cartilaginous, entire or coarsely toothed, woolly in axils. Flowerheads (1)2–5 on elongated, minutely scaly peduncles up to 300 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts 5–8, dark tipped, ± 5 × 1–1.5 mm. Cypselas 2–3 mm long, pubescent; pappus ± 2 mm long. Apr.–Sept. Stony slopes, NS, NH (Steinkopf to Port Nolloth). **(ece)**

[**Poorly known species** **Senecio crassicaulis** Hutch. may be conspecific with **Othonna sp. A**]

PEGOLETTIA[1] DRAAIBOS 9 spp., Africa to India

gariepina Anderb. Shrub, up to 1 m tall, with young branches glandular below flowerheads. Leaves subsessile, small, elliptic, dentate to ± lobate, glabrous, appearing varnished. Flowerheads discoid, solitary on branch tips; involucral bracts with glandular midstripe; disc florets yellow or with purplish tinge, corolla lobes erect. Cypselas cylindrical, ribbed; pappus yellowish, of hairy bristles and large, deeply incised, bristle-like scales. (Mar.–)Sept.–Oct. In sand in rocky places or streambeds, G (southern Namibian Escarpment and Richtersveld). **(ece)**

oxyodonta DC. Erect subshrub or perennial herb, up to 1 m tall. Leaves sessile or shortly petiolate, lanceolate to narrowly oblong, large, > 25 mm long, covered with glandular hairs, margins sharply serrate. Flowerheads discoid, solitary or corymbosely arranged; disc florets plain yellow,

corolla lobes erect. Cypselas cylindrical, ribbed; pappus of barbellate bristles and small, obtuse scales. Aug.–Nov. Sandy soils among rocks or in riverbeds, SN, G (northern Namibia to Richtersveld and Gordonia).

plumosa M.D.Hend. Shrublet, up to 1 m tall. Leaves lanceolate to narrowly spathulate, bristly haired, especially on margins. Flowerheads discoid, solitary on branch tips; disc florets yellow, aging purplish, corolla lobes erect. Cypselas cylindrical, ribbed; pappus of plumose bristles and large, deeply incised scales. June–Aug. Stony areas and hillsides, G (southern Namibian Escarpment and SE Namibia).

retrofracta (Thunb.) Kies DRAAIBOS Twiggy shrublet, up to 0.6 m tall. Leaves shortly petiolate, small, narrowly elliptic to obovate. Flowerheads discoid, solitary or corymbosely arranged terminally; disc florets yellow or purplish, corolla lobes recurved. Cypselas cylindrical, ribbed; pappus of barbellate bristles and large, acuminate scales. Aug.–Nov. Sandy, gravelly or stony places on hill slopes, G, NS, NH, KB, TS, CCR (widespread in semi-arid western half of southern Africa).

PENTATRICHIA[2] 4 spp., southern Africa

petrosa Klatt Glandular-hairy shrub, up to 1 m tall. Leaves distinctly petiolate, suborbicular-cordate, blade 10–35 mm long, lobed and toothed, glandular-hairy. Flowerheads solitary at branch tips, in loose corymbs, discoid, yellow, 10–12 mm diam.; involucral bracts numerous, imbricate, narrow-acuminate, becoming squarrose. Pappus of few bristles, glabrous below becoming barbellate above. June–Sept. Rocky slopes, G (Namibia to Richtersveld and Groot Pellaberg).

PENTZIA[2] SKAAPKAROO ± 23 spp., southern and N Africa

A. Flowerheads aggregated in subumbellate corymbs

dentata (L.) Kuntze GROOTSKAAPKAROO Erect-stemmed shrublet, up to 600 mm tall, young branches densely grey felted. Leaves petiolate, cuneate, palmately toothed to lobed above, 5–8 mm long. Flowerheads discoid, obconical, yellow, 3 mm diam., 10–30 in dense, umbellate corymbs on peduncles 2–10 mm long; involucral bracts ovate, obtuse. Pappus ½ as long as cypsela. Mainly Aug.–Jan. Dry stony, often sandstone slopes, WM, CCR (Roggeveld and Upper Karoo through SW Cape to E Cape).

punctata Harv. Erect-stemmed shrublet, up to 1 m tall, young branches densely felted. Leaves petiolate, spathulate and digitately lobed or divided (twice-divided), ± 10 mm long, green, sparsely to densely hairy and glandular-punctate. Flowerheads discoid, globose, yellow, 5–8 mm diam., (2)3–10 in umbellate-corymbose clusters at branch tips of peduncles up to 30 mm long; involucral bracts ovate with dark margins. Pappus ⅓ as long as cypsela. Feb.–May. Stony flats, WM, TS (Hantam to Roggeveld, Tierberg and Upper Karoo).

A.' Flowerheads solitary on pedunculoid stems or branches
B. Involucre bracts narrowly ovate to ovate and obtuse

incana (Thunb.) Kuntze SKAAPKAROO Twiggy shrublet, up to 1 m tall, young branches silvery-felted. Leaves petiolate and (bi)pinnatisect, 5–8 mm long, thinly or densely greyish hairy. Flowerheads discoid, globose, yellow, 5–10 mm diam., solitary on slender peduncles 30–100 mm long; involucral bracts ovate, obtuse, broadly membranous. Pappus ± as long as cypsela. Mainly Nov.–Jan. Dry habitats, G, NH, KB, WM, TS, CCR (southern Namibia through Namaqualand to E Cape and Upper Karoo).

tortuosa (DC.) Fenzl ex Harv. Much-branched shrublet, with smooth, flexuose stems scarred by persistent leaf bases. Leaves alternate, ± rosulate, petiolate, cuneate with apex 3-lobed, scabrous. Flowerheads discoid, globose, yellow, 4–7 mm diam., solitary on slender peduncles 15–40 mm long; involucral bracts ovate, obtuse, broadly membranous. Pappus absent. Nov.–Jan. Rocky mountain summits, WM (Hantamsberg and Nuweveld Mountains to E Cape Drakensberg Mountains).

spinescens Less. Divaricately branched, spinescent shrublet, up to 0.5 m tall, young branches silvery felted. Leaves (bi)pinnatisect, 5–8 mm long, green, thinly hairy or glabrescent. Flowerheads discoid, globose, yellow, 8–10 mm diam., solitary on slender peduncles 10–50 mm long becoming spinescent after fruiting; involucral bracts narrowly ovate, obtuse, narrowly membranous,

with dark margins. Pappus ½ as long as cypsela. May–Oct. Stony flats and plateaux, WM, TS (Loeriesfontein through Hantam and Roggeveld to Matjiesfontein and Upper Karoo).

B.' Involucre bracts lanceolate and acute-acuminate or truncate

argentea Hutch. Gnarled subshrub, up to 1 m tall, young branches densely grey-felted. Leaves crowded at base of flowering stems, cuneate-flabellate, 5–16 mm long, lobed or toothed above, densely grey-felted. Flowerheads discoid, globose, yellow, 10–12 mm diam., solitary on stout, striate-hairy, pedunculoid stems 80–300 mm long; involucral bracts lanceolate, acute-acuminate, narrowly membranous. Pappus as long as cypsela. Jan.–July. Quartzite outcrops, G (southern Namibia and Gordonia through Bushmanland to Richtersveld).

lanata Hutch. Like **P. peduncularis** but leaves and peduncles glabrescent and glandular-papillate, and involucral bracts acute-acuminate. (Feb.)July–Sept. Stony flats and rocky hillsides, G, NH (Karas Mountains, Richtersveld to Springbok through Bushmanland to Upper Karoo).

peduncularis B.Nord. Gnarled subshrub, up to 1 m tall, young branches densely whitish felted. Leaves crowded at base of flowering stems, (bi)pinnatisect, 5–25 mm long, green, sparsely to densely hairy. Flowerheads discoid, globose, yellow, 10–15 mm diam., solitary on stout, striate-hairy, pedunculoid stems 80–300 mm long; involucral bracts lanceolate, truncate, narrowly membranous. Pappus as long as cypsela. July–Sept. Stony flats and dolomite outcrops, NH, KV (Bitterfontein to Knersvlakte). **(ece)**

PERDICIUM[2] 2 spp., winter rainfall region of South Africa **(gce)**

leiocarpum DC. Acaulescent, tufted perennial, up to 200 mm tall. Leaves radical, prostrate, lyrate-pinnatifid, 50–180 mm long, lobes rounded, glabrous or thinly cobwebby above but whitish-woolly beneath. Flowerheads solitary on naked scapes, obscurely radiate, 25–35 mm diam., white. Cypselas glabrous, beaked. Aug.–Sept. Gravelly and sandy slopes, KB, WM, CCR (Kamiesberg and Bokkeveld Mountains to Roggeveld to Cederberg Mountains). **(gce)**

?PHANEROGLOSSA[2] 1 sp., W Cape

[**Uncertain record P. bolusii** (Oliv.) B.Nord. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

PHYMASPERMUM[2] 19 spp., southern Africa

aciculare (E.Mey. ex Harv.) Benth. & Hook. ex B.D.Jacks. Loose shrublet, up to 0.8 m tall, leafy on young parts or leaves reduced. Leaves linear-lanceolate, 5–15 mm long, diminishing rapidly in size upwards, leathery, shortly pungent, tips sometimes recurved, concave above, leathery, glabrous. Flowerheads in loose corymbs on wiry peduncles terminating slender stems, sparsely radiate; ray florets white; disc florets yellow, 5–8 mm diam. Dec.–Apr. Rocky slopes, WM (Sutherland along the Escarpment to Cradock).

schroeteri Compton Compact, twiggy shrublet, up to 0.8 m tall, leafy on young parts. Leaves suberect, linear-oblanceolate, (5–)8–15 mm long, leathery, adpressed silvery-silky. Flowerheads solitary at branch tips on short peduncles, radiate; ray florets white; disc florets yellow, 10–20 mm diam. Aug.–Feb. Stony S-facing shale slopes, TS (Matjiesfontein: Ghaapkop). **(ece)**

PSEUDOGNAPHALIUM[1] ± 90 spp., cosmopolitan

*__luteo-album__ (L.) Hilliard & B.L.Burtt Greyish white, thinly woolly annual, decumbent and occasionally rooting at base, then erect, up to 0.5 m tall. Leaves sessile, oblanceolate, obtuse, becoming smaller and lanceolate to linear upwards, acute to acuminate, concolorous. Flowerheads disciform, in dense glomerules at tips of branches; involucral bracts palest golden-brown, buff or whitish; disc florets whitish, tipped reddish. Cypselas hairy; pappus of barbellate bristles. Mar.–Nov. Sandy or clayey soils near streams and marshes, often in gardens, SN, G, WM (introduced from southern Europe, widespread through southern Africa, cosmopolitan weed in temperate regions).

undulatum (L.) Hilliard & B.L.Burtt Much-branched, aromatic, grey-woolly annual, up to 0.5 m tall. Leaves narrowly lanceolate, apex acute, clasping at base and running down stem, often reaching lower node, discolorous, glabrescent and glandular above, white-woolly below. Flowerheads disciform, in dense corymbs; involucral bracts whitish; disc florets yellowish. Cypselas glabrous; pappus of barbellate bristles. Nov.–Apr. Damp grassy or rocky slopes, streamsides and riverbanks, KB, TS, CCR (central Namibia Kamiesberg and Bokkeveld Mountains to Port Elizabeth and southern Mozambique, southern Madagascar, naturalised in W Europe).

PTERONIA[1] GOMBOS ± 70 spp., mainly southern Africa, 1 sp. in Zimbabwe

A. Leaves alternate and scattered along stems or tufted on alternate short shoots

aspalatha DC. Slender shrublet, up to 0.6 m tall. Leaves alternate, sessile, small, linear-oblanceolate, glabrous, margins entire or rarely few-toothed. Flowerheads discoid, solitary at branch tips, obconical; involucral bracts oblong-linear to -lanceolate, acuminate, membranous, slightly hairy on outside; disc florets yellow. Cypselas shortly hairy; pappus yellowish white. Aug.–Oct. Sandy or shale flats or slopes, WM, TS (Hantam through to Touwsrivier, Laingsburg and near to Fraserburg). **(ece)**

camphorata (L.) L. SANDGOMBOS Slender, aromatic shrub, up to 1 m tall. Leaves alternate, in tufts or scattered, linear to filiform, long, acute, minutely bristly all over or glabrous, occasionally only margins ciliate with short white teeth. Flowerheads discoid, 1–few at branch tips, obconical; involucral bracts acute, shorter than florets, straw-coloured, shortly and closely ciliate; disc florets yellow. Cypselas glabrous; pappus straw-coloured. Sept.–Dec. Coastal to upland slopes, KB, CCR (Kamiesberg Mountains and Bokkeveld Escarpment through to SW Cape and E to Uniondale). **(gce)**

ciliata Thunb. BILTONGBOS, DRAAI T'NIBBIEBOS Twiggy shrub, 0.3–1 m tall. Leaves alternate, small, linear, glabrous, keeled below, fleshy. Flowerheads discoid, solitary at branch tips, contracted near mouth; involucral bracts rounded to obtuse at apex, margins ciliate; disc florets yellow. Cypselas densely short-haired; pappus brownish yellow. Sept.–Nov. Dry stony hills in sandy soils, G, NS, NH, KV, CCR (Namibia and Bushmanland through Namaqualand to Clanwilliam). **(gce)**

intermedia Hutch. & E.Phillips Shrub, up to 0.3 m tall. Leaves alternate, linear-oblong, apex obtuse, minutely bristly-ciliate to glabrous. Flowerheads discoid, solitary at ends of branches, contracted near mouth; involucral bracts with narrowly lacerate, membranous margins, apex rotund to obtuse; disc florets yellow. Cypselas densely long-haired. June–Nov. Flats and slopes, WM, TS (Calvinia to Karoopoort). **(ece)**

leucoclada Turcz. Shrub or dwarf shrub, up to 0.6 m tall, with smooth, white bark. Leaves small, scattered, alternate, occasionally tufted, club-shaped, obtuse, narrowed at base, fleshy, glabrous. Flowerheads terminal, solitary, obconical; involucral bracts linear-lanceolate to lanceolate, long-acuminate, very acute, glabrous, margins membranous; disc florets yellow. Cypselas densely covered with long hairs. Mar. and Sept. Deep sand, NH (southern Namibia, Gordonia and near Bitterfontein).

onobromoides DC. BOEGOEBOS, BUCHU, SAB Rounded, aromatic shrub, up to 1 m tall. Leaves alternate, long, linear or oblong, obtuse or subacute, glabrous, margins with close-set bristly teeth. Flowerheads discoid, large, solitary at branch tips, contracted near mouth; involucral bracts ovate, dry, glabrous; disc florets yellow. Cypselas densely glandular-hairy; pappus brownish yellow. May and Nov. Sandy coastal flats, SN, G, NS, CCR (southern Namibia to Saldanha). **(gce)**

pomonae Merxm. Woody shrublet, 0.4–0.5 m tall. Leaves alternate to subopposite, tufted on short shoots, linear, terete, glabrous, but conspicuously ciliate around flowerheads. Flowerheads discoid, terminal, solitary, cylindrical, surrounded by upper leaves; involucral bracts obtuse, greenish yellow; disc florets yellow. Cypselas densely sericeous. Aug.–Oct. Hillsides, mountain slopes or flats, in sandy or rocky soils, SN, G (southern Namibia).

scariosa L.f. Dwarf shrub, up to 0.6 m tall. Leaves alternate, small, obovate or oblong-obovate, rounded at apex, glabrous. Flowerheads discoid, solitary, terminal, ± bell-shaped; involucral bracts broadly ovate to narrowly elongate-oblong, glabrous, with a prominent keel extending beyond pale, broadly-membranous, slightly jagged margins; disc florets yellow. Cypselas long-

haired. Aug.–Oct. Hillslopes or flats in sand or rocky areas, occasionally on calcrete, NH, WM, TS (isolated in central Namibia and through Bushmanland, NE Namaqualand and Hantam to Prince Albert).

villosa L.f. Small shrub, ± 0.25 m tall, with white-woolly but eventually glabrous branches. Leaves alternate, spathulate-linear, obtuse, margins and often lower surface minutely bristly. Flowerheads discoid, solitary, terminal, ± bell-shaped; outer involucral bracts oblong-elliptic, rounded, glabrous, margins jagged, membranous, inner bracts oblong, rounded; disc florets yellow. Cypselas densely long-haired. Aug.–Sept. On low hills and flats in sandy loam and on quartz fields, KV, TS (southern Knersvlakte and northern Tanqua Karoo). **(ece)**

sp. A Woody shrublet, up to 0.6 m tall, like **P. aspalatha** but leaves oblanceolate, narrowed to base and ± petiolate, gland-dotted above and below, and cypselas glabrous. (May)Aug.–Dec. Dry slopes in stony soil, TS (western Tanqua Karoo through to Prince Albert and Upper Karoo).

A.' Leaves opposite, in scattered pairs or opposite clusters
B. Leaves woolly or downy, with soft, greyish white hairs

cinerea L.f. Shrub, up to 0.3 m tall. Leaves opposite, ± stem-sheathing at base, small, spathulate-linear, keeled below, greyish white-woolly. Flowerheads discoid, solitary at branch tips, ± bell-shaped; outer involucral bracts partly white-woolly, margins membranous and jagged; disc florets yellow. Cypselas densely short-haired; pappus straw-coloured. Sept.–Oct. Rocky mountain slopes, KB, TS, CCR (Kamiesberg to Olifants River Mountains and Laingsburg District). **(gce)**

glauca Thunb. VAALKRAAK-KRAAK, VAALT'IBBIE Dwarf shrub, up to 0.5 m tall. Leaves opposite, small, lanceolate or linear-lanceolate, obtuse or subacute, greyish white-tomentose. Flowerheads discoid, terminal, solitary, obconical-cylindrical; outer involucral bracts ovate-lanceolate or oblong-lanceolate, subacute, with membranous margins, midrib distinct with a median band of greyish white hairs; disc florets yellow. Cypselas hairy in lower half; pappus straw-coloured. July–Oct. Sandy to gravelly areas, SN, NH, WM (Namibia, Botswana, eastern Namaqualand, Roggeveld, Upper and Great Karoo).

incana (Burm.) DC. ASBOSSIE, T'KAIBEBOS Divaricately branched shrub, 0.5–1 m tall. Leaves opposite, small, linear or spathulate-linear, obtuse, narrow and stem-clasping at base, leathery, greyish white-woolly. Flowerheads discoid, solitary at branch tips, ± obconical; outer involucral bracts narrowly ovate, inner oblong-linear, obtuse, glabrous, margins narrowly membranous and hyaline; disc florets yellow. Cypselas shortly hairy in lower part, glandular; pappus straw-coloured. July–Oct. Stony slopes in sand or clay, G, NH, KB, KV, WM, TS, CCR (Namaqualand and Western Mountain Karoo through to SW and E Cape).

ovalifolia DC. GEELKNOPBOS, GRYSGOMBOS, VAALKNOPBOS Shrub, up to 0.3 m tall, branchlets opposite. Leaves opposite, ovate or oblong-ovate, obtuse, broad and free from each other at base, keeled below, greyish white-woolly. Flowerheads discoid, large, solitary at branch tips, ± oblong; involucral bracts partly white-woolly, margins narrowly membranous and slightly fimbriated; disc florets yellow. Cypselas long-haired; pappus straw-coloured. Aug.–Oct. Rocky slopes and flats in sandy or rocky soils, NS, CCR (Groenrivier Mouth to W Coast and Hex River Valley). **(gce)**

B.' Leaves densely to sparsely covered with short, stiff or rough hairs, at least on margins
C. Hair-covering on leaves dense and whitish to greyish

inflexa Thunb. ex L.f. Dwarf shrub, up to 0.5 m tall. Leaves opposite, small, oblong or oblong-elliptic, rounded at apex, densely minutely bristly-pubescent and glandular. Flowerheads discoid, solitary at ends of short branchlets, cylindrical to bell-shaped; involucral bracts suborbicular, with sharply defined, membranous margins, broadly saccate below apex, sparingly glandular outside, otherwise glabrous; disc florets yellow. Cypselas sparingly hairy; pappus straw-coloured. Aug.–Sept. Hillsides, NH, WM, TS (Namibia and near Bitterfontein, northern Tanqua Karoo and Western Upper Karoo).

lucilioides DC. Shrub or dwarf shrub, up to 1 m tall. Leaves opposite, free from each other at base, small, linear or subspathulate-linear, obtuse, densely white-scabrid to papillose. Flowerheads terminal, solitary, acute before opening then oblong-cylindrical; outer involucral bracts oblong-oblanceolate, scaly-membranous and glabrous; disc florets yellow. Cypselas densely glandular-hairy, mixed with scattered short hairs; pappus straw-coloured. Aug.–Oct. Rocky mountain slopes and rock outcrops in sandy or stony soils, SN, G (southern Namibia S to Richtersveld).

membranacea L.f. Shrub, up to 0.6 m tall, older branches quadrangular. Leaves opposite, small, oblong to oblong-lanceolate, densely hispid-puberulous. Flowerheads discoid, large, solitary at branch tips, oblong-campanulate; involucral bracts with broad, pale, membranous margins; disc florets pale yellow. Cypselas densely long-villous. Sept. Mostly dry, sandstone slopes in watercourses, TS, CCR (Montagu and Bonteberg to E Cape and Karoo).

C.' Hair-covering ± sparse, often only the margins shortly and coarsely toothed

adenocarpa Harv. Twiggy shrublet, up to 0.5 m tall. Leaves opposite, small, ovate, flat, recurved at tips, scabrous on margins, otherwise glabrous. Flowerheads discoid, solitary at branch tips, large, pinkish, fragrant, oblong-campanulate; involucral bracts obtuse, viscid, apex membranous, occasionally with jagged margins. Cypselas densely glandular, occasionally with a few long hairs. Sept. On rocky slopes, WM, CCR (Roggeveld Escarpment to Tulbagh through to Upper Karoo).

divaricata (P.J.Bergius) Less. GEELGOMBOS, GEELKNOPBOS, SPALKPENBOS Rounded, leafy shrub, up to 2 m tall. Leaves opposite, shortly petiolate, obovate-elliptic or occasionally ± orbicular, 3-nerved from base, minutely scabrous. Flowerheads discoid, in dense corymbs at ends of branchlets, obconical; involucral bracts ovate to linear; disc florets yellow or whitish. Cypselas sparingly hairy, glandular; pappus whitish or reddish white. Aug.–Nov. Sandy and stony slopes and flats, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to SW Cape). **(gce)**

elata B.Nord. Shrub, 1–2 m tall. Leaves opposite, in distant pairs or crowded on lateral short shoots, spathulate to narrowly oblong-obovate, base half stem-clasping, apex rounded, obscurely apiculate, margins regularly white-toothed, otherwise glabrous. Flowerheads discoid, terminal, solitary, shortly pedunculate, ± campanulate; involucral bracts leathery-cartilaginous, glabrous, pale golden-yellow to straw-coloured, brownish towards apex, obtuse or rounded apically; disc florets yellow. Cypselas densely short-haired; pappus brownish. Nov. Mountain sides, G (Richtersveld, NE of Eksteenfontein). **(ece)**

glomerata L.f. GEEL-BOEGOEKAROO, GOMBOSSIE Low, twiggy shrublet, up to 0.25 m tall, branches often viscid above. Leaves opposite, minute, oblong or oblong-lanceolate, in tight clusters, shortly toothed on margins, fleshy. Flowerheads discoid, solitary at branch tips, ovoid; involucral bracts viscid, rounded at apex, minutely ciliolate; disc florets yellow. Cypselas covered with long hairs; pappus straw-coloured. Aug.–Oct. Clay slopes and stony or sandy soils, WM, TS, CCR (?Bushmanland through to Roggeveld, Ceres, Laingsburg and Upper Karoo).

hutchinsoniana Compton Erect shrub. Leaves opposite, slightly stem-clasping at base, glabrous apart from bristly dentate margins. Flowerheads discoid, solitary, terminal, oblong-cylindrical; involucral bracts ovate-lanceolate, obtuse, centre brown, margins membranous, whitish; disc florets white. Cypselas with long hairs from base. Sept.–Nov. Rock crevices, TS, CCR (Laingsburg to Gamkapoort). **(gce)**

mucronata DC. Low shrub, up to 0.6 m tall. Leaves opposite, shortly stem-clasping at base, small, linear, densely set, margins finely serrate-ciliolate. Flowerheads discoid, solitary, terminal, cylindrical; involucral bracts membranous, with mucronate recurved tips and ciliate margins; disc florets yellow. Cypselas densely long-haired; pappus yellowish. Sept.–Oct. Sandy places, G, KV (southern Namibia through to Bushmanland, Upper Karoo and northern Knersvlakte).

tricephala DC. BILTONGBOS Small shrub, up to 0.8 m tall. Leaves opposite, linear, acute and hooked at apex, glabrous or slightly scabrous on margins. Flowerheads discoid, in threes at branch tips, ± bell-shaped; involucral bracts acute or subacute, keeled near apex, glabrous, margins membranous and finely ciliate; disc florets yellow. Cypselas densely hairy. Dec. ?Habitat, WM (Roggeveld Escarpment to Upper Karoo).

undulata DC. Shrub or dwarf shrub, up to 1.5 m tall. Leaves opposite, obovate, narrowed into a short petiole, free from each other at base, edges strongly twisted and crinkled, viscid, minutely scabrid, at least on margins and midrib. Flowerheads 3–6 at ends of branchlets, narrowly turbinate, pedunculate; involucral bracts oblong-lanceolate to linear-oblanceolate, subacute to obtuse, membranous, glabrous; disc florets yellow. Cypselas sparsely hairy, glandular; pappus straw-coloured. Sept.–Oct. Rocky slopes and outcrops, NH, KB, CCR (Springbok area, Kamiesberg Mountains and Koue Bokkeveld). **(gce)**

viscosa Thunb. Shrublet, up to 0.3 m tall. Leaves opposite, small, lanceolate or oblong-lanceolate, keeled, minutely bristly on margins and often below, thick and fleshy. Flowerheads discoid, solitary, terminal, narrowly campanulate; outer involucral bracts ovate, subacute, inner linear-lanceolate, acute, ± wrinkled outside; disc florets yellow. Cypselas glabrous, margins ribbed; pap-

pus straw-coloured. Aug.–Dec. Hillslopes, G, WM, TS, CCR (southern Namibian Escarpment through to Hantam, Laingsburg, Little and Upper Karoo).

B." Leaves glabrous or warty, occasionally with long, soft hairs in axils
D. Leaf pairs distinctly fused at base and forming a distinct sheath around the stem

adhaerens Compton Subdichotomously branched shrublet, up to 0.6 m tall, with viscous new growth. Leaves opposite, fused basally and sheathing stem, terete, furrowed when dry, minutely papillate, viscid, tips obtuse. Flowerheads discoid, solitary, terminal, ovoid, held close to leaves; involucral bracts bluntly lanceolate, viscid, ± yellow, smooth; disc florets yellow. Cypselas covered with long, erect hairs. Oct.–Dec. On lower slopes in heavy soils, TS (Matjiesfontein near Laingsburg). **(ece)**

fastigiata Thunb. Low, twiggy shrublet, up to 0.4 m tall. Leaves opposite, fused below and sheathing stem, semi-terete, closely imbricate, viscid. Flowerheads discoid, mostly solitary or rarely 2 or 3 at branch tips, narrowly cylindrical; involucral bracts densely ciliate; disc florets yellow. Cypselas densely short-haired. Oct.–Nov. Stony clay slopes, TS, CCR (Bushmanland to Klein Roggeveld and Worcester).

flexicaulis L.f. Shrub, up to 0.5 m tall. Leaves opposite, clustered at ends of branches, long, subterete, fused below and sheathing stem for ± 10 mm, punctate, viscid, tips recurved. Flowerheads discoid, in threes at branch tips, ovoid; involucral bracts horny, glabrous, viscid; disc florets yellow. Cypselas sparsely hairy and glandular. Oct.–Dec. Dry slopes, TS, CCR (near Laingsburg through Little Karoo to southern Karoo). **(gce)**

paniculata Thunb. GOMBOSSIE, KAMBRO-BOS, KRAAK-KRAAK Much-branched shrub, up to 1 m tall. Leaves opposite, fused at base and sheathing branchlet, long, linear, fleshy, glabrous, viscid, tips recurved, subobtuse. Flowerheads discoid, narrowly turbinate, several in crowded corymbs at branch tips; involucral bracts with narrow, hyaline, jagged margins; disc florets golden-yellow. Cypselas long-haired. Oct.–Jan. Dry slopes in shaley and sandy soils, SN, G, NS, NH, KV, WM, TS, CCR (widespread from Namibia to Port Elizabeth, E Cape and Karoo).

D.' Leaf pairs ± free from each other or slightly fused at base and half clasping the stem

anisata B.Nord. Aromatic, much-branched, dwarf shrub, 0.2–0.3 m tall. Leaves opposite, linear-filiform, minutely papillate with resin dots, subacute, base half stem-clasping, with a tuft of long, weak hairs in axils. Flowerheads discoid, solitary at branch tips, bell-shaped; involucral bracts oblong or ovate-oblong, obtuse, with 3 brown, resiniferous lines, margins distinct, white, membranous, glabrous; disc florets yellow. Cypselas densely short-haired; pappus bristles pale red. Oct.–Nov. Mountain slopes, G (Richtersveld Mountains). **(ece)**

empetrifolia DC. (including **P. foleyi** Hutch. & E.Phillips) RIBBOKBOS Viscid shrub, 0.2–0.6 m tall. Leaves opposite, densely set, linear, thick. Flowerheads discoid, solitary, terminal on branch tips, ± obconical; involucral bracts yellowish, obtuse, margin narrowly ciliate-lacerate; disc florets purplish or yellow. Cypselas shortly hairy. July–Nov. Mountain slopes, rocky areas and sandy flats, WM, TS (Loeriesfontein along Roggeveld Escarpment to Touwsrivier and Prince Albert). **(ece)**

glabrata L.f. KNOPBOS Brittle-stemmed, spreading shrublet, up to 0.4 m tall. Leaves opposite, free from each other at base, linear or oblong, flat, often ± falcate, fleshy, glabrous. Flowerheads discoid, solitary at branch tips, globose-campanulate; outer involucral bracts broadly ovate, rounded at apex, with narrowly membranous margins, glabrous; disc florets yellow. Cypselas densely short-haired. June–Oct. Coastal dunes, saline soils, streambeds and sandy areas, SN, G, NS, NH, KB, KV, TS, CCR (southern Namibia to Clanwilliam and northern Tanqua Karoo). **(gce)**

heterocarpa DC. Succulent shrub or dwarf shrub; stems decumbent, rooting at nodes. Leaves opposite, half stem-clasping at base, linear, obtuse, fleshy, glabrous, with dense, woolly tufts in axils. Flowerheads discoid, terminal, solitary, broadly bell-shaped; outer involucral bracts resembling leaves and scaly outside, oblong-lanceolate, rounded at apex, glabrous, margins broadly membranous; disc florets yellow. Cypselas long-haired; pappus reddish brown. July–Sept. Quartz-covered hills, KV (Knersvlakte). **(ece)**

leptospermoides DC. Shrub or dwarf shrub, up to 1.5 m tall. Leaves opposite, linear or oblanceolate-linear, narrowed and free at base, flat, or when very narrow, almost terete and club-shaped, whitish woolly basally, otherwise glabrous. Flowerheads discoid, solitary, narrowly cylindrical;

involucral bracts closely imbricate, lanceolate, obtuse or subacute, glabrous; disc florets white with contrasting purple styles. Cypselas long-haired below and short-haired above; pappus reddish. Aug.–Nov. Rock outcrops on hillsides or flats in sandy soil, G, NH, KB (Richtersveld to Springbok and Kamiesberg Mountains). **(ece)**

leucoloma DC. Shrub or dwarf shrub. Leaves opposite, sessile, orbicular or oval, glabrous. Flowerheads discoid, terminal, solitary, sessile, cylindrical; involucral bracts obtuse, with white scarious margins, concealing disc florets. Cypselas very hairy. ?Flowering time. ?Habitat, KB (Kamiesberg Mountains). **(ece)**

oblanceolata E.Phillips Low, spreading shrublet, up to 0.15 m tall, occasionally rooting along sprawling branches. Leaves opposite, oblanceolate to spathulate, subacute, tapering and free from each other at base, flat, fleshy, glabrous. Flowerheads discoid, solitary, terminal, obconical; involucral bracts ovate to lanceolate, ± obtuse, glabrous, with broad membranous margins; disc florets white or pale yellow. Cypselas covered with long soft hairs; pappus straw-coloured. Aug.–Sept. Stony slopes and sandy flats, WM, TS, CCR (near Loeriesfontein to Laingsburg and Little Karoo). **(gce)**

pallens L.f. AASVOËLBOSSIE, JOGGEMSCHOLTZBOSSIE, SCHOLTZBOSSIE, STOLSBOSSIE, WITGATBOSSIE Pale-stemmed, twiggy shrub, up to 0.6 m tall. Leaves opposite, ± fused at base, linear, subterete, glabrous. Flowerheads discoid, 1–3 at branch tips, globose to ovoid; involucral bracts obtuse, with minutely ciliate margins; disc florets yellow or orange. Cypselas densely hairy; pappus straw-coloured. Oct.–Feb. Sandy soils on stony slopes or plains, often in lime-rich soils, WM, TS, CCR (Calvinia along Roggeveld Escarpment through to Cederberg Mountains, Tanqua Karoo and Little Karoo). **(gce)**

pillansii Hutch. Dwarf shrub, 0.3–0.5 m tall. Leaves opposite, scarcely fused at base, linear or subspathulate-linear, obtuse, thick and fleshy, finely spotted when young, some quite glabrous. Flowerheads discoid, terminal, solitary, ± cylindrical; outer involucral bracts oblong-elliptic, rounded, with submembranous, jagged-ciliate margins, otherwise glabrous. Cypselas with silky white hairs; pappus pale yellow. Dec. S-facing slopes, NH (Garies to Nuwerus). **(ece)**

spinulosa E.Phillips Much-branched shrub, with spiny remains of internodes on lower branches. Leaves opposite, fused at base, small, boat-shaped, fleshy, densely pale-warty when dry. Flowerheads discoid, solitary, terminal, ± globose; involucral bracts obtuse, with slightly hyaline margins and fleshy keel near tip, glabrous; disc florets yellow. Cypselas with long whitish hairs; pappus straw-coloured. Aug.–Dec. Coastal sand dunes or hillsides, SN (coast of southern Namibia).

succulenta Thunb. Twiggy shrublet, up to 0.4 m tall. Leaves opposite, few, crowded at branch tips, linear-trigonous, fleshy, densely covered with warts. Flowerheads discoid, 1–3 at branch tips, ovoid; involucral bracts rounded, margins narrowly membranous, glabrous; disc florets pale yellow. Cypselas long-haired; pappus brownish yellow. Aug.–Oct. Stony slopes and sandy flats, KV, WM, CCR (Knersvlakte and Hantam through Little Karoo to Oudtshoorn). **(gce)**

PULICARIA FLEABANE ± 80 spp., mainly Mediterranean, N Africa and Asia

scabra (Thunb.) Druce Erect, single-stemmed, thinly woolly perennial, up to 1 m tall. Leaves lanceolate, auriculate at base, often scabrid above. Flowerheads obscurely radiate, solitary at branch tips, yellow. Mainly Dec.–Apr. Marshes and streambanks, G, CCR (lower Gariep Valley, Bokkeveld Mountains to tropical Africa).

RHYNCHOPSIDIUM[2] (= *RELHANIA* in part) 2 spp., winter rainfall region of South Africa **(gce)**

pumilum (L.f.) DC. GEELSNEEU Erect or spreading annual, up to 200 mm tall. Leaves linear, 5–30 mm long, glandular-hairy and sometimes cobwebby above. Flowerheads solitary on short, slender peduncles, radiate, yellow, 10–15(–20) mm diam., receptacle paleate, florets coarsely hairy around middle; involucre broadly urn-shaped to suborbicular. Aug.–Oct. Sandy and clay flats and slopes, G, NS, NH, KB, KV, WM, CCR (Richtersveld to Oudtshoorn). **(gce)**

sessiliflorum (L.f.) DC. Erect or spreading annual, up to 200 mm tall. Leaves linear, 5–20 mm long, glandular-hairy and sometimes cobwebby. Flowerheads solitary, sessile or rarely pedunculate, shortly and obscurely radiate, yellow, 3–6 mm diam., receptacle paleate, florets coarsely hairy around middle; involucre urn-shaped. Mainly Aug.–Nov. Clay flats, WM, TS, CCR (Hantam and Roggeveld, Clanwilliam to Port Elizabeth). **(gce)**

ROSENIA[2] HARTEBEESKAROO 4 spp., South Africa and Namibia

A. Flowerheads mostly < 10 mm diam.

humilis (Less.) K.Bremer Gnarled, twiggy shrublet, up to 300 mm tall, rarely somewhat thorny. Leaves linear-oblanceolate or subterete, 5–20 mm long, glabrous to grey-felted, often glandular-hairy. Flowerheads solitary at branch tips, sometimes congested, radiate, yellow with reddish reverse, 8–10 mm diam.; receptacle paleate or epaleate; involucre cup-shaped, (2–)6–11 mm diam., bracts yellowish brown, inner ± spathulate, rarely brownish apically. Mainly Aug.–Oct. Stony clay or sandy flats, G, NH, WM, TS, CCR (Namibia through Karoo to E Cape; absent from Roggeveld).

oppositifolia (DC.) K.Bremer Twiggy, sometimes prostrate shrublet, up to 300 mm tall. Leaves linear-subterete, 2–12 mm long, grey-felted. Flowerheads solitary at branch tips, radiate, yellow with reddish reverse, 8–10 mm diam.; receptacle epaleate; involucre narrowly obconical, 2–6 mm diam., bracts brown with broad transparent margins, inner elliptic. Mainly Sept.–Oct. Stony clay flats, WM, TS (Roggeveld and Matjiesfontein District and along escarpment to S Free State).

A.' Flowerheads mostly > 10 mm diam.

glandulosa Thunb. Twiggy, rarely somewhat thorny shrublet, up to 300 mm tall. Leaves linear-oblanceolate, 2–10 mm long, grey-felted, often glandular-hairy. Flowerheads solitary at branch tips, radiate, yellow with reddish reverse, 10–20 mm diam.; receptacle conspicuously paleate; involucre cup-shaped, 4–14 mm diam., bracts dark brown with broad white papery margins, inner elliptic. Mainly Aug.–Sept. Stony clay flats, WM (Hantam and Roggeveld and along Escarpment to Beaufort West).

spinescens DC. Twiggy, thorny shrublet, up to 300 mm tall, with pair of branches beneath flowerhead developing into leafless thorns. Leaves oblong-oblanceolate, 3–15 mm long, grey-felted, often glandular-hairy. Flowerheads solitary at branch tips, radiate, yellow with reddish reverse, 10–20 mm diam.; receptacle epaleate; involucre cup-shaped, 4–14 mm diam., bracts dark brown with broad, white, papery margins, inner elliptic. Mainly Aug.–Sept. Stony clay flats, TS (Whitehill to Murraysburg).

SENECIO[2] GROUNDSEL, HONGERBLOM, RAGWORT ± 1 200 spp., cosmopolitan (see also **KLEINIA, MESOGRAMMA**)

A. Annuals
B. Plants ± glandular-pubescent; ray florets yellow, mauve or white

arenarius Thunb. (= *S. cakilefolius* DC.) HONGERBLOM Annual, 100–400 mm tall, subglabrous or thinly to densely glandular-pubescent on stems and leaves. Leaves variable, oblanceolate and irregularly toothed to deeply pinnatisect, (10–)30–80 mm long, lower leaves tapering below and often subpetiolate, upper mostly auriculate, margins sometimes revolute. Flowerheads in loose corymbs, radiate, yellow with mauve to purple (rarely white) ray florets; involucre cylindrical, 5–8 mm diam., glandular-pubescent, bracts 15–20, 0.5–1 × 7–8 mm, bracteoles 2–6, subulate. July–Sept. Sandy and gravelly flats and washes, SN, G, NS, NH, KV, WM, TS, CCR (central Namibia through Namaqualand and western South Africa to Agulhas).

giessii Merxm. Like **S. arenarius** but daintier with lower leaves conspicuously petioled, cordate to suborbicular and toothed. July–Sept. Sandy and gravelly flats, SN (southern Namibia). **(ece)**

glutinosus Thunb. TAAIGEELHONGERBLOM Annual, 100–400 mm tall, thinly to densely glandular-pubescent on stems and leaves. Leaves oblong-oblanceolate and pinnatisect, (10–)30–80 mm long, lobes oblong and toothed, lower leaves tapering below and often subpetiolate, upper amplexicaul-auriculate. Flowerheads in loose corymbs, radiate, yellow with yellow ray florets; involucre cylindrical, 3–5 mm diam., usually glandular-pubescent, bracts 12–18, 0.5–0.8 × 6– 9 mm, bracteoles 2–6, subulate. July–Sept. Rocky outcrops, SN, NH, CCR (central and southern Namibia through Gordonia, central Namaqualand and western South Africa to Humansdorp).

sisymbriifolius DC. Annual, 100–400 mm tall, thinly to densely glandular-pubescent on stems and leaves. Leaves lyrate-pinnatisect, 20–80 mm long, terminal lobe largest and often palmatifid, lower leaves tapering below and petiolate, upper sometimes auriculate, thin-textured, sometimes purple beneath. Flowerheads in loose, ± divaricate corymbs, radiate, yellow; involucre cylindrical, 3–5 mm diam., glandular-pubescent, bracts 12–18, 0.5–0.8 × 5–7 mm, bracteoles 1–4, subu-

late. July–Sept. Shaded places among rocks, SN, G, NH (southern Namibia and Bushmanland to central Namaqualand).

B.' Plants ± glabrous; ray florets yellow
C. Leaves all ± sessile; involucre conspicuously calycled

littoreus Thunb. GEELHONGERBLOM Erect annual, up to 600 mm tall, glabrescent or puberulous with a mix of glandular and acute hairs. Leaves obovate to oblanceolate, mostly 20–80 mm long, variously toothed or incised to pinnatisect, upper sessile and often auriculate, lower narrowed below and subpetiolate. Flowerheads radiate, in loose corymbs, yellow; involucre cylindrical-campanulate, 5–7 mm diam., conspicuously calycled, bracts and bracteoles black-tipped, bracts 10–12, 5–6 × ± 1 mm, bracteoles imbricate, 5–7, lanceolate and arachnose-ciliate. Aug.–Nov. Mainly coastal sands, NS, CCR (Wallekraal along W Coast to Bredasdorp). **(gce)**

maritimus L STRANDHONGERBLOM Sprawling to prostrate annual, up to 300 mm tall, stems flushed purple, usually rooting along stem, glabrous. Leaves oblong-obovate, mostly 10–50 mm long, obtuse to truncate, slightly toothed, auriculate, sessile, but lower sometimes narrowed below and subpetiolate, toothed to slightly pinnatifid, sometimes auriculate at base, fleshy, thick-textured. Flowerheads radiate, 1–few in mostly crowded corymbs, yellow; involucre campanulate-hemispherical, 6–7 mm diam., conspicuously calycled, bracts and bracteoles black-tipped, bracts 10–12, 5–6 × ± 1 mm, bracteoles imbricate, 5–7, lanceolate, ray florets usually relatively short. Aug.–Dec. Coastal dunes and slopes, NS, CCR (Vredendal to Agulhas). **(gce)**

C.' Lower leaves ± petiolate; involucre mostly weakly calycled

cardaminifolius DC. (including **S. piptocoma** O.Hoffm.) Erect annual, up to 600 mm tall, glabrous or thinly pubescent but not glandular. Leaves lanceolate to obovate, mostly 30–80 mm long, lower pinnatisect to bipinnatisect and subpetiolate, upper sessile and auriculate, linear to pinnatisect. Flowerheads radiate, in open corymbs, yellow; involucre cylindrical-campanulate, 4–6 mm diam., bracts 10–12, 5–6 × ± 1 mm, bracteoles 2–5, subulate. Stony and gravelly flats, SN, G, NS, NH, KV, WM, TS, CCR (southern Namibia and Gordonia through western Karoo to Worcester and Laingsburg).

flavus (Decne.) Sch.Bip. (= *S. lobelioides* DC.) Annual, 100–400 mm tall, sometimes robust, glabrous. Lower leaves petiolate without auricles, blade mostly 20–40 mm long, ovate-reniform, roughly toothed, upper sessile and cordate-amplexicaul. Flowerheads in loose, ± divaricate corymbs, discoid or obscurely radiate, with few ray florets, erect, scarcely longer than involucre, yellow; involucre narrowly cylindrical, 2–3 mm diam., bracts 10–12, 0.5–0.8 × 7–8 mm, bracteoles 3–5, subulate. July–Sept. Stony flats, SN, G, NH, WM (tropical Africa through Namibia to Calvinia).

hermannii B.Nord. Annual, 50–350 mm tall, glabrous, small or robust. Leaves subrosulate to alternate, petiolate without auricles, blade cordate-reniform, 10–100 mm diam., weakly toothed, brittle-textured, usually purple beneath. Flowerheads 1–many in a lax corymb on naked peduncles, radiate, yellow; involucre campanulate, 4–6 mm diam., bracts 12–20, 5–6 × 0.5–1 mm, bracteoles 1–5 (rarely more), subulate and black-tipped. June–July. Sheltered places on S-facing slopes at base of rocks, SN, G (southern and southeastern Namibia and Richtersveld).

A.' Stem- or leaf-succulents
D. Leafless stem-succulent

junceus (DC.) Harv. SJAMBOKBOS Erect or tangled, succulent-stemmed shrub, up to 1 m tall, with rod-like stems from woody rootstock, apparently leafless, glabrous. Leaves linear-subulate, dry, 2–8 mm long. Flowerheads in subsessile or pedunculate corymbs, terminal and in upper axils, radiate, yellow; involucre cylindrical, 3–4 mm diam., bracts 8–10, 7–8 × ± 1 mm, bracteoles 2–4, subulate. Cypselas glabrous. Feb.–Apr. Dry rocky slopes, NH, KB, WM, TS, CCR (Springbok through central Namaqualand and western Karoo to Little Karoo and Great Karoo and Grahamstown).

D.' Leaf-succulents with fusiform-cylindrical to ovoid leaves
E. Flowerheads discoid, white to mauve

articulatus (L.) Sch.Bip. (= *Kleinia articulata* (L.) Haw.) WORSIES Succulent shrublet, up to 600 mm tall, with swollen jointed stems, (6–)10–20 mm diam. Leaves on terminal stem-joint, sagit-

tate and toothed, petiolate, blades 10–30 mm diam. Flowerheads discoid, few in terminal corymbs on long, naked peduncles, white or yellowish; involucre cylindical, 4–6 mm diam., bracts 8–10, 6–8 × 1.5–2 mm, glabrous, bracteoles 1 or 2, subulate. Apr.–June. Rocky slopes in shaded situations, TS, CCR (Prince Albert and Little Karoo to Great Karoo).

cicatricosus Sch.Bip. Erect-stemmed, dwarf succulent shrublet with short, tubercled stem, up to 50 mm tall, 8–10 mm diam., leafless below, suckering and with tuberous roots. Leaves crowded at branch tips, terete-fusiform, often incurved, (20–)40–50 × 2–3 mm. Flowerheads 1–4 on short, naked peduncles up to 50 mm long, scarcely exserted above leaves, discoid, white to mauve; involucre cylindrical, 3–5 mm diam., bracts 10–12, ± 8 × 1 mm, bracteoles 1–3, subulate. Mar.–Sept. Rock crevices and stony or loamy flats, KV (Knersvlakte). **(ece)**

hallianus G.D.Rowley Succulent perennial, with resinous-gummy, prostrate or procumbent stems, 2–3 mm diam., rooting along their length, roots with distant, fusiform tubers. Leaves persistent, secund, shortly petiolate, blade fusiform, pale grey with dorsal window, mostly 15–25 × 3–5 mm. Flowerheads 1 or 2(3) on terminal, sparsely bracteate peduncles up to 100 mm long, discoid, white, fragrant; involucre cylindrical, 3–5 mm diam., bracts 8–10, 9–10 × 1–1.5 mm, glabrous, bracteoles 1 or 2, subulate. Nov.–Dec. Rock fissures, TS (Prince Albert to Great Karoo).

pinguifolius (DC.) Sch.Bip. Erect-stemmed, succulent shrublet, with tubercled stems, up to 100 mm tall, 8–15 mm diam., leafless below. Leaves deciduous, fusiform, 30–100 × 2–5 mm, woolly in axils. Flowerheads in branching corymbs on naked peduncles up to 200 mm long, well exserted above leaves and woolly in branch-bract axils, discoid, whitish; involucre cylindrical, 3–5 mm diam., bracts 10–15, 6–8 × ± 1 mm, bracteoles 1–3, subulate. Mar.–Sept. Rocky slopes, SN, G, NH (southern Namibia to Kourkammaberg). **(ece)**

radicans (L.f.) Sch.Bip. (= *Kleinia radicans* (L.f.) Haw.; including **S. herreianus** Dinter) BOBBEJAANTOONTJIES, VINGERTJIES Succulent perennial, with prostrate or procumbent stems, 1.5–2 mm diam., rooting along their length. Leaves persistent, secund, shortly petiolate, blade ovoid-fusiform, mostly 10–25 × 5–8 mm, glabrous with dorsal window. Flowerheads 1 or 2(3) on terminal, sparsely bracteate peduncles up to 100 mm long, discoid, white or mauve, fragrant; involucre cylindrical, 5–7 mm diam., bracts 10–12, 9–12 × 1–2 mm, glabrous or with short, stout, capitate glands, bracteoles ± 3, subulate. Apr.–Sept. Rock outcrops or stony flats, SN, G, ?NS, WM, TS, CCR (southern Namibia and Richtersveld, W Coast, Hantam and through central South Africa, Little Karoo and E Cape).

sulcicalyx N.E.Br. Succulent, dwarf, rhizomatous perennial, with short stems up to 50 mm tall and thickened, tuberous roots. Leaves persistent, ovoid, shortly petiolate, 10–25 × 7–12 mm, slate-grey, glaucous, glabrous or puberulous, with dorsal window and ventral keel. Flowerheads 1–3 on short, ± naked peduncles up to 100 mm long, discoid, white to mauve; involucre cylindrical, 3–5 mm diam., bracts 10–15, 5–7 × ± 1 mm, bracteoles 1–3, subulate. Feb.–July. Rock crevices, SN, G, NH (southern Namibia to Bitterfontein). **(ece)**

E.' Flowerheads disciform, yellow

acaulis (L.f.) Sch.Bip. Tufted, dwarf succulent shrublet, with short rhizome and few thick, erect, tubercled stems, up to 50 mm tall, crowned with leaves, roots slightly swollen. Leaves crowded at stem tips, narrowly fusiform, uncinate, 60–150 × 2–4 mm, with dorsal window. Flowerheads solitary on sparsely bracteate peduncles up to 200 mm long, disciform, marginal florets female and filiform, dull greenish yellow, fragrant; involucre cylindrical, 10–15 mm diam., bracts 10–16, 15–20 × 2–5 mm, bracteoles 1–3, subulate. Oct.–Nov. Rocky karroid slopes, TS, CCR (Cold Bokkeveld to Matjiesfontein and to Grahamstown).

haworthii (Sweet) Sch.Bip. Erect-stemmed, succulent shrublet, up to 1.2 m tall, stems 10–15 mm diam., leafless below and branching at tips, white-felted when young. Leaves crowded at branch tips, fusiform-cylindrical or biconvex with flattened tip, mostly 40–60 × 10–12 mm, white-felted. Flowerheads solitary on white-felted, bracteate peduncles up to 150 mm long, disciform with marginal florets female and filiform, yellow; involucre cylindrical-campanulate, 15–20 mm diam., bracts 10–15, 15–20 × 3–5 mm, obtuse and fleshy, bracteoles 1–3, bract-like. Nov.–Mar. Rocky slopes, G, TS (Richtersveld and Moordenaars Karoo). **(ece)**

laticipes Bruyns Dwarf succulent shrublet, up to 0.5 m tall, stems procumbent to erect, forming dense clumps and remaining pliable. Leaves deciduous, aromatic when bruised, terete, 15–55 × 2.5–4 mm. Flowerheads 1 or 2, shortly pedunculate, disciform, marginal florets female and filiform or minutely rayed, yellow; involucre cylindrical, bracts 6–8, 7–8 × 1–1.5 mm, bracteoles ± 3, subulate. Apr. Stony flats on granite rocks, NH (Wallekraal to Kareeberg). **(ece)**

E." Flowerheads radiate, yellow
F. Prostrate or stoloniferous perennials

abbreviatus S.Moore Succulent perennial, with prostrate stems, 2–3 mm diam. Leaves persistent, mostly scattered, secund, ellipsoid, mostly 10–20 × 3–5 mm, glabrous with dorsal window, minutely woolly in axils. Flowerheads solitary on terminal, sparsely bracteate peduncles up to 100 mm long, radiate, yellow, fragrant; involucre cylindrical, 7–10 mm diam., bracts 8–10(–15), 12–17 × 2–3 mm, bracteoles ± 3, subulate. June–Aug. Dry, karroid, stony slopes, WM, TS, CCR (Bokkeveld and Hantam, Tanqua Karoo to Worcester to Little and Great Karoo). [possibly not distinct from **S. bulbinifolius**]

bulbinifolius DC. KRAALTJIES Tufted, succulent perennial, with short, erect stems, up to ± 100 mm tall, puberulous when young, spreading by means of arching, leafless or sparsely leafy runners 2–3 mm diam. Leaves persistent, cylindric, mostly 15–60 × 3–5 mm, glabrous with dorsal window. Flowerheads 1(–3) on terminal, sparsely bracteate peduncles up to 120 mm long, radiate, yellow, fragrant; involucre cylindrical, 7–10 mm diam., bracts 8–10(–15), 12–17 × 2–3 mm, bracteoles ± 3, subulate. Aug.–Sept. Rocky slopes, ?SN, G, NH, KV, CCR (?southern Namibia, Richtersveld and Bushmanland to Klawer).

F.' Shrublets

aloides DC. GROOTDIKBLAAR Succulent shrublet, up to 0.7 m tall, sparsely branched, with some stems arching and rooting at tips, 5–8 mm diam. Leaves crowded apically, terete-cylindrical, 30–70 × 2–5 mm, with dorsal window, with some wool in axils. Flowerheads solitary on sparsely bracteate peduncles up to 150 mm long, radiate, yellow, fragrant; involucre cylindrical, 10–12 mm diam., bracts 10–15, 12–15 × 2–3 mm, bracteoles 3–5, imbricate, lanceolate. July–Oct. Coastal rocks and dunes, SN, NS, CCR (southern Namibia to Cape Peninsula). **(gce)**

corymbiferus DC. (including **S. phonolithicus** Dinter) Succulent shrublet, up to 1 m tall, with erect, sparsely branched stems, leafless below, 6–15 mm diam. Leaves crowded at branch tips, deciduous, fusiform-falcate and compressed, 60–110 × 5–7 mm. Flowerheads in shortly pedunculate corymbs usually nested among leaves, radiate, yellow; involucre cylindrical, 3–5 mm diam., bracts ± 8, 7–12 × ± 1 mm, bracteoles ± 3, subulate. Mar.–July. Rocky slopes, SN, G, NS, NH, KB, WM, CCR (southern Namibia and Bushmanland to Kamiesberg Mountains, Loeriesfontein, Cederberg Mountains and Swartruggens).

cotyledonis DC. Succulent shrublets, up to 0.6 m tall, with erect stems well-branched above and leafless below, 6–8 mm diam. Leaves crowded at branch tips, deciduous, trigonous-falcate, apiculate, 10–40 × 2–3 mm. Flowerheads crowded, mostly 1 or 2 in shortly pedunculate corymbs nested among leaves, radiate, yellow; involucre cylindrical, 3–5 mm diam., bracts ± 8, 7–12 × ± 1 mm, bracteoles ± 3, subulate. Mar.–Aug. Stony karroid slopes, WM, TS, CCR (Roggeveld and Upper Karoo to Little and Great Karoo).

sarcoides C.Jeffrey (= *S. succulentus* DC.) Succulent shrublet, up to 0.7 m tall, with stems well branched above and leafless below, 5–8 mm diam. Leaves crowded apically, terete-cylindrical, 30–70 × 2–5 mm, with dorsal window, with some wool in axils. Flowerheads 3–10 in simple or branched corymbs on naked peduncles up to 100 mm long, with woolly bract axils, radiate, yellow, fragrant; pedicels scaly; involucre cylindrical, ± 5 mm diam., bracts 8–12, 8–12 × 1–2 mm, bracteoles 3–5, imbricate, lanceolate-subulate. July–Oct. Rocky slopes and stony flats, SN, G, NS, NH, KV, CCR (southern Namibia to Cape Peninsula to Prince Albert). **(gce)**

sp. A Dwarf succulent shrublet, with thick crown of short, tubercled stems, up to 10 mm tall and 6–8 mm diam. and thick, fleshy roots. Leaves cylindrical-clavate, 25–40 × 4–6 mm, woolly in axils. Flowerheads 1–5 on short naked peduncles up to 40 mm long, with woolly bract-axils, radiate, yellow, fragrant; involucre cylindrical, 6–8 mm diam., bracts 8–12, ± 10 × 1.5–2 mm, bracteoles 3–5, imbricate, subulate. July–Aug. Rock crevices, NH, KV (Springbok to Knersvlakte). **(ece)**

A." Stemless perennials or short-stemmed subshrubs with tufted leaves, not succulent
G. Subshrubs with discoid (rarely radiate) heads

albopunctatus Bolus (= *S. longipedunculatus* Dinter, *S. maydae* Merxm.) Tufted subshrub, up to 400 mm tall, ± glabrous but covered in sticky resin. Leaves clustered, petiolate, mostly 40–100 × 5–15 mm, irregularly lacerate-pinnatisect, with narrow, toothed lobes tipped with callosity,

margins revolute, thick-textured, resinous. Flowerheads solitary on bracteate peduncles, discoid (rarely radiate), yellow; involucre campanulate, 7–10 mm diam., bracts 10–15, 7–10 × 1–1.5 mm, glabrous-resinous, bracteoles 3–7, imbricate, lanceolate. July–Sept. Rocky slopes and crevices, SN, G, NH (southern Namibia to Steinkopf). **(ece)**

crepidiformis Hutch. Tufted subshrub, up to 150 mm tall, glabrous. Leaves clustered, petiolate, linear-oblanceolate to lacerate-pinnatilobed, 40–50 × 4–8 mm, lobes oblong-triangular or toothed, margins revolute. Flowerhead solitary on a scaly peduncle, radiate, yellow, reddish beneath; involucre campanulate, 6–7 mm diam., bracts ± 12, 3.5 × 0.6 mm, ecalyculate. Sept.–Nov. Rocky slopes, KB (Kamiesberg Mountains). **(ece)**

G.' Stemless perennials with radiate heads

albifolius DC. Stemless, rhizomatous perennial, 50–200 mm tall, densely white-felted. Leaves basal, petiolate, oblanceolate, regularly pinnatisect, lobes oblong-cuneate and toothed, margins revolute, densely white-felted beneath and glabrescent above, mostly 30–70 mm long. Flowerheads 1–3 on long, bracteate, woolly peduncles, radiate, yellow, ray florets sometimes reddish on reverse; involucre campanulate, 7–8 mm diam., bracts 12–15, 6–7 × 1–1.5 mm, canescent, bracteoles 3–5, subulate. Aug.–Jan. Rock ledges and cracks in mountains, WM, CCR (Loeriesfontein: Kubiskouberg, Cederberg to Hex River Mountains and Klein Swartberg Mountains). **(gce)**

asperulus DC. (= *S. pearsonii* Hutch.) Stemless perennial, up to 600 mm tall, minutely glandular-scabrid. Leaves basal, narrowed to a petiole-like base, linear-lanceolate, mostly 50–150 × 2–10 mm, serrate or serrulate, with margins revolute, thick-textured, glandular-scabridulous. Flowerheads 1–5 on long, bracteate, glandular-hairy peduncles, discoid, yellow; involucre campanulate, 8–10 mm diam., bracts 14–20, 10–12 × ± 1 mm, glandular-scabrid, bracteoles 3–5, imbricate, subulate. Aug.–Feb. Stony slopes, KB, WM (Kamiesberg Mountains, Hantam and Roggeveld along Escarpment to Gauteng).

erosus L.f. (= *S. eriobasis* DC., *S. panduratus* (Thunb.) Less.) WOOLLY-STEMMED GROUNDSEL Stemless perennial, up to 600 mm tall, subglabrous to glandular-haired, with short, erect, almost bulb-like rhizome. Leaves basal, petiolate, base expanded and sheathing rhizome, densely silky-woolly in axils and on sheath, oblanceolate, mostly 60–120 mm long, irregularly toothed or lacerate. Flowerheads (1–)3–10 in loose corymbs on long, sparsely leafy peduncles, radiate (rarely discoid), yellow, ray florets sometimes reddish on reverse; involucre cylindrical, 8–10 mm diam., bracts ± 24–30, 7–12 × ± 1 mm, bracteoles 3–5, narrowly triangular. Aug.–Sept. Rocky slopes and flats, NH, KB, WM, TS, CCR (Springbok to Kamiesberg Mountains, Bokkeveld and Roggeveld to Laingsburg and CCR into Little Karoo). **(gce)**

robertiifolius DC. (= *S. panduratus* auct.) STICKY-LEAVED GROUNDSEL Stemless perennial, up to 600 mm tall, subglabrous to densely glandular-haired, with short, horizontal rhizome. Leaves basal, petiolate, not clasping at base of petiole, oblanceolate, mostly 60–120 mm long, lacerate to pinnatisect, lobes oblong and further toothed. Flowerheads (1–)3–10 in loose corymbs on long, sparsely leafy peduncles, radiate (rarely discoid), yellow; involucre cylindrical, 8–10 mm diam., bracts ± 24–30, 7–12 × ± 1 mm, bracteoles 3–5, subulate. Aug.–Sept. Rocky slopes and flats, NH, KB, WM, TS, CCR (Steinkopf to Kamiesberg Mountains, Bokkeveld and Roggeveld to Laingsburg and CCR into Little Karoo). **(gce)**

spiraeifolius Thunb. FERN-LEAVED GROUNDSEL Stemless perennial, up to 600 mm tall, ± cobwebbed. Leaves basal, petiolate, narrowly oblong, mostly 60–120 mm long, regularly pinnatisect, lobes oblong and further toothed, thinly glandular or subglabrous above and ± cobwebbed beneath, thinly or densely silky-woolly in axils. Flowerheads (1–)3–8 in loose corymbs on long, sparsely leafy peduncles, radiate, yellow; involucre cylindrical, 8–10 mm diam., bracts ± 15–25, 7–12 × ± 1 mm, bracteoles 3–5, subulate. Aug.–Sept. Stony clay flats, WM, CCR (Bokkeveld and Roggeveld to W Coast). **(gce)**

A.''' Woody perennials or shrubs with scattered leaves, not succulent
H. Leaves oblong-pandurate, denticulate

vestitus (Thunb.) P.J.Bergius PAPERLEAF RAGWORT Softly woody shrub, up to 1.5 m tall, glabrous, sometimes glaucous. Leaves oblanceolate-pandurate, mostly 40–100 × 15–50 mm, sometimes narrowed to a petiole-like base, auriculate and stem-clasping, irregularly serrulate, thin-textured. Flowerheads in dense, branched, terminal corymbs, shortly radiate, yellow; involucre campanulate, 3–5 mm diam., bracts 15–20, ± 3 × 0.5 mm, bracteoles numerous, imbricate, subu-

late. Sept.–Jan. Rocky, mostly sandstone slopes, KB, CCR (Kamiesberg and Bokkeveld Mountains to Paarl and Montagu). **(gce)**

H.' Leaves pinnatisect

achilleifolius DC. Decumbent shrublet, with rod-like branches, up to 400 mm tall, rooting along lower parts of stem, glabrescent but thinly cobwebbed when young. Leaves sessile, often with axillary tufts or shoots, closely pinnatisect, 3–8-jugate, mostly 10–30 × 6–10 mm, lobes linear and simple or upper lobulate, 2–6 mm long, glabrescent and leathery, margins slightly revolute. Flowerheads solitary or several in lax corymbs on laxly bracteate peduncles up to 100 mm long, radiate, yellow; involucre campanulate, 7–10 mm diam., bracts 10–14, 5–7 × 1–2 mm, bracteoles 3–7, bract-like, lanceolate. July–Dec. Streamsides and seepages, WM, TS (Hantam and Roggeveld to Laingsburg and through Upper Karoo to Mpumalanga).

carroensis DC. (= *S. parvifolius* DC.) Softly woody, lax shrublet, up to 600 mm tall, stems and leaves subglabrous or thinly woolly. Leaves oblong, inciso-pinnatisect, 3- or 4-jugate, mostly 10–20 mm long, lobes mostly small, toothed, 1–3 mm long, margins revolute. Flowerheads in loose corymbs, radiate, yellow; involucre cylindrical, 4–6 mm diam., bracts glabrous, 12–14, 6–7 × 0.5–1 mm, bracteoles several, imbricate, subulate. July–Oct. Granite and sandstone outcrops, NH, KB, TS, CCR (central Namaqualand to Little Karoo). **(gce)**

cinerascens Aiton HANDJIESBOS Leafy shrub, up to 2 m tall, stems white-cobwebby. Leaves regularly pinnatifid, sometimes dentate and leaves sub-bipinnatifid, 2–4-jugate, mostly 40–120 × 20–40 mm, lobes linear-lanceolate, (5–)10–20 × 1–3 mm, felted beneath and cobwebby or glabrescent above, margins revolute. Flowerheads in pedunculate, branched terminal corymbs, sparsely radiate, yellow; involucre campanulate, 8–10 mm diam., bracts black-tipped, 12–18, 8–10 × 1–1.5 mm, bracteoles numerous, imbricate, bract-like and half as long. July–Sept. Rocky slopes, SN, G, NH, KB, WM, CCR (southern Namibia to Cederberg Mountains, Hantamsberg and Roggeveld). **(gce)**

H." Leaves ± linear or with only a few teeth or lobes
I. Flowerheads discoid

angustifolius (Thunb.) Willd. Erect or straggling, slender-stemmed shrublet, up to 500 mm tall, ± glabrous. Leaves linear and often denticulate, rarely with a few narrow lobes, sessile but narrowed to base, mostly 20–30 × 1–2 mm, margins revolute. Flowerheads in upper axils in lax corymbs, discoid, yellow; involucre campanulate, 3–5 mm diam., bracts 10–15, 5–7 × ± 1 mm, bracteoles 5–7, imbricate, lanceolate, black-tipped. Mainly Oct.–Mar. Stony slopes, WM, TS, CCR (Hantam to Laingsburg and Little Karoo). **(gce)**

niveus (Thunb.) Willd. Erect or straggling, slender-stemmed shrublet, up to 500 mm tall, stems ± white-woolly or cobwebbed. Leaves linear-oblanceolate, mostly 20–30 × 1–2 mm, rarely with a few narrow lobes, sessile, ± cobwebbed but later subglabrous, margins revolute. Flowerheads 1 or 2 in upper axils in lax corymbs, discoid, yellow; involucre campanulate, 5–8 mm diam., bracts 10–15, 7–10 × ± 1 mm, cobwebbed, bracteoles 5–7, imbricate, lanceolate, black-tipped. Mar.–Oct. Stony slopes and dry, riverbanks, SN, G, NS, NH, KB, KV, WM (southern Namibia to Knersvlakte and across central South Africa).

I.' Flowerheads radiate

burchellii DC. GEELGIFBOS Softly woody shrublet, up to 400 mm tall, branching from base, ± glabrous but sometimes thinly cobwebbed. Leaves linear-lanceolate, mostly 20–80 × 1.5–5 mm, sessile and minutely serrulate-auriculate, glabrous or thinly cobwebbed and glabrescent, margins revolute and sometimes minutely and sparsely toothed, usually with axillary tufts. Flowerheads in lax corymbs with ultimate pedicels naked or sparsely scaly and 10–40 mm long, radiate, yellow; involucre campanulate, ± 5 mm diam., bracts ± 12, 5 × 1 mm, bracteoles several, imbricate, subulate-lanceolate. Mainly Apr.–July. Sandy and stony slopes, NH, KB, WM, TS, CCR (central Namaqualand, Hantam to Port Elizabeth). **(gce)**

juniperinus L.f. Erect or sprawling shrublet, with softly woody, thinly or thickly white-felted stems, up to 1 m tall. Leaves linear lanceolate, mostly 15–40 × 1–3 mm, hard and leathery, pungent, sessile, glabrescent and glossy above, but thickly felted beneath, with margins strongly revolute and sometimes with a few scattered teeth or lobes, typically with a small sharp tooth on each

side at base. Flowerheads in lax terminal corymbs, ultimate pedicels sparsely scaly and mostly 10–40 mm long, radiate, yellow; involucre campanulate, 4–5 mm diam., bracts with thickened margins and black tips, 15–20, ± 5 × 1 mm, bracteoles numerous, imbricate, subulate and black-tipped. Aug.–Jan. Sandy and stony slopes and dry, streambanks, KB, TS (Kamiesberg Mountains, Bokkeveld through Little Karoo to KwaZulu-Natal).

rosmarinifolius L.f. GRYSHONGERBLOM Erect or sprawling shrublet, with softly woody stems, up to 1 m tall, mostly single-stemmed and branching near base, thinly white-woolly when young but glabrescent. Leaves linear-lanceolate, mostly 20–80 × 1.5–5 mm, sessile and minutely serrulate-auriculate, thinly woolly but glabrescent, especially above, margins revolute and sometimes minutely and sparsely toothed, usually with axillary tufts. Flowerheads in dense, subumbellate clusters on branched corymbs, ultimate pedicels bracteolate and 3–5 mm long, with adjacent heads ± touching, radiate, yellow; involucre campanulate, ± 3 mm diam., bracts 12–15, ± 3 × 0.5 mm, bracteoles 5–7, imbricate, subulate. Mainly Oct.–Mar. Sandy and stony slopes and dry watercourses, NH, TS, CCR (central Namaqualand, Cederberg Mountains to E Cape and Karoo).

[**Species insufficiently known** **S. crassicaulis** Hutch. (see **Othonna cyclophylla** Merxm.), **S. trachylaenus** Harv., possibly conspecific with one of the above.]

*SONCHUS[2] SOW-THISTLE ± 60 spp., Eurasia to tropical Africa

***oleraceus** L. COMMON SOW-THISTLE Erect annual, with hollow stems, up to 1.5 m tall. Leaves mostly in a basal tuft, runcinate-pinnatifid, toothed, with winged petiole, upper leaves clasping. Flowerheads in irregular, corymbose umbels at branch tips, with peduncles sometimes glandular-hairy, ligulate, pale yellow, ± 10 mm diam. Jan.–Dec. Waste places and roadsides, SN, NS, NH (Eurasian weed).

STEIRODISCUS[2] GEELKRUID 5 spp., W Cape **(gce)**

capillaceus (L.f.) Less. Erect annual, with wiry, flexuose stems, 50–200 mm tall. Lower leaves pinnatisect with filiform segments, upper leaves filiform, 20–40 mm long. Flowerheads solitary at branch tips, radiate, 15–40 mm diam.; ray florets yellow; disc florets yellow; involucral bracts green, free. Cypselas densely hairy; pappus lacking. Aug.–Sept. Sandy flats and slopes, WM, TS, CCR (Bokkeveld Mountains to Piketberg, Komsberg, Laingsburg). **(gce)**

schlechteri Bolus ex Schltr. Like **S. capillaceus** but ovaries and cypselas glabrous. Aug.–Sept. Sandy flats, KV (Vanrhynsdorp to Klawer). **(gce)**

[**Uncertain species** **S. linearilobus** DC.]

STILPNOGYNE[2] 1 sp., winter rainfall region of South Africa **(gce)**

bellidioides DC. Delicate, glabrous annual, 50–200 mm tall. Leaves long-petiolate, lyrate-deltoid to suborbicular, coarsely toothed, blade 5–10 mm long. Flowerheads solitary on slender peduncles, disciform or shortly 3-radiate, yellow, 3–5 mm diam. Aug.–Oct. Shaded rocky slopes or in the shelter of shrubs, G, NH, KB, WM, TS, CCR (Namaqualand, Roggeveld, Cederberg to Witteberg Mountains). **(gce)**

STOEBE HARTEBEESKAROO 34 spp., mainly W Cape, S tropical Africa, Madagascar, Reunion

nervigera (DC.) Sch.Bip. Stiffly branched shrublet, up to 0.3 m tall. Leaves ericoid, erect or recurved, imbricate, pungent. Flowerheads discoid, few in terminal clusters, florets conspicuous, cream-coloured; bracts golden, acuminate. Jan.–July. Sandy or clay slopes and flats, NS, CCR (Kap Vley, Hondeklipbaai, Bokkeveld Escarpment to Albertinia). **(gce)**

plumosa (L.) Thunb. SLANGBOS Much-branched, sprawling, white-woolly, softly woody shrub, up to 1 m tall, with short shoots. Leaves granular and tufted. Flowerheads discoid, in axillary glomerules forming spike-like inflorescences; bracts golden, acuminate. Mainly Apr.–June. Rocky flats and slopes, KB, WM, CCR (mountains of Angola, Namibia, Kamiesberg Mountains, Hantamsberg to SW Cape and eastern parts of southern Africa to Mozambique and Zimbabwe).

SYNCARPHA[1] (= *HELIPTERUM* in part) EVERLASTING, SEWEJAARTJIE ± 28 spp., southern Africa

canescens (L.) B.Nord. PIENKSEWEJAARTJIE, ROOISEWEJAARTJIE Sparsely branched, closely leafy, grey-felted shrublet, up to 0.5 m tall. Leaves alternate, small, elliptic, oblong or obovate, acute or obtuse, sessile, ascending and imbricate, woolly. Flowerheads discoid, mostly solitary on closely leafy branch tips, conical; involucral bracts papery, acuminate, white, pink to red or mottled with red, brown and white; disc florets maroon to purple. Sept.–Oct. Rocky sandstone or granite slopes, KB, CCR (Kamiesberg Mountains and Bokkeveld Escarpment to SW Cape and E to Humansdorp). **(gce)**

[**Uncertain record S. staehelina** (L.) B.Nord. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

TRIPTERIS[1] (= *OSTEOSPERMUM* in part) SKAAPBOS ± 16 spp., southern Africa and Angola to Egypt, Arabia and Jordan

A. Annuals

amplectens Harv. (= *Norlindhia amplectens* (Harv.) B.Nord.) DASSIEGOUSBLOM Glandular-pubescent annual, 0.3–1.2 m tall, lower branches often decumbent. Leaves alternate, lower ones distinctly petiolate, elliptic to ovate to rhomboid, margin dentate or lobed, middle and upper ones sessile, narrow, subentire, ± clasping and auriculate. Flowerheads radiate, pedunculate, terminal, corymbosely arranged; ray florets ± 3 times longer than involucre, yellow to orange; disc florets yellow with purplish tips. Cypselas 4–5 mm long, triangular-pear-shaped, 3-winged (occasionally 1 or 2 wingless), windowless. Apr.–Nov. Granite hills and sandy flats, G, NS, NH, KB, KV (Richtersveld through Namaqualand to Vanrhynsdorp and foothills of Bokkeveld Mountains). **(ece)**

breviradiata (Norl.) B.Nord. (= *Norlindhia breviradiata* (Norl.) B.Nord.) LEMOENBOSSIE Glandular-hairy annual, up to 0.5 m tall. Leaves alternate, soft, elliptic- to linear-lanceolate, sparsely toothed, lower ones petiolate and upper ones ± clasping. Flowerheads radiate, terminal, corymbosely arranged; ray florets equalling to slightly longer than involucre; ray and disc florets yellow. Cypselas ± 5 mm long, triangular-obovoid, 3-winged, windowless. (June)Aug.–Sept. Rocky hills and sandy riverbeds, G, WM, CCR (southern Namibian Escarpment and Richtersveld to foothills of Nieuwoudtville-Calvinia Plateau and Botterkloof). **(gce)**

clandestina Less. (= *Monoculus monstrosus* (Burm.f.) B.Nord.) TREKKERTJIE Glandular-hairy, aromatic annual, up to 400 mm tall. Leaves alternate, sparsely pilose to glabrous, oblanceolate or linear, margin sinuate-dentate, lower ones petiolate, upper ones auriculate and half clasping at base. Flowerheads radiate, few in branched panicles, rarely solitary; involucral bracts broadly scariose; ray florets equalling or slightly longer than involucre, yellow to orange, occasionally dark-spotted at base; disc florets mauve or brown. Cypselas 8–9 mm long, triangular, 3-winged, with 1 apical window. July–Sept. Sandy and rocky flats or slopes, G, NS, NH, KV, WM, TS, CCR (southern Namibian Escarpment through Namaqualand to SW Cape and Little Karoo). **(gce)**

hyoseroides DC. (= *Monoculus hyoseroides* (DC.) B.Nord.) DASSIEGOUSBLOM Glandular-pubescent to glabrescent annual, 200–700 mm tall. Leaves alternate, oblong to oblanceolate, margin ± sinuous to sinuate-dentate, lower ones petiolate, upper ones sessile, auriculate and half clasping at base. Flowerheads radiate, corymbose, terminal; involucral bracts with white scarious margins; ray florets 2–3 times longer than involucre, orange; disc florets violet or purple. Cypselas 7–8 mm long, triangular, 3-winged, with 1 apical window. (May)July–Oct. Among boulders in sandy soils over rocks in drainage lines, G, NS, NH, WM, TS (Richtersveld and Bushmanland, S to Nieuwoudtville and E to Roggeveld Escarpment and foothills).

microcarpa Harv. BOEGOEBOSSIE Robust, roughly glandular-hairy annual, up to 0.8 m tall. Leaves alternate, glandular-pubescent to subglabrous, lower and middle ones rhomboid, ovate, elliptic to oblanceolate, base tapered into a distinct petiole, often prominently 3-nerved from base, upper ones oblanceolate to sublinear, sessile, auriculate, margin sinuate-dentate to subentire. Flowerheads radiate, small, in upper corymbs; ray florets much longer than involucral bracts, yellow to orange; disc florets yellow. Cypselas 4–5 mm long, triangular, 3-winged, with 3 small, apical windows. July–Mar. Sandy riverbeds, along sandy coastal belt and on quartzite hillslopes, SN, G, NS, NH, KV, WM (southern Angola to Vanrhynsdorp and Gordonia).

polycephala DC. Annual, up to 0.5 m tall. Leaves alternate, glabrous, somewhat succulent, basal ones elliptic to oblanceolate, tapering into a petiole, 3-nerved from base, middle and upper ones linear-(ob)lanceolate. Flowerheads radiate, numerous, corymbosely arranged; ray florets longer than involucral bracts, yellow; disc florets yellow. Cypselas small, 3–4 mm long, triangular-pear-shaped, with 3, ± 1 mm-broad wings and 3 apical windows. May–Nov. Rocky hillsides, riverbeds and plains in deep sandy soil, SN, G (southern Namibia, Gariep Valley and coast N of Port Nolloth). **(ece)**

A.' Perennial herbs or shrubs
B. Leaves alternate

aghillana DC. SAGTEBIETOU, SKAAPBOS Roughly hairy or bristly and glandular perennial herb, up to 300 mm tall, with woody base. Leaves alternate, mostly basal, oblanceolate, upper ones lanceolate, entire to sharply toothed. Flowerheads radiate, 1–few on elongate peduncles; ray florets yellow or cream-coloured, often striped purple below; disc florets yellow. Cypselas 9–12 mm long, triangular, with 3 broad wings and 3 apical windows. Mar.–Oct. Rocky slopes and hills, dolerite ridges or sandy areas, WM, TS, CCR (widespread from Namibia through to SW Cape, E Cape, Free State and Mpumalanga).

crassifolia O.Hoffm. Shrub or dwarf shrub, up to 1 m tall. Leaves alternate, densely glandular-pubescent, succulent, lower ones oblanceolate to linear-oblanceolate, petiolate, margins entire to coarsely and distantly dentate, upper ones sessile, linear, subterete, margins entire. Flowerheads radiate, in terminal corymbs; ray and disc florets yellow. Cypselas 4–5.5 mm long, 3-winged, with 3 apical windows. Year-round. Coastal and inland dunes, mountain slopes and riverbeds, SN, G, NS (coastal belt from Angola to southern Namibia and Richtersveld).

pinnatilobata (Norl.) B.Nord. Shortly glandular-pilose shrub or dwarf shrub, 200–300 mm tall. Leaves alternate, bipinnatipartite to pinnatipartite. Flowerheads radiate, terminal, corymbosely arranged; ray florets longer than involucral bracts, yellow; disc florets yellow. Cypselas 5 mm long, glabrous, triangular-ellipsoid, 3-winged, with 3 apical windows. July–Aug. and Oct. Among rocks, granite koppies or hillsides, G, NH (Richtersveld and Springbok). **(ece)**

B.' Leaves opposite

oppositifolia (Aiton) B.Nord. MUISHONDBOS, SKAAPBOS, STINKSKAAPBOS Pungent-smelling, rounded, glaucous shrub, up to 1 m tall. Leaves opposite, narrowly oblanceolate, succulent, glabrous. Flowerheads radiate, solitary or few corymbosely arranged at branch tips; ray florets much longer than involucral bracts, yellow to orange; disc florets purple. Cypselas 10–15 mm long, triangular, 3-winged, with 3 small, apical windows. May–Oct. Rocky sandstone or granite slopes, sandy flats or dunes, SN, G, NS, NH, KV, CCR (southern Namibia to Clanwilliam). **(gce)**

sinuata DC. BIETOU, HARDEVELDBIETOU, KAROOBIETOU, KLEINSKAAPBOSSIE, SKAAPBOS Twiggy shrublet, up to 0.5 m tall. Leaves opposite, slightly succulent and glaucous, younger ones glandular-powdery; obovate to elliptic, to rarely sublinear-lanceolate, margins sinuate-dentate to sparsely denticulate. Flowerheads radiate, 1–few at branch tips; ray florets longer than involucral bracts, yellow; disc florets yellow. Cypselas 9–12 mm long, triangular, 3-winged, with 3 apical windows. July–Oct. Rocky clay flats and slopes or sandy flats, SN, G, NS, NH, KV, WM, TS, CCR (southern Namibia through to SW Cape, E Cape and Free State).

sp. A (= *Osteospermum nordenstamii* J.C.Manning & Goldblatt) Dwarf, gnarled, ± creeping shrublet, < 100 mm tall. Leaves opposite, oblanceolate, leathery or ± succulent, with distinctly woolly axils. Flowerheads radiate, solitary at branch tips; ray florets ± twice as long as involucral bracts, dull yellow; disc florets yellow tipped blackish. Cypselas unknown. July–Sept. Among white quartzite pebbles, mainly on N-facing slopes, KV (near Riethuis and Koekenaap). **(ece)**

[**Taxonomic note** Recent molecular studies (Nordenstam & Källersjö 2009) suggest that *Monoculus* and *Norlindhia* (Nordenstam 2006) fall within a group comprising species of *Tripteris*. Problems still remain as to the delimitation of *Tripteris* and *Osteospermum* which as presently circumscribed are not monophyletic.]

TROGLOPHYTON[1] 6 spp., southern Africa

A. Heads homogamous, discoid

acocksianum Hilliard Mat-forming, perennial herb, rooting at nodes. Leaves alternate, petiolate, ovate to ovate-elliptic, white-woolly. Flowerheads discoid, up to 6 mm long, solitary or few to-

gether, arranged corymbosely on short peduncles at branch tips; inner involucral bracts with white, elliptic, obtuse tips. Pappus of bristles, with barbellate shaft and subplumose tips. Sept.–Nov. Shale slopes, WM (Calvinia area and Roggeveld). **(ece)**

capillaceum (Thunb.) Hilliard & B.L.Burtt Delicate, white-woolly annual, up to 300 mm tall. Leaves alternate, petiolate, elliptic to elliptic-ovate, ± tapering at both ends, mucronate, pale green and glabrescent above. Flowerheads discoid, up to 3 mm long, few together, subracemosely arranged on long peduncles; involucral bracts with obtuse tips, generally irregularly toothed, white to purple. Pappus of barbellate bristles. Mainly Sept.–Oct. Damp shady slopes under shrubs or rocks, SN, G, NH, WM, TS, CCR (southern Namibia to Cape Peninsula and E to Drakensberg Mountains).

A.' Heads heterogamous, disciform

leptomerum Hilliard Delicate, weakly erect or prostrate annual, branches up to 120 mm long. Leaves alternate, petiolate, elliptic, apex mucronate, both surfaces thinly woolly. Flowerheads disciform, 1 per axil on a slender peduncle, or few at branch tips; involucral bracts subacute, ± opaque, white; female florets fewer or slightly more than bisexual florets. Pappus of subplumose bristles, shaft barbellate, cilia at tips of bristles often thickened or elongated. Aug.–Dec. Moist shady places under rocks, NH, KB, CCR (Springbok through to Kamiesberg Mountains, Cederberg Mountains and to Piketberg). **(gce)**

parvulum (Harv.) Hilliard & B.L.Burtt Annual, ± erect, 10–150 mm tall. Leaves alternate, petiolate, upper subsessile, oblanceolate to elliptic, apex subacute to obtuse, mucronate. Flowerheads disciform, pedunculate to almost sessile, corymbosely arranged at branch tips; involucral bracts white, occasionally tinted reddish, tips obtuse to subacute; female florets mostly at least twice as many as bisexual florets. Pappus of barbellate bristles. Aug.–Nov. Damp often shady slopes, SN, G, WM, CCR (southern Namibia, eastern Richtersveld and Hantam to SW Cape).

tenellum Hilliard Delicate, diffuse, grey-woolly annual, 30–100 mm tall. Leaves alternate, petiolate, upper sessile or subsessile, elliptic, apex acute or subacute, mucronate, glabrescent above. Flowerheads disciform, 1 per axil on a slender peduncle, or few corymbosely arranged at branch tips on shorter peduncles; involucral bracts milk-white, tips very obtuse; female florets fewer or slightly more than bisexual florets. Pappus with subplumose tips and barbellate shaft, cilia at tips of bristles thickened. Sept.–Oct. Shady damp places on hills and mountains, probably under rocks, NH, KB, CCR (northern Namaqualand and Kamiesberg to Cederberg Mountains and Botterkloof). **(gce)**

URSINIA BERGMARGRIET ± 40 spp., mainly South Africa, 1 sp. in E Africa

A. Disc florets of flowerhead bearing truncate or trifid paleae without rounded scale-like appendages

anthemoides (L.) Poir. MARGRIET Erect, annual herb, up to 0.5 m tall, stems often reddish. Leaves alternate, 20–50 mm long, pinnatisect or bipinnatisect, glabrous to sparsely hairy. Flowerheads radiate, solitary, long-pedunculate; involucral bracts densely imbricate, ± pubescent or glabrous, outer ovate with membranous margins, middle ones ovate or oblong with triangular apex, inner oblong with ovate-rotundate appendages, outer 3 or 4 rows often with dark brown margins; ray florets yellow often with a purple spot at base, occasionally reddish below; disc florets yellow or purplish tipped, paleae truncate. Cypselas ± curved. July–Oct. Sandy and loamy soils, G, NH, KB, KV, WM, TS, CCR (southern Namibia to SW Cape and Port Elizabeth). **(gce)**

calenduliflora (DC.) N.E.Br. Annual herb, 40–350 mm tall. Leaves 20–60 mm long, pinnatipartite, rarely bipinnatipartite. Flowerheads radiate, large, solitary, long-pedunculate; involucral bracts densely imbricate, outer with ± 0.5–1 mm-long, roundish, membranous, apical appendages, innermost with large, round, brown-purplish membranous appendages; ray florets orange or yellow with purple spot at base; disc florets yellow or apex purple, paleae truncate. Cypselas ± curved, basal tuft of hairs rarely absent. July–Sept. Sandy soil on rocky slopes, G, NH, KB (Richtersveld Mountains to Springbok and Kamiesberg Mountains). **(ece)**

pilifera (P.J.Bergius) Poir. GROOTBERGMARGRIET Thinly woolly, perennial subshrub, up to 350 mm tall, woody below. Leaves bipinnatisect, 15–25 mm long, lobes long bristle-tipped. Flowerheads radiate, large, solitary on long peduncles; outer involucral bracts with conspicuous brown

margins and apical appendages, inner with silvery appendages, conspicuously rotundate; ray florets white or pale yellow above, purple or coppery below with white margins; disc florets yellow with coppery tips, paleae trifid. July–Oct. On gravelly or rocky slopes, WM, TS, CCR (Bokkeveld Mountains and Hantam Plateau along Roggeveld Escarpment to Worcester and Willowmore). **(gce)**

A.' Disc florets of flowerhead bearing paleae with ovate to round scale-like appendages
B. Perennial subshrubs

chrysanthemoides (Less.) Harv. POKKIESBOS Perennial subshrub, 0.15–1 m tall, occasionally decumbent and rooting at nodes. Leaves pinnatipartite to bipinnatipartite, glabrous or pubescent. Flowerheads radiate, large, solitary on long peduncles; outer involucral bracts with membranous, triangular, acuminate apices, lacerated, inner bracts with ovate or rounded silvery appendages; ray florets yellow or occasionally white or red with dark reverse; disc florets yellow or with purple tips, paleae with prominent scale-like appendages. June–Oct. Sandy soils, NS, NH, KB, WM, TS, CCR (Namaqualand to Karoo, SW Cape and E Cape).

frutescens Dinter Perennial subshrub, up to 0.8 m tall. Leaves clustered, linear, occasionally with a few small teeth. Flowerheads radiate, solitary on short peduncles; outer involucral bracts with inconspicuously lacerated, apical appendages and narrow, membranous margins, inner with round, membranous appendages; ray florets short, yellow; disc florets yellow, paleae extending into a rounded appendage. Sept.–Oct. On rocky substrates, SN (inselbergs of Sperrgebiet). **(ece)**

B.' Annual or rarely short-lived perennial herbs

cakilefolia DC. GANSOOGBERGMARGRIET, GOUSBLOM Erect or sprawling annual herb, up to 0.6 m tall. Leaves alternate, mostly bipinnatisect, 20–50 mm long, lobes linear, apex mucronate and long bristle-tipped. Flowerheads radiate, solitary on long peduncles; outer involucral bracts without appendages, triangular, submembranous, black-margined, apex of innermost bracts appendaged, membranous, ovate to rotund-obtuse; ray florets yellow or orange; disc florets yellow, occasionally dark purple or black at apex, paleae with prominent scale-like appendages. May–Nov. Sandy flats and slopes or disturbed places, G, NH, KB, KV, CCR (Richtersveld and Namaqualand to Bokkeveld Mountains to Clanwilliam). **(gce)**

nana DC. KLEINBERGMARGRIET Spreading annual or short-lived perennial herb (in summer rainfall regions), up to 0.4 m tall. Leaves bipinnatisect, 15–50 mm long, semi-succulent. Flowerheads radiate, small, solitary on short peduncles; involucral bracts very broadly ovate with black crescent marks apically, inner bracts with oblong membranous appendages; ray florets pale yellow; disc florets pale yellow, rarely white, inner paleae oblong with small, ovate, scale-like appendages. (Apr.)July–Oct. On sandy and loamy soils, often in disturbed habitats, SN, G, NH, KB, KV, WM, TS, CCR (central Namibia through Namaqualand to Mpumalanga to Ethiopia).

pygmaea DC. Annual herb, 30–200 mm tall. Leaves pinnatipartite or bipinnatipartite. Flowerheads radiate, solitary, shortly pedunculate; outer involucral bracts triangular, long acuminate, apex purplish black, submembranous, inner bracts with rotundate, apical appendage, produced into a narrow point in middle bracts, appendages purplish black, membranous; ray and disc florets pale yellow, paleae with prominent, scale-like appendages. July–Oct. Quartz patches and on deep sandy soils, NS, NH, KV (Komaggas to near Garies to Varsrivier near Vanrhynsdorp). **(ece)**

speciosa DC. Annual herb, 100–400 mm tall. Leaves sub-bipinnatipartite. Flowerheads radiate, large, solitary on short or long peduncles; outer involucral bracts with 2–3 mm-long transversely ovate, papery appendages; ray florets yellow or orange, rarely white; disc florets yellow, rarely purple-tipped, paleae with prominent, scale-like appendages. June–Dec. Usually on deep sandy soils and stabilised inland dunes, SN, G, NS, KB, KV, CCR (southern Namibia, Namaqualand to Malmesbury). **(gce)**

sp. A Previously included in **U. cakilefolia** but with prominent appendages on all involucral bracts, appendages thick, opaque, those on outer bracts ovate, obtuse or rounded; ray florets yellow. Aug.–Sept. Sandy soils, on mountain summits, KB (Kamiesberg Mountains). **(ece)**

sp. B Like **U. nana** but erect to prostrate; outer involucral bracts black-margined, inner unmarked; inner paleae lorate, with elliptic appendages. Apr.–Sept. Sandy soils, G (Richtersveld to northern Bushmanland). **(ece)**

[**Taxonomic note** Preliminary molecular studies on the genus suggest that several cryptic taxa may yet have to be described and that the subgeneric classification may have to be reassessed.]

[**Uncertain record** **U. sericea** (Thunb.) N.E.Br. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

VELLEREOPHYTON[1] 7 spp., W to E Cape

dealbatum (Thunb.) Hilliard & B.L.Burtt Sprawling, white-woolly annual or ?perennial herb, up to 300 mm tall. Leaves alternate, oblanceolate, decreasing in size upwards, apex subacute to obtuse. Flowerheads disciform, in dense woolly, terminal corymbs; tips of inner involucral bracts oblong, obtuse, white, with purplish red blotch in centre; female florets more than bisexual florets, yellow, tipped red-purple. Pappus bristles with subplumose tips. July–Mar. Damp, often sandy places, such as streambeds, dune slacks, marshes and seepages, KB, CCR (Kamiesberg and Bokkeveld Mountains to SW Cape and E Cape).

niveum Hilliard Rounded, white-woolly, weakly erect annual or perennial herb, up to 200 mm tall. Leaves alternate, oblanceolate, apex obtuse to subacute. Flowerheads disciform, in glomerules arranged in corymbs at branch tips; tips of inner involucral bracts broadly ovate to obtuse, white, with purplish red blotch near centre; bisexual florets 2 or 3 times as many as female florets, yellow, tipped pink. Pappus bristles with subplumose tips. Sept.–Jan. Damp sand in streambeds or pans, WM, CCR (Nuweveld Mountains through to Albertinia and Potberg).

pulvinatum Hilliard Cushion-forming, grey-woolly perennial, forming dense mats ± 100 mm across. Leaves oblanceolate or spathulate. Flowerheads disciform, in subcorymbose clusters, tips of involucral bracts oblong, white, eventually entire bract spreading horizontally, bisexual florets more than female florets. Pappus with subplumose tips. Mar. Sandy lowlands, KV (near Klawer). **(ece)**

BIGNONIACEAE

by D.A. Snijman

RHIGOZUM 7 spp., Africa and Madagascar

obovatum Burch. WILDEGRANAAT Stiffly branched, spiny shrub, up to 4.5 m tall. Leaves in tufts, obovate, on short petioles, margins revolute. Flowers 1–3 on short shoots, showy, funnel-shaped, 20–30 mm long, golden-yellow. Fruit narrow and flattened, seeds papery winged. July–Dec. Dry shale slopes, TS, CCR (Worcester to Uitenhage into central South Africa).

trichotomum Burch. DRIEDORING Small, woody, grey-green shrub, up to 1.5 m tall, sprouting from creeping underground stems. Leaves scattered in small dense tufts on 3-branched stems with pointed tips. Flowers trumpet-shaped, 20–40 mm long, white or rarely pale pink. Fruit narrow and flattened, seeds papery winged. Oct.–Mar. (depending on rain). Dune valleys, pans, and dry river banks, SN (Klinghardt Mountains to Kgalagadi, Bushmanland and central Karoo).

BORAGINACEAE

by E. Retief, **Lobostemon** by M.H. Buys

1. Petals and stamens 10–12; ovules many in each locule; robust, white-prickly annuals (subfamily CODONOIDEAE) ..... **Codon**
1.' Petals and stamens 4 or 5; ovules solitary in each locule:
  2. Ovary entire or shallowly 4-lobed; style terminal:
    3. Flowers 5-merous; style entire; stigma 1; fruit becoming dry, of 2–4 nutlets (subfamily HELIOTROPIOIDEAE) ..... **Heliotropium**
    3.' Flowers 4-merous; style divided; stigmas 2; fruit a capsule (subfamily WELLSTEDIOIDEAE) ..... **Wellstedia**
  2.' Ovary deeply 4-lobed; style gynobasic; fruit dry, of 2–4 nutlets (subfamily BORAGINOIDEAE):
    4. Calyx strongly accrescent in fruit; anthers with connectives prolonging into long appendages, usually twisted above thecae ..... **Trichodesma**

4.' Calyx not or slightly accrescent in fruit; anthers not prolonged into long appendages:
5. Stamens exserted ..... **Lobostemon**
5.' Stamens included:
6. Corolla naked in throat ..... **Amsinckia**
6.' Corolla with fornices:
7. Nutlets glabrous:
8. Nutlets smooth. ..... **Lithospermum**
8.' Nutlets rugose, tuberculate and verrucose:
9. Corolla throat with 5 well-developed, elongate, vertical nectar guides ..... **Buglossoides**
9.' Corolla throat without nectar guides, but with 5 scales opposite lobes ..... **Anchusa**
7.' Nutlets glochidiate (with barbed bristle or hooked hair):
10. Nutlets 2, stellately glochidiate ..... **Rochelia**
10.' Nutlets 4:
11. Inflorescence ebracteate; nutlets attached to gynobase for their entire length **Cynoglossum**
11.' Inflorescence bracteate; nutlets attached to gynobase for only part of their length **Lappula**

*AMSINCKIA YSTERGRAS 50 spp., New World

***calycina** (Moris) Chater Roughly hairy annual, up to 500 mm tall. Leaves narrowly ovate to ovate, apex acuminate. Flowers in tightly rolled, helicoid cymes, corolla orange-yellow. Fruit smooth. Weed in sandy soil, disturbed areas, NH (native of the Americas).

***menziesii** (Lehm.) A.Nelson & J.F.Macbr. (= *Amsinckia retrorsa* Suksd.) Roughly hairy annual, up to 500 mm tall. Leaves with blade narrowly ovate to ovate, apex acute to rounded. Flowers in tightly rolled, helicoid cymes, corolla yellow to orange. July–Nov. Fruit rugose, tuberculate and verrucose. Weed in sandy soil, disturbed areas, G, NS, NH, KB, KV, WM, CCR (American weed).

ANCHUSA CAPE FORGET-ME-NOT ± 35 spp., mainly European

capensis Thunb. Softly or roughly hairy annual, up to 1 m tall. Leaves narrowly ovate. Flowers in helicoid cymes lengthening in fruit, blue or dark blue. Nutlets ovoid. Sept.–Nov. Sandy flats, often disturbed places and roadsides, NH, KB, WM, CCR (Namibia, Lesotho and drier parts of South Africa, to Mpumalanga).

*BUGLOSSOIDES ± 7 spp., Europe to China

***arvensis** (L.) I.M.Johnst. IRONWEED, NAALDJIEBOSSIE Greyish green, annual herb, up to 600 mm tall, densely covered with appressed bristles. Leaves narrowly ovate to obovate. Flowers in scorpioid cymes, white, corolla tube hairy inside, with scale-like lobes at base, calyx with a white indumentum, enlarging in fruit. Nutlets ± ovoid, rugose and tuberculate. Aug.–Dec. In disturbed places, WM, CCR (native of Eurasia, widespread naturalised weed in many parts of the world).

CODON SUIKERKELK 2 spp., Namibia and South Africa

royenii L. White-prickly, softly woody, short-lived shrublet, up to 1.5 m tall. Leaves petioled, blade ovate-cuneate, with white prickles. Flowers axillary or in terminal, helicoid cymes, large, corolla ± cylindrical, 25–40 mm long, white to cream-coloured, with yellowish throat and purplish red or greenish stripes. Capsule sparsely tubercled. Aug.–Apr. Dry stony slopes, SN, G, NH, KV, WM, TS, CCR (central Namibia to Gordonia through Namaqualand to Loeriesfontein to Biedouw Mountains to Tanqua Karoo).

schenckii Schinz Like **C. royenii** but flowers smaller, corolla slightly campanulate, 15–18 mm long, pale to bright yellow, with reddish dots near apex of lobes. Rain dependent. Sandy water courses and rocky slopes, SN, G (western Namibia to Richtersveld).

CYNOGLOSSUM HOUND'S TONGUE, KNOPPIESKLITS 55 spp., temperate and warm regions

obtusicalyx Retief & A.E.van Wyk Softly hairy perennial or biennial, up to 450 mm tall. Basal leaves long-petioled, narrowly elliptic, winged. Flowers in terminal, scorpioid cymes, white or blue, pedicels slightly curved, 15 mm long, calyx lobes obtuse. Nutlets densely covered with min-

ute prickles and slender hooked hairs. Sept.–Jan. Often on screes below cliffs, WM, CCR (Hantamsberg and Ceres and Beaufort West).

HELIOTROPIUM heliotrope ± 250 spp., tropical and warm regions

A. Calyx persistent on stem

*__curassavicum__ L. Erect or procumbent, annual or perennial halophyte, up to 500 mm tall. Leaves spathulate, bluish green, succulent. Flowers in a helicoid cyme, white. Nutlets rugose. Sept.–Apr. Disturbed places, damp soil, SN, G, NH, WM, TS, CCR (naturalised halophyte from the Americas, drier parts of southern Africa).

ovalifolium Forssk. Perennial herb, up to 600 mm tall. Leaves obovate, covered with stiff hairs, somewhat silvery. Flowers in a helicoid cyme, white, calyx much shorter than corolla tube. Rain-dependent. Often in disturbed places, G (eastern Richtersveld and eastwards through southern Africa).

A.' Calyx and fruit dispersed together

*__supinum__ L. Procumbent, annual or perennial herb, branches up to 300 mm long. Leaves broadly ovate to broadly obovate, densely adpressed-hairy, veins usually sunken above and prominent beneath. Flowers in a helicoid cyme, white. Nutlets smooth. Nov.–Apr. Disturbed places in damp soil, KV, CCR (European weed, Old World).

tubulosum E.Mey. ex DC. Coppicing, perennial herb, up to 350 mm tall, woody basally. Leaves elongate-ovate to narrowly ovate, densely hairy. Flowers in a helicoid cyme, cream-coloured to white, calyx densely hairy, almost as long as corolla tube. Apr.–Oct. Sandy soils in dry riverbeds or among rocks, SN, G, KV (Namibia to Bushmanland to Knersvlakte).

LAPPULA 50 spp., mainly temperate Eurasia

capensis (A.DC.) Gürke Erect or sprawling annual, up to 300 mm tall. Leaves softly hairy, narrowly obovate with a tendency to fold. Flowers in terminal, leafy cymes elongating in fruit, pedicels very short. Nutlets ovoid-trigonous with glochidiate margins. Sept.–Oct. Disturbed places, KV, WM, CCR (near Loeriesfontein to E Cape to Free Sate and Lesotho).

LITHOSPERMUM gromwell 59 spp., temperate regions, excluding Australia

scabrum Thunb. Low to procumbent, roughly hairy subshrub, up to 300 mm tall. Leaves narrowly elliptic to narrowly ovate. Flowers in compact heads, white, sweetly scented. Sept.–Oct. On rocky ridges, WM (Kubiskou Mountains to Roggeveld Escarpment to Free State).

LOBOSTEMON agtdaegeneesbos 29 spp., South Africa, mostly W Cape

A. Flowers small (< 15 mm long), rotate

echioides Lehm. Shrublet, 200–800 mm tall. Leaves sessile, oblong-narrowly ovate, hairy, often with soft, silvery hairs. Flowers in cymes, blue, hairy outside, staminal scales triangular with lateral lobes, stamens exserted, style glabrous. Aug.–Oct. Stony slopes and flats in mostly sandstone derived soils, G, NH, KB, WM, CCR (Ploegberg, Spektakelberg, Kamiesberg and Bokkeveld Mountains to SW Cape to Little Karoo to near Grahamstown).

A.' Flowers medium to large (≥ 15 mm long), funnel-shaped
B. Flowers hairy outside

fruticosus (L.) H.Buek douwurmbos, luibos Shrub, 500–800 mm tall. Leaves sessile, oblanceolate-obovate, hairy, with both long and short hairs. Flowers in cymes, blue to pink, hairy outside, staminal scales ridge-like without lateral lobes, style hairy. May–Dec. Sandstone slopes

or sandy or shale flats, NH, KB, CCR (Spektakelberg, Kamiesberg Mountains and Redelinghuys to Malmesbury to Cape Peninsula to Worcester). **(gce)**

B.' Flowers glabrous outside

argenteus (P.J.Bergius) H.Buek Shrublet, 300–600 mm tall. Leaves sessile, linear-lanceolate, hairy, with both long and short hairs, margins revolute. Flowers in a pseudo-spike, 1 per bract, blue, glabrous outside except for midvein and margins, staminal scales reduced to ridges without lateral lobes. July–Feb. Mainly on granitic derived soils in the north, and shale or sandstone derived soils to the east, KB, WM, CCR (Kamiesberg Mountains, Kubiskou Mountains and Clanwilliam to Cape Peninsula to Grahamstown).

cinereus DC. & A.DC. (= *L. trichotomus* (Thunb.) A.DC. pro parte) Shrub, 0.6–1 m tall. Leaves sessile, linear-lanceolate, hairy, with numerous short, ash-coloured hairs on both surfaces and interspersed with bulbous-based hairs on lower surface, appearing gland-dotted. Flowers in cymes, white, sometimes pale pink, staminal scales slightly triangular with lateral lobes, style glabrous. Aug.–Sept. Sandy slopes or flats, NS, CCR (Port Nolloth to Heerenlogement and Cederberg Mountains). **(gce)**

glaucophyllus (Jacq.) H.Buek (including **L. pearsonii** Levyns) Shrub, 0.6–0.9 m tall, young branches glabrous. Leaves sessile, narrowly oblong-lanceolate, hairy but appearing glabrous. Flowers in lax cymes, cream-coloured to blue, glabrous outside, staminal scales triangular with lateral lobes, style hairy. July–Oct. Rocky slopes or sandy soils, G, NS, NH, KB, CCR (near Steinkopf to Karootjie to Cape Peninsula to Laingsburg). **(gce)**

*ROCHELIA 20 spp., Eurasia

***disperma** (L.f.) K.Koch Annual, up to 200 mm tall. Leaves alternate, rosulate, basal leaves dying off during flowering, sessile, blade narrowly obovate or spathulate. Flowers in scorpioid cymes, arranged in loose panicles, bracteate, calyx deeply lobed, accrescent in fruit, corolla pale blue. Nutlets 2, stellulately glochidiate. Aug.–Sept. Mountain renosterveld, WM (Eurasia, N and W Africa, introduced in Calvinia area).

TRICHODESMA 35 spp., tropical and warm regions of the Old World

africanum (L.) Lehm. Prickly annual, up to 500 mm tall. Leaves with blade ovate to narrowly ovate, petiolate or sessile, alternate or opposite, coarsely white-hispid. Flowers in helicoid cymes, pale pink or white, calyx as long as corolla, lobes with dark tips, margins and midrib hairy. Nutlets ovoid with serrate, raised margins, inner face glochidiate. July–Oct. Stony slopes and dry riverbeds, G, NH, WM, TS, CCR (drier parts of South Africa to W and N Africa).

WELLSTEDIA 6 spp., Socotra, Somalia, Ethiopia, Namibia and N Cape

dinteri Pilg. Procumbent, greyish, dwarf shrub, ± 100–150 mm tall. Leaves narrowly obovate to spathulate, remains of old bases becoming spine-like, densely pubescent with fine bristles. Flowers single or in scorpioid cymes, 4-merous, corolla densely hairy outside, pink or white. Capsule hairy. Apr.–Feb. Rocky slopes and dry riverbeds, G (Namibia, Richtersveld and Bushmanland).

BRASSICACEAE

by D.A. Snijman from Marais (1970)

1. Fruit transversally articulate with 2 or more segments, which separate at maturity . . . . . **Raphanus**
1.' Fruit not transversally articulate:
  2. Fruit a silicula, less than 4 times as long as broad:
    3. Fruit not compressed or dorsally compressed:
      4. Plants with stellate hairs, sometimes mixed with simple hairs. . . . . **Alyssum**
      4.'Plants with simple hairs or completely glabrous . . . . . **Heliophila**

3.' Fruit compressed laterally:
5. Ovules 1–4; silicula few-seeded ..... **Lepidium**
5.'Ovules 6–24; silicula many-seeded:
6. Plants with branched hairs; silicula triangular-obcordate ..... **Capsella**
6.' Plants glabrous or with simple hairs; silicula ellipsoid to obovate..... **Hymenolobus**
2.' Fruit a silicula, at least 4 times as long as broad:
7. Plants glabrous or with simple hairs only:
8. Style beak-like and seed-bearing ..... **Brassica**
8.'Style never beak-like and seed-bearing:
9. Flowers yellow (in the South African material)..... **Sisymbrium**
9.' Flowers blue, white, pink, mauve or purple ..... **Heliophila**
7.' Plants hairy with branched and stellate hairs or with a mixture of branched and simple hairs:
10. Perennial shrublets, glandular..... **Matthiola**
10.' Perennial or annual herbs, not glandular (in the South African material):
11. Annual herbs; valves of silicula 1-nerved; stigma capitate ..... **Descurainia**
11.' Perennial herbs; valves of silicula 3-nerved; stigma 2-lobed..... **Sisymbrium**

*ALYSSUM ± 100 spp., Mediterranean, central Europe and Asia

***minutum** Schltdl. ex DC. Small, densely hairy annual, up to 120 mm tall. Leaves oblanceolate to elliptic, 5–15 mm long, covered with stellate hairs. Flowers in a compact raceme, small, yellow, fading to white, petals densely hairy-backed. Fruit disc-shaped, ± inflated, 3–4 mm diam., with a short persistent style. Aug.–Sept. In shaley stony ground, KB, WM (southern and eastern Europe, naturalised in South Africa).

*BRASSICA ± 40 spp., Mediterranean, western and central Europe and eastern Asia

***tournefortii** Gouan Slender annual, up to 600 mm tall, densely hispid in lower part, ± glabrous above. Leaves in a basal rosette, divided with 4–12 pairs, upper leaves undivided. Flowers in a raceme, pale yellow. Fruit linear attenuate, 30–50 × 2–2.8 mm, with beak 10–20 mm long, valves bulging with seeds. Aug.–Oct. Sandy soils, NS, CCR (West Coast to E Cape, native to Mediterranean coast).

*CAPSELLA ± 5 spp., Mediterranean and western Asia

***bursa-pastoris** (L.) Medic. SHEPHERD'S PURSE Annual or biennial, up to 450 mm tall, stems glabrous or thinly hairy, striate. Leaves in a basal rosette, coarsely and deeply lobed, upper ones lanceolate, entire or dentate, sagittate and stem-clasping at base. Flowers small, white. Fruit triangular-obcordate, 6–9 × 4–8 mm, truncate or notched at apex. Aug. Disturbed habitats, WM, CCR (cosmopolitan weed, introduced from Europe).

*DESCURAINIA ± 50 spp., N and S America, Europe, Asia and Macronesia

***sophia** (L.) Webb ex Prantl FLIXWEED Annual, 0.3–1 m tall, stem densely stellate-hairy below. Leaves finely 2- or 3-pinnatisect, with 6–9 pairs of primary lobes, densely stellate-hairy. Flowers minute, whitish or yellowish. Fruit linear, 10–20(–45) × 0.5–0.8 mm, ± knotted along length. ?Flowering time. Open, dry, disturbed areas, G (Europe, Asia and N Africa, naturalised along Gariep and near Graaff-Reinet).

HELIOPHILA (= *BRACHYCARPAEA, THLASPEOCARPA*) SPORRIE ± 70 spp., Namibia and South Africa, mostly in winter rainfall region

A. Shrublets

carnosa (Thunb.) Steud. Shrublet, up to 600 mm tall, lower part of annual shoots often reddish. Leaves ± crowded at base, ± strap-shaped, entire to few-lobed in upper half to pinnately lobed, 30–200 × 0.5–4 mm, often ± fleshy. Flowers large, white, pale mauve or pink, rarely purple or blue, crowded near apex, ovules 14–30. Fruit broadly linear, 25–80 × 2.5–5 mm, margins straight.

Aug.–Oct. (in W), Sept.–Jan. (in E). Dry habitats, SN, G, NH, KB, WM, TS, CCR (southern Namibia to W Cape, E Cape, Lesotho, Free State, KwaZulu-Natal and Gauteng).

cornuta Sond. Shrublet, up to 1.5 m tall, sometimes minutely hairy below. Leaves exstipulate, filiform to linear-oblanceolate, 15–120 × 0.5–3 mm, fleshy and subterete. Flowers white, mauve or blue, outer sepals shortly horned, petals basally appendaged, ovules 14–38. Fruit necklace-shaped, 30–100 mm long. July–Nov. Stony flats and slopes, SN, G, NH, KB, KV, WM, TS, CCR (Klinghardt Mountains through Namaqualand to Roggeveld Escarpment to Riviersonderend and Richmond).

juncea (P.J.Bergius) Druce (= *Brachycarpaea juncea* (P.J.Bergius) Marais) Willowy shrublet, up to 1 m tall. Leaves linear to narrowly oblong. Flowers large and showy, white to pink to purple. Fruit subglobose, papillose. Aug.–Dec. Rocky slopes, NS, NH, KB, CCR (Spektakelberg and near Komaggas, Kamiesberg and Bokkeveld Mountains to Langkloof Mountains). **(gce)**

A.' Perennial and annual herbs
B. Fruit ± rounded in outline, less than 3 times as long as wide

cornellsbergia B.J.Pienaar & A.Nicholas Soft, sparsely hairy annual, up to 290 mm tall. Leaves exstipulate, narrowly lanceolate, 10–40 × 2–8 mm. Flowers small, white, drying cream, sepals glabrous, petals appendaged, ovules 2. Fruit small, globose, inflated, 2–3 mm across. Aug.–Sept. Stony soil and rock cracks on S-facing slopes, G (Richtersveld: Vandersterrberg and Cornellsberg). **(ece)**

eximia Marais Straggling perennial herb, ± 300 mm tall, woody at base. Leaves elongate-cuneate, 45–65 × 10–20 mm, 3–7-toothed near apex. Flowers white to blue, ovules ± 6. Fruit teardrop-shaped to elliptical, ± 15 × 5.5 mm, margins evenly curved. Sept. Stony slopes and quartzite cliffs, G (Richtersveld: Helskloof and Numees Peak). **(ece)**

namaquensis (Marais) Al-Shebhaz & Mummenhoff (= *Thlaspeocarpa namaquensis* Marais) Purplish tinged annual, 150–350 mm tall, stems and branches minutely hairy. Leaves pinnatifid, 30–100 mm long, 3–9-lobed. Flowers small, white. Fruit ± orbicular to obovate, 8–10 mm across, pendulous. Aug.–Sept. ?Habitat, NH (northern Namaqualand near Steinkopf). **(ece)**

patens Oliv. Much-branched annual, up to 200 mm tall. Leaves linear, entire, 10–25 mm long. Flowers white, sepals glabrous, petals with large papillate appendage at base, ovules 2 rarely 3 or 4. Fruit oblong, obovate to ± disc-shaped, 3–6.5 × 2–2.5 mm, valves papillate. July. Sandy soils, KV, CCR (Vredendal and Piketberg). **(gce)**

suborbicularis Al-Shebhaz & Mummenhoff (= *Thlaspeocarpa capensis* (Sond.) C.A.Sm.) Annual, 120–350 mm tall, stems and branches hairy or smooth. Leaves pinnatifid, 20–100 mm long, 3–9-lobed, ± fleshy. Flowers in a ± terminal cluster, white turning violet. Fruit suborbicular to obovate, 12–17 mm across, pendulous. Aug.–Sept. Seasonally damp places, WM, CCR (Bokkeveld Plateau, Roggeveld Escarpment and Matroosberg). **(gce)**

B.' Fruit cylindrical, at least 6 to considerably more times longer than wide
C. Fruit margins contracted at regular intervals like a beaded necklace

amplexicaulis L.f. Annual, up to 450 mm tall, sometimes thinly hairy. Leaves exstipulate, lanceolate, entire, 15–60 × 1–16 mm, stem-clasping below. Flowers white, pink or mauve, sepals hairy or glabrous, petals with basal appendages, ovules 6–16. Fruit strongly necklace-like, 25–35 × 1.5–2.5 mm, on long slender smooth pedicels. Aug.–Oct. Sandy slopes, NH, KB, WM, CCR (near Springbok to Kamiesberg Mountains, Klawer, Calvinia to Saldanha and Laingsburg). **(gce)**

arenaria Sond. Annual, erect or with several decumbent stems, up to 500 mm tall, ± hairy in lower part. Leaves linear, simple or with 1–5 pairs of lobes, 15–120 mm long. Flowers blue, sepals densely hairy or rarely glabrous, petals basally appendaged, ovules 16–36. Fruit linear, 15–55 × 0.7–1.5 mm, straight-sided or necklace-like, with small or long constrictions between seeds. July–Sept. Stony or sandy slopes and flats, KV, CCR (just N of Vanrhynsdorp to Piketberg). **(gce)**

bulbostyla Barnes Annual, up to 350 mm tall, usually minutely hairy below. Leaves stipulate, linear, 20–75 mm long, lower ones 3–7-divided, upper ones entire. Flowers blue, sepals glabrous, petals with basal appendages, ovules 20–44. Fruit linear, straight or ± necklace-like, 35–55 × 1.2–1.4 mm, with persistent ± globose style. Sept.–Oct. Rocky slopes, TS, CCR (Klein Roggeveld, Laingsburg and Worcester to Swellendam). **(gce)**

collina O.E.Schulz Sprawling, much-branched annual, up to 200 mm tall, hairy below. Leaves minutely stipulate, divided, with 3 or 4 pairs of lobes 1–2 mm wide, ± fleshy. Flowers white or

cream, sweetly scented, sepals minutely hairy, petals with a small appendage, ovules 4–12. Fruit necklace-like, 10–20 × 2.3–3 mm. July–Sept. Heavy doleritic clay, WM (Bokkeveld Plateau and Roggeveld Escarpment). **(ece)**

coronopifolia L. Annual, up to 600 mm tall, lower parts roughly hairy. Leaves sometimes stipulate, linear or variously pinnatisect, 60–150 mm long, up to 3–13-lobed, upper lobes sometimes lobed again. Flowers large, blue with white or greenish centre, sepals glabrous, petals with basal appendages, ovules 16–50. Fruit necklace-like, 30–90 × 1.3–2 mm, occasionally sparsely hairy near base. Aug.–Oct. Flats and slopes, KV, CCR (just N of Vanrhynsdorp to Caledon). **(gce)**

gariepina Schltr. Like **H. amplexicaulis** but sepals always glabrous, fruiting pedicels short (3–4 mm long), stout and coarsely hairy, and fruit 1.3–1.5 mm wide. July–Aug. Stony soils, G, NH (Richtersveld to near Steinkopf). **(ece)**

leptophylla Schltr. Slender, glaucous annual, 150–350 mm tall. Leaves few, linear, entire, 25–50 mm long. Flowers pale blue, petals with a conspicuous appendage, ovules 18–30. Fruit linear, slightly necklace-like, 25–60 × 1.5–1.8 mm. ?June. ?Habitat, KV (Knersvlakte: Soutrivier). **(ece)**

obibensis Marais Erect, branched, glabrous annual, up to 150 mm tall. Leaves stipulate, linear, entire, up to 25 mm long. Flowers white, ageing to pink, sepals glabrous, petals without basal appendages, ovules 8–12. Fruit linear-oblong, ± necklace-like, 12–17 × 2–2.5 mm. Sept. Quartzite screes on N-facing slopes, SN (Obib Mountains). **(ece)**

pubescens Burch. ex Sond. Like **H. collina** but leaves pinnatisect with 5 or 6 pairs of lobes, glabrous or hairy, sepals densely downy, ovules 4–8, and fruit 1.5–1.9 mm wide. July–Aug. Stony slopes, WM, CCR (Gifberg to Franschhoek, Roggeveld Escarpment to near Graaff-Reinet).

variabilis Burch. ex DC. Bright green, finely papillate- to glandular-downy, spreading annual, up to 350 mm tall. Leaves stipulate, pinnatisect, up to 70 mm long, with 1–3 pairs of widely spaced filiform lobes. Flowers white, drying mauve or lilac, sepals glandular-pubescent, ovules 16–26. Fruit linear ± necklace-like, 20–40 × 2–2.8 mm. July–Sept. Dry sandy slopes, G, NS, NH, KB, KV, TS, CCR (Richtersveld through Namaqualand to Pakhuis Mountains and Laingsburg). **(gce)**

*C.' Fruit margins straight, but ventral valves occasionally bulging with mature seeds (see also **H. arenaria** and **H. bulbostyla**)*

affinis Sond. Slender annual, up to 350 mm tall, sparsely hairy near base. Leaves exstipulate, filiform, entire, 25–70 × 0.5–1.8 mm. Flowers white, drying pale yellowish, sometimes pinkish towards base, sepals glabrous, petals lacking an appendage, ovules 14–20. Fruit linear, 20–40 × 1.3–1.5 mm, valves slightly bulged by seeds but margins straight. Aug.–Sept. ?Habitat, NH, KB (Okiep to Kamiesberg Mountains). **(ece)**

africana (L.) Marais Nearly glabrous or hairy annual, up to 1.35 m tall. Leaves exstipulate, ± lanceolate, up to 130 × 3.5–12 mm, entire or with few to several lobes. Flowers blue or mauve, sepals hairy or glabrous, petals with basal appendages, ovules 20–52. Fruit linear, 13–100 × 1.6–2.5 mm, margins straight. Mainly Aug.–Oct. Sandy flats, NH, CCR (Garies to Swellendam). **(gce)**

crithmifolia Willd. Thinly hairy annual, up to 600 mm tall. Leaves stipulate, pinnatifid, 30–120 mm long, 1–6-lobed, fleshy. Flowers white or pink to violet, sepals glabrous, petals sometimes with basal appendages, ovules 20–42. Fruit linear-oblong, 15–60 × 2–4.5 mm, margins straight, seeds narrowly to broadly winged. July–Oct. Usually sandy slopes, also clay flats, SN, NH, KV, WM, TS, CCR (southern Namibia, Namaqualand, western and southern Karoo to Riviersonderend through to Free State).

deserticola Schltr. Several-stemmed annual, up to 300 mm tall. Leaves exstipulate, pinnatisect, 10–30 mm long, with 3–9 linear lobes. Flowers white, mauve or blue, scented, sepals glabrous, petals sometimes with basal appendages, ovules 36–66. Fruit linear, 19–26 × 1.9–2.6 mm, margins straight. May–Sept. Sandy flats, SN, G, NH, TS, CCR (southern Namibia, eastern Namaqualand, Bushmanland, through Tanqua Karoo to Gydouw Pass).

laciniata Marais Annual, up to 500 mm tall. Leaves in a ± spreading, basket-like basal rosette, stipulate, divided, 40–150 mm long, with 5–14 lobes, abruptly downturned or upturned from midrib. Flowers large, white, ageing to mauve, sepals glabrous, ovules 20–38. Fruit linear, 25–40 × 2–2.7 mm, margins straight. July–Sept. Sandy or stony soils, NH (Springbok to Komaggas). **(ece)**

lactea Schltr. Annual, 150–550 mm tall, with lower parts rarely hairy. Leaves exstipulate, linear, entire, 35–90 × 0.5–1 mm. Flowers pale blue with white centre, sepals glabrous, petals with a conspicuous appendage, ovules 40–80. Fruit linear, 15–65 × 1–1.8 mm, valves bulging with seeds but margins straight. July–Oct. In sandy soil, SN, NS, NH, KB, WM (southern Namibia to near Vanrhynsdorp through Calvinia to near Colesberg).

namaquana Bolus Glabrous or hairy annual, up to 300 mm tall. Leaves sometimes stipulate, linear or filiform, 15–23 mm long, ± fleshy. Flowers small, white, pink or blue, sepals sparsely hairy, petals sometimes with a very small appendage, ovules 10–24. Fruit linear, 15–37 × 1–1.5 mm, margins ± straight, on stout, erect fruiting pedicels, style ± obovate to cylindrical. Aug.–Oct. Sandy soils, NH, WM, CCR (northern Namaqualand to Calvinia through to Swartruggens). **(gce)**

pectinata Burch. ex DC. Delicate, finely papillate-hairy annual, 50–300 mm tall. Leaves stipulate, pinnatifid, up to 50 mm long, with up to 5 pairs of lobes, each up to 2 mm broad. Flowers small, white, sepals glabrous, ovules 10–16. Fruit linear, 8–25 × 0.8–1.5 mm, margins ± straight. Aug.–Sept. Damp, sheltered slopes, KB, WM, CCR (Kamiesberg Mountains and Roggeveld Escarpment to Clanwilliam and Montagu through to Great Karoo).

schulzii Marais Slender or stout annual, 150–450 mm tall, basal parts shortly hairy. Leaves minutely stipulate, entire or 3-lobed, 50–120 mm long, minutely hairy above. Flowers blue or purple, sepals shortly downy, petals with a basal appendage, ovules (36–)44–70(–80). Fruit linear, 35–60 × 1–1.8 mm, margins straight. Aug.–Oct. Granite hills, NH, KB (Grootvlei to Kamiesberg Mountains). **(ece)**

seselifolia Burch. ex DC. Glabrous, glaucous annual, up to 350 mm tall. Leaves mostly crowded near base, exstipulate, pinnatisect, 15–55 mm long, 3–11-lobed with 2–4 pairs close together. Flowers white, fading pink, sepals glabrous, petals usually with basal appendages, ovules 12–27. Fruit linear, 13–35 × 1.5–3.7 mm, margins straight. July–Sept. Sandy loam or clay soils, NH, KB, KV, WM, CCR (Okiep to Bokkeveld and Roggeveld Escarpments to Swartruggens and Laingsburg). **(gce)**

thunbergii Steud. (= *Heliophila latisiliqua* E.Mey. ex Sond.) Like **H. crithmifolia** but sparsely to densely hairy, leaves minutely stipulate, pinnatifid, 3–5-lobed, lobes entire or rarely lobed again, flowers small, white, pale blue, pale mauve or pink, sepals sparsely hairy, petals usually with a basal appendage, ovules (5–)8–18, fruit 23–55 × 4.5–9 mm, seeds broadly winged. July–Aug. Loamy to clay soils, G, NH, WM, CCR (Richtersveld: Rooiberg II, northern Namaqualand, Bokkeveld Mountains to near Worcester). **(gce)**

trifurca Burch. ex DC. Robust, glabrous, glaucous annual, up to 600 mm tall. Leaves minutely stipulate or exstipulate, linear, entire or up to 5-lobed, 35–120 × 0.8–2.5 mm. Flowers white, blue, mauve, lilac or violet, scented, sepals glabrous, ovules 20–44. Fruit linear or linear-oblong, 20–25 × 2.5–4.2 mm, margins straight. Mar.–Sept. Sandy or stony soil, dry riverbeds or among rocks, SN, G, ?KV, TS (southern Namibia, lower Gariep Valley, Bushmanland to central and southern Karoo, and ?Knersvlakte).

*HYMENOLOBUS ± 3 spp., Mediterranean

***procumbens** (L.) Nutt. ex Schinz & Thell. Annual or biennial, 30–300 mm tall, smooth or sparsely hairy. Leaves oblanceolate, entire or lower ones pinnatifid, 3–7-lobed. Flowers minute, white. Fruit ellipsoid to obovoid, membranous, net-veined. ?Flowering time. ?Habitat, WM (introduced to Komsberg Plateau).

LEPIDIUM (= *CORONOPUS*) BIRD-SEED, PEPPER WEED ± 175 spp., cosmopolitan

africanum (Burm.f.) DC. Pale or yellowish green biennial or short-lived perennial, up to 750 mm tall, branched only above, branches minutely hairy or smooth. Leaves oblanceolate, up to ± 50 mm long, basal ones 3–11-lobed, lower ones fewer lobed or toothed. Flowers white. Fruit oblong-ovate, notched, 1.8–2.7 mm across. Sept.–Mar. Often in disturbed ground, G, NH, KV, TS, CCR (Sudan to South Africa, widespread indigenous weed).

desertorum Eckl. & Zeyh. Sprawling, shortly hairy perennial, up to 250 mm tall, stems minutely hairy. Leaves 15–15 mm long, basal ones rosulate, pinnatifid or deeply cut, upper ones serrate to entire. Flowers subcorymbose, petals 0, nectaries filiform. Fruit ovate, notched, 1.6–2.1 mm long. Aug.–Sept. Drier flats, SN, G, NH, KV, WM, CCR (through winter rainfall region to Free State).

ecklonii Schrad. Shortly hairy perennial, up to 600 mm tall. Leaves on lower parts pinnatifid, 20–70 mm long, 9–11-lobed, upper ones shorter, serrate or toothed. Flowers apparently in leaf-opposed racemes through elongation of the lateral shoots, white. Fruit oblong-ovate, notched, 2.4–3.4 × 1.7–2.2 mm. Apr.–Nov. Sandy flats, WM, CCR (Cape Peninsula to Roggeveld and E Cape).

englerianum (Muschler) Al-Shehbaz (= *Coronopus integrifolius* (DC.) Spreng.) Prostrate or erect perennial herb, up to 300 mm tall, stems bearing ± club-shaped hairs. Leaves in a basal rosette, pinnatisect, 7–15-lobed, lobes semi-lunate, upper leaves entire, 50–75 × 1–5 mm. Flowers small, white. Fruit shaped in 2 ± globose halves, each 0.8–1 mm diam., warted or pitted. Sept.–Apr. In sandy soils, SN, G, KV, WM, TS, CCR (widespread in southern Africa).

MATTHIOLA ± 50 spp., Mediterranean, central Asia and Africa

torulosa (Thunb.) DC. Cushion-like or spreading to erect shrublet, up to 450 mm tall, nearly entirely covered with dense stellate hairs. Leaves linear-oblanceolate, 15–70 × 1.5–6 mm, entire to rarely pinnatifid with 2 or 3 pairs of lobes. Flowers dirty cream to dull purplish. Fruit linear, terete, ± like a beaded string, glandular. Oct.–Dec., depending on rain. Clay, limestone or calcareous soils, WM, CCR (Bokkeveld Plateau to central Karoo and Free Sate to Gourits River).

*RAPHANUS ± 8 spp., Mediterranean

***raphanistrum** L. WILD RADISH, WILDEMOSTERT Annual or biennial herb, 150–800 mm tall, with a stout taproot. Leaves lyrate, pinnatisect with large terminal lobe, 100–150 mm long, becoming smaller upwards. Flowers in a long raceme, white or yellow, mostly violet-veined. Fruit 30–90 × 3–6 mm, hard, longitudinally grooved, constricted between seeds, breaking crosswise into 1-seeded portions. June–Dec. WM, CCR (throughout southern Africa).

SISYMBRIUM ± 80 spp., temperate regions worldwide

burchellii DC. Perennial herb, 10–30(–70) mm tall, stems covered with simple and branched hairs. Leaves in a basal rosette, often shed at flowering, pinnatisect, with 4–11 pairs of lobes, upper ones fewer-lobed, all hairy. Flowers small, yellow. Fruit linear, terete, 20–45 × 0.8–1.4 mm. Mar.–May. Shaley or sandy flats, NH (widespread in dry areas of southern Africa).

capense Thunb. Perennial, up to 1 m tall, stems pubescent with simple grey hairs, shooting from woody base. Leaves crowded below, pinnatifid, with up to 12 pairs of lobes. Flowers subcorymbose, yellow. Fruit erect, subterete, 40–85 × 0.8–1 mm. Oct.–Apr. Flats, slopes and stream sides, KV, WM, TS, CCR (Knersvlakte to Great Karoo, KwaZulu-Natal and Free State to Cape Peninsula).

***orientale** L. Annual or perennial herb, up to 1 m tall, stems pubescent with simple hairs, especially basally. Leaves in a basal rosette, pinnatisect, in 4 or 5 pairs of lobes, upper ones fewer-lobed with terminal lobe spearhead-shaped. Flowers yellow. Fruit linear, terete, 50–85 × 1.2–1.5 mm. Aug.–Oct. Disturbed places, WM, CCR (Mediterranean and Asia, widely naturalised).

?BRUNIACEAE

by D.A. Snijman

[**Uncertain records** **Audouinia laxa** (Thunb.) A.V.Hall (= *Tittmannia laxa* (Thunb.) C.Presl and **Brunia fragarioides** Willd. (= *Nebelia fragarioides* (Willd.) Kuntze). See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

BURSERACEAE

by D.A. Snijman

COMMIPHORA ± 190 spp., Africa, Madagascar, Arabia to Sri Lanka, Mexico, S America

capensis (Sond.) Engl. NAMAKWA-KANNIEDOOD, NAMAQUA CORKWOOD Thick-stemmed, deciduous shrub or small tree, up to 4 m tall; bark smooth, with dark patches; branches with rigid,

dwarf spur-branchlets. Leaves trifoliolate, obovate to ± circular, dark green, glabrous. Flowers small, greenish yellow. Oct.–Mar. Fruit a small, round berry. Rocky slopes or outcrops, SN, G (Lüderitz area to Richtersveld and E to Goodhouse).

cervifolia J.J.A.van der Walt Thick-stemmed, deciduous shrub or small tree, up to 3 m tall; bark smooth, with dark patches; branches with short, stout branchlets. Leaves trifoliolate, ± strap-shaped and irregularly lobed. Flowers small, yellowish to reddish. Fruit an ellipsoidal berry. Sept. Rocky slopes and outcrops, G (Ai-Ais to near Goodhouse to Cornellsberg).

CAMPANULACEAE

by D.A. Snijman with C.N. Cupido

1. Capsule opening regularly by apical valves or rarely opening partially from base ..... **Wahlenbergia**
1.' Capsule not opening regularly by apical valves:
2. Capsule cylindrical, at length splitting longitudinally into 5 strips ..... **Prismatocarpus**
2.' Capsule cylindrical, opening by a terminal plug ..... **Roella**

PRISMATOCARPUS 30 spp., South Africa

crispus L'Hér. Robust, shortly hairy annual, up to 500 mm tall. Leaves few, scattered, linear, margins slightly thickened and sparsely undulate-toothed. Flowers in leafless, terminal cymes, blue or lilac, cup-shaped, (15–)20–30 mm diam., ovary glabrous or hairy. Fruit 40–60 mm long. Oct.–Dec. Dry, often sandy flats and slopes, KV, CCR (near Vanrhynsdorp to Klawer and Nardousberg to Malmesbury to Riviersonderend Mountains and E Cape).

diffusus (L.f.) A.DC. Sprawling or rounded shrublet, up to 450 mm tall, shortly hairy on young stems. Leaves needle-like, sparsely ciliate below. Flowers in leafless, divaricate, terminal cymes, blue sometimes white, hypocrateriform, ± 10 mm diam., lobes linear, anthers partially or just exserted, bracts 2–3 mm long. Fruit 10–20 mm long. Nov.–Feb. Sandstone and granite slopes, KB, CCR (Kamiesberg Mountains to Riviersonderend Mountains). **(gce)**

hildebrandtii Vatke Stout annual, up to 500 mm tall. Leaves widely scattered, linear, flat, margins revolute, thickened, with a few teeth. Flowers in many-branched inflorescences, large, widely campanulate, with corolla divided half way, pale blue or violet. Fruit up to 8 mm long. ?Flowering time. Open places, WM (Vanrhyns Pass and Hantamsberg). **(ece)**

ROELLA ± 21 spp., South Africa, mostly W Cape, 1 sp. to KwaZulu-Natal

bryoides H.Buek Erect or sprawling shrublet, up to 400 mm tall. Leaves outspread, linear-subulate, with axillary clusters of smaller leaves, ciliate at base. Flowers 1, terminal campanulate, white or pale blue, style with 2 glands below stigma. Dec.–Feb. Sandy slopes, KB, CCR (Kamiesberg Mountains and Clanwilliam to Swartberg near Caledon). **(gce)**

WAHLENBERGIA (= *LIGHTFOOTIA*) AFRICAN BLUE-BELL, BLOUKLOKKIE ± 260 spp., chiefly S temperate

*A. Shrublets or rarely annual (see **W. sonderi**); corolla either divided to near base or salver-shaped; petals narrowly lanceolate, more than twice as long as broad*

asparagoides (Adamson) Lammers Sprawling, much-branched shrub, up to 1 m tall, with green stems becoming ± spine-tipped. Leaves alternate, rigid, with thickened, bluntly toothed margins. Flowers in a divaricately branched inflorescence, with peduncles becoming spinescent, corolla tube 2.5–3 mm long, ± as long as lobes, white, ovary inferior, ± hemispherical. Aug.–Sept. Coastal sands, NS, CCR (near Port Nolloth to Lambert's Bay). **(gce)**

denticulata (Burch.) A.DC. Compact, much-branched shrublet or rarely annual, 200–500 mm tall. Leaves in clusters, mostly crowded on stem, thick. Flowers 1 on rigid branch tips that later become ± spine-tipped, blue, white or yellow, deeply cut and star-like, ovary subinferior to semi-

superior. Jan.–Mar. Rocky places and gravelly lower slopes, SN (Angola through Namibia southwards to Elizabeth Bay to southern Kenya).

nodosa (H.Buek) Lammers Rigid, much-branched, somewhat spiny shrublet, up to 450 mm tall. Leaves alternate, clustered, recurved, ovate-lanceolate, concave, margins thickened. Flowers in divaricately branched panicles, white, 5–7 mm diam., tube ± 1 mm long, ovary half-inferior, shortly hairy. Oct.–May. Dry rocky slopes, WM, TS, CCR (widespread in southern Africa).

sonderi Lammers Many-stemmed, short-lived annual, up to 300 mm tall, covered with short hairs when young. Leaves alternate, scattered, linear, with a few, small teeth. Flowers 1 or in groups of 2 or 3, 6–8 mm long, with tube as long as thick, entire, very narrow calyx lobes, blue or white, ovary densely white-haired except for green veins. Capsule a little longer than wide. Oct. In sandy soils, NH (Steinkopf to Spektakelberg). **(ece)**

thunbergiana (H.Buek) Lammers Erect or sprawling shrublet, 150–600 mm tall. Leaves alternate, reflexed, lanceolate, margins thickened, sometimes minutely toothed below. Flowers in divaricate panicles, with peduncles becoming spinescent, pale blue, white or cream-coloured with darker reverse, ovary half-inferior, hairy. Aug.–Nov. Stony slopes and flats in karroid scrub, NH, KB, KV, CCR (Concordia to Vanrhynsdorp and Great Karoo to Little Karoo).

A.' Perennial herbs or annuals; corolla bell- or funnel-shaped or rarely ± tubular; petals mostly ovate, less than twice as long as broad
B. Leaves ovate to oblong-lanceolate, margins often ± undulate; flowers long-pedicellate, with longest pedicels several times longer than corolla
C. Leaves alternate, ± scattered on stem towards base

lasiocarpa Schltr. & Brehmer Like **W. schlechteri** but leaves broadly lanceolate, with an obtuse-acute apex, and calyx very hairy. Aug.–Sept. Stony or sandy flats and slopes, G, NH (Richtersveld to northern Namaqualand). **(ece)**

meyeri A.DC. Delicate, slender annual, up to 200 mm tall, branching from hairy base. Leaves mostly near base, oblanceolate, roughly hairy, undulate-crisped. Flowers in dichotomously branched, paniculate cymes, funnel-shaped, white or pale blue, calyx lobes ovate acute, ovary (2)3-locular, glabrous, style with 2 small glands below stigma. Capsule obovoid, striate. Sept.–Dec. Sandstone and granite slopes, NH, KB, CCR (near Springbok to Cederberg Mountains). **(gce)**

patula A.DC. Soft perennial, 100–400 mm tall, dichotomously much-branched from a softly hairy base. Leaves alternate, thin-textured, petiolate, ovate, glabrous, unequally and coarsely serrate, lanceolate in upper parts. Flowers long-pedicellate, funnel-shaped, bright blue to purple, filaments narrowly pear-shaped at base, ovary 3-locular. Capsule ovoid, as long as calyx lobes. Sept. Rocky, shaded places on S-facing slopes, SN, G (southern Namibia and Richtersveld). **(ece)**

schlechteri Brehmer Erect, slender annual, 200–400 mm tall, stems modestly branched and ± hairy at base. Leaves alternate, subsessile, concentrated towards base, narrowly lanceolate, acute at apex, margin irregularly sinuate and minutely toothed. Flowers on long pedicels, ± campanulate, deeply cut with broadly oval lobes, white to pale mauve, with 6 small glands below stigma, ovary 3-locular, calyx glabrous. Capsule obovate, upper part broadly conical to hemispherical. Sept. ?Habitat, NH (central Namaqualand). **(ece)**

C.' Leaves tightly arranged in a basal rosette

androsacea A.DC. HARE-BELL Tufted annual, up to 400 mm tall. Leaves mostly basal, rosulate, oblanceolate, roughly hairy, margins undulate-crenate, bluntly toothed. Flowers on 2-forked peduncles, long-pedicellate, calyx lobes triangular, corolla widely funnel-shaped, white to pale blue, 5–15 mm diam., filaments broad at base, style with 3 glands, sometimes in a continuous band below stigma, ovary glabrous, 3-locular. Capsule spheroid. Sept.–Nov. Sandy to gravelly flats, SN, G, NH, KB, KV, WM, CCR (Namibia to SW Cape and tropical Africa).

annularis A.DC. PRONKBLOUKLOKKIE Like **W. androsacea** but leaves linear-lanceolate, flowers more broadly funnel-shaped, 15–20 mm diam., calyx lobes ovate, style less than half as long as corolla. Mostly Sept.–Nov. Sandy flats and lower slopes, G, NH, KV, TS, CCR (Lekkersing to Namaqualand and Bushmanland to Clanwilliam).

erophiloides Markgr. Annual, 80–150 mm tall, with rigid, glabrous stems. Leaves alternate, in a basal rosette, lanceolate, recurved, with acute tips, margins thickened, with long, white hairs towards base. Flowers in a widely branched dichasium, on long pedicels, ± funnel-shaped, ovary 3-locular. Capsule subglobose, shortly hairy. Aug. Sandy flats, SN (Haalenberg). **(ece)**

namaquana Sond. Annual, up to 300 mm tall, with simple stems, hairy at base. Leaves all basal, rosulate, oblong-lanceolate, narrowed or petiolate at base, undulate-crenulate, hairy on both sides. Flowers on 2- or 3-forked peduncles, long-pedicellate, broadly funnel-shaped, deeply cut, ovary 3-locular, style with a swollen ring below stigma. Capsule obconical. Oct. ?Habitat, NH (northern Namaqualand). **(ece)**

pauciflora A.DC. Like **W. annularis** but calyx lobes linear and capsule elongate-obovoid. Nov. Rocky places, KB (Kamiesberg Mountains). **(ece)**

B.' Leaves linear or narrowly lanceolate, mostly stiffly pointed, margins ± plane; flower subsessile or shortly pedicellate, with the longest pedicels mostly up to twice as long as corolla

D. Ovary (4)5-locular; stigmas (4)5

costata A.DC. Erect or procumbent annual, 50–150 mm tall, stem ± branched. Leaves alternate, not crowded at base, narrowly lanceolate, margins mostly thickened, ± rolled inwards. Flowers shortly pedicellate, tubular, ovary 5-locular, style thickened at apex. Capsule obovate. Sept. ?Habitat, NH (southeastern Namaqualand: Eenkokerboom). **(ece)**

oxyphylla A.DC. Like **W. costata** but a dwarf shrub, with basal leaves densely crowded, leaves short, up to 5 mm long, pungent, margin thickened and rolled inwards, subfalcate, style ?slender, and capsule hemispherical. July–Jan. On slopes in stony to sandy soil, G, NH, KB, KV, WM, ?CCR (through Namibia to Richtersveld and Namaqualand to Hantam and ?SW Cape).

D.' Ovary 2- or 3-locular

acaulis E.Mey. Dwarf annual, 20–50 mm tall. Leaves scattered or tufted at base of stem, obovate, hairy, narrowed into a ciliate petiole, upper ones lanceolate to linear-lanceolate, dentate. Flowers sessile, terminal and lateral, funnel-shaped, lobed at apex, ovary 3-locular. Capsule ± inferior. Aug.–Sept. Sandy soil, G, NH, KB (southern Richtersveld to Kamiesberg Mountains). **(ece)**

asperifolia Brehmer Erect annual, 80–100 mm tall, branched at base and densely pilose. Leaves alternate, narrowly lanceolate, acute, densely covering stem, broadly lanceolate, toothed, margin much thickened, rolled inwards. Flowers shortly pedicellate, in a copiose cyme, subcampanulate, ovary 3-locular. Capsule obovate, hairy, base subacute, upper part conical, hidden in calyx. Sept. In sandy places, KV (near Klawer). **(ece)**

buseriana Schltr. & Brehmer Spreading annual, up to 200 mm tall. Leaves alternate, narrowly lanceolate, apex subobtuse, margin ± thickened, hardly toothed, folded inwards, subpilose. Flowers shortly pedicellate, subcampanulate, deeply cut, mauve, filaments dilated at base, ovary 3-locular. Capsule hemispherical to subspherical, upper part conical. Sept. Sandy soils, NH (near Bitterfontein). **(ece)**

ingrata A.DC. Like **W. prostrata** but leaves subpilose near base, calyx with spreading hairs, corolla narrow, not broadly funnel-shaped, base of filament with angular swelling, and capsule narrowly cylindrical and acute in upper part. Oct. In sandy riverbeds, G, NH (lower Gariep Valley to Buffelsrivier). **(ece)**

minuta Brehmer Dwarf, basally branched, pilose annual, up to 30 mm tall. Leaves alternate, scattered, lanceolate, swollen towards subacute apex, margin thickened, toothed. Flowers shortly pedicellate, subcampanulate, deeply cut, ?colour, ovary 3-locular, style thickened above. Capsule spherical, pilose with reflexed hairs. ?Flowering time. ?Habitat, WM (Hantam). **(ece)**

polyclada A.DC. Rounded annual, up to 150 mm tall, with rough spreading hairs, branching from base. Leaves scattered, lanceolate, more-or-less cordate at base, margins thickened, slightly toothed. Flowers in lax cymes, narrowly funnel-shaped, blue with a dark ring in throat and a dark centre, calyx lobes large, toothed, filament base pear-shaped, ovary hispid, ovary (2)3-locular. Capsule hemispherical, hairy. Sept.–Oct. In deep, wind-blown sand, NS, KV, CCR (Vredendal to Vanrhynsdorp to Klawer). **(gce)**

prostrata A.DC. Nearly glabrous annual, with prostrate stems spreading from base, 5–150 mm tall, roots long, spreading and white. Leaves alternate and opposite, scattered, linear or clavate, rolled inwards, margins thickened, dentate, teeth tipped with a minute, bifid mucro. Flowers shortly pedicellate, broadly funnel-shaped, pale blue, ovary (2)3-locular, style constricted below stigma. Capsule hemispherical, with upper part broadly conical. Sept.–Oct. Usually on sandy flats, SN, G, NS, NH (southern Namibia to northern Namaqualand). **(ece)**

psammophila Schltr. Annual, 50–100 mm tall. Leaves alternate, narrowly lanceolate, acute, recurved near apex, margin thickened, minutely dentate, ± rolled inwards ± pubescent with whit-

ish hairs. Flowers shortly pedicellate, ± tubular, deeply cut, ?mauve, ovary 3-locular, style nearly half as long as corolla. Capsule hemispherical, superior part cylindrical. July–Sept. In sandy soils, NH (near Springbok to Nuwerus). **(ece)**

rara Schltr. & Brehmer Erect or ascending annual, 150–200 mm tall, branching basally. Leaves alternate, narrowly lanceolate, margin thickened, ± rolled inwards, pilose, toothed. Flowers shortly pedicellate, ovary 3-locular. Capsule hemispherical to broadly spherical, superior part narrowly conical to cylindrical. ?Habitat, NH (near Bitterfontein). **(ece)**

roelliflora Schltr. & Brehmer Like **W. prostrata** but leaves pilose, calyx segments lobed at base, and lower part of capsule with long, down-turned hairs. Sept. Sandy flats, NH (northern Namaqualand). **(ece)**

[**Species insufficiently known W. albicaulis** (Sond.) Lammers, **W. annuliformis** Brehmer, **W. divergens** A.DC., **W. subrosulata** Brehmer, **W. subumbellata** Markgr., **W. tenuis** A.DC., **W. tumida** Brehmer, **W. wyleana** Sond.]

CAPPARACEAE

by D.A. Snijman

1. Androphore (stalk bearing stamens) elongated, exceeding sepals . . . . . **Cadaba**
1.' Androphore short, not as long as sepals:
  2. Receptacle or calyx tubular . . . . . **Maerua**
  2.' Receptacle or calyx not tubular:
    3. Branches without spines; sepals valvate, lanceolate . . . . . **Boscia**
    3.' Branches with stipulate spines; sepals imbricate, orbicular, rarely ovate . . . . . **Capparis**

BOSCIA SHEPHERD'S TREES, WITGATBOME 37 spp., throughout Africa

albitrunca (Burch.) Gilg & Gilg-Ben. SHEPHERD'S TREE, WITGAT Stocky, evergreen tree, up to 7 m tall or rarely shrubby, with conspicuous whitish grey bark. Leaves oblanceolate to elliptic, 15–50 × 4–15 mm, leathery, grey-green on both surfaces. Flowers small, greenish sweetly scented. Fruit a spherical berry, 5–12 mm diam., glabrous, yellow. Aug.–Oct.(–Feb.). In deep sand or rocky places, SN, G, NH (Namibia to northern Namaqualand and other dry parts of southern Africa, Zambia, Zimbabwe and Mozambique).

foetida Schinz KLEINSTINKWITGAT, NOENIEBOS, SMELLY SHEPHERD'S TREE Shrub to small tree, up to 5 m tall, with pale grey bark, stems unpleasantly scented when cut. Leaves oblanceolate to linear, 6–35 × 1–12 mm, leathery, green to grey-green on both surfaces (in NW). Flowers small, greenish, unpleasantly scented. Fruit a spherical berry, ± 10 mm diam., velvety, yellowish. (Aug.) Sept.–Oct.(–Apr.). Stony or rocky places, SN, G, NH (dry northern parts of southern Africa).

CADABA WORM-BUSHES, WURMBOSSE 30 spp., Old World tropics

aphylla (Thunb.) Wild LEAFLESS WORMBUSH, SWARTSTORM Leafless, spinescent shrub or small tree, up to 2(–3) m tall, often with fleshy purple-tinged branches. Leaves short-lived, present only on seedlings. Flowers usually in short, flat-topped heads, yellowish to dark red, bearing stamens and style on a well-exserted stalk. Fruit cylindrical, 50–90 × 6–7 mm, smooth or densely glandular. Aug.–Nov.(–Apr.). Flats of hill slopes, mostly in rocky or gravelly soils, G, NS, NH, KV, CCR (widespread in dry parts of southern Africa).

CAPPARIS CAPER BUSHES, KAPPERBOSSE ± 250 spp., pantropical and subtropical

hereroensis Schinz Many-stemmed shrub, up to 2 m tall, sometimes appearing whitish-green from dense hairy covering. Leaves elliptic to oblanceolate, 25–50 × 10–20(–25) mm, shortly spine-tipped, wedge-shaped at base. Flowers solitary, axillary, cream-coloured. Fruit a conical berry, ± 40 × 25 mm, reddish brown. May. Sheltered sandy habitats, SN, NS (Namib coast through Lüderitz to just N of Hondeklipbaai).

MAERUA BUSH-CHERRY, WITBOSSE ± 100 spp., Africa to India and tropical Asia

gilgii Schinz RIVER BUSH-CHERRY, RIVIERWITBOS Shrub or small evergreen tree, up to 3 m tall, with olive-yellow to green twigs. Leaves linear to narrowly obovate, 50–120 × 3–11 mm, leathery. Flowers in racemes, whitish green to yellowish, stamens up to 30 mm long. Fruit ± spherical, ± 15 mm diam., covered with faint round bumps, brownish. Sept.–Nov. Seasonal washes, floodplains and hill slopes, SN, G (lower Gariep Valley eastwards to Gordonia).

schinzii Pax KRINGBOOM, RINGWOOD Evergreen tree, up to 7 m tall, bark white or reddish brown and often horizontally wrinkled. Leaves elliptic to ovate, 20–60 × 11–35(–73) mm, usually velvety. Flowers in terminal racemes, creamy white to yellowish, stamens 30–70 long. Fruit a slender pod, irregularly constricted between seeds. Mostly Sept.–Dec. Riverbanks and amongst rocks at base of mountains, G (through Namibia to northern Richtersveld).

CARYOPHYLLACEAE (= *ILLECEBRACEAE*)

by D.A. Snijman

1. Ovary with 1 or 2 ovules; fruit an indehiscent nutlet:
2. Stigma trifid; leaves mostly alternate ..... **Corrigiola**
2.' Stigma at most bifid; leaves mostly opposite or verticillate:
3. Stipules absent; perianth becoming crustaceous with age, pungent ..... **Scleranthus**
3.' Stipules present; perianth subsucculent, urceolate, mouth closed by a thickened, lobed disc..... **Pollichia**

1.' Ovary with 3 or more ovules; fruit a dehiscent capsule:
4. Sepals united into a short or long tube:
5. Calyx tube with commisural veins alternating with midveins of sepals; styles 3(5); leaves usually pubescent; petals usually with coronal scales..... **Silene**
5.' Calyx tube without commisural veins; styles 2; leaves glabrous or shortly scabrid; petals without coronal scales:
6. Calyx tube without wings; leaves linear..... **Dianthus**
6.' Calyx tube 5-winged; leaves ovate or lanceolate..... **Vaccaria**
4.' Sepals free or very nearly so:
7. Stipules absent; petals if present then deeply 2-fid:
8. Styles usually 4 or 5; capsule ellipsoid or subcylindrical..... **Cerastium**
8.' Styles usually 2 or 3; capsule subglobose or if ellipsoid then shorter than the persistent sepals ..... **Stellaria**
7.' Stipules present; petals entire or notched at apex:
9. Sepals strongly keeled up the back and sharply prominent in fruit; leaves obovate .... **Polycarpon**
9.' Sepals not keeled up the back; leaves linear:
10. Styles 3; capsules 2- or 3-valved ..... **Spergularia**
10.' Styles (3)5; capsule (3)5-valved ..... **Spergula**

CERASTIUM MOUSE-EAR ± 60 spp., cosmopolitan

capense Sond. HORINGBLOM Glandular-hairy annual, up to 400 mm tall, with no taproot. Leaves opposite, obovate or oblong. Flowers in open cymes, petals white, shorter than sepals, shallowly notched. Fruit a cylindrical, papery capsule, ± twice as long as sepals, splitting into 10 lobes above. Sept.–Dec. Sheltered flats and slopes and waste places, WM, CCR (widespread in southern Africa).

CORRIGIOLA STRAPWORT 11 spp., cosmopolitan

litoralis L. Prostrate annual, biennial or perennial, with reclining, slender stems up to 400 mm long, much branched from base. Leaves narrowly oblanceolate, glabrous or softly hairy. Flowers in terminal and axillary clusters, 1.25–1.75 mm long, greenish white. Feb.–Sept. Weedy, in open ground, NH, CCR (widespread in southern Africa through tropical Africa to Europe).

DIANTHUS PINK ± 300 spp., Old World

kamisbergensis Sond. Low, slender perennial, 250–400 mm tall. Leaves in a lax, basal tuft, linear, stiff, greyish green, covered with very short, stiff hairs towards base, margin rough. Flowers on simple or few-branched, smooth or rough, axillary peduncles, pink, calyx ± 10 mm long, with a broad, membranous margin, petal limb broadly elliptic or obovate, ± 6 mm long and more than half as wide, dentate. Nov. In granitic soil, NH, KB (near Springbok and on Kamiesberg Mountains). **(ece)**

laingsburgensis Hooper Slender, erect, scabrid perennial, up to 300 mm tall. Leaves in a ± compact basal tuft, linear, ± bristle-like, margin minutely scabrid towards base. Flowers few, on many, axillary peduncles, pink or white, calyx 15–20 mm long, with broad, membranous, shining margins, petal limb narrowly obovate or oblong, 5 mm long and at most half as wide, lacerate. Sept.–Dec. Usually amongst rocks, NH, WM, TS (eastern Namaqualand through to Laingsburg). **(ece)**

micropetalus Ser. Slender perennial from a woody, shortly branched base, up to ± 200 mm tall. Leaves in basal tufts, linear. Flowers solitary, on simple or few-branched, slender, axillary peduncles, creamy white or pale purple-pink, calyx 20–30 mm long, with narrow, membranous margins, petal limb obovate, ± 4mm long, ± 3 mm wide, with a few, short, broad teeth, often recurved. Aug.–Apr. On rocky outcrops, TS (southern Great Karoo through to NW Province).

namaensis Schinz Like **D. laingsburgensis** in habit, leaf-type and petal fimbriation but plants more variable and much larger, calyx 24–42 mm long, margin membranous but not shining. Aug.–Dec. On stony slopes, in rock crevices or under bushes, SN, G, NS, NH, KB, KV, WM (central Namibia through to Bushmanland and S to near Vredendal and E to Great Karoo).

POLLICHIA ARABOSSIE, WAXBERRY 1 sp., Africa and Arabia

campestris Aiton TEESUIKERKAROO Silky hairy shrublet, up to 600 mm tall. Leaves opposite or apparently verticillate, oblanceolate, apiculate, greyish green. Flowers in axillary clusters, greenish yellow, enclosed by fleshy, waxy, white bracts in fruit, edible. Throughout the year. Dry, sandy soils, SN, G, NS, NH, CCR (widespread in southern Africa through tropical Africa to Arabia).

POLYCARPON ALLSEED ± 16 spp., cosmopolitan

***tetraphyllum** (L.) L. FOUR-LEAVED ALLSEED, NAALDVRUG Prostrate, glabrous or shortly hairy annual or rarely perennial, up to 200 mm tall, with much-branched stems and without a woody rootstock. Leaves in whorls of 4, ± obovate. Flowers congested in small, branched cymes, petals white, shallowly notched. Sept.–Dec. Weed of waste places, KV, CCR (cosmopolitan weed).

*SCLERANTHUS 10 spp., Old World

***annuus** L. KNAWEL Sprawling, thinly hairy annual or biennial, up to 200 mm tall, with a weak taproot. Leaves opposite, linear, ciliate and connate at base. Flowers 1–few in axillary and terminal clusters, often exceeded by bracts, sepals green, petals absent. Fruit a nutlet, surrounded by persistent, narrowly tapering, keeled sepals. Aug.–Nov. Weed of disturbed places, WM, CCR (European weed, widespread throughout Africa).

SILENE CAMPION, CATCHFLY ± 500 spp., worldwide

A. Plants perennial

burchellii Otth (= *Silene pilosellifolia* Cham. & Schltdl. Erect or sprawling, shortly hairy perennial, up to 0.7 m tall, not viscid. Leaves linear-oblanceolate to oblanceolate. Flowers in a ± one-sided, raceme-like cyme, white to purple, calyx 10–25(–35) mm long, petals bifid, carpophore 6–9 mm long. Aug.–Jan. Flats and slopes, G, NS, NH, KB, WM, CCR (throughout Africa).

undulata Aiton (including **S. eckloniana** Sond.) Erect or sometimes sprawling, shortly glandular-hairy, viscid perennial, up to 0.6 m tall. Leaves oblanceolate. Flowers in a lax paniculate cyme, few, white, lemon or pink, calyx 22–35 mm long, petals showy, bifid, carpophore 4–6 mm long. Aug.–Apr. Slopes and flats, G, NH, KB, WM, CCR (southern and tropical Africa).

A.' Plants annual

aethiopica Burm. (including **S. clandestina** Jacq.) Shortly hairy annual, up to 450 mm tall. Leaves linear-oblanceolate. Flowers in lax, usually narrow, raceme-like cymes, whitish, open and scented at night, calyx 9–16 mm long, petals bifid, carpophore 1–5 mm long. Calyx contracted at mouth in fruit. Aug.–Jan. Sandy flats, G, NS, NH, KV, WM, CCR (Richtersveld to SW Cape to Port Elizabeth). **(gce)**

***gallica** L. KRUITBOSSIE, SMALL CATCHFLY Glandular-hairy, ± sticky annual, up to 450 mm tall. Leaves oblanceolate, ciliate. Flowers in ± one-sided, spike-like monochasial cymes, white or pink, calyx coarsely hairy, 7–10 mm long, petals entire, carpophore ± 1 mm long. Calyx contracted at mouth in fruit. Sept.–Feb. Weed of disturbed places, NH, KV, CCR (European weed).

*SPERGULA SPURRY ± 5 spp., temperate parts worldwide

***arvensis** L. CORN SPURRY, SPORRIE Annual, up to 0.6 m tall, with stems ± branched at base. Leaves apparently whorled, linear, fleshy. Flowers in open, glandular-hairy cymes, petals white, slightly longer than sepals. June–Oct. Weed of waste places, NH, CCR (cosmopolitan weed).

SPERGULARIA ± 40 spp., cosmopolitan

***bocconii** (Scheele) Asch. & Graebn. Annual or biennial, with slender stems, 50–250 mm tall, from a slender taproot. Leaves opposite, without axillary tufts, linear. Flowers in open, glandular-hairy cymes, entirely white, or pink with white bases, sepals 2–3.5 mm long. Seeds not winged, pale greyish brown. Sept.–Oct. Mainly near coast in disturbed places, NS, CCR (Namaqualand to E Cape, Europe and Mediterranean region).

***media** (L.) C.Presl ex Griseb. PERENNIAL SEA SPURRY Glabrescent, ± sticky, sprawling perennial, up to 0.5 m tall, with a thick, woody rootstock. Leaves opposite and in axillary tufts, linear, ± succulent. Flowers in open, glandular-hairy cymes, white or pink, sepals usually longer than 4 mm. Seeds winged. Oct.–Jan. Weed of coastal or inland marshes, SN, G, NS, NH, KB, KV, WM, CCR (cosmopolitan weed).

***rubra** (L.) J. & C.Presl SAND SPURRY Sprawling annual or perennial from slender taproot, up to 200 mm tall. Leaves opposite and in axillary tufts, linear. Flowers in open cymes, uniformly pink or lilac, sepals 3–4 mm long. Seeds not winged, dark brown. Sept.–Dec. Weed of sandy places, NH, CCR (cosmopolitan weed).

*STELLARIA CHICKWEED ± 100 spp., cosmopolitan

***media** (L.) Vill. STARWORT, STERREMUUR Diffuse, slender annual, up to 300 mm tall, stems angular, sparsely and softly hairy all round. Leaves opposite, ovate. Flowers in terminal cymes, white, sepals 4.5–5 mm long, hairy, petals bilobed almost to base, slightly shorter than sepals, stamens mostly 3–10. Fruit an ellipsoidal capsule, splitting into 5 valves. June–Nov. Weed of waste places, WM, CCR (cosmopolitan weed).

***pallida** (Dumort.) Piré LESSER CHICKWEED Like **S. media** but with a line of hairs down each internode, sepals 2–3.5 mm long, petals absent or vestigial, stamens 1–3. July–Aug. Weed of waste places, WM, CCR (cosmopolitan weed).

*VACCARIA 1 or 4 spp., Europe, Mediterranean, temperate Asia

***hispanica** (Mill.) Rauschert Erect annual, up to 600 mm tall, with a short taproot and a whitish to brownish, single stem, branched above. Leaves opposite, sessile, broadly lanceolate and ± eared at base. Flowers in open, terminal cymes, sepals with winged keels, petals pink. Oct.–Nov. Disturbed, sandy habitats, G (weedy in southern Africa, from Europe, Asia and N America).

CELASTRACEAE

by D.A. Snijman

1. Plants without spines; leaves alternate or scattered, never clustered in groups . . . . . **Maytenus**
1.' Plants with spines; leaves clustered in groups on short shoots, at least on older branches:

2. Suffrutices, shrubs or small trees; flowers always functionally unisexual with staminodes in female and pistillodes in male flowers; ovary (2)3(4)-locular; ovules 2 per locule; seeds covered completely or partially by an aril . . . . . **Gymnosporia**
2.' Shrubs; flowers always bisexual; ovary always 3-locular; ovules 3–12 per locule; seeds completely covered by an aril . . . . . **Gloveria**

GLOVERIA SPALKPENDORING 1 sp., N and W Cape **(gce)**

integrifolia (L.f.) M.Jordaan Spiny shrub, up to 2 m tall. Leaves fasciculate on short shoots, cuneate, greyish, leathery. Flowers few in axillary cymes, white, sometimes tinged pink. Fruit a yellow, 3-locular capsule, seed aril pinkish. Dec.–Apr. Rocky slopes, NS, NH, CCR (Spektakelberg to near Brand-se-Baai and Robertson to near Oudtshoorn). **(gce)**

GYMNOSPORIA (= *MAYTENUS* in part) PENDORING ± 40 spp., mainly Africa, also Madagascar, S Europe to Australasia

buxifolia (L.) Szyszyl. (= *Maytenus heterophylla* auct.) STINKPENDORING, MNQUQOBA Monoecious, spiny shrub or small tree, up to 7 m tall. Leaves in tufts, obovate, toothed above. Flowers many in axillary cymes, white, foetid. Fruit a globose, warty, brown capsule. July–Apr. Forest margins and disturbed areas, G, NS, NH, KB, CCR (widespread in southern and tropical Africa).

gariepensis M.Jordaan Lax, dioecious, spiny shrub, up to 2 m tall, with purplish red to red-brown stems. Leaves tufted in axils of short shoots, oblong to obovate-oblong, entire, rounded or ± notched at apex. Flowers 1 or few in axillary cymes, yellowish green. Fruit a drooping, obconic-trigonous, red capsule. June–July. S-facing slopes amongst large rocks, G (southern Namibia to northern Richtersveld). **(ece)**

linearis (L.f.) Loes. Greyish, drooping trees, up to 6 m tall, with slender to robust spines. Leaves rarely clustered, narrowly to broadly lanceolate, margin entire to closely denticulate. Flowers many per cyme, yellow or green. Fruit a globose, smooth, greyish brown capsule. July–Oct. Dry river courses and kloofs, SN, G, TS (lower Gariep Valley, Gordonia and Tanqua Karoo to Great Karoo and S to Uitenhage).

MAYTENUS ± 150 spp., cosmopolitan, mainly tropical

oleoides (Lam.) Loes. KLIPKERSHOUT Shrub or tree, up to 4 m tall. Leaves leathery, obovate to lanceolate, venation obsolete, glaucescent, margins revolute. Flowers in axillary cymes, whitish. Fruit a brown to orange capsule. Apr.–Sept. Rocky slopes, G, NH, KB, CCR (Stinkfontein Mountains, Springbok District, Kamiesberg and Bokkeveld Mountains to SW Cape to Great Winterhoek Mountains). **(gce)**

CLEOMACEAE

by D.A. Snijman from Codd & Kers (1970)

CLEOME ± 150 spp., tropical and warm temperate regions worldwide

angustifolia Forssk. Erect, ?annual herb, 0.3–1.2 m tall, stems usually prickly glandular near base. Leaves digitately 3–9(–13)-foliolate, with filiform leaflets, 10–40(–50) × 0.4–1(–2) mm. Flowers in a lax, terminal raceme, petals upturned, basally clawed, yellow and usually violet at base, fertile stamens 2 or 4, staminodes 6–12. Fruit a linear capsule, 40–100 × 3–4 mm. Rain dependent. Sandy flats and among rocks, SN, G, NS (widespread in dry parts of southern Africa, Yemen, Niger, Sudan, Ethiopia, Kenya and Tanzania).

foliosa Hook.f. Erect, annual or perennial herb, 0.2–1.2 m tall, with glandular-pubescent stems. Leaves digitately 3–7(–9)-foliolate, glandular-pubescent, with obovate to elliptic leaflets, 10–25(–35) × 6–12 mm. Flowers in a terminal raceme, petals upturned, narrowed to short claw at base, yellow, often fading reddish, fertile stamens 24–35. Fruit a linear capsule, 35–50(–80) × 1.5–2 mm. Rain dependent. Mostly in sandy soil in water courses, SN, G (Namibia, Richtersveld and Gordonia).

paxii (Schinz) Gilg & Gilg-Ben. Erect annual, 80–500 mm tall, with viscid glandular stems. Leaves 3-foliolate, leaflets linear-lanceolate 10–22 × 1.5–3.5 mm. Flowers in a sparse raceme, petals upturned, wedge-shaped at base, yellow, turning bluish when dry, fertile stamens 8–10. Fruit a narrowly oblong capsule, 20–40 × ± 4 mm. Feb.–June. Sandy flats and dunes, SN (through Namibia, Bushmanland and Gordonia).

CONVOLVULACEAE

by W.G. Welman

CONVOLVULUS BINDWEED, AKKERWINDE ± 250 spp., cosmopolitan.

***arvensis** L. AKKERWINDE, FIELD BINDWEED, LESSER BINDWEED Poisonous and medicinal perennial herb, with annual, prostrate or twining, glabrous to thinly hairy stems, up to 1.75 m tall, with a long taproot. Leaves entire, hastate or sagittate, up to 50 mm long. Flowers usually solitary in leaf axils, sepals obtuse, up to 5 mm long, corolla funnel-shaped, 15–25 mm long, white to pink, midpetaline areas sometimes dark pink. Oct.–Mar. Mainly in cultivated places, WM, CCR (native of Eurasia, common weed, mainly in temperate areas worldwide).

capensis Burm.f. CAPE BINDWEED, KAAPSE AKKERWINDE Perennial herb, with thinly hairy, mostly climbing stems, up to 1.5 m long. Leaves palmately nerved, entire to palmately 5-fid, up to 70 mm long. Flowers 1–few in leaf axils, sepals 6–10 mm long, usually silky and obtuse, corolla funnel-shaped, white to pink, 15–35 mm long, midpetaline areas with brownish hairs. Aug.–Dec. Sandy, stony, clay and shale soils, NH, KB, KV, WM, CCR (central Namaqualand through to W Cape and to Uitenhage). **(gce)**

sagittatus Thunb. WILD BINDWEED, WILDE AKKERWINDE Perennial herb, glabrous to hairy with long, thin taproot and annual, usually prostrate stems, up to 2 m long. Leaves very variable, linear to hastate-sagittate or oblong, basal lobes often bifid, up to 60 mm long. Flowers 1–few in leaf axils, sepals usually hairy, 5–9 mm long, corolla funnel-shaped, 8–25 mm long, white to mauve-pink, centre sometimes darker, midpetaline areas hairy near tips. Sept.–May. Stony flats and slopes; weed in cultivated and waste places, NH, WM, CCR (widespread in southern Africa, also tropical Africa and Arabia).

CRASSULACEAE

by P.V. Bruyns

1. Leaves alternate on vegetative branches 2
   2. Leaves soft and deciduous; inflorescence single-flowered to branched ..... **Tylecodon**
   2.' Leaves tough (rarely soft) and perennial; inflorescence spike-like (rarely branched or single-flowered) ..... **Adromischus**
1.' Leaves opposite or in whorls on vegetative branches 3
   3. Opposite leaves ± fused to one another at bases; stamens as many as sepals ..... **Crassula**
   3.' Leaves free from one another at bases; stamens twice as many as sepals ..... **Cotyledon**

ADROMISCHUS PLAKKIE 27 spp., Namibia, South Africa

A. Anthers included
B. Flowers and inflorescence covered with a waxy bloom; corolla tube longitudinally fluted

marianiae (Marloth) A.Berger Small, swollen-rooted, clump-forming, succulent perennial, with branches 25–50(–80) mm tall. Leaves narrowly lanceolate to obovate, terete and slightly flattened towards apical, horny margin, often noticeably papillate, red to grey-green. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 10–12 mm long, pale grey-green with a thick waxy bloom, lobes 2–3 mm long, with minute, club-shaped hairs in throat. Dec.–Mar. Under bushes or among rocks, flats and slopes, SN, G, NS, NH, KV, WM, TS, CCR (Klinghardt Mountains to Clanwilliam and Roggeveld). **(gce)**

subviridis Tölken Clump-forming, fibrous-rooted, succulent perennial, with branches up to 0.25 m tall. Leaves oblanceolate to elliptic, dorsiventrally flattened, pale grey-green with a waxy bloom, margin horny in upper half. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 9–11 mm long, pale grey-green with a thick waxy bloom, lobes 3–4 mm long, with minute, club-shaped hairs in throat. Dec.–Feb. Under bushes on steep, shaley slopes, WM (Loeriesfontein to Vanrhyns Pass to Bloukrans Pass). **(ece)**

B.' Flowers and inflorescence without a waxy bloom; corolla tube smooth and cylindrical

sphenophyllus C.A.Sm. Like **A. triflorus** but leaves oblanceolate to broadly elliptical and with margin horny all around, corolla tube 9–12 mm long. Dec.–Jan. Under bushes and among rocks on flats and N-facing slopes, TS, CCR (Klaarstroom to E Cape).

triflorus (L.f.) A.Berger Clump-forming, fibrous-rooted, succulent perennial, with branches up to 0.2 m tall. Leaves oblanceolate to obtriangular, dorsiventrally flattened, grey-green, often red-spotted, margin horny in upper half. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 8–10 mm long, yellow-green, lobes 3–5 mm long, with minute, club-shaped hairs in throat. Dec.–Jan. Under bushes and among rocks on flats and N-facing slopes, TS, CCR (Skitterykloof to Little Karoo to Steytlerville and Beaufort West).

A.' Anthers exserted
C. Corolla tube narrowly funnel-shaped; lobes spreading to recurved (not folded against tube), with straight margins
D. Leaves tough and fleshy, margins horny, at least near apices

nanus (N.E.Br.) Poelln. (including **A. diabolicus** Tölken) Small to dwarf, swollen-rooted, densely clump-forming, succulent perennial, with branches 10–40 mm tall, but often without visible stems. Leaves obovate to elliptic, dorsiventrally flattened and slightly convex, grey-green, with slight horny margin near apex. Flowers few at end of a mostly unbranched inflorescence; corolla tube 11–14 mm long, grey-green to dark red, lobes 2–3 mm long, throat with minute club-shaped hairs. Nov.–Jan. Crevices and pans in gneissic or quartzitic outcrops, G (Steinkopf to Pofadder).

D.' Leaves softly fleshy, margins not horny, even at apices

humilis (Marloth) Poelln. Like **A. phillipsiae** but plant smaller and more densely clump-forming, flowers ± erect, corolla tube 10–14 mm long, yellow-green, with deep maroon inside, throat with a few, minute, club-shaped hairs. Jan.–Apr. Under bushes or in crevices in shale outcrops on steep slopes, TS (Moordenaars Karoo to Beaufort West).

phillipsiae (Marloth) Poelln. Clump-forming, swollen-rooted, succulent perennial, with spreading, soft branches 20–50 mm tall. Leaves narrowly obovate to narrowly elliptic, dorsiventrally flattened, concave above and convex below, green. Flowers in a mostly branched, panicle-like inflorescence, ± pendulous; corolla tube 18–20 mm long, green to orange or red, with orange to red inside, lobes 3–5 mm long, throat smooth. Jan.–Apr. Under bushes on steep slopes, NH, KB, WM, TS (Kamiesberg Mountains to Komsberg Pass and near Matjiesfontein). **(ece)**

C'. Corolla tube cylindrical; lobes reflexed against tube and with frilly to undulate margins
E. Corolla tube longitudinally fluted; lobes ovate to ovate-triangular, tapering gradually to an acute tip

schuldtianus (Poelln.) Poelln. Small, swollen-rooted, densely clump-forming, succulent perennial, with branches 20–80 mm tall. Leaves sessile, oblanceolate to obovate, dorsiventrally flattened, pale grey from a waxy bloom, often red-spotted, margin often crenulate-horny in upper half. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 10–13 mm long, pale green to white from a waxy bloom, lobes 1.5–2.5 mm long and rough on inside. Dec.–Feb. Crevices in rocky outcrops, often in quartz, SN, G (central Namibia to Great Karas Mountains and Bushmanland).

subdistichus Makin ex Bruyns Small, fibrous-rooted, clump-forming, succulent perennial, with branches up to 0.12 m tall. Leaves stem-clasping, obovate to orbicular, dorsiventrally flattened

but ± convex, brown-green, margin horny all around. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 11–12 mm long, yellow-green with red markings, lobes 3–4 mm long, throat with minute club-shaped hairs. Dec.–Jan. In crevices among rocks on steep, often N-facing slopes, TS, CCR (Prince Albert to Uniondale and Willowmore). **(gce)**

E.' Corolla tube without longitudinal grooves; lobes broadly triangular and narrowing abruptly to a slender tip

alstonii (Schönland & Baker f.) C.A.Sm. Clump-forming, fibrous-rooted, succulent perennial, with branches up to 0.15 m tall. Leaves sessile, oblanceolate to obovate, dorsiventrally flattened, grey-green, occasionally red-spotted, with margin horny in upper half. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 9–12 mm long, brownish green, lobes 1.5–3 mm long, rough on inside. Nov.–Jan. Stony slopes in crevices or under bushes, SN, G, NH (Namibia: S of Witpütz to Garies and Platbakkies). **(ece)**

filicaulis (Eckl. & Zeyh.) C.A.Sm. Small, fibrous-rooted, often creeping, succulent perennial, with branches up to 0.35 m long. Leaves nearly sessile, linear-elliptic and terete-fusiform, grey-green, rarely red-spotted, with a slight horny tip. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 10–13 mm long, green to red, lobes 1–2 mm long, rough on inside. Nov.–Jan. Flats under bushes and stony slopes in crevices, SN, G, NS, NH, KB, KV, WM, TS, CCR (Rosh Pinah to Willowmore, Beaufort West and southern Great Karoo).

liebenbergii Hutchison Small, fibrous-rooted, clump-forming, succulent perennial, with branches up to 0.2 m tall. Leaves shortly petiolate, spathulate, grey-green, terete near base and dorsiventrally flattened towards apically horny margin. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 10–13 mm long, green to red, lobes 1–2 mm long, rough on inside. Dec.–Jan. Under bushes on stony flats, TS (Karoopoort to Beaufort West and Rietbron).

montium-klinghardtii (Dinter) A.Berger Small, fibrous-rooted, clump-forming, succulent perennial, with branches up to 0.2 m tall. Leaves sessile, circular to elliptic, dorsiventrally flattened and convex, grey-green, with margin indistinctly horny all around. Flowers in a spike-like, usually unbranched inflorescence; corolla tube 11–13 mm long, green, lobes 1–2 mm long, rough on inside. Nov.–Jan. Crevices in rocky outcrops, SN, G, NS (Klinghardt Mountains to near Grootmis, slopes of Ploegberg). **(ece)**

roaneanus Uitewaal Clump-forming, fibrous-rooted, succulent perennial, with branches up to 0.25 m tall. Leaves nearly sessile, oblanceolate, dorsiventrally flattened, grey-green, sometimes red-spotted, margin horny in upper half. Flowers in a spike-like, usually unbranched inflorescence, corolla tube 11–13 mm long, green, lobes 2–3 mm long, rough on inside. Nov.–Jan. Stony slopes, WM, TS, CCR (Vanrhyns Pass to Citrusdal and E of Calvinia to Karoopoort). **(gce)**

COTYLEDON PLAKKIE 10 spp., mainly South Africa with 1 sp. extending to Arabia

cuneata Thunb. Succulent shrublet, up to 0.75 m tall. Leaves broadly obovate, 60–100 × 40–80 mm, dorsiventrally flattened, occasionally pubescent and sticky. Flowers in a stout, sticky inflorescence, nodding; corolla yellow, glandular-hairy and sticky outside, tube 6–10 mm long, lobes 12–20 mm long. Nov.–Jan. Stony slopes among bushes, G, NH, WM, TS, CCR (N of Steinkopf to Victoria West and Little Karoo to Baviaanskloof).

orbiculata L. KOUTERIE, VARKOOR Succulent shrublet, up to 1 m tall. Leaves linear to broadly obovate, 40–100 × 10–50 mm, terete to dorsiventrally flattened, smooth and not sticky. Flowers in a stout, smooth inflorescence, nodding; corolla orange to red, glaucous, smooth and not sticky, tube 8–30 mm long, lobes 12–20 mm long. Nov.–Jan. Stony slopes among bushes, SN, G, NS, NH, KB, KV, WM, TS, CCR (SW Angola through western Namibia and South Africa to Mozambique).

papillaris L.f. Dwarf, sprawling, succulent shrublet, with branches up to 0.25 m long. Leaves linear-lanceolate, linear to narrowly elliptic, terete to slightly flattened, 15–20 × 4–10 mm, smooth and not sticky. Flowers in a smooth and occasionally sticky inflorescence, nodding; corolla orange to red, glaucous, smooth and not sticky, tube 5–8 mm long, lobes 10–15 mm long. Oct.–Feb. Stony slopes and flats usually inside other bushes, G, NH, KV, WM, TS, CCR (southern Namibia to E Cape).

CRASSULA ± 170 spp., mainly southern Africa with a few species through NE Africa to Arabia, China and Taiwan

*A. Geophytes, with ± spherical tubers covered with fine roots; stems deciduous, up to 150 mm tall, with 1–4 pairs of soft deciduous leaves at base (often hysteranthous in **C. saxifraga**)*

nemorosa (Eckl. & Zeyh.) Endl. ex Walp. Erect to decumbent, often branched, tuberous geophyte, 10–100 mm tall. Leaves usually in at least 3 pairs, petiolate, broadly ovate to circular, fleshy, 3–15 × 4–13 mm, grey-green, with crenate margin. Flowers in a loose, terminal cluster, without a peduncle, star- to cup-shaped, petals 2–3.5 mm long, pale yellow-green. June–Aug. S-facing stony slopes, often in shallow soil under bushes or rocks, G, NH, KB, WM, TS, CCR (Namuskluft to Montagu to E Cape).

saxifraga Harv. Tuberous geophyte, with unbranched, erect stem, 20–150 mm tall. Leaves ± emerging at flowering, 2(4), sessile, broadly obovate, slightly fleshy, 10–30 × 30–70 mm, with crenate margin. Flowers in a rounded, terminal cluster on a peduncle 50–150 mm long, tubular (fused only near base), petals 3.5–7.5 mm long, white often tinged pink. Apr.–June. Dry, S-facing, stony slopes, often under bushes or among rocks, G, NH, KV, WM, TS, CCR (Eksteenfontein to Paarl and Somerset East).

simulans Schönland Tuberous geophyte, with ± unbranched, erect stem, 80–150 mm tall. Leaves 6, rarely 8, elliptic to obovate, narrowed to a petiole up to 10 mm long, margin round-toothed. Flowers in ± lax, terminal clusters on a peduncle 20–60 mm long, star-shaped, petals 2.5–3.5 mm long, pale yellowish-green. Aug.–Oct. Sheltered rocky slopes, NS, CCR (Wallekraal, Worcester, Montagu). **(gce)**

umbella Jacq. Tuberous geophyte, with unbranched, erect stem, 20–150 mm tall. Leaves well-developed at flowering, 2(4), sessile, broadly obovate or ± fused into a disc around stem, slightly fleshy, 10–70 × 20–100 mm, with crenate margin. Flowers in a rounded, terminal cluster on a peduncle 5–60 mm long, star-shaped, petals 3–4.5 mm long, cream to yellow-green. Aug.–Sept. S-facing, stony slopes, often under bushes or rocks, G, NS, NH, KB, KV, WM, TS, CCR (Kubus to Citrusdal to Hankey). **(gce)**

A.' Annuals, non-geophytic perennials, shrublets or shrubs, if occasionally tuberous then tubers not covered with fine roots and stems with at least 8 pairs of succulent or leathery leaves
B. Flowers star- or shallowly cup-shaped; petals spreading from near the base
*C. Perennials (see also **C. natans** under C.')*

arborescens (Mill.) Willd. JADE PLANT Robust shrub, with stout, erect, fleshy branches, 0.5–1.5 m tall. Leaves sessile or shortly petiolate, broadly obovate to orbicular, dorsiventrally flattened, 20–40 × 20–30 mm, covered with a grey, waxy layer, margin horny. Flowers in a dense, rounded, terminal cluster on a peduncle 30–70 mm long, star-shaped, petals 7–10 mm long, white, tinged red. Oct.–Dec. Stony slopes, often N-facing, KV, TS, CCR (Rooiberg, S of Nuwerus to Matjiesfontein to E Cape).

expansa Dryand. Perennial, with herbaceous or brittle, ± translucent, decumbent branches, 0.05–0.2 m long. Leaves mostly sessile, lanceolate to elliptic or obovate, dorsiventrally flattened to terete, 6–20 × 2–4 mm. Flowers usually one per leaf axil near branch tips, cup-shaped, petals 2.5–4 mm long, white, tinged red, pedicels elongating in fruit. Sept.–Dec. Sandy to rocky slopes or flats among bushes, SN, G, NS, NH, KV, WM, TS, CCR (Namibia: Buchuberg to Worcester to E Cape to E Africa and Madagascar).

inanis Thunb. Aquatic, rhizomatous perennial, or rarely annual, like **C. natans** but leaves lanceolate to triangular and broadest near stem, often with 5–10 flowers per axillary cluster, (–20 in vigorous plants). Aug.–Mar. Permanent pools and slow flowing streams, WM, CCR (Roggeveld Escarpment and southern Cape to northern KwaZulu-Natal).

muscosa L. LIZARD'S TAIL, VETERBOS Densely leafy perennial, with erect to scrambling, ± woody branches, 0.05–0.4 m tall. Leaves obscuring stems, sessile, triangular to ovate, dorsiventrally flattened and leathery, 2–8 × 1–4 mm. Flowers in ± sessile clusters arranged along stems, sessile, cup-shaped, petals 1–2 mm long, pale yellow-green to brown. Oct.–Feb. Stony slopes to flats inside bushes, G, NS, NH, KB, KV, WM, TS, CCR (Lüderitz to E Cape and Free State).

*C.' Annuals (see also **C. inanis** under C.)*
D. Stems contracted and club- or disc-shaped

aphylla Schönland & Baker f. Aquatic, apparently leafless, ± succulent annual, 6–30 mm tall, main stem a solitary, enlarged, club-shaped internode, terminated by smaller, club-shaped branchlets, often reddish. Leaves fused into a fleshy ring indistinguishable from stem. Flowers few, terminal, star-shaped, petals 1–2 mm long, white or pinkish. Aug.–Oct. In pools on granite and sandstone rocks, KB, CCR (Kamiesberg Mountains and Bokkeveld to Hex River Mountains). **(gce)**

pageae Tölken Top- to disc-shaped annual, with flattened crust-like stem, 2–30 mm diam. Leaves sessile, fused to stem base, obovate to spathulate, dorsiventrally flattened and slightly convex above, 2–5 × 1.5–3 mm, finely papillate above. Flowers sessile, in a central cluster, cup-shaped, petals 1.2–2 mm long, brown to red. July–Oct. Moist depressions or under bushes, NH, WM, TS, CCR (S of Springbok and Calvinia District to Montagu, Matjiesfontein and near Prince Albert). **(gce)**

D.' Stems elongated and cylindrical
E. Flowers in sessile, axillary clusters forming an elongated, spike-like, compound inflorescence

campestris (Eckl. & Zeyh.) Endl. ex Walp. Annual, with few, erect to sprawling, wiry branches, 10–100 mm tall. Leaves sessile, lanceolate to narrowly triangular, dorsiventrally flattened and leathery, 4–6 × 1–2 mm. Flowers in ± sessile clusters arranged along stems, shortly pedicellate, ± cup-shaped, petals 0.5–1 mm long, pale yellow to brown. Aug.–Nov. Bare patches on sandy or gravelly slopes, G, NS, NH, KB, TS, CCR (southern Namibia to E Cape and Lesotho).

decumbens Thunb. Annual, with erect to decumbent branches, up to 120 mm tall. Leaves sessile, linear-lanceolate to elliptic or oblanceolate, ± terete, 3–8 × 0.5–2 mm. Flowers in ± sessile clusters arranged along stems, rarely solitary in axils, on slender pedicels, cup-shaped, petals 1.5–3 mm long, white or cream. Sept.–Nov. Sandy slopes and in depressions or near seasonal pools, NH, KB, KV, CCR (S of Springbok to Bredasdorp and Albertinia). **(gce)**

hirsuta Schönland & Baker f. Roughly hairy annual, with erect, wiry branches, up to 60 mm tall. Leaves sessile, linear-triangular, tapering to a long stiff bristle, dorsiventrally flattened and leathery, 3–8 × 0.5–2 mm. Flowers in sessile, rounded clusters along stems, shortly pedicellate, ± cup-shaped, petals 1–1.5 mm long, white. July–Sept. Bare patches on sandy or gravelly slopes, G, NH, KB, KV, CCR (Eksteenfontein to Little Karoo). **(gce)**

thunbergiana Schult. Annual, with decumbent branches, 20–80 mm tall, often rooting at nodes. Leaves sessile, lanceolate to narrowly elliptic, ± terete, 6–12 × 4–6 mm, with blister-like papillae. Flowers in tight clusters ± along length of stems, ± cup-shaped, petals ± 1 mm long, white, turning brown. Aug.–Nov. Sandy slopes and flats, often coastal, SN, NS, NH, KB, WM, TS, CCR (Aus to Cape Peninsula and Bredasdorp). **(gce)**

*E.' Flowers in stalked, ± terminal clusters or rarely 1–few in terminal axils (see also **C. decumbens** and **C. thunbergiana** under E.)*

dodii Schönland & Baker f. Decumbent annual, with branches 10–50 mm tall. Leaves petiolate, clustered near base in whorls of 4, ovate to elliptic, dorsiventrally flattened and slightly convex above, 2–4 × 2–3 mm, glabrous. Flowers in loose, mostly terminal clusters, on slender pedicels, ± cup-shaped, petals 1.4–2 mm long, white. Sept.–Oct. Moist depressions, NH, KV, TS, CCR (Springbok, Vanrhynsdorp to Caledon and Matjiesfontein). **(gce)**

glomerata P.J.Bergius Stiffly erect annual, up to 150 mm tall. Leaves opposite, triangular-lanceolate, papillate. Flowers sessile, in glomerules in a flat-topped thryse, cup-shaped or tubular, white, petals 1–1.5 mm, papillose, carpels tuberculate. Aug.–Nov. In sandy soils derived from granite, sandstone or limestone, KB, CCR (Kamiesberg Mountains and Clanwilliam to Port Elizabeth). **(gce)**

minuta Tölken Annual, with erect, wiry branches, up to 30 mm tall. Leaves sessile, linear-elliptic, dorsiventrally flattened, 1–2 × 0.5–1 mm. Flowers solitary in axils of terminal leaves, ± cup-shaped, petals 1–1.5 mm long, white or cream, tinged red. Sept.–Oct. Shallow pans in rocks on top of mountains, WM, CCR (Cederberg Mountains and Hantamsberg). **(gce)**

natans Thunb. Delicate, usually aquatic annual, or rarely rhizomatous perennial, up to 20–250 mm tall, branches often floating in water. Leaves obovate to narrowly elliptic, dorsiventrally flattened, 3–12 × 1–4 mm, pale green. Flowers 1(–3) per leaf axil, mostly near branch tips, shallowly cup-shaped, petals 1–2 mm long, white. May.–Nov. Shallow seasonally moist pans, NH, KB, WM, TS, CCR (Namaqualand to KwaZulu-Natal).

numaisensis Friedrich Like **C. oblanceolata** but leaves 4–10 mm broad. Aug.–Sept. Shaded places under rocks, G (N of Rosh Pinah). **(ece)**

oblanceolata Schönland & Baker f. Delicate annual, 60–120 mm tall. Leaves oblanceolate to narrowly elliptic, dorsiventrally flattened and slightly succulent, 5–8 × 1–3(4) mm, smooth. Flowers in loose, mostly terminal clusters, on slender pedicels, cup-shaped, petals 2–3 mm long, white, tinged red. Aug.–Oct. Moist or shaded places under rocks, G, NH, KB, WM, TS, CCR (N of Rosh Pinah to Cape Peninsula and Little Karoo). **(gce)**

roggeveldii Schönland Decumbent, often adventitiously rooting, ± reddish annual, with branches 10–40 mm tall. Leaves petiolate, obovate, dorsiventrally flattened and slightly convex above, 1–2 × 1–2 mm, finely papillate (at least when young). Flowers in small, axillary clusters, on short pedicels, ± cup-shaped, petals 1.5–2 mm long, white. Aug.–Oct. Moist places among rocks, WM (Hantamsberg to near Komsberg Pass). **(ece)**

strigosa L. Delicate, ± sparsely pubescent annual, up to 120 mm tall. Leaves petiolate (at least lower ones), elliptic, dorsiventrally flattened and slightly succulent, 4–15 × 2–7 mm. Flowers in loose, mostly terminal clusters, on slender pedicels, cup-shaped, petals 1–2 mm long, white, tinged red. Aug.–Oct. Moist or shaded places, NS, NH, KB, ?WM, CCR (Namaqualand to near Riviersonderend). **(gce)**

tenuipedicellata Schönland & Baker f. Annual, with stiff, erect branches, 10–100 mm tall. Leaves sessile, elliptic to obovate, dorsiventrally flattened and almost membranous, 6–12 × 4–6 mm. Flowers in loose clusters, on slender, spreading pedicels, cup-shaped, petals ± 1 mm long, white. July–Oct. Shady places under rocks or bushes, G, NH, KB, WM, TS (Spitzkop, Rosh Pinah to Calvinia and Laingsburg). **(ece)**

umbellata Thunb. Often reddish annual, 2–40 mm tall, erect or occasionally spreading. Leaves sessile to shortly petiolate, deltate to obovate, dorsiventrally flattened and slightly convex above, 2–4 × 2–4 mm, papillate above. Flowers in small, ± terminal clusters, on short pedicels which elongate greatly in fruit, cup-shaped, petals ± 1 mm long, white, tinged red, sepals papillate. July–Oct. Sandy soils in dry riverbeds, on flats and gravelly slopes, G, NS, NH, KB, WM, TS, CCR (Cornellsberg to Calvinia District to Cape Peninsula to Port Elizabeth and Great Karoo).

vaillantii (Willd.) Roth. Delicate, reddish, annual, 20–150 mm tall. Leaves linear, flat above and convex below, 2–4 × 1–2 mm, smooth. Flowers 1(–3) per leaf axil, mostly near branch tips, ± cup-shaped, petals 1–2 mm long, white. Sept.–Jan. Moist areas, G, NH, KB, KV, WM, CCR (Namaqualand to KwaZulu-Natal, introduced to SW Europe).

B.' Flowers ± tubular, flask- or urn-shaped; petals erect or recurved only at the apex
F. Annuals with wiry stems: flowers bright yellow or orange

dichotoma L. Annual, with erect, wiry, sparsely branched stem, 10–150 mm tall. Leaves sessile, obovate to linear, dorsiventrally flattened and slightly fleshy, 5–12 × 1–6 mm. Flowers usually in a loose, terminal cluster, funnel-shaped, petals 8–12 mm long, yellow to orange, often darker in tube. Sept.–Oct. Sandy soil in open patches among bushes, NS, NH, KB, KV, CCR (Concordia to Gansbaai). **(gce)**

sebaeoides (Eckl. & Zeyh.) Tölken Annual, with erect, wiry, sparsely branched stem, up to 80 mm tall. Leaves sessile, obovate to elliptic or ovate, dorsiventrally flattened and slightly fleshy, 5–12 × 1–6 mm. Flowers usually in a loose, terminal cluster, tubular to funnel-shaped, petals (3–)4–5 mm long, bright yellow. Sept.–Nov. Loamy soil among karroid bushes, KB, WM, TS, CCR (Kamiesberg Mountains, Vanrhyns Pass to Karoopoort and Grahamstown).

F.' Biennials or perennials with fleshy or ± woody stems; flowers white to pale yellow and sometimes suffused with pink or red
G. Inflorescence sessile and embedded in terminal leaves or ± shortly pedunculate; peduncle when present glabrous or hairy; bracts leaf-like, merging in size into the foliage leaves (see also ***C. mesembrianthemopsis*** *under G.')*
H. Small, succulent perennials; leaves short, thick and angular, glabrous but warty and grey from a broken waxy cover; flowers urn-shaped (compare with both H.' and H." below)

corallina Thunb. Small perennial, with short and either erect, soft, prostrate or decumbent branches, 10–80 mm tall, with tuberous roots in subsp. **macrorrhiza** Tölken. Leaves sessile, obo-

vate to rhombic, convex on both surfaces, 3–5 × 2–5 mm, ± covered with grey, waxy warts. Flowers 1–many, in terminal, apedunculate clusters, shortly pedicellate, urn-shaped and saccate around nectary scales, petals 2–3.5 mm long, cream. Oct.–Apr. Sandy to rocky flats, often with surface limestone, SN, NH, WM, CCR (Aus, N of Springbok, Roggeveld to Kuruman to Willowmore and Klipplaat).

deltoidea Thunb. KATA-KISO Small perennial, with brittle, fleshy, erect to spreading branches, 20–80 mm tall. Leaves sessile, rhombic to oblanceolate, convex on both surfaces, 10–15 × 4–10 mm, covered with small warts and grey wax-flakes. Flowers many, in compact, terminal clusters on a short glabrous peduncle up to 10 mm long, urn-shaped and saccate around nectary scales, petals 3.5–5 mm long, cream. Oct.–Nov. Bare gravelly areas on flats or lower slopes, WM, TS, CCR (Keetmanshoop to Bushmanland to Matjiesfontein, Touwsrivier, Prince Albert and Cradock).

vestita Thunb. Small perennial, with few, fleshy, erect to spreading branches, 20–80 mm tall, densely covered with clasping leaves. Leaves sessile, broadly obovate to rhombic, convex on both surfaces, 5–6 × 3–4 mm, warty, covered with a grey, waxy layer. Flowers in a sessile, dense, terminal head ± enveloped by leaves, urn-shaped, petals 2–3 mm long, cream. Oct.–Nov. Among or inside low shrublets among rocks, WM (Roggeveld: S of Sutherland). **(ece)**

*H.' Often short-lived, succulent perennials; leaves dorsiventrally much-flattened, often leathery, densely clustered along stem, margins ciliate at least near base (but entirely glabrous in **C. pyramidalis** and occasionally in **C. columnaris** and **C. congesta**); flowers slender and flask-shaped*

alpestris Thunb. Occasionally branching perennial, 20–80 mm tall. Leaves densely overlapping, sessile, triangular, dorsiventrally flattened and leathery (becoming covered with sand), 10–20 × 5–8 mm, with marginal cilia near base. Flowers in a dense, usually terminal, rounded head, held close to leaves on a glabrous peduncle, elongate flask-shaped, petals 6–9 mm long, fused in lower 2–3 mm, white, often tinged red. July–Nov. Gravelly flats and gentle slopes sometimes under bushes, TS, CCR (Bokkeveld Mountains to Matjiesfontein). **(gce)**

barklyi N.E.Br. Perennial or biennial, 20–90 mm tall, branching around base. Leaves tightly overlapping, sessile, broadly ovate and saucer-like, 3–4 × 10–15 mm, with membranous, densely ciliate margins. Flowers in a dense, terminal, rounded head, embedded among leaves, flask-shaped, petals 9–11 mm long, fused in lower 2–3 mm, cream. May–Oct. Gravelly exposed flats and gentle slopes or shallow flat pans in rocks, G, NS, NH, KV, CCR (SE of Port Nolloth to Strandfontein and Botterkloof). **(gce)**

columnaris Thunb. BERGKOESNAATJIE, SENTKANNETJIE Perennial or biennial, 10–20 mm tall (reaching 60 mm when flowering), often branched at base. Leaves overlapping, sessile, broadly ovate and saucer-like, 3–12 × 10–25 mm, often with membranous, ciliate margins. Flowers in a dense, terminal, brush-like head, ± embedded among leaves, flask-shaped, petals 7–13 mm long, fused in lower 2.5–3.5 mm, pale yellow, tinged red. May–Oct. Gravelly exposed flats and gentle slopes or shallow flat pans in rocks, SN, G, NS, NH, KV, WM, TS, CCR (Namibia: Buchuberg to Bushmanland to Vanrhynsdorp, Laingsburg and Little Karoo).

congesta N.E.Br. Single-stemmed biennial, 20–150 mm tall. Leaves partially overlapping, sessile, lanceolate, flat and grooved above, strongly convex below, 15–25 × 8–13 mm, glabrous or with few marginal cilia. Flowers in a dense, terminal, rounded head, held close to leaves on a glabrous peduncle, flask-shaped, petals 9–13 mm long, fused in lower 3–3.5 mm, cream, often tinged red. June–July. Gravelly flats and gentle slopes on hot northern slopes, TS, CCR (Touwsrivier to Laingsburg and Little Karoo). **(gce)**

multiceps Harv. Usually branched perennial, 10–60 mm tall. Leaves in loosely spaced whorls, sessile, narrowly triangular, dorsiventrally flattened and leathery, 3–5 × 2–3 mm, with marginal cilia towards base. Flowers in a dense, terminal, rounded head, ± embedded among leaves, flask-shaped, petals 5–8 mm long, fused in lower 2 mm, cream to pale yellow. May–June. Gravelly quartz-strewn flats and gentle slopes, NS, NH, KV (Riethuis to Komkans and NE of Bitterfontein). **(ece)**

pyramidalis Thunb. RYGBOSSIE Occasionally branched perennial, 30–250 mm tall. Leaves very densely packed, sessile, ovate-triangular, dorsiventrally flattened and leathery, 4–12 × 4–8 mm, margins smooth. Flowers in a dense, terminal, rounded head, ± embedded among leaves, flask-shaped, petals 8–11 mm long, fused in lower 3–4 mm, white, often tinged red. Aug.–Oct. Gravelly flats and gentle slopes, often in shallow soil, TS, CCR (Skitterykloof to Matjiesfontein, Little Karoo and E Cape).

H." Leaves dorsiventrally compressed with ± subacute tips, arranged in basal rosettes or groups of rosettes in young plants, ciliate but otherwise glabrous (except in ***C. exilis*** *and* ***C. tomentosa****); plants elongating greatly when flowering with leaves gradually merging upwards into ever shorter leaf-like bracts on an ± indistinct, fleshy peduncle; flowers tubular*

barbata Thunb. Perennial, with 1 leaf-rosette, up to 0.3 m tall when flowering. Leaves sessile, obovate to orbicular, dorsiventrally flattened, 10–35 × 15–35 mm, glabrous, except for a dense, softly hairy fringe up to 5 mm long. Flowers sessile, in numerous, ± equidistant, compact clusters, in a spike-like inflorescence on a leafy bracteate, glabrous peduncle, tubular, petals 3.5–5.5 mm long, fused in lower 1.5 mm, white, tinged pink. Sept.–Nov. Sheltering under bushes, often on S-facing slopes, WM, TS, CCR (Calvinia to Oudtshoorn, and Great Karoo near Victoria West).

brachystachya Tölken Often tuberous-rooted perennial, with several leaf-rosettes, up to 0.2 m tall when flowering. Leaves sessile, oblanceolate-oblong, dorsiventrally compressed, 20–40 × 5–15 mm, glabrous, with a few marginal cilia. Flowers nearly sessile, in several, ± loose clusters, in a spike-like inflorescence on a distinct, leafy bracteate, glabrous peduncle, tubular, petals 4–5 mm long, fused in lower 1 mm, white. Nov.–Jan. Sheltered crevices in rocks and cliffs in ravines, TS, CCR (Pieter Meintjies to Bosluiskloof and Prince Albert). **(gce)**

capitella Thunb. Perennial, with several, loose leaf-rosettes, up to 0.4 m tall when flowering. Leaves sessile, usually lanceolate to ovate, dorsiventrally compressed and grooved above, 10–50 × 4–15 mm, glabrous except for dense, marginal cilia. Flowers nearly sessile, in several, stalked clusters, in a ± loose, spike-like inflorescence on a distinct, leafy bracteate, glabrous peduncle, tubular, petals 3–4 mm long, fused in lower 0.6 mm, white or cream, tinged red. Jan.–May. Sheltering under bushes on gentle slopes or flats, NH, KV, WM, TS, CCR (Steinkopf to Montagu, E Cape to KwaZulu-Natal).

exilis Harv. Perennial, consisting of cushions of many tiny rosettes, up to 0.1 m tall when flowering. Leaves sessile, linear-oblanceolate to linear-elliptic, dorsiventrally compressed, 4–35 × 0.3–10 mm, mostly glabrous, terminating in a stout hair. Flowers pedicellate, in a terminal, loosely spreading, flat-topped cluster on an indistinct, leafy bracteate, minutely hairy peduncle 10–80 mm long, tubular, petals 3.5–4 mm long, fused in lower 0.2–0.8 mm, white, often tinged pink. Mar.–May. Sheltered southern slopes in crevices in rocks and cliffs, G (Steinkopf to Pofadder, southeastern Namibia to E Cape).

hemisphaerica Thunb. Perennial, with 1–3 leaf-rosettes, up to 0.15 m tall when flowering. Leaves in spirally arranged pairs, sessile, ovate, dorsiventrally flattened, 15–30 × 15–25 mm, glabrous, with marginal cilia. Flowers nearly sessile, in several, ± stalked clusters, in a spike-like inflorescence on a leafy bracteate, glabrous or hairy peduncle, tubular, petals 2.5–2.8 mm long, scarcely fused, white or cream. Sept.–Nov. Mostly in sandstone or quartzite derived soils, gentle slopes or flats, NH, KV, WM, TS, CCR (N of Kliprand to near Williston, Little Karoo to Prince Albert).

luederitzii Schönland (including **C. aurusbergensis** G.Will.) Perennial, consisting of cushions of few–many leaf-rosettes, up to 0.15 m tall when flowering. Leaves 4-ranked, sessile, obovate to ovate, dorsiventrally compressed, 10–30 × 8–20 mm, glabrous, with marginal cilia. Flowers ± sessile, in a terminal, round-topped, several clustered head on a peduncle 10–20 mm long, tubular, petals 2–3 mm long, fused in lower 0.5 mm, white. July–Sept. Sheltered, S-facing slopes in crevices in rocks, SN, G (Lüderitz district, Aurus Mountains to Namuskluft). **(ece)**

montana Thunb. Perennial, consisting of cushions of many rosettes, up to 0.12 m tall when flowering. Leaves 4-ranked, sessile, obovate to ovate, dorsiventrally flattened, 10–35 × 6–20 mm, glabrous, with marginal cilia. Flowers almost sessile, in 1–several clusters in a terminal, flat-topped to elongated inflorescence on a glabrous peduncle 10–80 mm long, tubular, petals 3–5.5 mm long, fused in lower 0.5 mm, white, often tinged pink. Aug.–Oct. Sheltered southern slopes in crevices in rocks, TS, CCR (Gifberg to Worcester, Laingsburg to Somerset East).

orbicularis L. Perennial, consisting of few–many leaf-rosettes, up to 0.25 m tall when flowering, often forming clumps from runners. Leaves in spirally-arranged pairs, sessile, oblanceolate, dorsiventrally flattened, 8–15 × 4–13 mm, glabrous, with marginal cilia. Flowers nearly sessile, in several, ± stalked clusters, in an elongated inflorescence on a glabrous peduncle 0.05–0.2 m long, tubular, petals 2–5 mm long, fused in lower 0.5 mm, white to pale yellow. June–Nov. Sheltered southern slopes under bushes or rocks, TS, CCR (Montagu to Laingsburg to KwaZulu-Natal).

pseudohemisphaerica Friedrich Perennial, consisting of 1–few leaf-rosettes, up to 0.2 m when flowering. Leaves 4-ranked, sessile, obovate to orbicular, dorsiventrally flattened, 8–30 × 10–35

mm, glabrous, but with marginal cilia. Flowers pedicellate, in several, ± equidistant clusters in a spike-like inflorescence on a glabrous peduncle 5–180 mm long, tubular, petals 3–4 mm long, fused in lower 0.6 mm, pale yellow, often tinged red. Sept.–Nov. Sheltered S-facing slopes under bushes or rocks, SN, G, NS, NH (Lüderitz to near Nuwerus). **(ece)**

tomentosa Thunb. Perennial, with 1–few leaf-rosettes, up to 0.6 m tall when flowering. Leaves sessile, oblong-elliptic to orbicular, dorsiventrally flattened, 10–80 × 5–25 mm, tomentose and ciliate. Flowers sessile, in several, ± equidistant, dense clusters, in a spike-like inflorescence on a leafy bracteate, hairy peduncle, tubular, petals 2.5–4.5 mm long, fused in lower 1.5 mm, cream to pale yellow. Nov.–Dec. Sheltering under bushes on sandy flats to rocky slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (Klinghardt Mountains to Kakamas to SW Cape to Laingsburg).

H.'" Shrublets; leaves scattered along stems, narrowly lanceolate to ovate, dorsiventrally compressed to terete and entirely glabrous or ciliate; peduncle indistinct from stem; flowers tubular or rarely urn-shaped

brevifolia Harv. Like **C. rupestris,** but leaves linear-elliptic 20–30 × 2–4 mm and with horny margin only near apex, petals fused in lower 1.2 mm, with a subterminal appendage, yellow-green. Mar.–June. Exposed, rocky N-facing slopes to flats near coast, SN, G, NS, NH, KB, KV, CCR (Buchuberg to Pakhuis Pass). **(gce)**

cymosa P.J.Bergius Small shrublet, with decumbent, slightly woody branches, 60–250 mm tall. Leaves sessile, narrowly lanceolate, dorsiventrally compressed, 3–5 × 1–1.5 mm, fringed with roundish cilia. Flowers nearly sessile, in several clusters arranged in a flat- to round-topped head, on a glabrous peduncle 10–25 mm long, tubular, petals 3.5–4.5 mm long, fused in lower 1 mm, with blunt to acute tips, yellow to white. Oct.–Dec. Sandy to gravelly slopes, NS, CCR (near Hondeklipbaai, Vanrhyns Pass to Genadendal). **(gce)**

dejecta Jacq. Shrublet, with erect, slightly woody, sparsely hairy branches, 60–400 mm tall. Leaves sessile, oblong-elliptic to ovate, dorsiventrally flattened, 8–15 × 4–13 mm, margin with stout hairs. Flowers nearly sessile, in several clusters arranged in a flat- to round-topped head, on a short, roughly hairy peduncle, tubular, petals 6–8 mm long, fused in lower 1 mm, with a sharp terminal appendage, white, often tinged red. Oct.–Feb. Shallow soils on large rock outcrops, NH, CCR (Kamieskroon, Gifberg to Genadendal). **(gce)**

fusca Herre Sparsely branched, erect shrublet, 0.1–0.4 m tall. Leaves sessile, sheathing stem, lanceolate, boat-shaped, 40–90 × 8–15 mm, with sharp, ± serrulate margins. Flowers sessile in a terminal rounded to elongated cluster, on a peduncle 10–30 mm long, tubular, petals 4–5 mm long, fused in lower 0.4 mm, with a ± acute tip, white or cream. Nov.–Dec. Among bushes on steep, S-facing, schistose slopes, SN, G (Schakalsberg to northern Richtersveld). **(ece)**

macowaniana Schönland & Baker f. Robust, much-branched shrub, 0.1–1.2 m tall, with mostly succulent stems. Leaves sessile, stem-clasping, linear-lanceolate, dorsiventrally compressed, 25–60 × 3–15 mm, without a waxy bloom, with rounded, glabrous margin. Flowers nearly sessile, in a terminal rounded cluster, on a glabrous peduncle 10–50 mm long, tubular, petals 2.5–4 mm long, fused in lower 0.6 mm, with rounded tips, white tinged pink. Oct.–Dec. Exposed, rocky, N-facing slopes, G, NS, NH, CCR (Spitzkop, Rosh Pinah to near Clanwilliam). **(gce)**

muricata Thunb. Like **C. whiteheadii** but without adventitious roots on branches, without cilia on sepals and with petals extending into a fleshy apex without a subterminal appendage. Oct.–Dec. Lower gentle gravelly slopes, often in shallow soil among short vegetation, TS, CCR (Skitterykloof to SE of Oudtshoorn). **(gce)**

pallens Schönland & Baker f. Shrublet, with adpressed, hairy branches when young, but smooth and white-barked later, ± 0.5 m tall, forming long, woody roots from lower branches. Leaves sessile, narrowly lanceolate, dorsiventrally compressed, 10–20 × 2–4 mm, ± fringed with stout hairs. Flowers nearly sessile, in several dense clusters on a pubescent peduncle, tubular, petals 2.5–3.5 mm long, fused in lower 1 mm, with a prominent subterminal appendage, cream or white. Sept.–Oct. Lower slopes and stabilised dunes, SN, NS, NH (Buchuberg, Holgatrivier and Kareeberg). **(ece)**

rudolfii Schönland & Baker f. Shrublet, with erect or scrambling branches, 0.1–0.8 m tall. Leaves sessile, narrowly lanceolate, dorsiventrally compressed, 8–15 × 2–3 mm, with ± recurved hairs on margins. Flowers nearly sessile, in rounded, terminal clusters on a pubescent peduncle, tubular to urn-shaped, petals 2–3 mm long, fused in lower 0.8 mm, with a prominent, subterminal appendage, cream or white. Aug.–Oct. On gravelly, often steep slopes, G, NH, KB (Spitzkop, Rosh Pinah to NW of Bitterfontein). **(ece)**

rupestris Thunb. CONCERTINA PLANT, SOSATIES Much-branched shrub, 0.1–0.5 m tall, with ± brittle stems. Leaves sessile, sheathing stem, ovate to lanceolate, dorsiventrally compressed, 5–15 × 3–10 mm, often with a waxy bloom, margin horny. Flowers sessile, in a terminal, rounded cluster, on a glabrous peduncle 10–20 mm long, tubular, petals 3–4 mm long, fused in lower 0.6 mm, with rounded tips, white, tinged pink. June–Dec. Exposed, rocky, N-facing slopes, SN, G, TS (Schakalsberg to northern Richtersveld, Vanrhyns Pass to Grahamstown).

sladenii Schönland Few-branched, scrambling or pendulous shrublet, 0.2–0.4 m tall. Leaves sessile, sheathing stem, ovate, ± convex on both surfaces, 25–40 × 15–25 mm, with a waxy bloom, margin serrulate. Flowers sessile, in a terminal, rounded to flat-topped cluster, on a glabrous peduncle 10–20 mm long, tubular, petals 4–5 mm long, fused in lower 1 mm, with a small, subterminal appendage, white, tinged pink. Mar.–May. Among rocks on steep, S-facing, schistose or gneissic slopes, SN, G (Namuskluft to Numees). **(ece)**

tetragona L. KARKAI Woody or fleshy, branched perennial, with erect to prostrate branches, often with peeling bark on older stems, 0.1–1 m tall. Leaves sessile, lanceolate, dorsiventrally compressed to terete, 8–80 × 1–4 mm. Flowers in a rounded to flat-topped cluster on a glabrous peduncle 10–150 mm long with internodes usually longer than those of stem, tubular, petals 1–2 mm long, fused only at base, with a small, subterminal appendage, cream or white. Jan.–June. Dry, N-facing, stony slopes, often among bushes or rocks, G, NH, KB, WM, CCR (Karrachabpoort to Worcester and E Cape).

whiteheadii Harv. Small shrublet, with erect, woody branches covered by rough, flaking bark when mature, often with thick adventitious roots, 50–150 mm tall. Leaves sessile, narrowly lanceolate, dorsiventrally compressed, 3–5 × 1–1.5 mm, margins hairy when young. Flowers nearly sessile, in several terminal clusters on a pubescent peduncle, tubular to urn-shaped, petals 3–4 mm long, fused in lower 1 mm, with a pointed, subterminal appendage, white, tinged red. Sept.–Oct. Lower gravelly slopes among short vegetation, G, NS, NH (SE of Eksteenfontein to Steinkopf to Wallekraal). **(ece)**

G.' Inflorescence pedunculate; peduncle pubescent or papillate, usually slender and longer than the main flower-bearing axis; bracts conspicuously shorter than uppermost foliage leaves and not leaf-like
*I. Shrublets or shrubs with much-branched woody or rarely succulent stems; leaves scattered along stems or clustered towards tips of bare branches (see also **C. garibina** under J.')*

ammophila Tölken Much-branched, decumbent shrublet, up to 0.8 m tall, with brittle branches, all parts densely and roughly adpressed-pubescent. Leaves oblong-lanceolate, flat to ± convex above and very convex below, 8–15 × 2–3 mm, greyish. Flowers in ± stalked globular heads, on a short, pubescent peduncle 10–30 mm long, tubular, petals 3–3.5 mm long, fused in lower 0.6 mm, with acute tips, cream. Oct.–Nov. Scrambling inside bushes in coastal sandveld, NS, CCR (Holgatrivier to Saldanha). **(gce)**

atropurpurea (Haw.) D.Dietr. Much-branched shrublet, 0.05–0.6 m tall. Leaves oblanceolate to obovate to linear-elliptic, dorsiventrally flattened and slightly convex above and below, 15–30 × 6–25 mm, green or tinged red, glabrous to pubescent. Flowers in many, round clusters in an elongated, 3–many-branched inflorescence, on a pubescent peduncle 0.15–0.4 m long, tubular, petals 3.5–4.5 mm long, fused in lower 0.8 mm, with a long terminal appendage, cream. Oct.–Dec. Stony slopes or gravelly flats or among bushes on sand, SN, G, NS, NH, KB, TS, CCR (Oranjemund to Cape Fold Mountains and Humansdorp). **(gce)**

mollis Thunb. Much-branched shrublet, 0.1–0.5 m tall. Leaves linear-elliptic, flat above and convex below, 10–20 × 2–3 mm, shortly velvety. Flowers in round-topped clusters, in a 3–many-branched inflorescence, on a shortly pubescent peduncle 0.15–0.25 m long, tubular petals 2.5–3.5 mm long, fused in lower 1 mm, with a fleshy, terminal appendage, cream. Dec.–Feb. Stony slopes to flats or in shallow soil on outcrops of sandstone, TS, CCR (Matjiesfontein to Prince Albert and Mossel Bay to E Cape).

rogersii Schönland Much-branched shrublet, 0.1–0.3 m tall. Leaves oblanceolate to club-shaped, flat to convex above and very convex below, 15–20 × 4–8 mm, pubescent. Flowers in a round-topped cluster, on a 3–many-branched inflorescence, on a pubescent peduncle 0.05–0.15 m long, tubular, petals 3–4 mm long, fused in lower 0.6 mm, with an acute terminal appendage, pale yellow. Jan.–Mar. Stony, shaley slopes, often in other bushes, TS, CCR (Beaufort West to Matjiesfontein to Prince Albert and E Cape).

subacaulis Schönland & Baker f. Scrambling perennial or shrublet, with brittle branches, 0.1–0.6 m tall. Leaves narrowly oblong-elliptic, flat and canaliculate above and convex below, 30–80 × 3–8 mm, glabrous to pubescent, usually deep red. Flowers in many dense heads in a branched inflorescence, on a pubescent peduncle 0.15–0.4 m long, tubular, petals 3–3.5 mm long, fused in lower 0.6 mm, with a fleshy, terminal appendage, cream to pale yellow. Sept.–Oct. Gravelly slopes, often among very short vegetation, G, NS, NH, WM, CCR (Namuskluft to Clanwilliam and Botterkloof). **(gce)**

subaphylla (Eckl. & Zeyh.) Harv. Slender, much-branched, decumbent or climbing shrublet, 0.1–0.8 m tall, with wiry-woody stems. Leaves linear-elliptic to linear-lanceolate, terete to dorsiventrally compressed and slightly convex above and below, 8–30(–40) × 2–3 mm, shortly adpressed-pubescent to glabrous. Flowers in small clusters, in a 3–many-branched inflorescence, on a pubescent peduncle 0.03–0.15 m long, tubular, petals 3.5–4.5 mm long, fused in lower 0.4 mm, with a pointed terminal appendage, cream. Oct.–Dec. Stony slopes or flats, often clambering inside bushes, SN, G, NS, NH, KB, ?KV, WM, TS, CCR (Namibia: Brandberg to Little and Great Karoo).

*I.' Succulent perennials with short, fleshy, solitary or few-branched stems, if woody then only at base; leaves densely clustered at base or in columns up stem (see also **C. ammophila** under I.)*
*J. Leaves covered with papillae (rarely smooth or hairy in **C. elegans** and **C. grisea**)*

deceptor Schönland & Baker f. Perennial, with short, erect, columnar branches, 20– 80 mm long, internodes hidden. Leaves broadly ovate, concave above and very convex below, closely stem-clasping, 6–15 × 6–10 mm, densely white-papillate. Flowers in small, round-topped clusters, on a papillate peduncle 20–80 mm long, tubular, petals 2–2.5 mm long, fused in lower 0.5 mm, cream, fading to brown. Jan.–Mar. Gentle slopes or rocky outcrops often among quartzitic gravel, SN, G, NS, NH, KB, KV, CCR (southern Namibia to Elandsbaai and Pofadder to Kakamas).

elegans Schönland & Baker f. Dwarf perennial, with short branches, 10–80 mm tall, internodes hidden. Leaves ovate to lanceolate, very swollen, 5–15 × 4–8 mm, green to deep red, glabrous to finely hairy or papillate. Flowers in small, round-topped heads, on a pubescent peduncle 25–60 mm long, tubular, petals 2–2.5 mm long, fused in lower 0.5 mm, cream, fading to brown. Jan.–Apr. Flats under bushes to rocky slopes, SN, G, NS, NH, KV (Lüderitz to Vanrhynsdorp, Geselskapbank).

grisea Schönland Perennial, with few, erect branches, 50–200 mm tall, with internodes ± visible. Leaves linear-lanceolate, triangular in cross section, 20–80 × 3–6 mm, glabrous to hairy or papillate. Flowers in round-topped, branched clusters, on a minutely pubescent peduncle 20–100 mm long, tubular, petals 2–3 mm long, fused in lower 0.3 mm, cream, fading to brown. Feb.–Apr. Gravelly lower slopes among gneissic or quartzitic rocks, G, NS, NH (S of Witpütz to near Hondeklipbaai). **(ece)**

mesembrianthemopsis Dinter Dwarf perennial, with 1–few leaf rosettes, 20–50 mm diam., only upper leaf margins exposed above ground. Leaves sessile, cuneate to obpyramidal, as thick as broad and truncate, 10–20 × 3–6 mm, covered with small papillae. Flowers in a round-topped and compact head, partly hidden among leaves, on a pubescent peduncle 6–20 mm long, shortly pedicellate, tubular, petals 5–6 mm long, fused in lower 1 mm, with a ± hooded tip, white to cream. Mar.–May. Flats in gneissic, quartzitic to limestone gravel, G, NH (Cape Cross to Platbakkies and Kenhardt).

plegmatoides Friedrich Perennial, with erect to decumbent columnar branches, 50–150 mm long, internodes hidden. Leaves closely stem-clasping, broadly ovate, concave above and convex below, 5–8 × 7–13 mm, greyish, densely white-papillate. Flowers in small round-topped clusters, on a pubescent peduncle 30–60 mm long, tubular, petals 2–3 mm long, fused in lower 0.4 mm, cream, fading to brown. Mar.–Apr. Gentle slopes towards tops of hills among quartzitic gravel, SN, G, NS (Buchuberg to Wolfberg). **(ece)**

susannae Rauh & Friedrich Dwarf perennial, forming several leaf rosettes, 20–60 mm diam., only upper leaf margins exposed. Leaves sessile, oblong, dorsiventrally flattened and truncate, 6–10 × 4–8 mm, covered with small papillae. Flowers in few heads, on a pubescent peduncle 10–30 mm long, sessile, tubular, petals 2.5–3.5 mm long, fused in lower 0.3 mm, with pointed, abruptly spreading tips, white. Apr.–May. On gentle slopes in quartzitic gravel, NS (Riethuis). **(ece)**

tecta Thunb. Perennial, with few, short branches covered by leaves to form rosettes, 20–60 mm diam. Leaves sessile, oblong to oblanceolate, dorsiventrally compressed but convex, 20–35 ×

5–12 mm, greyish, covered with coarse, white, swollen papillae, margin often ciliate near base. Flowers in a dense, spherical head on a papillate peduncle 30–80 mm long, tubular, petals 3–4 mm long, fused in lower 0.8 mm, with blunt to subacute tips, white to cream. Apr.–June. Gentle gravelly lower slopes often with scattered Witteberg quartzite rocks, TS, CCR (Anysberg to Laingsburg to near Steytlerville).

J.' Leaves smooth and glabrous or covered with hairs
*(see also **C. elegans** and **C. grisea** under J.)*

alstonii Marloth Perennial, with 1–few short branches closely hidden by leaves, forming spherical rosettes 20–50 mm diam. Leaves sessile, orbicular to broadly obovate, flat above and slightly swollen below, 6–10 × 12–20 mm, greyish, densely and stiffly adpressed-tomentose. Flowers in a few, dense, rounded heads on a tomentose peduncle 20–40 mm long, tubular, petals 2.5–3 mm long, fused in lower 0.8 mm, without a subterminal appendage, cream to pale yellow. Mar.–Apr. Gentle slopes or flats among quartzitic or gneissic gravel, G, NS, NH (Lekkersing to Umdaus and Komaggas). **(ece)**

ausensis Hutchison Perennial, with a few short branches, forming dense cushions 20–80 mm diam. Leaves sessile, lanceolate to oblanceolate, flat above and strongly convex below, 12–30 × 4–10 mm, covered with short, white, erect hairs. Flowers in 1–few heads, on a pubescent peduncle 20–45 mm long, pedicellate, tubular, petals 5–6 mm long, fused in lower 1 mm, with a small, subterminal appendage, white to cream. Mar.–Apr. Usually wedged into sheltered crevices in rock outcrops, SN, ?G (Tiras Mountains to near Lüderitz to Great Karas Mountains).

clavata N.E.Br. Perennial, with several basal rosettes and few short, ± woody branches, up to 0.15 m tall. Leaves oblong-lanceolate to obovate or elliptic, dorsiventrally flattened, but slightly convex above and very convex below, 20–40 × 5–13 mm, usually purplish red, glabrous or rarely shortly pubescent. Flowers in many heads in a branched inflorescence, on a glabrous or finely pubescent peduncle 0.1–0.2 m long, tubular, petals 2.5–3.5 mm long, fused in lower 1 mm, with a fleshy, terminal appendage, cream to pale yellow. Sept.–Oct. Stony slopes, often in shallow soil on rocks, G, KV, WM, TS, CCR (Numees Mountain, Gifberg to Matjiesfontein and Little Karoo). **(gce)**

columella Marloth & Schönland Perennial, with erect, columnar branches, 50–150 mm tall, internodes hidden. Leaves tightly packed on stem, broadly ovate, dorsiventrally flattened, 5–8 × 6–10 mm, yellowish green, velvety. Flowers in small, round-topped clusters, on a pubescent peduncle 20–50 mm long, tubular, petals 2–2.5 mm long, fused in lower 0.3 mm, cream or pale yellow, fading to brown. Mar.–Apr. Usually SW-facing slopes in crevices, G, NS (N of Lekkersing to Kleinsee and Wolfberg). **(ece)**

cotyledonis Thunb. BERGPLAKKIE Perennial, with basal rosette and few, rarely woody, short branches, 50–200 mm tall. Leaves oblong-lanceolate to broadly obovate, dorsiventrally flattened, but slightly convex above and below, 30–60 × 10–25 mm, coarsely and densely grey-adpressed-pubescent, marginal cilia in 2 or more rows. Flowers in many, dense, spherical heads in a branched inflorescence, on a pubescent peduncle 0.15–0.3 m long, tubular, petals 3–4.5 mm long, fused in lower 0.6 mm, with a fleshy, terminal appendage, cream to pale yellow. Nov.–Jan. Gravelly slopes among rocks and bushes, G, NS, NH, ?KB, ?KV, TS, CCR (Namuskluft to Little Karoo and E Cape).

garibina Marloth & Schönland Decumbent perennial, rarely shrubby, with spreading, brittle branches 50–250 mm long. Leaves sessile, linear-lanceolate, flat or convex above and strongly convex below, 20–40 × 3–6 mm, glabrous to covered with fine, swollen-tipped hairs. Flowers in a loose rounded cluster, on a pubescent peduncle 20–40 mm long, pedicellate, tubular, petals 3–6 mm long, fused in lower 1.5 mm, with a small subterminal appendage, white to cream. Sept.–Nov. Usually in crevices in gneissic or quartzitic outcrops, G (Alexander Bay to Goodhouse and Ai-Ais to near Steinkopf).

hirtipes Harv. Stiffly hairy perennial, with many, brittle, spreading branches, 20–150 mm tall. Leaves sessile, lanceolate to ovate, terete to flat above and strongly convex below, 8–15 × 4–7 mm. Flowers in few, spherical heads on a conspicuously pubescent peduncle 15–25 mm long, tubular, petals 3–4 mm long, fused in lower 0.8 mm, without a subterminal appendage, cream to yellow. Aug.–Sept. Gravelly slopes to loamy flats often under bushes or rocks, NS, NH, KV, CCR (Komaggas to Olifants River Mouth). **(gce)**

namaquensis Schönland & Baker f. Perennial, with few, short branches covered by leaves to form basal clusters, 20–80 mm diam., rootstock woody. Leaves sessile, oblong to oblanceolate, terete to

flat above and strongly convex below, 10–35 × 3–10 mm, grey- to blue-green, densely and stiffly adpressed-tomentose. Flowers in 1–few, dense, spherical heads, on a tomentose peduncle 20–100 mm long, tubular, petals 3–8 mm long, fused in lower 1 mm, apically beaked, white to yellow. Sept.–Nov. Gentle gravelly slopes to shallow soil overlying sandstone outcrops, G, NH, KB, CCR (Grünau, Helskloof to Pofadder to Skitterykloof).

nudicaulis L. Woody or fleshy, branched perennial, with several basal rosettes, 50–250 mm tall. Leaves oblong-elliptic to orbicular, flat and slightly convex above and convex below, 20–80 × 6–15 mm, glabrous to pubescent. Flowers, in many dense stalked or sessile clusters, in an elongated to spike-like inflorescence, on a pubescent peduncle 0.1–0.2 m long, tubular, petals 3–3.5 mm long, fused in lower 0.8 mm, with a fleshy, terminal appendage, cream to white. Sept.–Dec. Exposed or sheltered gravelly slopes, NS, NH, KV, WM, TS, CCR (Holgatrivier to Cape Peninsula, Little Karoo to Drakensberg Mountains).

pubescens Thunb. Much-branched, low shrublet, 0.1–0.3 m tall. Leaves oblanceolate to obovate, flat to slightly convex above and below, 10–30 × 4–15 mm, tomentose to glabrous. Flowers in few globular clusters, on an unbranched inflorescence, on a pubescent to glabrous peduncle 0.08–0.15 m long, tubular, petals 2–3 mm long, fused in lower 0.5 mm, each with a ± spherical, terminal appendage, pale yellow. Sept.–Feb. Stony, often S-facing slopes, TS, CCR (Bokkeveld to Verlatekloof to E Cape).

sericea Schönland Perennial, with erect branches, 50–200 mm tall, ± woody at base with peeling bark. Leaves sessile, oblanceolate to obovate, rounded and swollen but slightly flattened above, 10–35 × 6–35 mm, greyish, densely tomentose or papillose. Flowers in several, ± widely spaced, dense, spherical heads, on a tomentose peduncle 40–100 mm long, tubular, petals 3–4 mm long, fused in lower 1 mm, with tips blunt or acute, cream to pale yellow. May–Nov. Crevices in or among rocks on N-facing slopes, SN, G, NH (Klinghardt Mountains to Warmbad and Pofadder).

TYLECODON 39 spp., southern Namibia and western South Africa, mainly in winter rainfall region

A. Old leaves not falling off cleanly but wearing away gradually

faucium (Poelln.) Tölken Like **T. ventricosus** but branches 10–50 mm tall, without a tuber and with slender and longer phyllopodia, leaves more densely glandular-tomentose, corolla tube 12–14 mm long and not swollen in middle, lobes 6–10 mm long, pink with maroon streaks. Jan.–Feb. Stony slopes under bushes, WM, TS (Ouberg Pass, Sutherland to Matjiesfontein and Moordenaars Karoo). **(ece)**

grandiflorus (Burm.f.) Tölken ROOISUIKERBLOM Sprawling, succulent shrub, up to 0.3 m tall, with branches 15–45 mm thick, with scattered, blunt phyllopodia. Leaves dry at flowering, oblanceolate, dorsiventrally flattened, 40–80 × 5–15 mm, usually glabrous. Flowers upright to spreading, in a showy, glandular-pubescent to glabrous inflorescence, with peduncle 0.2–0.5 m long, corolla tube 30–40 mm long, broadening towards mouth, orange to red, lobes 13–17 mm long, orange to red. Jan.–Feb. Deep red sand among restios, NS, CCR (W of Komaggas to Cape Peninsula to Bonnievale). **(gce)**

racemosus (Harv.) Tölken Succulent shrub, 60–400 mm tall, with branches at least 8 mm thick, smooth, covered above with white papery remains of leaves. Leaves elliptic to obovate or orbicular, dorsiventrally flattened, 20–45 × 5–25 mm, glandular-pubescent to glabrous. Flowers spreading, in a compact, glandular-pubescent to glabrous inflorescence, with peduncle 30–80 mm long, corolla tube 7–10 mm long, broadening towards mouth, pale green, lobes 4–6 mm long, white. Sept.–Oct. Stony slopes and on rocky outcrops, SN, G, NS, NH (Rosh Pinah to Riethuis and Steinkopf). **(ece)**

striatus (Hutchison) Tölken Like **T. ventricosus** but often only a single stem arising from swollen tuber, stem (or branches) 3–7 mm thick and streaked grey and brown, smooth or with short phyllopodia, leaves 3–5 mm broad, corolla tube 12–15 mm long and lobes 5–7 mm long. Nov.–Jan. Stony slopes, often under bushes, KV, TS, CCR (Riethuis to Clanwilliam to Verlatekloof Pass). **(gce)**

tribblei Van Jaarsv. Small succulent, with few, slender, woody branches 0.1–0.4 m long, from a swollen tuber, with very short phyllopodia or smooth. Leaves dry at flowering, linear, terete or slightly grooved above, 15–25 × 2–4 mm, glandular-pubescent. Flowers upright, in a sparse glandular-pubescent inflorescence, with peduncle 30–50 mm long, corolla tube 8–10 mm long and cylindrical, pale green, lobes 4–7 mm long, yellowish. Feb.–Mar. Clambering in bushes or among outcrops of rock, NH (NW of Nababeep to Komaggas). **(ece)**

ventricosus (Burm.f.) Tölken (including **T. jarmiliae** Halda) KLIPNENTA Sprawling succulent, 20–200 mm tall, often from a swollen tuber, branches at least 8 mm thick, often with scattered, truncate phyllopodia. Leaves dry at flowering, linear to oblanceolate to cordate, dorsiventrally flattened, 30–60 × 5–20 mm, glandular-pubescent to glabrous. Flowers ± upright, in a narrow, glandular-pubescent to glabrous inflorescence, with peduncle 0.1–0.3 m long, corolla tube 16–20 mm long, much swollen in middle, green, streaked with brown, lobes 8–11 mm long, pale green, streaked with brown. Dec.–Jan. Stony slopes, often under bushes, G, NH, KB, WM, TS, CCR (Numees Mountain to Piketberg to near De Aar and Jansenville).

A.' Old leaves not remaining attached to branches and falling off cleanly
B. Stems rough with remains of phyllopodia
(petiole-like insertions on the nodes)

aridimontanus G.Will. Like **T. torulosus** but branches 15–45 mm long, leaves narrowly ovate to elliptic, 4–5 × 3–4 mm, peduncle 10–12 mm long, corolla tube 11 mm long, green, lobes white to pink. Jan.–Feb. In crevices between rocks, SN (Klinghardt Mountains). **(ece)**

bayeri Van Jaarsv. (including **T. cordiformis** G.Will.) Dwarf succulent, with 1–few, erect to spreading slender, ± woody branches, up to 180 mm long, from a solitary swollen tuber, with short phyllopodia. Leaves dry at flowering, narrowly oblanceolate to obcordate, dorsiventrally flattened, 10–40 × 4–32 mm, glandular-pubescent. Flowers upright, in a sparse glandular-pubescent inflorescence, with peduncle 8–15 mm long, corolla tube 10–12 mm long, cylindrical and widening towards mouth, pale yellow, lobes 4–5 mm long, bright yellow. Jan.–Feb. In sheltered crevices in rocky outcrops on hills, G (Klipbok to Harras Mountains). **(ece)**

ellaphieae Van Jaarsv. (= *Tylecodon cremnophilus* Bruyns) Dwarf succulent, with few, erect branches, up to 60 mm long and 6–8 mm thick, from a tuber, with short phyllopodia. Leaves dry at flowering, obovate to spathulate, dorsiventrally flattened, 20–45 × 10–30 mm, glandular-pubescent. Flowers upright, in a glandular-pubescent inflorescence, with peduncle 30–50 mm long, corolla tube 12–15 mm long and cylindrical, pale green, lobes 6–10 mm long, white. Jan.–Feb. In sheltered crevices in rocks and cliffs, gneiss to quartzite, G (Rosyntjieberg). **(ece)**

hirtifolius (W.F.Barker) Tölken (including **T. petrophyllus** Van Jaarsv. & A.E.van Wyk) Succulent shrub, up to 0.3 m tall, with branches 15–30 mm thick, covered with prominent, truncate phyllopodia. Leaves dry at flowering, oblanceolate to obovate, dorsiventrally flattened, 40–60 × 15–35 mm, glandular-pubescent. Flowers spreading, in a slender, glandular-pubescent inflorescence, with peduncle 0.3–0.6 m long, corolla tube 14–16 mm long, broadening towards mouth, yellow-green, lobes 7–8 mm long, white to yellow. Nov.–Dec. Stony slopes among rocks, NH (N of Spektakel Pass to Komaggas). **(ece)**

mallei G.Will. Dwarf succulent, with several creeping branches, up to 250 mm long and 1.5–4 mm thick from a solitary, often spreading, swollen tuber, bearing scattered, short phyllopodia. Leaves dry at flowering, obovate, dorsiventrally flattened, 10–20 × 8–15 mm, glandular-pubescent. Flowers upright in a sparse glandular-pubescent inflorescence, with peduncle 8–12 mm long, corolla tube 12–15 mm long and cylindrical, brownish green, lobes 6–7 mm long, brown. Jan.–Feb. In sheltered crevices in rocks near tops of hills, G (S of Kouefontein). **(ece)**

rubrovenosus (Dinter) Tölken Succulent shrub, up to 0.3 m tall, with branches at least 20 mm thick, younger stems covered with short, truncate phyllopodia. Leaves dry at flowering, linear, terete or slightly grooved above, 20–40 × 2–4 mm, glandular-pubescent to glabrous. Flowers drooping, in a glandular-pubescent inflorescence, with peduncle 60–120 mm long, corolla tube 7–9 mm long, cylindrical or broadening towards mouth, yellow-green, lobes 5–7 mm long, pink to brown. Oct.–Nov. Stony slopes among rocks, SN, G (Witpütz to Kodas Peak eastwards along Gariep Valley to Prieska).

similis (Tölken) Tölken (including **T. bodleyae** Van Jaarsv.) Dwarf succulent, with 1–few, erect to straggling branches, up to 120 mm long and 1–5 mm thick, from a small underground tuber, often with very short phyllopodia. Leaves usually dry at flowering, narrowly elliptic to oblong, dorsiventrally flattened, 5–13 × 2–4 mm, mostly glabrous. Flowers upright, in a sparse glabrous inflorescence, with peduncle 8–30 mm long, corolla tube 6–15 mm long and cylindrical, pale green to white, lobes 3.5–5 mm long, often softly hairy, white. Sept.–Mar. In crevices in rocky outcrops, SN, G, NS, NH (E of Oranjemund to Steinkopf to SW of Garies and Kotzesrus). **(ece)**

stenocaulis Bruyns Dwarf succulent, with 1–few erect branches, up to 150 mm long and 2–4 mm thick, from an underground tuber, with short phyllopodia. Leaves dry at flowering, oblanceolate to elliptic, dorsiventrally flattened, 12–30 × 5–10 mm, glandular-pubescent. Flowers upright, in

a sparse glandular-pubescent inflorescence, with peduncle 50–70 mm long, corolla tube 11–13 mm long and cylindrical, pale green, streaked with maroon, lobes 5–6 mm long, dark maroon. Nov.–Dec. In crevices in small tillite or shale outcrops, TS (southern Tanqua Karoo, Tulpfontein to near Patatsrivier). **(ece)**

tenuis (Tölken) Bruyns (including **T. scandens** Van Jaarsv.) Small, straggling succulent, with 1 erect stem from an underground tuber, up to 200 mm long and 1.5–3 mm thick, with protruding and often decurved phyllopodia. Leaves dry at flowering, linear-oblanceolate to elliptic, dorsiventrally flattened, 6–18 × 4–6 mm, glandular-pubescent. Flowers ± spreading, in a loose glandular-pubescent inflorescence, with peduncle 30–60 mm long, corolla tube 6–8 mm long, inflated towards mouth, brownish yellow-green, lobes 4–5 mm long, red-striped on yellow. Nov.–Dec. Flats and gentle slopes inside small bushes, KV (S of Nuwerus to Koekenaap and Moedverloor). **(ece)**

tuberosus Tölken (including **T. atropurpureus** Bruyns) Dwarf succulent, with short, mainly subterranean, smooth branches, 3–8 mm thick, from a tuber, smooth and without obvious phyllopodia. Leaves dry at flowering, cuneate-spathulate, dorsiventrally flattened, 25–80 × 8–60 mm, glandular-pubescent. Flowers upright, in a sparse glandular-pubescent inflorescence, with peduncle 0.1–0.3 m long, corolla tube 8–14 mm long and cylindrical to slightly swollen in middle, pale green, lobes 2.5–4 mm long, deep maroon. Jan.–Mar. Stony flats under bushes in renosterveld, NH (Steinkopf to top of Spektakel Pass). **(ece)**

wallichii (Harv.) Tölken KANDELAARBOS, KOKERBOS Succulent shrub, up to 0.8 m tall, with branches at least 30 mm thick, covered with prominent, truncate phyllopodia. Leaves dry at flowering, linear, terete or slightly grooved above, 30–120 × 2–4 mm, usually glabrous. Flowers ± drooping, in a glandular-pubescent to glabrous spreading inflorescence, with peduncle 0.2–0.6 m long, corolla tube 7–12 mm long, broadening towards mouth, yellow-green, lobes 5–7 mm long, yellow. Dec.–Jan. Stony slopes, SN, G, CCR (Aus to Worcester and Willowmore, and Great Karoo around Beaufort West).

B.' Stems ± smooth, lacking phyllopodia (enlarged, persistent, petiole-like insertions on the nodes)

aurusbergensis G.Will. & Van Jaarsv. Like **T. torulosus** but branches 20–80 mm long, 2–5 mm thick, sometimes bearing very short phyllopodia, peduncle up to 20 mm long, corolla tube 10–12 mm long, pale green, lobes 2–3 mm long, white to pink. Jan.–Apr. In crevices between rocks, SN (Aurus Mountains). **(ece)**

bruynsii Van Jaarsv. & S.A.Hammer Like **T. torulosus** but pendulous or erect and shrub-like, up to 300 mm tall and broad. Flowers with white, spreading lobes. Dec.–Feb. Crevices in steep sandstone cliffs, G (E of Rosh Pinah). **(ece)**

buchholzianus (Schuldt & P.Stephan) Tölken (including **T. bleckiae** G.Will.) Small, much-branched succulent, up to 0.15(0.3) m tall, branches 3–8 mm thick, smooth. Leaves dry at flowering, linear to obovate, terete or slightly grooved above, 5–15 × 2–4 mm, glabrous. Flowers upright, in a sparse, mostly glabrous inflorescence, with peduncle 5–10 mm long, corolla tube 10–13 mm long, cylindrical, pink to red, lobes 3–5 mm long, white to pink to red. Oct.–Dec. Stony slopes to loamy flats, SN, G, NS, NH (S of Witpütz to Harras Mountains). **(ece)**

decipiens Tölken Like **T. torulosus** but branches shorter, leaves oblanceolate to elliptic, 4–12 × 3–8 mm, sparsely glandular-pubescent and later glabrous. Flowers ± upright, in a sparsely glandular-pubescent inflorescence, with peduncle 8–20 mm long, corolla tube 9–11 mm long, lobes pink to white. Oct.–Dec. Crevices in sheltered, S-facing, schist outcrops, NS (Buffelsrivier E of Kleinsee). **(ece)**

fragilis (R.A.Dyer) Tölken Small, sprawling succulent, with few branches up to 80(–350) mm long and 3–6 mm thick, from a swollen tuber, smooth. Leaves dry at flowering, linear, terete to slightly grooved above, 12–25 × 3–4 mm, glabrous. Flowers ± spreading, in a loose glabrous inflorescence, with peduncle 30–80 mm long, corolla tube 8–10 mm long and cylindrical, yellow-green, lobes 5–6 mm long, yellow. Jan.–Feb. Crevices in coastal sandstone outcrops or under bushes in sand, NS (Port Nolloth to Olifants River Mouth). **(ece)**

hallii (Tölken) Tölken Succulent, densely-branched shrub, up to 0.3 m tall, with smooth branches, 3–15 mm thick, grey, becoming blackish towards base of plant. Leaves linear-lanceolate, terete to grooved above, 8–35 × 3–5 mm, glandular-pubescent to glabrous. Flowers upright, in a short, erect, glandular-pubescent inflorescence, with peduncle 15–35 mm long, corolla tube 10–14 mm long and cylindrical, brownish yellow-green, lobes 6–8 mm long, yellow-brown. Sept.–Oct. Stony slopes, G (Spitzkop, Rosh Pinah to near Vioolsdrift and Umdaus).

kritzingeri Van Jaarsv. Slender succulent, with 1–several, straggling, smooth branches, up to 1 m long and 3–4 mm thick, from an underground tuber. Leaves dry at flowering, linear, flat and slightly grooved above, recurved towards tips, 20–50 × 2–5 mm, glabrous. Flowers upright, in a sparse, almost glabrous inflorescence, with peduncle 50–180 mm long, corolla tube 15–20 mm long and cylindrical, green, lobes 6–10 mm long, pink to maroon. Jan.–Feb. Inside bushes on steep slopes, G (NW of Kubus to Rosyntjieberg). **(ece)**

nigricaulis G.Will. & Van Jaarsv. Small, densely clumped succulent, with blackish, smooth branches, 40–80 mm long and 3–6 mm thick, from a swollen base. Leaves dry at flowering, narrowly elliptic, terete or slightly grooved above, 8–12 × 2–4 mm, glabrous. Flowers ± upright, in a glandular-pubescent inflorescence, with peduncle 8–20 mm long, corolla tube 5–7 mm long and cylindrical, pale green to yellow, lobes 3–4 mm long, white to pink. Jan.–Feb. In crevices on slabs of gneiss, NH (Garies). **(ece)**

nolteei Lavranos Dwarf succulent, with stout, short, smooth branches, 20–70 mm long and 6–15 mm thick, from a swollen base. Leaves dry at flowering, obovate to elliptic, dorsiventrally flattened, 10–25 × 7–20 mm, glandular-pubescent. Flowers upright, in a glandular-pubescent inflorescence, with peduncle 20–40 mm long, corolla tube 12–13 mm long and cylindrical, pale green to pink, lobes 2–4 mm long, white. Nov.–Feb. In sheltered crevices in outcrops of rock, NH (S of Nuwerus). **(ece)**

occultans (Tölken) Tölken (including **T. opelii** Van Jaars. & S.A.Hammer, **T. peculiaris** Van Jaarsv.) Minute succulent, up to 10 mm tall, with a single short stem, from a small ± globose tuber. Leaves dry at flowering, 1 or 2, orbicular, swollen and slightly grooved above near base, 10–15 mm diam., glandular-pubescent to glabrous. Flowers in a sparse glandular-pubescent inflorescence, with peduncle 8–25 mm long, corolla tube 6–8 mm long and cylindrical, yellow-green to reddish, lobes 3–4 mm long, pale yellow to pink. Feb.–Mar. Flats and gentle slopes covered with quartz-gravel, KV (northern Knersvlakte and Komkans to Soutrivier near Vanrhynsdorp). **(ece)**

paniculatus (L.f.) Tölken BOTTERBOOM, T'KABADDA Stout, succulent shrub, up to 1.5 m tall, with yellow, peeling bark, branches at least 20 mm thick, smooth. Leaves dry at flowering, obovate, dorsiventrally flattened, 60–120 × 30–100 mm, glandular-pubescent to glabrous. Flowers in a branched, glabrous inflorescence, on a bright red peduncle 80–200 mm long, corolla tube 12–16 mm long, broadening towards mouth, orange to red, lobes 10–13 mm long, orange. Nov.–Jan. Stony slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (Sturmhaube, NW of Aus, Klein Karas to Worcester and De Rust).

pearsonii (Schönland) Tölken Dwarf, much-branched, succulent shrublet, up to 0.15 m tall, upper parts of branches covered with short, white leaf-bases. Leaves dry at flowering, linear-lanceolate, terete to slightly grooved above, 15–40 × 2–4 mm, glabrous. Flowers ± spreading, in a loose glandular-pubescent inflorescence, with peduncle 60–100 mm long, corolla tube 12–14 mm long, much swollen in middle, pale brown, lobes 3–4 mm long, pale brown. Nov.–Dec. Stony slopes to gravelly flats, G, NH, KV (Mountains E of Port Nolloth to Steinkopf and Umdaus to Vanrhynsdorp). **(ece)**

pusillus Bruyns Like **T. occultans** but leaves reniform-orbicular, 4–15 mm diam. and more flattened, glandular-pubescent, inflorescence glandular-pubescent, corolla tube 5.5–7.5 mm long, lobes pilose inside, bright yellow. Jan.–Mar. Flats and hilltops, in pale gneissic gravel in shallow pans on gneiss, G, NH (Jakkalswater to S of Steinkopf). **(ece)**

pygmaeus (W.F.Barker) Tölken Small succulent, stem usually solitary, erect, up to 60(–200) mm long and 4–6 mm thick, from an underground tuber, smooth. Leaves dry at flowering, circular to linear-oblanceolate, swollen and slightly grooved above, 5–15 × 4–7 mm, white-papillate. Flowers upright in a sparse glandular-pubescent inflorescence, with peduncle 30–50 mm long, corolla tube 4–6 mm long and cylindrical, pale yellow-green, lobes 4–6 mm long, yellow-green. Nov.–Mar. Flats and gentle slopes in quartz-gravel, KV (NE of Bitterfontein to between Soutrivier and Varsrivier). **(ece)**

reticulatus (L.f.) Tölken OUKOE Much-branched succulent, up to 0.3 m tall, sometimes with short leaf-bases. Leaves dry at flowering, linear to obovate, terete (rarely dorsiventrally flattened), 15–50 × 2–10 mm, glandular-pubescent to glabrous. Flowers in a twiggy, divaricately-branched inflorescence, mostly glandular-pubescent, with peduncle 30–100 mm long, usually persistent, corolla tube 6–8 mm long and cylindrical, yellow-green to brown, lobes 3–5 mm long, yellow to pink. Oct.–Dec. Stony slopes to loamy flats, SN, G, NS, NH, KV, WM, TS, CCR (Witpütz to Little Karoo to Beaufort West and Klipplaat).

schaeferianus (Dinter) Tölken Small succulent, with 1–several, erect, smooth branches, up to 40 mm long and 2–4 mm thick, from an underground tuber. Leaves dry at flowering, elliptic to

obovate, swollen, 8–15 × 3–12 mm, soon glabrous. Flowers upright, in a sparse glabrous inflorescence, with peduncle 5–40 mm long, corolla tube 7–10 mm long and funnel-shaped, yellow-green, lobes 3–6 mm long, pink to white. Sept.–Oct. Crevices in schist outcrops or submerged in sand, SN, G (Lüderitz to Buchuberg). **(ece)**

singularis (R.A.Dyer) Tölken Dwarf succulent, with a single, short, subterranean stem, 3–8 mm thick, from a branched, underground tuber. Leaves usually solitary and pressed to ground, orbicular-cordate, dorsiventrally flattened, 40–80 mm diam., glandular-pubescent, dark green above and purple below. Flowers ± upright, in a slender glandular-pubescent inflorescence, with peduncle 0.2–0.5 m long, corolla tube 10–13 mm long, broadening towards mouth, pale yellow-green, lobes 6–7 mm long, yellow-green. Sept.–Nov. Steep stony slopes at bases of cliffs, G (E of Rosh Pinah: Namuskluft to Fish River Mouth).

suffultus Bruyns ex Tölken Slender succulent, with 1–several, straggling, smooth branches, up to 0.3 m long and 3–4 mm thick, from an underground tuber. Leaves dry at flowering, linear-elliptic, terete to slightly grooved above, 10–20 × 2.5–5 mm, glabrous. Flowers ± spreading, in an almost glabrous inflorescence, with peduncle 20–50 mm long, corolla tube 5–6 mm long and cylindrical, pinkish yellow-green, lobes 4–5 mm long, pink. Nov.–Dec. Inside bushes on slopes of hills, KV (Nuwerus to near foot of Vanrhyns Pass). **(ece)**

torulosus Tölken (including **T. longipes** Van Jaarsv. & G.Will.) Small succulent, with an irregular swollen base, with erect to sprawling, smooth branches, up to 0.25 m long and 4–10 mm thick. Leaves dry at flowering, ovate-spathulate, dorsiventrally flattened, 15–35 × 5–20 mm, glandular-pubescent. Flowers spreading, in glandular-pubescent heads, with peduncle 5–8 mm long, corolla tube 12–23 mm long and cylindrical, yellow-green, lobes 4–6 mm long, pale yellow. Jan.–Feb. Crevices in steep, sheltered, schist outcrops, G (Lekkersing). **(ece)**

viridiflorus (Tölken) Tölken Spreading succulent, with smooth branches, up to 0.35 m long and 4–8 mm thick, from an irregular swollen base. Leaves dry at flowering, oblanceolate to elliptic, dorsiventrally flattened, 20–40 × 4–20 mm, glandular-pubescent. Flowers in a glandular-pubescent inflorescence, with peduncle 8–40 mm long, corolla tube 16–20 mm long and cylindrical, yellow-green, lobes 5–7 mm long, yellow. Jan.–Feb. Crevices in steep, sheltered, schist outcrops and under bushes on stony slopes, G (Helskloof to N of Lekkersing). **(ece)**

CUCURBITACEAE

by W.G. Welman

Key applicable only to genera in the study area.

1. Ripe fruit red or rarely green but then developing below ground:
   2. Ripe fruit opening as if cut circularly around ..... **Corallocarpus**
   2.' Ripe fruit never opening as if cut circularly around:
   3. Ripe fruit tuberculate, splitting into 3 valves ..... **Momordica**
   3.' Ripe fruit smooth, indehiscent and berry-like ..... **Kedrostis**

1.' Ripe fruit variously coloured except red, always developing above ground:
   4. Ripe fruit never with prickles, 30 mm or more in diam. ..... **Citrullus**
   4.' Ripe fruit armed with tubercles and prickles or the remains thereof (if apparently smooth then not more than 25 mm diam.):
   5. Fruits moderately sized, spherical to ellipsoidal, up to 80 mm long ..... **Cucumis**
   5.' Fruits large, ± spherical, up to 200 mm diam. ..... **Acanthosicyos**

ACANTHOSICYOS 2 spp., southern Africa, Angola, Zambia, Zimbabwe and Mozambique

horridus Welw. ex Hook.f. NARA Monoecious, deep-rooted, pungent, much-branched shrub, up to 1 m tall, with leafless often longitudinally grooved stems bearing paired spines at nodes, without tendrils. Male flowers solitary or clustered, 10–12 mm long, pale yellow. Female flowers solitary in spine axils, 10–12 mm long, pale yellow with green venation, with greyish hairs outside. Fruit ± spherical, ± 200 mm diam., pale orange-yellow when ripe, with spine/bristle-tipped

fleshy conical protuberances, edible when ripe. Seeds highly nutritious. Sporadically throughout year, mainly Feb.–Oct. Coastal sand dunes and riverbeds, SN, G (Angola to lower Gariep Valley).

CITRULLUS WILD MELON 4 spp., Africa and Asia

ecirrhosus Cogn. NAMIB TSAMMA Monoecious, scabrid-hairy, perennial herb, with woody rootstock and prostrate stems, up to more than 2 m long, without tendrils. Leaves ± cordate, up to 95 mm long, deeply dissected, crinkled. Male and female flowers solitary in leaf axils, 7–10 mm long, yellow. Fruit subglobose, 80–150 mm diam., glabrous, mottled green, maturing yellow. Whole plant very bitter and poisonous, except edible and nutritious seeds. Dec.–May. Mainly dry, sandy watercourses, SN, G (western Namib to Richtersveld near Eksteenfontein).

lanatus (Thunb.) Matsumura & Nakai TSAMMA, KARKOER, WILD MELON Monoecious, hairy annual, with prostrate stems, up to 3 m long, with robust, usually bifid tendrils. Leaves ± ovate, up to 200 mm long, deeply trifid, with rounded, slightly toothed lobes. Male and female flowers solitary in leaf axils, up to 30 mm diam., greenish yellow. Fruit globose, 30–200 mm diam., glabrous, mottled green, flesh white, edible, (sometimes used for preserve, progenitor of watermelon). Sept.–Dec. Dry areas, in sandy soils, SN, G, NH, WM, CCR (widespread in southern Africa, also tropical Africa and Asia).

CORALLOCARPUS ± 15 spp., Old World, mainly African

dissectus Cogn. Monoecious, tuberous, perennial herb, with annual, prostrate or climbing stems, up to 0.8 m long, spiculate on ridges, with simple, slender tendrils. Leaves triangular-ovate, 30–60 mm long, deeply 3–5-sect, glabrous above, white-punctate below. Flowers ± 1 mm long, greenish yellow, male 3–8, in sub-capitate, axillary clusters, female 1–2, subsessile. Fruit on a long pedicel, ± subglobose, 12–19 mm long, beaked, glabrous, red, opening as if cut around near base. Jan.–Oct. Rocky slopes and dry riverbeds, SN, G (Namibia, Witpütz, Namuskluft, Bushmanland).

CUCUMIS 32 spp., mainly Africa, also Asia, Australia.

africanus L.f. WILD CUCUMBER, WILDE AGURKIE Monoecious, roughly hairy, perennial herb, with woody rootstock and prostrate stems, up to 2 m long, and with simple tendrils. Leaves broadly ovate, 15–115 mm long, deeply palmately 5-lobed. Flowers yellow, male 5–10, per axil, up to 9 mm long, female solitary, up to ± 11 mm long. Ripe fruit 30–80 mm long, prickly, greenish white, with purplish brown or yellow, longitudinal stripes, small, ellipsoidal, bitter and poisonous or large, cylindrical, non-bitter and edible (as preserves). Aug.–May. Stony, sandy soil, slopes, flats, and watercourses, SN, G, NH, WM, TS (widespread in southern Africa, also tropical Africa).

myriocarpus Naudin STRIPED WILD CUCUMBER, STREEPWILDEKOMKOMMER Monoecious, roughly hairy, poisonous annual, with prostrate stems, up to 2.5 m long, and with simple tendrils. Leaves broadly ovate, up to 160 mm long, deeply palmately 5-lobed. Flowers up to 8.5 mm long, yellow, male 1–6 per axil, female solitary. Ripe fruit ellipsoidal or globose, 15–50 mm long, sparsely to densely prickly, longitudinally striped in shades of orange or uniform pale yellow. Jan.–June. Clay-loam or sand, weed on disturbed ground, G, WM, TS (widespread in southern and tropical Africa, recently introduced to Australia and Europe).

rigidus E.Mey. ex Sond. Dioecious, roughly hairy, perennial shrublet, up to 1 m tall, with woody rootstock and grey-green to whitish stems, without tendrils. Leaves ovate, up to 55 mm long, palmately 3- or 5-lobed. Flowers yellow, male 1–4 per axil, up to 7.5 mm long, female solitary, up to 5.5 mm long. Ripe fruit ellipsoidal or globose, 25–45 mm long, yellow, covered with prickles up to 4.5 mm long. Aug.–Dec. Stony soil and sandy watercourses, SN, G (southern Namibia to Richtersveld National Park and Bushmanland).

sagittatus Peyr. Monoecious, roughly hairy, perennial herb or subshrub, with woody rootstock and procumbent or ± climbing stems, up to 1.2 m long, with simple tendrils. Leaves broadly ovate, up to 105 mm long, entire to 3- or 5-lobed, cordate or hastate basally. Flowers yellow, male 1–11 per axil, up to 9.5 mm long, female solitary, 12 mm long. Ripe fruit globose, 20–25 mm diam., yellow or orange, glabrous. Nov.–Sept. Stony ground and sandy watercourses, G (Namibia, Richtersveld, Bushmanland, Angola).

KEDROSTIS KLEINBOBBEJAANKOMKOMMER ± 25 spp., worldwide in tropics, mostly African.

capensis (Sond.) A.Meeuse Monoecious, tuberous perennial herb, with climbing or prostrate stems, up to 500 mm long, tendrils reduced or absent. Leaves ± entire to palmatisect, up to 70 mm long, ± hairy. Flowers axillary, 3–8 mm long, greenish, often present before leaves, male up to 20, fascicled, female solitary. Ripe fruit subglobose to oblong, shortly beaked, 15–30 mm long, glabrous, red. Oct.–Apr. Rocky slopes, SN, G, NH, TS, CCR (Namibia to Lambert's Bay, Prince Albert to Free State and Lesotho).

psammophila Bruyns Monoecious, tuberous, hairy, perennial herb, with prostrate stems, up to more than 1 m long, branched underground, without tendrils. Leaves ± entire to palmately 3–5-lobed, up to 25 mm long. Flowers arising from underground stems, male ± 25 per axil, fascicled, 5–7 mm long, green, female solitary, 10–12 mm long, yellow, with subterranean ovary. Fruit developing below ground, ± spherical, 22 mm diam., pubescent, white, turning green when exposed. June–Aug. Fine, reddish coastal sand and inland gneissic sand, NS, NH, KV, CCR (Port Nolloth, Kliprand to Redlinghuis). **(gce)**

MOMORDICA ± 40 spp., Old World, mainly Africa.

balsamina L. LALOENTJIE Monoecious, tuberous, perennial herb, with prostrate or climbing stems, up to 5 m long, with simple tendrils. Leaves deeply palmately 5–7-lobed, up to 120 mm long. Flowers solitary in leaf axils, male prominently bracteate, bract ± ovate, up to 18 mm long, pallid, green-veined, corolla white to yellow, green-veined, 10–20 mm long; female inconspicuously bracteate, with corolla ± smaller than in male. Fruit ovoid, beaked, 25–60 mm long, tuberculate, bright orange-red or red, splitting into 3 valves. Jan.–May. Sandy soils, SN, G (widespread in southern Africa, except W Cape, also in tropical Africa, Arabia, India, and Australia).

CYTINACEAE (= RAFFLESIACEAE in part)

by D.A. Snijman

CYTINUS AARDROOS ± 10 spp., Africa, Mediterranean, Mexico

sanguineus (Thunb.) Fourc. Dioecious, root parasite, up to 50 mm tall. Leaves scale-like, obovate. Flowers in sessile clusters, funnel-shaped, up to 50 mm long, lobes (5)6, mostly smooth, margins shortly incised, orange or vermilion. July–Sept. Parasitic mostly on shrubby Asteraceae, NS, WM, CCR (W of Garies, Bokkeveld Mountains, northern Roggeveld to SW Cape to E Cape).

DIDIEREACEAE (= *PORTULACACEAE* in part)

by D.A. Snijman

1. Flowers unisexual, rarely bisexual, arranged in clusters or axillary racemes. . . . . **Ceraria**
1.' Flowers bisexual, clustered, usually in groups on shortened, terminal, leafless branchlets . . . .**Portulacaria**

CERARIA 3 spp., Angola. Namibia, Richtersveld and Gordonia

fruticulosa H.Pearson & Stephens Low, much-branched shrub, up to 1.5 m tall, with slender branches, bark reddish brown with a whitish bloom when young, bearing small, raised spur-branchlets in 4 ranks. Leaves few on each spur-branchlet, sessile, small and fleshy. Flowers few at terminal nodes, on short pedicels, pinkish purple. Feb. On rocky slopes, SN, G (Aus to Richtersveld to Bushmanland).

namaquensis (Sond.) H.Pearson & Stephens NAMAQUA PORKBUSH, WOLFTOON Deciduous, small tree, up to 5 m tall, with pale grey to ± creamy white bark, bearing scattered, small, ± raised spur-branchlets along stem. Leaves in clusters on spur-branchlets, sessile, small and fleshy. Flow-

ers small in short sparse axillary sprays, pale to deep pink. Dec.–Feb. In rocks, SN, G (southern Namibia, Richtersveld and Gordonia).

PORTULACARIA SPEKBOOM 3 spp., southern Namibia and South Africa

armiana Van Jaarsv. Rounded, evergreen, succulent shrub, 500–700 mm tall in vegetative state, but erect flowering branches up to 3–5 m tall. Leaves in pairs, 4-ranked, obovate-ovate, 30–70 × 30–55 mm, fleshy. Flowers in dense, axillary fascicles, small, white. July–Oct. N-facing, mica-schist koppies, SN, G (lower Gariep Valley). **(ece)**

pygmaea Pillans Dwarf, much-branched, succulent shrub, up to 200 mm tall. Leaves cuneate-obovate, 10–14 × 7–9 mm, fleshy. Flowers 2–6, in sessile terminal cymes, white, suffused with pale pink. Feb. (in cultivation). On low hills, G (lower Gariep Valley). **(ece)**

DIPSACACEAE

by D.A. Snijman

SCABIOSA SCABIOUS ± 100 spp., Africa to Asia

columbaria L. JONGMANSKNOOP Shortly hairy, tufted perennial, up to 0.8 m tall. Leaves mostly basal, markedly dimorphic, lower oblanceolate to lyrate-pinnatifid, toothed or incised, upper pinnatisect. Flowerheads pedunculate, white to mauve. Cypselas crowned with papery white enlarged calyx. Aug.–Feb. Rocky slopes and sandy flats, NH, KB, KV, WM, TS, CCR (widespread through Africa, Europe and Asia).

DROSERACEAE

by D.A. Snijman

DROSERA SUNDEW, DOUBLOM ± 130 spp., widespread but mainly Australia

alba E.Phillips Tufted, red-glandular perennial, up to 130 mm tall. Leaves basal, dimorphic, red, lower ones rosulate and oblanceolate, with both long, flattened tentacles and short, terete tentacles, upper ones ± erect and linear, but absent in KB. Flowers few in a subcorymbose cyme, white or mauve, stigmas multifid. Aug.–Oct. Damp slopes and sandy stream banks, KB, CCR (Kamiesberg Mountains and Bokkeveld to Cederberg Mountains). **(gce)**

trinervia Spreng. Tufted, red-glandular perennial, up to 100 mm tall. Leaves basal, rosulate, uniformly oblanceolate-cuneate, with long, tapering, marginal tentacles. Flowers few in subcorymbose cymes, white to mauve, or brick- to salmon-red (in KB), stigmas multifid. Aug.–Nov. Seepage areas near granite or sandstone boulders, KB, CCR (Kamiesberg Mountains and Bokkeveld Mountains to Agulhas). **(gce)**

EBENACEAE

by D.A. Snijman based on De Winter (1963)

1. Calyx not enlarging in fruit; ovary on a fringed disc; fruits usually 1-seeded . . . . . **Euclea**
1.' Calyx usually enlarging and ± conspicuous in fruit; ovary on a glabrous disc; fruits usually 2- or more-seeded . . . . . **Diospyros**

DIOSPYROS PERSIMMON, TOLBOS ± 500 spp., pantropical and subtropical

acocksii (De Winter) De Winter NAMAKWA-JAKKALSBESSIE, NAMAQUA JACKAL-BERRY Rigid, branched, dioecious shrub or small tree, up to 5 m tall. Leaves ± obovate-elliptic, leathery, glossy

green above, sparsely bristled beneath, margin rolled under, often ± wavy. Flowers solitary, creamy white. Fruit an ovoid berry. Sept.–Apr. Along dry watercourses, NH (southeastern Namibia, northeastern Namaqualand and Bushmanland).

austro-africana De Winter FIRE-STICKS, KRITIKOM Dioecious, ± greyish green shrub, up to 3 m tall. Leaves subsessile, oblanceolate, leathery, densely stellate-felted and with scattered bristles beneath. Flowers solitary, axillary, cream-coloured, pink or red. Fruit fleshy, shortly hairy, red to black. Aug.–Oct. Rocky flats and slopes, or sandy ridges, NS, NH, KB, WM, TS, CCR (Springbok to Bokkeveld Mountains and Roggeveld to SW Cape to Mpumalanga).

lycioides Desf. BLOUBOS, BLUEBUSH STAR-APPLE Dioecious shrub or small tree, up to 7 m tall, with dark grey bark. Leaves shortly petiolate, oblanceolate, leathery, silky when young. Flowers solitary, axillary, creamy yellow, fragrant. Fruit a thinly hairy berry, yellow or red to brown. Sept.–Jan. Rocky slopes, G, TS, CCR (drier parts of southern and tropical Africa).

ramulosa (E.Mey. ex A.DC.) De Winter NAMAKWA KRITIKOM, NAMAQUA FIRE-STICKS Rigid, dioecious shrub or small tree, up to 5 m tall. Leaves subsessile, small, elliptic, with clustered short hairs and long, rigid, appressed hairs beneath, margin sometimes ± rolled under. Flowers solitary, axillary, whitish. Fruit a shortly hairy berry, yellowish. Mar.–July. Rocky slopes, SN, G, NS, NH, CCR (southern Namibia to Clanwilliam and central Karoo).

EUCLEA GUARRI ± 20 spp., Africa and Arabia

lancea Thunb. NAMAKWA-GHWARRIE, NAMAQUA GUARRI Evergreen, dioecious shrub or small tree, 2–4 m tall. Leaves linear-elliptic, thickly leathery, glaucous green above, ± paler beneath, margin ± thickened, apex shortly mucronate. Flowers axillary, small, cream-coloured, corolla shallowly lobed. Fruit ± globose, ± hairy. Oct.–Apr. Rocky slopes, KB, CCR (Kamiesberg Mountains and Bokkeveld to Cederberg Mountains). **(gce)**

pseudebenus E.Mey. ex A.DC. BLACK EBONY, EBBEHOUT Evergreen, dioecious tree or occasionally shrub, 3–9 m tall, with dark rough bark and slender drooping branches. Leaves linear, often ± falcate, thickly leathery, ± glaucous green. Flowers axillary, small, greenish yellow, corolla shallowly lobed. Fruit globose, ± fleshy. Along watercourses and sandy depressions, SN, G (tropical W Africa, Angola, Namibia to Richtersveld and Gordonia).

racemosa Murray DUINEGWARRIE, DUNE GUARRI Dioecious shrub or small tree, up to 6 m tall. Leaves leathery, obovate, glabrous, margin thickened and rolled under. Flowers in glabrous, axillary racemes, deeply cleft, cream-coloured, fragrant. Fruit globose, shortly bristly. Dec.–June. Coastal scrub, SN, NS, CCR (southern Namibia to SW Cape, E Cape and through to Egypt).

tomentosa E.Mey. ex A.DC. HEUNINGGWARRIE, KLIPKERS Dioecious, many-stemmed shrub, up to 1.5 m tall, grey-velvety on young parts. Leaves obovate, leathery, usually grey-hairy. Flowers in axillary racemes, sometimes solitary, shallowly lobed, white, fragrant. Fruit woolly. Sept.–Oct. Sandy soils and dry rocky slopes, G, NS, NH, KV, CCR (Richtersveld to SW Cape). **(gce)**

undulata Thunb. COMMON GUARRI, GEWONE GHWARRIE Evergreen, dioecious shrub or tree, up to 7 m tall, rusty granular on young parts. Leaves oblanceolate, firm, often dark green above, paler beneath, usually undulate. Flowers in axillary racemes, small, glabrescent, deeply cleft, cream-coloured, fragrant, ovary scaly. Fruit globose, ± fleshy. Dec.–Apr. Sandy plains and rocky slopes, NH, KB, KV, WM, TS, CCR (widespread in southern Africa to tropical Africa).

ELATINACEAE

by D.A. Snijman

BERGIA ± 25 spp., cosmopolitan

glomerata L.f. Prostrate, mat-forming, densely leafy, woody perennial, up to 1 m diam. Leaves small, obovate, bright green, sometimes coarsely toothed above. Flowers sessile, few in axillary glomerules, white. Nov.–Feb. Damp places or temporary pools, often coastal, KV, TS, CCR (Vredendal and near Vanrhynsdorp to SW Cape and E to Grahamstown).

ERICACEAE

by E.G.H. Oliver

ERICA HEATHER, HEIDE ± 860 spp., Africa, Europe and Middle East, mostly southern Africa

cristiflora Salisb. Low, erect shrub, up to 0.5 m tall. Leaves in whorls of 3, 2.5 mm long. Flowers 3 per head, on a shortly hairy pedicel, bract, bracteoles and sepals ± large, pink, corolla broadly cup-shaped, 2.5 mm long, pink, anthers included, without appendages, style exserted, stigma small, disc-like. Mar.–Nov. Seasonally moist rocky slopes, KB, CCR (Kamiesberg Mountains to Swartberg Mountains). **(gce)**

lepidota Rach Low, erect, narrow shrub, up to 0.6 m tall, with stiff, branched hairs on young branches. Leaves in whorls of 3, 2 mm long. Flowers 3 per head, bract, bracteole and calyx ± large, cream-coloured, corolla cup-shaped, 2.5 mm long, cream-coloured, anthers just exserted, stigma large, cup-shaped. July–Oct. Rocky granite or sandstone slopes, KB, CCR (Kamiesberg Mountains to SW Cape). **(gce)**

lucida Salisb. Small, erect shrub, up to 500 mm tall. Leaves in whorls of 3, 2 mm long, with minutely fringed edges. Flowers 3 per head, bracts, bracteoles and calyx ± large, pink, corolla cup-shaped, 3 mm long, pale pink, anthers included, style exserted, with a small stigma. Sept.–Nov. Seasonally moist soils on rocky slopes, KB, CCR (Kamiesberg Mountains to SW Cape). **(gce)**

philippioides Compton Small, much-branched, soft shrub, up to 500 mm tall. Leaves in whorls of 3, ± 5 mm long, shortly hairy. Flowers usually in clusters of 3 at tips of branchlets, corolla bell-shaped, open-mouthed, 1 mm long, anthers included, without appendages, stigma disc-like, exserted. June–Oct. Upper slopes and summits, KB, CCR (Kamiesberg and Cederberg Mountains). **(gce)**

plukenetii L. HANGERTIJIE Erect shrub, up to 1(–2.5) m tall. Leaves ± 8 mm long. Flowers solitary, but in clusters at ends of branches, sepals coloured, corolla inflated-tubular, ± 25 mm long, reddish pink to white, anthers well-exserted, without basal appendages. Aug.–Oct. Rocky or sandy slopes, NH, KB, CCR (Spektaktelberg, Komaggas, Toringberg, Kamiesberg and Bokkeveld Mountains to Langeberg Mountains). **(gce)**

pudens H.A.Baker Small shrub, up to 400 mm tall, covered with sticky glandular hairs, except sometimes on corolla. Leaves in whorls of 4. Flowers in pendulous clusters of up to 12 at branch tips, bracts, bracteoles and calyx green, corolla narrowly urn-shaped, 5 mm long, white, anthers included, with large, basal appendages. Aug.–Nov. Dry sandy or stony slopes, KB, CCR (Kamiesberg Mountains to Grootwinterhoek Mountains). **(gce)**

rigidula (N.E.Br.) E.G.H.Oliv. Small shrub, up to 300 mm tall. Leaves in whorls of 3, 15 mm long, ± fringed. Flowers inconspicuous in groups of 3 at tips of branchlets, sepals fringed with long hairs, corolla bell-shaped, 1.5 mm long, greenish, stamens just exserted, without appendages, stigma exserted, widely funnel-shaped. Fruit hairy, with persistent corolla. July–Jan. Sandy or rocky slopes or flats, KB, CCR (Kamiesberg Mountains to Witteberg Mountains and Bredasdorp). **(gce)**

verecunda Salisb. Compact shrub, up to 800 mm tall. Leaves in whorls of 4. Flowers on red pedicels 5 mm long, bracts, bracteoles and calyx red, tapering into long thin points, corolla bell-shaped, 4 mm long, smooth or hairy, white to pinkish, anthers included. Dec.–May. On slopes, usually along seepage lines, KB, CCR (Kamiesberg and Bokkeveld Mountains to near Touwsrivier). **(gce)**

[**Uncertain records** **E. longistyla** L.Bolus and **E.subulata** J.C.Wendl. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

EUPHORBIACEAE

by P.V. Bruyns

1. Plant a soft-stemmed, non-succulent shrub to tree, bearing large palmate leaves; capsule covered with soft spines ..... **Ricinus**
1.' Plant, leaves and capsule not as above:

2. Flowers reduced to stamens (male) and (often a rudimentary) stalked ovary (female) with copious hair-like bracteoles especially among males, all enclosed in a ± cup-shaped involucre, the whole resembling an ordinary flower ..... **Euphorbia**
2.' Flowers with a calyx, not reduced as above:
3. Plant not succulent; leaves entire and not deciduous ..... **Clutia**
3.' Plant somewhat succulent; leaves 3–5-pinnate and deciduous ..... **Jatropha**

CLUTIA BLIKSEMBOS ± 70 spp., mainly Africa with 2 in Arabia

A. Petals of male flowers each with 3 or more glands, leaves and young stems grey-tomentose

thunbergii Sond. Dioecious shrub, up to 0.3–1.5 m tall, with terete internodes. Leaves obovate to suborbicular, margins flat. Male flowers 1 or 2; females solitary, sepals and petals as in male. July–Oct. Rocky hills, G, NH, KB, CCR (Namuskluft, SW of Kamieskroon, Kamiesberg and Bokkeveld Mountains to Swartberg Mountains). **(gce)**

A.' Petals of male flowers each with 1 or 2 glands, leaves and young stems glabrous

alaternoides L. (including **C. rubricaulis** Eckl. ex Sond.) Dioecious shrub, up to 0.6 m tall, with slightly angular internodes. Leaves lanceolate or narrowly obovate-lanceolate, dark green above, paler below, margins slightly revolute. Male flowers in small clusters; females solitary, larger than males. July–Oct. Rocky mountain slopes with relatively high rainfall, KB, CCR (Kamiesberg Mountains, SW Cape to E Cape).

imbricata E.Mey. ex Sond. Like **C. alaternoides** but leaves much smaller and bluish green, internodes terete. Aug.–Sept. Rocky gneissic mountain slopes, KB (Kamiesberg Mountains). **(ece)**

polifolia Jacq. Dioecious tree or large shrub, up to 1.8 m tall, with slightly angular internodes. Leaves lanceolate or linear-lanceolate, somewhat bluish green, margins revolute. Male flowers 2 or 3; females solitary, larger than males. July–Sept. Rocky hills, KB, CCR (Kamiesberg Mountains to Port Elizabeth). **(gce)**

EUPHORBIA ± 1 700 spp., nearly cosmopolitan

A. Annuals with non-succulent stems

phylloclada Boiss. Monoecious, spineless, glabrous, spreading annual, up to 150 mm tall. Leaves without petioles, crowded above into head-like masses, 5–18 mm long and equally broad, cordate-ovate or orbicular-ovate, without stipules. Cyathia solitary, hidden among leaves, 2 mm diam., with 4 minute glands each with a petaloid, whitish appendage. Capsule far-exserted on recurved pedicel, glabrous. July–Sept. Dry rocky slopes and watercourses, SN, G (northern Namibia to Richtersveld and Gariep Valley at Goodhouse).

A.' Perennials with at least partly succulent stems
B. Acaulescent geophytes with conspicuous leaves in rosettes on ground

tuberosa L. Dioecious, spineless geophyte, up to 30 mm tall, with stems usually extensively branched beneath soil. Leaves deciduous, in a spreading rosette, oblong to oblanceolate or linear, 10–50 mm long, abruptly to gradually narrowed into petiole, margins often undulate, occasionally pubescent. Cyathia 1–7 per branch, on deciduous peduncles up to 30 mm long, 4–6 mm diam., pubescent, with 5 entire green glands. Capsule slightly exserted, 6–8 mm diam., pubescent. June–Sept. Flats to gentle slopes, sand or gravel, NS, NH, KB, KV, WM, CCR (Spektakelberg to Hondeklipbaai and Kamiesberg Mountains to Cape Peninsula, Matjiesfontein and Riversdale). **(gce)**

B.' Plants with aerial stems and often rudimentary leaves
C. Plants with twiggy, non-succulent, young branches, with shiny, papery, yellowish, peeling bark on trunk

guerichiana Pax (including **E. frutescens** N.E.Br.) Monoecious, spineless, scarcely succulent, glabrous shrub, up to 2.5 m tall. Leaves deciduous, oblong to lanceolate 3–20 × 1.3–5 mm, slightly

succulent. Cyathia solitary, terminal, on short shoots on younger branches, 4–5 mm diam., with 5 entire, yellow-green glands. Capsule exserted on ascending pedicel, 6–10 mm diam., glabrous. July–Sept. Dry rocky slopes, SN, G (southern Angola to Richtersveld and Limpopo).

C.' Plants highly succulent, young branches always succulent, trunk never with shiny, papery, yellowish, peeling bark
D. Leaf-rudiments subtended by pair of sharp spreading spines, spines arising on a hardened brownish spine-shield surrounding base of leaf-rudiment

avasmontana Dinter (including **E. hottentota** Marloth) Like **E. virosa** but stems more slender. Cyathia with 5 glands. Capsule exserted on initially decurved pedicel up to 6 mm long, 5–6 mm diam., distinctly 3-angled. Aug.–Oct. Arid rocky slopes, G (northern Namibia to Great Karas Mountains, Rosh Pinah and Richtersveld to Prieska).

virosa Willd. Monoecious, spiny, glabrous shrub, 1–2.5 m tall, with short main stem bearing many, ascending 5–8-angled, often articulated branches, 5–10 cm thick. Leaves soon deciduous, ovate, 1–3 mm long. Cyathia many, near apex of branches, axillary, in groups of 3, up to 10 mm diam., with 5–10 bright, yellow, entire glands. Capsule sessile, nearly spherical, 15–23 mm diam., glabrous. Aug.–Oct. Very arid rocky slopes, especially along Gariep Valley, SN, G (southern Angola to Gariep Valley).

D.' Leaves not subtended by spines, spines (if present) developing from sterile short shoots, persistent woody peduncles or from tips of branches
E. Stems without obvious tubercles on which leaves are borne, terete and without angles
F. Cyathial glands with 3–9 finger-like processes on outer margins

lignosa Marloth Monoecious, very densely branched, spiny, glabrous, succulent shrub, up to 0.6 × 1 m, branches 3–15 mm diam., rigid, terete, with obscure tubercles, glaucous, tips spinescent. Leaves linear, 5–15 × 1–3 mm, soon deciduous. Cyathia many, 1–3 together terminating some branches, 7–10 mm diam., minutely puberulous, with 5 green glands. Capsule sessile, 5 mm diam., pubescent. July–Oct. Gravelly flats and crevices in rock slabs, SN, G (southern Angola to Rosh Pinah District and near Sendelingsdrift to Warmbad and near Kakamas).

F.' Cyathial glands with entire margins
G. Leaves alternate, robust shrubs
H. Plants dioecious, tips of young growth velvety-pubescent, cyathia sessile and densely clustered at tips of branches

gregaria Marloth Like **E. gummifera** but plant branching mainly from base, up to 2 × 6 m, branches not angular, leaves up to 7 mm long. Capsule exserted on decurved pedicel, 16–22 mm diam., 3–5-locular, minutely tawny-pubescent. July–Nov. Gravelly to sandy plains, SN, G (Bethanie to W of Ai-Ais, Pella and Kakamas).

gummifera Boiss. Succulent, spineless, much-branched shrub, up to 1.3 m tall, branches 5–10 mm diam., slightly angular from raised lines running down from leaf scars. Leaves soon deciduous, recurved, 1–3 mm long, fleshy. Cyathia clustered and sessile at apex of branches, 4 mm diam., pubescent, with 4 or 5 dark red or purple glands. Capsule exserted on short, erect pedicel, ± 12 mm diam., minutely pubescent. July–Sept. Gravelly plains and very arid, lower slopes, SN, G (Kowis Mountains to E of Eksteenfontein). **(ece)**

H.' Plants monoecious, tips of young growth not velvety-pubescent, cyathia arising in rayed umbels around a central sessile cyathium

dregeana E.Mey. ex Boiss. Succulent, spineless, glabrous shrub, up to 2 m tall, branching mainly from base, branches 20–50 mm diam., terete, glabrescent, grey-green. Leaves soon deciduous, sessile, ovate 3–8 × 3.5–5.5 mm. Cyathia terminal, with 3 often forked rays up to 75 mm long, subtended by conspicuous, semi-circular bracts, 6–8 mm diam., slightly pubescent outside, with 5 yellow to red glands. Capsule sessile, 8–9 mm diam., minutely pubescent. July–Aug. Gravelly plains and stony slopes, SN, G, NS, NH (Haalenberg to Messelpad and Bushmanland: Namies).

mauritanica L. GEELMELKBOS Succulent, spineless, glabrous shrub, up to 2 m tall, much-branched above ground, branches 3–6 mm diam., terete, usually bright yellow-green. Leaves

soon deciduous, sessile, lanceolate, 5–15 × 2–5 mm. Cyathia terminal, sessile male cyathia up to 15 mm diam., surrounded by 5–7 bisexual cyathia, ± 7 mm diam., on rays 6–10 mm long, with 5–8 yellow glands. Capsule usually exserted by 3–6 mm, 5–6 mm diam., glabrous. May–Oct. Sandy plains to rocky slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (northern Namibia to Cape Peninsula to KwaZulu-Natal).

stolonifera Marloth ex A.C.White, R.A.Dyer & B.Sloane Like **E. mauritanica** but plant 0.15–0.6 m tall, rhizomatous, branching at base and near tips of stems, branches 3–10 mm diam., often tapering to both ends and slightly glaucous. Capsule usually less conspicuously exserted. May–Oct. Slopes among rocks and bushes, G, NH, WM, TS, CCR (southern Namibia to Laingsburg, Beaufort West to Mossel Bay).

tenax Burch. (including **E. arceuthobioides** Boiss., **E. mixta** N.E.Br.) STEENBOKMELKBOS Succulent, much-branched, dioecious shrub, 50–500 mm tall, sometimes with tuberous rootstock, branches very slender, 2–4 mm diam., erect, greyish, often roughened and slightly ridged. Leaves opposite, ± sessile, triangular, 1–3 mm long. Cyathia 2–3 mm diam., glands ± entire, greenish yellow. June–Nov. Among restios on sand, NS, CCR (W of Kotzesrus, Nieuwoudtville to Cape Peninsula). **(gce)**

G.' Leaves rudimentary, opposite, often small shrubs
I. Stipules present as flattened subglobose structures alongside bases of leaf-rudiments

burmanii E.Mey. ex Boiss. (including **E. corymbosa** N.E.Br., **E. karroensis** (Boiss.) N.E.Br., **E. macella** N.E.Br.) SOETMELKBOS Dioecious, spineless, glabrous, succulent shrub, up to 1 m tall, branches 3–5 mm diam., terete, green, articulated, smooth. Leaves soon deciduous, spathulate, 2–3 mm long, with shiny and smooth, brownish stipules. Cyathia many, 1–3 together terminating some branches, 2–4 mm diam., with 5 green glands. Capsule shortly exserted, 3–3.5 mm diam., dull green, pubescent. June–Sept. Sandy flats and hills, SN, G, NS, NH, KV, CCR (Buchuberg, N of Oranjemund to Cape Peninsula to Grahamstown).

exilis L.C.Leach (including **E. glandularis** L.C.Leach & G.Will.) SPRINGBOK MELKBOS Dioecious or monoecious, spineless, glabrous, succulent shrub, up to 0.6 m tall, branching mainly from base, branches 1–3(–5) mm diam., terete, brittle, green, smooth, not articulated. Leaves soon deciduous, shortly spathulate, 1–1.5 mm long, lower half pressed into branch, with small, shiny, brownish stipules. Cyathia many, 1–3 together terminating some branches, 3–4 mm diam., with 5 green glands. Capsule sessile, 3–5(7) mm diam., green, with red stripes on angles and in sinuses, shiny and glabrous. Aug.–Sept. Stony to sandy flats or gentle slopes, G, NH, KV (Eksteenfontein to Klawer and Vanrhyns Pass). **(ece)**

suffulta Bruyns Like **E. burmanii** but clambering on other shrubs, up to 1 m tall, stems and stipules papillate and cyathia usually solitary. Capsule sessile. Oct.–Mar. Stony gentle slopes, often inside other bushes, TS (Merweville to Klaarstroom).

I.' Stipules absent alongside bases of leaf-rudiments

angrae N.E.Br. (including **E. einensis** G.Will.) Like **E. rhombifolia** but plant up to 120 mm tall, densely branched, branches up to 25 mm long and 6 mm diam. July–Aug. Stony flats and slopes, SN, G (Lüderitz through to Alexander Bay and Buchu Twins). **(ece)**

ephedroides E.Mey. ex Boiss. Dioecious, spineless, glabrous, dwarf to large, succulent shrub, 0.05–1 m tall, branching mainly from base, branches 2–4 mm diam., terete, yellow- to grey-green, ± articulated. Leaves soon deciduous, shortly petiolate, oblong to elliptic, up to 10 × 4 mm. Cyathia many, 1–3 or more together terminating some branches, 2–3 mm diam., with 5 yellow-green glands. Capsule sessile, 4 mm diam., not evidently lobed, glabrous. July–Aug. Rocky slopes to sandy flats, SN, G, NS, NH (N of Aurus Mountains to Wallekraal and E to Pofadder).

gentilis N.E.Br. (including **E. vaalputsiana** L.C.Leach) Dioecious, dwarf, spineless, glabrous succulent, up to 100 mm tall, branches softly fleshy, mottled with purple, 3–6 mm thick. Leaves soon deciduous, sessile, spathulate, 1–3 mm long. Cyathia many, 1–6 terminating some branches, with ± spathulate bracts, occasionally pubescent, 2–3 mm diam., with 5 yellow-green glands. Capsule exserted on recurved, later erect pedicel, 3–4 mm diam., pubescent. July–Aug. Gravelly and often calcareous, loamy flats among bushes, NH, KV, WM, TS (Vaalputs, E of Kamieskroon to Vanrhynsdorp to N and E of Karoopoort). **(ece)**

herrei A.C.White, R.A.Dyer & B.Sloane Dioecious, dwarf, spineless, glabrous succulent, 50–80 mm tall, with many short branches, 4–10 mm thick, branches usually slightly angled along upper

side. Leaves soon deciduous, shortly petiolate, ± ovate, denticulate, 1–1.5 mm long, fleshy. Cyathia many, 1–3 terminating some branches, nearly sessile, with 2–4 tiny, leaf-like bracts, 2 mm diam., with 5 almost erect yellow-green glands. Capsule exserted on recurved pedicel, ± 2.5 mm diam., glabrous. May.–Sept. Gravelly alluvial pavements, SN, G (N and S sides of Gariep Valley: Skilpad to Bloeddrif). **(ece)**

juttae Dinter (including **E. aequoris** N.E.Br.) Dioecious, dwarf, spineless, glabrous succulent, up to 80–150 mm tall, with several short, often horizontally spreading, slightly angled branches, 4–8 mm diam. Leaves soon deciduous, shortly petiolate, spathulate, 1–2 mm long, fleshy. Cyathia few, solitary and terminating some branches, nearly sessile, with 2–4 tiny, leaf-like bracts, 1.5–2 mm diam., with 4 or 5 yellow-green glands. Capsule exserted on recurved pedicel, 2.5–3.5 mm diam., glabrous. July–Oct. Gravelly flats, SN (Naukluft to Rosh Pinah, Great Karas Mountains to N of Kliprand and Great Karoo).

lavrani L.C.Leach Like **E. rhombifolia** but plant up to 200 mm tall, branches 2–5 mm diam., papillate and not spinescent. Cyathia pubescent, 1.5–2 mm diam. Capsule sessile, ± 2 mm diam., pubescent. July–Aug. Limestone outcrops, G (Rosh Pinah). **(ece)**

muricata Thunb. (including **E. aspericaulis** Pax) Dioecious, spineless, glabrous succulent, up to 0.6 m tall, branches 2–8 mm thick, grey-green, covered with laterally compressed ridges and warts. Leaves sessile, ± deltoid, 1–2 mm long, soon deciduous. Cyathia many, 1–3 terminating some branches, 1.5–2 mm diam., with 5 yellow glands. Capsule sessile, 2–3 mm diam., glabrous. June–Sept. Flats to gentle slopes on loam, NS, KV, WM (Skaapvlei on coastal plain and E to Calvinia to Doringrivier bridge). **(gce)**

rhombifolia Boiss. (including **E. amarifontana** N.E.Br., **E. brachiata** E.Mey. ex Boiss., **E. chersina** N.E.Br., **E. decussata** E.Mey. ex Boiss., *nom illegit.*, **E. indecora** N.E.Br., **E. mundii** N.E.Br., **E. perpera** N.E.Br., **E. rudolfii** N.E.Br., **E. spicata** E.Mey. ex Boiss.) SOETMELKBOS, SPRINGBOK MELKBOS Dioecious, spinescent, glabrescent, often densely branched succulent, up to 1 m tall, branches 2–8 mm diam., finely papillate to smooth, often spinescent at tips. Leaves soon deciduous, sessile, deltoid, usually with 2 spreading basal horns. Cyathia many, in cymes terminating some branches, sessile, 1–3 per cyme, 2–2.5 mm diam., often pubescent outside near base, with 4 or 5 yellow-green glands. Capsule slightly exserted on erect pedicel, 3–4.5 mm diam., sometimes pubescent. June–Sept. Flats to stony slopes, SN, G, NS, NH, KV, WM, TS, CCR (Lüderitz to Free State and E Cape).

spartaria N.E.Br. (including **E. cibdela** N.E.Br., **E. rectirama** N.E.Br.) Like **E. rhombifolia** but stems more slender and taller, leaves slender and narrowly spathulate, without basal horns. Cyathia and capsules glabrous. Oct.–Apr. Stony slopes, SN, G, TS, CCR (Namibia: Otavi Mountain to Oudtshoorn to E Cape and KwaZulu-Natal).

stapelioides Boiss. (including **E. lumbricalis** L.C.Leach) Dioecious, dwarf, spineless, few-branched, glabrous succulent, up to 100 mm tall, with subterranean tubers, branches 30–100 × 2–5 mm, ± terete. Leaves soon deciduous, ± opposite, sessile, hastate to deltoid, 1.5 mm long. Cyathia few, 1–5 in a terminal, nearly sessile cyme, 2.5–3 mm diam., occasionally pubescent, with 5 yellow-green glands. Capsule exserted, 2–4 mm diam., often pubescent. Apr.–Sept. Red loam and gravelly slopes, sometimes with windblown sand, SN, G, NS, KV (Oranjemund to Koekenaap). **(ece)**

verruculosa N.E.Br. Dioecious, dwarf, spineless, glabrous succulent, up to 150 mm tall, branches 25–80 × 4–7 mm, ± terete, covered with small, wart-like outgrowths. Leaves soon deciduous, sessile, deltoid, 1 mm long. Cyathia few, 1–5 in a terminal, nearly sessile cyme, 2–2.5 mm diam., with 5 yellow-green to orange glands. Capsule exserted on recurved pedicel, 3–4 mm diam., papillate. June–Oct. Gravelly coastal flats and fissures in rock outcrops, SN (N of Lüderitz to Bogenfels).

E.' Stems with distinct tubercles that bear leaves at their apices, tubercles spiralled or arranged vertically into rows or fused into wing-like angles along stem

brakdamensis N.E.Br. VINGERPOL Like **E. caput-medusae** but plant up to 200 mm diam., central stem up to 70 mm diam., and branches up to 8 mm diam., with smaller tubercles, cyathial glands often with a bright green or reddish spot on upper surface near base, and with fewer, smooth processes on outer margins. June–Oct. Gently sloping to flat karroid areas on loam or gneiss gravel, NH, KB, KV (Kamieskroon and Wallekraal through to Bitterfontein and Kliprand). **(ece)**

braunsii N.E.Br. (including **E. rudis** N.E.Br.) VINGERPOL Monoecious, spineless, glabrous succulent, up to 150 × 250 mm, with a rosette of branches from a stout stem, branches ascending, ± clavate, 15–30 mm thick, tuberculate. Leaves soon deciduous, linear, 5–15 × 1–2 mm. Cyathia many around apex of each branch, each on an often persistent peduncle 3–16 mm long in axil of tubercle, 5–6 mm diam., with 5 green to brown glands each with 2–4 fine processes on outer margins. Capsule sessile, 6–7 mm diam., occasionally pubescent. Aug.–Sept. Loamy to stony flats among scattered bushes, G, WM, TS (Namibia: Mariental SE to Prince Albert).

caput-medusae L. (including **E. bolusii** N.E.Br., **E. confluens** Nel, **E. ramiglans** N.E.Br., **E. tuberculata** Jacq.) VINGERPOL Monoecious, spineless, glabrous succulent, up to 0.2–0.9 × 0.15–1 m, with a rosette of branches from a stout, obconic stem, branches ascending, ± clavate, 10–30 mm thick, tuberculate. Leaves soon deciduous, linear, 5–40 × ± 2 mm, ± fleshy. Cyathia many around apex of each branch, each on a sometimes persistent peduncle 5–15 mm long in axil of tubercle, 9–18 mm diam., with 5 green glands each with 3–6 cream, often divided processes on outer margin, covered with small protuberances. Capsule sessile, 6–8 mm diam., occasionally pubescent. Aug.–Sept. Sandy flats among scattered bushes, SN, G, NS, KV, WM, CCR (Oranjemund to Cape Peninsula to Mossel Bay). **(gce)**

celata R.A.Dyer (including **E. miscella** L.C.Leach) Dioecious, dwarf, spineless, glabrous succulent, up to 50 mm tall, with many rhizomatous stems, 10–60 × 3–5 mm, from tuber. Leaves deciduous, obovate to nearly circular, 3–6 × 3–5 mm, somewhat fleshy. Cyathia 1–3, terminating each branch, sessile, 3–5 mm diam., with 5 green glands minutely toothed on outer margin. Capsule sessile, 5–7 mm diam., glabrous. May–Aug. Gently sloping quartz gravel patches or among rocks, G, NS, KV (Lekkersing to Koekenaap). **(ece)**

clavarioides Boiss Monoecious, dwarf, spineless, glabrous succulent, up to 50 mm tall, forming a dense cushion, up to 1 m diam., with many short branches from a stout subterranean stem, branches truncate-clavate, 8–20 mm thick, tuberculate. Leaves soon deciduous, ovate, 1–2 × ± 1 mm, somewhat fleshy. Cyathia many around apex of each branch, each sessile in axil of tubercle, 5–6 mm diam., with 5 green to bright yellow glands each nearly entire or with short, finger-like processes on outer margin. Capsule sessile, 6–7 mm diam., glabrous. Oct.–Jan. Stony shale flats to slopes, WM (Sutherland to Beaufort West to KwaZulu-Natal).

crassipes Marloth (including **E. fusca** Marloth) VINGERPOL Monoecious, spineless, glabrous succulent, up to 300 × 300 mm, with a rosette of branches from a stout, obconic main stem, branches ascending, cylindrical, 8–10 mm thick, spineless, but with persistent woody peduncles, covered with low tubercles. Leaves soon deciduous, ovate, 1–2 mm long. Cyathia many around apex of each branch, each on a sometimes persistent peduncle in axil of tubercle, 6–7 mm diam., with 5 brown glands each with 5–7 finger-like processes on outer margin. Capsule sessile, 5–6 mm diam., glabrous. Sept.–Oct. Gravelly flats, NH (Namibia: Warmbad to N of Kliprand and E to Pofadder, Prieska and Kimberley).

cylindrica A.C.White, R.A.Dyer & B.Sloane Monoecious, single-stemmed, spineless, glabrous succulent, up to 400 mm tall, stem 30–50 mm thick, cylindrical, covered with spirally arranged, conical tubercles, up to 7 mm long. Leaves deciduous, narrowly elliptic-oblong, up to 60 × 9 mm. Cyathia many around apex of stem, each on a deciduous peduncle 3–10 mm long in axil of tubercle, 5 mm diam., with 5 green glands each scalloped on outer margin. Capsule slightly exserted, 6–7 mm diam., finely pubescent. July–Oct. Stony slopes often inside other bushes, WM (Loeriesfontein to N of Nieuwoudtville). **(ece)**

decepta N.E.Br. SPUTNIK, VINGERPOL Like **E. caput-medusae** but main stem up to 100 mm thick and tall, branches 20–40 mm long, often with persistent peduncles, up to 15 mm long, cyathial glands dark green to brown, with 3–6 short teeth on outer margin. May–Oct. Stony and loamy flats under bushes, TS (Beaufort West to Klaarstroom and Klipplaat, Calitzdorp).

fasciculata Thunb. NOORDPOL Monoecious, single-stemmed, spineless, glabrous succulent, up to 300 mm tall, stem 30–75 mm thick, cylindrical, covered with spirally arranged, conical tubercles, up to 12 mm long. Leaves soon deciduous, linear-lanceolate, 10–25 × 1–4 mm. Cyathia many around apex of stem, several on each persistent and later woody peduncle up to 50 mm long in axil of tubercle, 6–7 mm diam., with 4 or 5, almost smooth, green glands. Capsule exserted on initially decurved pedicel, ± 7 mm diam., glabrous. June–Oct. Flats to gently sloping hills, loam or quartz gravel, KV (Soutrivier to Flaminkvlakte). **(ece)**

ferox Marloth VOETANGEL Dioecious, much-branched, spiny, glabrous succulent, 0.2–1 m tall, branches cylindrical, 20–40 mm diam., with obscure tubercles arranged in 9–12 angles, covered with stout, thorny, simple peduncles and short-shoots, 10–30 mm long. Leaves soon deciduous, 2–3 mm long. Cyathia many around apex of each branch, each on a short persistent peduncle

in axil of tubercle, 3–5 mm diam., with 5 entire green glands. Capsule sessile, 5–6 mm diam., glabrous. June–Sept. Gravelly to stony flats and gentle slopes among low karroid bushlets, TS (Beaufort West, Klaarstroom to E Cape).

filiflora Marloth (including **E. versicolores** G.Will.) Monoecious, dwarf, spineless, glabrous succulent, up to 300 mm tall, with short main stem bearing many tuberculate branches, 8–20 mm thick. Leaves deciduous, linear, 12–25 × 0.7–1 mm. Cyathia many around apex of each branch, each on a persistent and ± woody peduncle 25–75 mm long in axil of tubercle and surrounded by 4–6 bracts, ± 9 mm diam., with 5 green glands each with 2–4 linear processes on outer margin. Capsule sessile, 6–8 mm diam., glabrous. July–Oct. Rocky slopes or gravelly flats, G, NH (Kubus and Eksteenfontein to Springbok). **(ece)**

gariepina Boiss. Dioecious, spineless, glabrous succulent, up to 0.15–0.8 × 0.3–0.6 m, branches cylindrical, pale grey, with scattered tubercles. Leaves soon deciduous, elliptic, 5–15 × 4–6 mm. Cyathia 1–3 terminating each branch, 2.7–3.5 mm diam., with 5 entire glands. Capsule sessile, 5–6 mm diam., glabrous. Aug.–Oct. Rocky flats and lower slopes, SN, G (southern Angola to Richtersveld, Prieska and Douglas).

hallii R.A.Dyer Monoecious, mostly single-stemmed, spineless, glabrous succulent, up to 0.5 m tall, stem cylindrical-clavate, 30–40 mm diam., pale green, covered with low tubercles. Leaves soon deciduous, linear, up to 10 mm long. Cyathia many around apex of each branch, 1–3 on each peduncle in axil of tubercle, 8–10 mm diam., with 5 red glands each with 3–5 slender and branched, cream-coloured processes on outer margin. Capsule sessile, 6–8 mm diam., glabrous. Apr.–Sept. Gravelly lower slopes and loamy flats, TS, CCR (Botterkloof to Biedouw, marginal to CCR). **(gce)**

hamata (Haw.) Sweet (including **E. peltigera** E.Mey. ex Boiss.) Dioecious, spineless, glabrous succulent, up to 0.5 × 0.6 m, branches 6–20 mm thick, with prominent tubercles, loosely arranged in 3 angles, green to red. Leaves deciduous, ovate to lanceolate, 8–20 mm long, ± sessile, slightly fleshy. Cyathia solitary and terminating each branch, subtended by 3 prominent bracts 6–10 × 4–10 mm, 5–7 mm diam., with 5 yellow to red glands each minutely toothed on outer margins. Capsule sessile, 6 mm diam., glabrous. Apr.–Sept. Stony slopes, SN, G, NH, KB, WM, TS, CCR (Lüderitz to SE of Worcester). **(gce)**

heptagona L. (including **E. atrispina** N.E.Br., **E. enopla** Boiss.) BOKNOORS Dioecious, much-branched, spiny, glabrous succulent, up 0.2–1 m tall, branches cylindrical, 15–30 mm diam., with obscure tubercles arranged in 6–8 angles, covered with stout, thorny, simple, persistent peduncles and short-shoots, 8–60 mm long. Leaves soon deciduous, 1–2 mm long. Cyathia many around apex of each branch, each on a later woody, persistent peduncle in axil of tubercle, 3–5 mm diam., with 5 entire green to red glands. Capsule sessile, 4–5 mm diam., glabrous. June–Sept. Karroid scrub on stony N-facing slopes, TS, CCR (Touwsrivier and Montagu to Jansenville).

hypogaea Marloth Monoecious, dwarf, spineless, glabrous succulent, up to 50 × 150 mm, with 1–10 branches from a stout, subterranean main stem, branches erect, ± clavate, 10–25 mm thick, tuberculate. Leaves soon deciduous, linear, margins often undulate, 5–15 × 0.5–1 mm. Cyathia many around apex of each branch, each on a peduncle 8–20 mm long in axil of tubercle, 5–6 mm diam., with 5 dark green glands each with 5–7 simple, finger-like processes on outer margins. Capsule sessile, 3–4 mm diam., glabrous. Sept.–Nov. Karroid scrub, usually on flats under or alongside bushes, WM (Sutherland to Great Karoo).

loricata Lam. (including **E. eustacei** N.E.Br.) Monoecious, glabrous, spinescent shrub to cushion-forming succulent, up to 0.15–1.50 m tall, stems 8–15 mm thick, cylindrical, tuberculate, covered with stout, often white, spinescent peduncles 12–50 mm long. Leaves linear-lanceolate, 25–75 × 3–10 mm, glaucous, deciduous. Cyathia many around apex of each branch, each on a persistent and later spinescent peduncle in axil of tubercle, with 5 entire, green glands. Capsule sessile, 6–8 mm diam., glabrous to puberulous. May–Aug. Stony sandstone to tillite or shale slopes or loamy flats, KV, WM, TS, CCR (Vredendal to Clanwilliam and Botterkloof, Gannaga Pass to Laingsburg). **(gce)**

melanohydrata Nel Like **E. caput-medusae** but plant developing several, ± erect, thicker stems, covered with small, tuberculate branches and with persistent, woody, often divided peduncles, cyathial glands each with 3, mostly simple, finger-like processes on outer margins. July–Sept. Sandy to gravelly plains, SN, G (Aurus Mountains to Annisfontein and Alexander Bay). **(ece)**

multiceps A.Berger VINGERPOL Monoecious, densely branched, conical, glabrous succulent, up to 0.6 m tall, thick main stem up to 25 mm diam., nearly as tall as plant, with many, crowded, spreading, tuberculate branches, 20–75 × 15–30 mm, decreasing in length towards apex of plant, with few, woody, persistent, sterile peduncles near apex. Leaves soon deciduous, linear, 5–12 ×

1–2 mm. Cyathia many around apex of each branch, each on a peduncle 6–8 mm long in axil of tubercle, 5–8 mm diam., with 5 green glands each with 2–4 or more, ± linear, spreading processes on outer margin. Capsule sessile, 5–6 mm diam., glabrous. May–Sept. Gravelly slopes and flats, NH, WM, TS, CCR (E of Springbok, Laingsburg to Little Karoo near Muiskraal). **(gce)**

namaquensis N.E.Br. (including **E. multiramosa** Nel) Monoecious, tuberculate, spineless, glabrous succulent, with 1 or 2(3) thick main stems, up to 300 × ± 100 mm, densely covered with persistent, later somewhat woody short shoots. Leaves soon deciduous, linear, 8–15 × 1–2 mm. Cyathia many on branches in lower half of stems, 1–4 on peduncle in axil of tubercle, 7–12 mm diam., with 5 brown-green glands each with 3–8 yellow processes on outer margin. Capsule sessile, 6–8 mm diam., glabrous and shiny. July–Sept. Granitic gravel plains, G (Steinkopf to Gamoep and NE to Kakamas).

namibensis Marloth Monoecious, slightly spiny, glabrous succulent, up to 200 mm tall, with thick main stem up to 80 mm diam., and many, spreading, tuberculate branches 50 × 15 mm. Leaves soon deciduous, linear, 15–25 × 1–2 mm. Cyathia many around apex of each branch, each on a persistent, woody, spinescent peduncle up to 10 mm long in axil of tubercle, 5–8 mm diam., with 5 green glands each with 2–5, ± linear, spreading processes on outer margins. Capsule sessile to slightly exserted, 6–7 mm diam., glabrous. May–Sept. Gravelly slopes and flats, SN (Helmeringhausen to Klinghardt Mountains).

namuskluftensis L.C.Leach Like **E. celata** but stems 10–20 × 4–6 mm. May–Aug. Crevices in limestone, G (Rosh Pinah). **(ece)**

obesa Hook.f. (including **E. symmetrica** A.C.White, R.A.Dyer & B.Sloane) Dioecious, dwarf, spineless, glabrous succulent, 50–200 mm tall, with single, unbranched stem, 80–100 mm diam. and minute tubercles arranged in 7–10 low angles. Leaves soon deciduous, ± 1 mm long. Cyathia many near apex of stem, 1–3 on each short, deciduous peduncle in axil of tubercle, 2.5–6 mm diam., with 5 entire, green glands. Capsule sessile, 6–7 mm diam., glabrous. May–Sept. Gravelly flats among low, karroid scrub, TS (Rietbron and Willowmore to Graaff-Reinet).

oxystegia Boiss. Like **E. loricata** but with few, shorter branches and fewer, longer, softer, usually curved 'spines'. Capsule puberulous. May–June. Densely bushy, W-facing, rocky slopes, NH (uplands W of Steinkopf to Springbok and Komaggas). **(ece)**

pedemontana L.C.Leach Like **E. hamata** but plants up to 150 mm tall, branches 3–5 mm thick, and cyathia pubescent. Apr.–Sept. Loamy flats, KV (S of Vanrhynsdorp). **(ece)**

pentops Marloth ex A.C.White, R.A.Dyer & B.Sloane VINGERPOL Like **E. brakdamensis** but glands on cyathia with small, round, green spot surrounded by cream to pink pubescent area from which finger-like processes arise. June–Sept. Gently sloping to flat karroid areas on loam with scattered quartz-gravel, NH (Komaggas to foot of Anenous Pass). **(ece)**

pillansii N.E.Br. KLEINNOORSDORING Dioecious, much-branched, spinescent, glabrous succulent, up to 150–300 mm tall, branches cylindrical-clavate, 25–60 mm diam., with obscure tubercles arranged in 7–9 angles and with many, stout spinescent peduncles 8–20 mm long, often branching near apex. Leaves soon deciduous, 1–2 mm long. Cyathia many around apex of each branch, 1–5 on each persistent peduncle in axil of tubercle, 4–5 mm diam., with 5 entire green glands. Capsule sessile, 5–7 mm diam., glabrous. May–Sept. Stony slopes among low, karroid shrublets, TS, CCR (N of Karoopoort to Matjiesfontein and Muiskraal). **(gce)**

polygona Haw. (including **E. horrida** Boiss.) BAVIAANNOORS Dioecious, much-branched, spiny to sometimes spineless, glabrous succulent, up to 0.5–2 m tall, branches cylindrical-clavate, 50–150 mm diam., with obscure tubercles fused vertically into 7–20 prominent, wing-like angles, usually with groups of 2–5 spines 4–40 mm long arising in axil of each tubercle. Leaves soon deciduous, ± 1 mm long. Cyathia many around apex of each branch, 1–3 on each persistent peduncle 2–8 mm long in axil of tubercle, 4–7 mm diam., with 5 entire red to dark purple glands. Capsule sessile, 5–6 mm diam., pubescent. May–Sept. Gravelly flats to stony slopes among karroid scrub, TS, CCR (Seweweekspoort and S of Calitzdorp to Grahamstown).

quadrata Nel (including **E. francescae** L.C.Leach) Monoecious, spineless, glabrous shrub, up to 1.1 m tall, branches 3–6 mm thick, slightly succulent, terete and tuberculate towards tips, later subwoody. Leaves narrowly elliptic to linear, 20–60 × 4–12 mm, on short petiole. Cyathia many around apex of some branches, in groups of 2–6, 4–8 mm diam., with 4 or 5 green glands each toothed along outer margin. Capsule exserted on ascending to recurved pedicel, 8–10 mm diam., glabrous. Sept.–Mar. Upper mountain slopes or flats, among rocks and bushes, G (Vandersterrberg to Steinkopf). **(ece)**

restituta N.E.Br. Monoecious, many-stemmed, spineless, glabrous, succulent shrub, up to 0.3 × 0.5 m, stems cylindrical, 30–75 mm thick, covered with spirally arranged, conical tubercles up to

8 mm long. Leaves soon deciduous, oblanceolate-spathulate, 10–25 × 3–6 mm, sessile. Cyathia many around apex of each branch, several on each persistent and later woody peduncle 70–250 mm long in axil of tubercle, 6–8 mm diam., with 4 green glands each with 3–6 yellow teeth on outer margin. Capsule exserted on decurved pedicel, ± 7 mm diam., glabrous. July–Oct. Flats to gently sloping hills on loam, NS, NH (S of Komaggas to just S of Garies). **(ece)**

schoenlandii Pax NOORDPOL Like **E. fasciculata** but up to 500 mm tall, cyathia usually solitary on short peduncles which do not persist as woody spines, short shoots slender and sterile, arising in same axil as peduncle but on side away from stem and persisting as a woody spine, capsules not exserted on decurved pedicel. Apr.–June. Firm loam on flats among scattered low bushes, NS, NH, KV, CCR (Kotzesrus to Vanrhynsdorp and outskirts of Strandfontein just S of Olifants River Mouth). **(gce)**

stellispina Haw. SKAAPNOORS Dioecious, much-branched, spiny, glabrous succulent, up to 0.7 × 0.7 m, branches cylindrical-clavate, 30–80 mm diam., with obscure tubercles fused into 10–16 low angles and many stout persistent and later spiny peduncles 4–20 mm long, each branching subapically into 3–5, spreading, rigid, sterile spinelets 4–10 mm long. Leaves soon deciduous, 3–10 mm long. Cyathia many around apex of each branch, each on a peduncle 5–20 mm long in axil of tubercle, 3.5–5 mm diam., with 5 entire green to reddish glands. Capsule sessile, 5–7 mm diam., glabrous. July–Sept. Karroid scrub on stony slopes with scattered dolerite rocks, WM, TS (NE of Calvinia, N of Laingsburg, widespread in Great Karoo).

[**Species excluded** **E. albertensis** N.E.Br.: poorly known and probably conspecific with one of above.]

JATROPHA ± 175 spp., Old and New World, mainly in tropics and subtropics

orangeana Dinter ex P.G.Mey. Monoecious, spineless, glabrous shrub, up to 0.5–2 m tall, with dark grey bark and rubbery stems. Leaves 3–5-fid, bluish green, with very small stipules. Flowers in densely clustered, lateral to terminal cymes; males with obtuse sepals, no petals, 8 stamens; females with unequal, elliptic to broadly ovate sepals, ± 8 petals, and glabrous ovary. Capsule tuberculate, wrinkled. Aug.–Oct. Rocky slopes, G (Namibia: lower Gariep Valley, ?N bank only).

*RICINUS CASTOR-OIL PLANT, KASTEROLIEBOOM 1 sp., native to NE tropical Africa

***communis** L. Monoecious, spineless, glabrous shrub to tree, up to 5 m tall. Leaves peltate, palmately lobed, up to 300 mm or more in diam. Flowers in a lax, subterminal raceme, without petals; males with many stamens, filaments united at base in repeatedly branching clusters; females with a spathe-like, soon deciduous calyx. Capsule 12–18 mm diam., covered with soft spines. Aug.–Sept. Riverbeds and disturbed land, SN, G, NS, NH, CCR (widespread in southern Africa and the tropics).

FABACEAE

by G.J. Campbell-Young
Indigastrum and **Indigofera** by B.D. Schrire
Calobota, **Euchlora**, **Lebeckia, Leobordea, Lotononis** and **Wiborgiella** by J.S. Boatwright

1. Flowers actinomorphic; petals valvate (touching but not overlapping) in bud, often united basally; sepals usually united basally; stamens as many as petals or twice as many or numerous, free or all united into a tube or to base of petals; leaves twice pinnate or rarely pinnate; seeds normally with an areole on each face or side (subfamily MIMOSOIDEAE):
   2. Plant unarmed; leaves reduced to simple entire phyllodes . . . . . **Acacia** (Australian spp.)
   2.' Plant armed with prickles or spines; leaves bipinnate:
      3. Flowers in spikes or spiciform racemes . . . . . **Prosopis**
      3.' Flowers in globose or subglobose heads or reduced to 2–4 flowers per 'head':
         4. Inflorescence many-flowered; flowers yellowish; filaments free . . . . . **Acacia** (African spp.)
         4.' Inflorescence reduced to 2–4 flowers; flowers pink; filaments shortly united into a tube . . . . . **Calliandra**

1'. Flowers nearly always zygomorphic; petals imbricate (overlapping) in bud, free or some of them united; sepals free or united basally; stamens usually twice as many as petals, free or united into a tube; leaves simple, digitate or variously compound; seeds usually without an areole (subfamilies CAESALPINIOIDEAE and PAPILIONOIDEAE):
5. Adaxial (uppermost) petal overlapped by adjacent lateral petals when these are present; sepals often free; stamens 10 or fewer or occasionally more, free or, less often, variously united; leaves twice pinnate or pinnate, rarely simple or 1-foliolate; seeds with radicle usually straight (subfamily CAESALPINIOIDEAE):
6. Leaves simple, deeply bilobed; calyx campanulate, with 5 short lobes; fertile stamens 10, plants often conspicuously glandular ..... **Adenolobus**
6.' Leaves reduced or pinnate:
7. Leaves reduced; pinna-rhacillae green, more-or-less terete and needle-like, with or without minute inconspicuous leaflets, or rhachillae laterally winged and appearing flattened, '± phyllodial' with numerous pairs of leaflets up to 9 × 3 mm; petals bright yellow; plant armed with stout spines..... **Parkinsonia**
7.' Leaves pinnate (not reduced), with more than 2 well-developed leaflets; rhachillae not laterally winged and appearing flattened; petals red or sometimes pink; plant unarmed..... **Schotia**
5'. Uppermost petal placed outside adjacent lateral petals; sepals united basally; stamens 10 or rarely fewer, sometimes free, most often adaxial one free or nearly so and other 9 united, sometimes united into 2 groups of 5 or all united; leaves never twice pinnate; seeds with radicle usually curved (subfamily PAPILIONOIDEAE):
8. Anthers with an extended apical connective; 2-branched hairs present; petals usually caducous; upper margin of keel usually hairy:
9. Petals hairy (most obviously on dorsal surface of standard), standard mostly broad at base tapering suddenly to a short claw; wings forming a level platform above keel; keel always with lateral spurs, upper margin of keel with a fringe of hairs **Indigofera**
9.' Petals glabrous, standard narrow at base tapering gradually to claw; wings twisted outwards distally, not forming a level platform above keel; keel often with lateral pockets (spurs absent); upper margin of keel glabrous ..... **Indigastrum**
8.' Anthers without an extended apical connective; 2-branched hairs generally absent; petals usually persistent; upper margin of keel usually without hairs:
10. Leaflets with conspicuous, closely parallel veins extending to margins:
11. Leaflets with smooth margins; stipules not adnate to petiole; leaves 1–many-foliolate, if 3-foliolate then lateral leaflets often slightly asymmetrical..... **Tephrosia**
11.' Leaflets with toothed margins (sometimes minutely so); stipules ± adnate to petiole; leaves (1)3(7)-foliolate:
12. Flowers in slender racemes; fruit subglobose or ovoid, indehiscent or tardily 2-valved ..... **Melilotus**
12.' Flowers in heads or short racemes or rarely solitary; fruit variously shaped but not subglobose or ovoid, dehiscent or scarcely dehiscent:
13. Fruit straight or curved, mostly linear ..... **Trigonella**
13.' Fruit mostly spirally coiled, scarcely dehiscent, mostly prickly..... **Medicago**
10.' Leaflets with veins not extending to margins:
14. Fruit both 1-seeded and glandular; leaves more-or-less gland-dotted:
15. Flower pedicel subtended by a distinctive lobed cupulum..... **Psoralea**
15.' Flower pedicel never subtended by a cupulum:
16. Fruit conspicuously black glandular-warty when mature; mat-forming shrublet ..... **Cullen**
16.' Fruit never black glandular-warty; shrubs, subshrubs or rarely decumbent herbs..... **Otholobium**
14.' Fruit not both 1-seeded and glandular; leaves not gland-dotted:
17. Leaves predominantly pinnately 3–many-foliolate:
18. Leaves imparipinnate (with leaflets in pairs + an odd terminal leaflet):
19. Leaves glandular; pod with ± velvety, glandular walls ..... **Rhynchosia**
19.' Leaves not glandular; pod with membranous walls ..... **Lessertia**
18.' Leaves paripinnate (without an odd terminal leaflet); pod walls firm:
20. Leaves ending in a tendril; pod compressed ..... **Vicia**
20.' Leaves not ending in a short point; pod septate ..... **Sesbania**
17.' Leaves palmately (1)3(5–17)-foliolate or simple, petiolate or sessile:
21. Calyx with a trifid lower lip, upper lobes sometimes fused higher up to form an upper lip; pod often pointing upwards:
22. Stipules semi-sagittate or semi-cordate at base, with a narrow point of attachment; glandular tubercles often present..... **Melolobium**
22.' Stipules not lobed below; glandular tubercles absent:

23. Peduncle absent, internode below inflorescence elongated; stipules often adnate to petiole (and sometimes also connate on the leaf-opposed side); bracts and bracteoles rarely present; keel petals imbricate along lower side ..... **Polhillia**
23.' Peduncle present, internode below inflorescence not elongated; stipules rarely fused; bracts and bracteoles invariably present; keel petals rarely imbricate:
24. Leaves 3-foliolate; stipules free or united along leaf-opposed margin; keel obtuse, rarely slightly beaked; filaments in a tube closed or split towards base ..... **Argyrolobium**
24.' Leaves 5–17-foliolate; stipules adnate to petiole base; keel strongly beaked; filaments in a closed tube. ..... **Lupinus**
21.' Calyx without a trifid lower lip; pod usually horizontal or nodding:
25. Stamens free or united into an open tube, anthers not strongly dimorphic; seed aril conspicuous, fleshy ..... **Amphithalea**
25.' Stamens united into an open tube, never free, anthers strongly dimorphic; seed aril inconspicuous, non-fleshy:
26. Anthers 5 + 5; keel beaked; bracteoles present; upper part of style with 1 or 2 lines of hairs (when glabrous then with a thin upper part and a thick lower part); pod usually much inflated ..... **Crotalaria**
26.' Anthers 6 + 4 or 5 + 4 + 1 (carinal anther intermediate), rarely 5+5; keel beaked or not; bracteoles absent or present; upper part of style glabrous, usually not with a thin upper and thick lower part; pod flat or inflated:
27. Ovary with 2–4 ovules; fruit 1-seeded; leaves sessile, without stipules ..... **Aspalathus**
27.' Ovary with more than 6 ovules; fruit several-seeded; leaves sessile or petiolate, with or without stipules:
28. Bracteoles absent or vestigial; stipules present or rarely absent; calyx unequally lobed with lateral lobes sometimes united in pairs on either side; fruit often with upper suture verrucose:
29. Calyx lobes not united into pairs; stipules equal in size when present; geophyte with woody tuber ..... **Euchlora**
29.' Calyx lobes united into pairs on either side; stipules simple or dimorphic (if stipules equal in size then suffrutescent perennials resprouting from an enlarged underground rootstock and stipules similar to leaflets); rootstock not tuberous:
30. Keel petals usually beaked and glabrous ..... **Lotononis**
30.' Keel petals usually obtuse and pubescent ..... **Leobordea**
28.' Bracteoles present; stipules usually absent; calyx subequally lobed with lobes usually very short; upper suture of fruit never verrucose:
31. Leaves needle-like; plants glabrous except occasionally on bracts and bracteoles ..... **Lebeckia**
31.' Leaves with flattened blades; plants pubescent at least on vegetative parts:
32. Petals pubescent, at least on dorsal midrib of standard petal (if glabrous then plant strongly spinescent, woody, practically leafless shrubs); leaflets simple or variously digitate; petioles not tuberculate **Calobota**
32.' Petals glabrous; leaflets exclusively trifoliolate; petioles often tuberculate:
33. Fruit winged, indehiscent; carinal anther intermediate (5+4+1) ..... **Wiborgia**
33.' Fruit not winged, dehiscent or indehiscent; carinal anther resembling the short anthers (6+4) ..... **Wiborgiella**

ACACIA DORINGBOOM, THORN TREE, WATTLE > 1 450 spp., cosmopolitan except for Antarctica, mainly pantropical and subtropical

A. Plant armed with spines; leaves bipinnate

erioloba E.Mey. [alternative name **Vachellia erioloba** (E.Mey.) P.J.H.Hurter] CAMEL THORN, KAMEELDORING Shrub or tree, 2–16 m tall, with a wide, spreading crown, bark deeply furrowed. Leaves twice pinnate, with 3 or 4 pairs of pinnae, each with 10–18 pairs of leaflets, stipules strongly spinescent, straight or slightly curved, often with swollen bases. Flowers in globose heads, golden-yellow, sweetly scented. Pod half-moon-shaped or ± curled into a circle, grey-velvety. July–Sept. Dry stony or sandy areas, often in dry riverbeds, SN, G, NS (Namibia, northern Namaqualand and from Kgalagadi to Limpopo Province and Free State).

karroo Hayne [alternative name **Vachellia karroo** (Hayne) Banfi & Galasso] SOETDORING, SWEET THORN Tree or rarely a shrub, up to 15 m tall, young branches conspicuously rusty red, bark rough, dark red-brown. Leaves twice pinnate, with 2–7 pairs of pinnae, each with 8–20 pairs of

oblong leaflets, stipules of straight, stout, white spines with dark tips. Flowers in globose heads, deep golden-yellow, sweetly scented. Pod slender, sickle-shaped, slightly constricted between seeds, compressed, glabrous, thinly woody. Oct.–Feb. Often along rivers and streams, SN, G, NS, NH, KB, KV, WM, TS, CCR (throughout southern Africa to Zambia).

A.' Plant unarmed; leaves reduced to simple entire phyllodes

***cyclops** A.Cunn. ex G.Don REDEYE, ROOIKRANS Rounded shrub or small tree, 2–4(–6) m tall. Phyllodes narrowly oblong, ± straight, obliquely mucronate, with 3–7 longitudinal veins. Flowers in scattered globose heads on short peduncles, yellow. Pod often in coiled clusters, oblong, undulate or twisted, compressed, leathery. Seed black, with a prominent, fleshy, red aril. Mainly Oct.–May. Watercourses in sandy soil, G, NS, NH, KV, CCR (Gariep Mouth to SW Cape to Port Elizabeth, invasive weed from SW Australia).

***saligna** (Labill.) H.L.Wendl. GOUDWILGER, PORT JACKSON WILLOW Resprouting shrub or tree, 3–7(–10) m tall, often with large, brown galls formed by a rust fungus. Phyllodes oblong-lanceolate, with a single midvein, much wider and wavy on young plants, pinnate leaves only in seedlings. Flowers in axillary globose heads, bright yellow. Pod compressed, constricted between seeds, with hardened whitish margins. Aug.–Nov. Watercourses, SN, TS, CCR (N bank of Gariep Mouth, W and E Cape, invasive weed from SW Australia).

ADENOLOBUS 2 spp., southern Africa

gariepensis (E.Mey.) Torre & Hillc. BLOUBEESKLOU, BUTTERFLY LEAF Bushy shrub or small tree, up to 4 m tall, branches long, slender, rod-like. Leaves alternate or clustered on dwarf lateral shoots, simple, thick, fleshy, wider than long, deeply notched apically, usually ± folded. Flowers tubular, with sepals and petals tightly furled, up to 25 mm long, dark maroon, petals greyish, streaked maroon, protruding from calyx, stamens exserted. Pod small, kidney-shaped, compressed. Sept.–Jan. Coarse sand or stony soil on rocky hills, G (southern Angola to Richtersveld and E to Augrabies Falls).

AMPHITHALEA 42 spp., N Cape, W Cape and E Cape

obtusiloba (Granby) A.L.Schutte Shrublet, up to 0.7 m tall. Leaves alternate, simple, sessile, oblong, with strongly incurved margins. Flowers 2, violet, calyx lobes imbricate, ovary 1-ovuled, sericeous. Pod small, narrowly ovate, compressed. Nov.–Mar.? Granite fynbos, 1 500–1 600 m, KB (Kamiesberg Mountains). **(ece)**

ARGYROLOBIUM ± 80 spp., mainly southern Africa, Madagascar, Mediterranean to India

argenteum (Jacq.) Eckl. & Zeyh. Shrublet, up to 0.5 m tall, young stems and petioles with dense, silky, white hairs. Leaves 3-foliolate, leaflets weakly dimorphic, broadly obovate to obovate, ± conduplicate. Flowers 1–3, leaf-opposed, occasionally on elongate peduncles, often subsessile, yellow, fading rusty-brown, calyx hairy, 2-lipped, lobes slightly sickle-shaped, standard silky on back, keel silky near apex. Pod narrowly oblong, straight or sickle-shaped, densely silky hairy. All year. Lower slopes, WM, TS, CCR (Bokkeveld Plateau and Roggeveld to SW Cape and dry interior of N and E Cape).

petiolare (E.Mey.) Steud. Somewhat woody shrub, with silky hairy stems, at least 150 mm tall. Leaves 3-foliolate, leaflets small, petioles elongate, up to 35 mm long. Flowers solitary, leaf-opposed, sessile, large, yellow, fading rusty-brown, calyx 2-lipped, lobes long, upper ones broadly sickle-shaped, standard silky on back. Pod narrowly oblong, densely silky hairy. Aug. Mountain renosterveld, NH, KB (Koperberg and Kamieskroon to Garies). **(ece)**

ASPALATHUS CAPE GORSE 279 spp., South Africa

A. Leaves 1-foliolate

angustifolia (Lam.) R.Dahlgren Erect, rigid, spreading shrub, up to 2.5 m tall, young branches pale yellow. Leaves 1-foliolate, sessile, lanceolate, prominently 3-veined, tips pungent. Flowers

usually 1, bright yellow to partly reddish, calyx glabrous, lobes acuminate or spine-tipped, standard densely white-hairy or silky on back, keel hairy. Pod linear, glabrous. Oct.–Apr. Rocky ridges, KB, CCR (subsp. **robusta** (E.Phillips) R.Dahlgren endemic to Kamiesberg Mountains; subsp. **angustifolia** from Bokkeveld Mountains through to SW Cape and Port Elizabeth). **(gce)**

A.' Leaves 3-foliolate
*B. Leaflets distinctly flat, not spine-tipped (see also **A. acicularis**)*

obtusata Thunb. Erect, spreading shrub, up to at least 0.4 m tall, with rigid branches ending in pungent thorns. Leaves 3-foliolate, leaflets spathulate-oblanceolate, sparsely appressed hairy. Flowers 1 per leaf axil, inconspicuous, pale yellow or ± pale purple. Pod triangular-lanceolate, sparsely short-sericeous. Sept. In sandveld or on rocky or clay outcrops, NS, NH, CCR (Koingnaas to Matsikammaberg to Lambert's Bay). **(gce)**

quinquefolia L. Erect, densely branched shrub, 0.35–1.5 m tall, with branch ends silky or hairy. Leaves 3-foliolate, leaflets oblong-elliptic, grey or silvery-silky or ± glabrous. Flowers (8–)15–35, terminally clustered in ovate to elongate spikes, pale to bright yellow, clusters rarely ± globose and compact, then plant taller than 0.8 m and silvery silky, calyx silky, standard short-silky on most of back, wings and keel silky. Pod obliquely ovate, silky hairy. Aug.–Jan. Coastal, lowlands and mountains, NS, KV, CCR (W of Komaggas and from Vanrhynsdorp to Mossel Bay). **(gce)**

B.' Leaflets ± round or angular in cross section, sometimes grooved or somewhat flattened
C. Leaflets not spine-tipped

hispida Thunb. Erect to decumbent shrub, 1 m or more tall, young branches reddish to pale yellowish. Leaves 3-foliolate, leaflets linear, straight or slightly curved. Flowers along upper parts of branches, inconspicuous, pale yellow or partly white with keel apex and middle of standard back often violet or purplish, calyx lobes broadly awl-shaped to linear, standard with upper half reflexed, hairy on upper half of back. Pod rhombic-ovate, sparsely hairy. Sept.–Jan. Sandy or clay soils, NH, KB, CCR (Spektakel Pass, Kamiesberg and Bokkeveld Mountains to SW Cape and Alexandria).

spinescens Thunb. Erect shrub, (0.7)1–2 m tall, branches slender, sometimes slightly nodding, with soft, leafy tips, rarely rigid but not thorny. Leaves 3-foliolate, leaflets ovoid to cylindrical. Flowers 1 or 2(3) on short-shoots, many along branches, pale or bright yellow, calyx short-silky to ± glabrous, lobes short, standard hairy on most of back, keel silky. Pod triangular-lanceolate. Sept.–Oct. Sandy flats, NS, KV, CCR (W of Komaggas through to Vredendal, Olifants River Mountains and Mamre). **(gce)**

C.' Leaflets mucronate or spine-tipped

acicularis E.Mey. Erect, branched shrub, 0.25–1.5 m tall, often with thorny branch tips. Leaves 3-foliate, leaflets ± linear, slightly to distinctly flat, subglabrous to silky, tips apiculate to acuminate. Flowers up to 10, often on thorny axis, pale yellow, standard and keel partly rose-coloured, calyx pubescent, with short deltoid teeth, standard partly silky on back. Pod broadly lanceolate. Dec.–Jan. Mountain slopes, KB, WM (Kamiesberg Mountains, southern Roggeveld and mountains of Great Karoo to Lesotho).

acuminata Lam. Erect, ascending shrub, up to 0.8 m tall, lateral branches pale yellow, thorny. Leaves 3-foliolate, leaflets slightly recurved, oviform to linear or awl-shaped, spine-tipped. Flowers few on thorny branchlets (large in Namaqualand form), pale to bright yellow or orange, standard sometimes partly violet, calyx lobes widened at base, with apical spinelets, standard silky on back, keel upcurved at ± right angles, hairy. Pod triangular-lanceolate. Aug.–Mar. Lower slopes, NS, NH, KB, CCR (near Steinkopf, Kamiesberg Mountains, near Hondeklipbaai and Cederberg Mountains to Albertinia). **(gce)**

albens L. Erect or ascending, spreading shrub, up to 1 m tall, young branches yellowish. Leaves 3-foliolate, leaflets needle-like, mucronate or spine-tipped, straight to S-curved, with prominent leaf-base tubercles on long-shoots. Flowers few to many in terminal spikes, small, pale yellow, fading brownish or pink, calyx large, hairy, lobes spine-tipped, standard reflexed, hairy on most of back, keel hairy on upper half. Pod obliquely ovate, hairy. Aug.–Sept. Sandy flats and hills, NS, CCR (near Hondeklipbaai, Nardouw Kloof to Cape Peninsula). **(gce)**

cuspidata R.Dahlgren Low, wide-spreading, diffusely branched shrublet, 0.15–0.3 m tall, branches pale yellow or orange when young. Leaves sparsely set, 3-foliolate, leaflets slightly recurved, sharply spine-tipped, spreading. Flowers 2 or 3, terminally closely set, light yellow, calyx tube with sparse, appressed hairs, lobes, tapering into sharp spinelets, glabrous, standard short-silky on upper part of back, keel upcurved at ± right angles, short-silky along lower margin. Pods triangular-lanceolate. Oct.–Dec. Clayey soil in sandveld, NS, KV, CCR (Groenrivier to Vredendal sandveld to Vanrhynsdorp). **(gce)**

pulicifolia R.Dahlgren Suberect, rigid, spreading, densely branched shrub, 0.2–0.5(–1) m tall, branches thorny when old. Leaves 3-foliolate, leaflets linear-oblong to conical or ± globose, sharp-tipped, short, glabrous or grey hairy. Flowers solitary or paired near branch tips, pale yellow, calyx hairy, lobes broad at base, spinelet-tipped, standard basally recurved, apex incurved, densely silky on back, keel boomerang-shaped, silky. Sept.–Nov. Gravelly granite rock, sand or shale, NH, KB, CCR (Steinkopf, Kamiesberg Mountains, plateau near Vanrhynsdorp to Botterkloof Pass). **(gce)**

CALLIANDRA ± 135 spp., mostly endemic to the Americas, 3 spp. in tropical and southern Africa

redacta (J.H.Ross) Thulin & Asfaw Much-branched, thorny shrub, 0.3–0.6 m tall, young branchlets densely hairy, with conspicuous dark purplish glands. Leaves twice pinnate, grey-hairy, stipules paired, spinescent, straight or curved, pinnae paired, each bearing 2–4 pairs of oblique, oblong, elliptic or rounded leaflets, with minute glands at attachment point. Flowers (1)2–4, in axillary heads, pinkish, densely hairy. Pod linear-oblong, straight, densely grey-hairy, glandular. June–Sept. Among rocks, G (Richtersveld). **(ece)**

CALOBOTA (= *LEBECKIA* in part) 16 spp., Cape, Namibia and N Africa, especially winter rainfall areas

*A. Strongly spinescent shrubs; pods laterally compressed (see also **C. angustifolia**)*

acanthoclada (Dinter) Boatwr. & B.-E.van Wyk (= *Lebeckia acanthoclada* Dinter) Erect or decumbent, spinescent shrub, up to 1 m tall, older branchlets with blackish or greyish brown bark. Leaves simple, clustered on short shoots, petiole absent, leaflets spathulate, with appressed silvergrey silky hairs. Flowers in (1)3–5-flowered short racemes, yellow or dirty yellow, often tinged bluish, calyx hairy, standard densely sericeous. Pod linear, laterally compressed, sericeous. Feb.–Nov. Well-drained stony soils or limestone, SN, G (Kleinfontein to Richtersveld).

pungens (Thunb.) Boatwr. & B.-E.van Wyk (= *Lebeckia pungens* Thunb.) Rigid, many-branched, almost leafless, pungent shrub, up to 2.5 m tall, sericeous. Leaves unifoliolate, petiole up to 3 mm long, leaflet obovate to oblong. Flowers 4–10, in rigid spine-tipped racemes, yellow, calyx shortly hairy, lobes short and broad, standard pilose along dorsal midrib. Pod laterally compressed, slightly falcate, densely tomentose. Sept.–Dec. Rocky soil, TS, CCR (Laingsburg near Matjiesfontein, to Swartberg Mountains, Klaarstroom and near Uniondale). **(gce)**

spinescens (Harv.) Boatwr. & B.-E.van Wyk (= *Lebeckia spinescens* Harv.) Erect to spreading, thorny shrub, up to 1 m tall. Leaves 3-foliolate, petiole 6–25 mm long, leaflets linear to spathulate, sericeous. Flowers few to many in short racemes, yellow, calyx sericeous, standard sericeous on back. Pod linear or falcate, laterally compressed, sericeous or glabrous with a hairy upper suture. Oct.–May. Sandy soil, dunes and roadsides, SN (southern Namibia, N, W and E Cape).

A.' Unarmed shrubs; pods semi-terete

angustifolia (E.Mey.) Boatwr. & B.-E.van Wyk (= *Lebeckia multiflora* E.Mey.) (including **Lebeckia parvifolia** (Schinz) Harms) Erect to spreading, divaricately-branched shrub, up to 2 m tall. Leaves 3-foliolate, petiole 8–45 mm long, often as wide as linear to linear-lanceolate leaflets, with thick, silvery, silky hair-covering. Flowers many, in long racemes, pale or lemon yellow, calyx hairy, standard partially hairy on back. Pod linear, semi-terete, sericeous. Jan.–Nov. Sandveld, Richtersveld and strandveld, SN, G, NS, NH, KV, CCR (Walvis Bay to Langebaan). **(gce)**

cinerea (E.Mey.) Boatwr. & B.-E.van Wyk (= *Lebeckia cinerea* E.Mey. Rigid shrub, up to 1.5 m tall, branches longitudinally grooved, with a grey felt-like covering. Leaves 3-foliolate, petiole 3–14 mm long, leaflets oblanceolate to narrowly obovate, hairy. Flowers 5–30, in lax racemes, pale yellow, calyx silky, standard abruptly reflexed at base, silky-backed. Pod linear, semi-terete, densely tomentose. May–Nov. In sand, SN, G, NS, CCR (Kovis Mountains through Richtersveld to Clanwilliam). **(gce)**

halenbergensis (Merxm. & A.Schreib.) Boatwr. & B.-E.van Wyk (= *Lebeckia halenbergensis* Merxm. & A.Schreib.) Green, nearly glabrous or lightly pubescent shrub, up to 1.5 m tall. Leaves 3-foliolate, petiole 10–40 mm long, leaflets mostly linear. Flowers many, in long racemes, yellow, calyx pilose to glabrescent, standard hairy along middle of back. Pod linear, semi-terete, glabrous. Mar.–Nov. In sandy loam, water courses or disturbed roadsides, SN, G, NS, NH (southern Namibia: Haalenberg E of Lüderitz, S to near Garies). **(ece)**

linearifolia (E.Mey.) Boatwr. & B.-E.van Wyk (= *Lebeckia linearifolia* E.Mey.) Erect or virgate shrub, up to 3 m tall, entirely covered with short, appressed to ± spreading, silvery grey hairs, stems longitudinally grooved. Leaves simple, petiole absent, leaflet linear to narrowly ovate, upper surface channelled, apex acuminate. Flowers 4–12, in lax racemes on short lateral branches, yellow, lined purplish to brownish pale red, calyx and standard silky. Pod straight, sericeous, somewhat constricted between seeds. Jan.–Nov. Alluvial soils and dunes, SN, G (Sanitatas to Sperrgebiet, lower Gariep Valley, Kgalagadi and N Cape).

lotononoides (Schltr.) Boatwr. & B.-E.van Wyk (= *Lebeckia lotononoides* Schltr.) Multi-stemmed, decumbent shrub, up to 0.5 m tall, with buried stems. Leaves 3(5)-foliolate, 1-sided on branches, petiole 10–23 mm long, leaflets ± narrowly oblanceolate, conduplicate, silky-hairy. Flowers (3)4–14, in short racemes, yellow, calyx pubescent, standard pilose along midrib on back. Pod straight, narrowly oblong, semi-terete, sericeous. July–Nov. Well-drained coastal sands, NS, NH (Hondeklipbaai to Nuwerus and Brand-se-Baai). **(ece)**

sericea (Thunb.) Boatwr. & B.-E.van Wyk (= *Lebeckia sericea* Thunb.) SILVER-PEA, VAALERTJIEBOS Rounded, silvery grey shrub, up to 1.5 m tall or a small tree, 2–3 m tall. Leaves 3-foliolate, petiole 10–55 mm long, occasionally flattened, leaflets elliptic to narrowly oblanceolate, sericeous. Flowers few to many, in slender racemes, pale to deep yellow, occasionally tinged with purple, calyx sericeous, standard pilose on midline of back. Pod linear, semi-terete, sericeous. May–Oct. Usually on sandy soil, granite, rocky slopes or disturbed roadsides, G, NS, NH, KB, KV, CCR (Richtersveld to Clanwilliam). **(gce)**

sp. A Virgate shrub, up to 1.2 m tall, branch tips and raceme axis often spiny, young shoots with a thick, spreading, whitish grey hair-covering, glabrous when mature, pale yellowish brown and grooved to ± 4-angled. Leaves undivided, petiole absent, leaflet elliptic to ovate, with short, soft hair-covering. Flowers 3–8 in lax racemes, pale yellow, often tinged bluish or almost green, calyx silky, standard densely silky. Pod linear, semi-terete, tomentose. Mar.–Oct. Dunes or sandy soil, SN (Sperrgebiet, Koichab to Aus). **(ece)**

CROTALARIA GEELKEURTJIE ± 690 spp., mostly Africa and Madagascar, tropics and subtropics

colorata Schinz Erect, perennial herb or small shrub, 0.3–0.6 m tall, stems and leaves silvery grey-hairy, roots yellow. Leaves 3-foliolate, leaflets obovate, 1–3.5 mm long, petiole slightly thickened, grooved. Flowers 16–30, in racemes, bright yellow, standard hairy on middle of back, keel rounded with a short, twisted beak. Pod shortly stalked, oblong-elliptic, densely hairy. Sept.–Oct. (–Jan.). In sand, often along roadsides, SN, G (Swakopmund S to Gariep Valley and SE Namibia).

excisa (Thunb.) Baker f. Sprawling perennial, stems slender, 0.1–0.25 m long, from a woody rootstock, mature vegetative parts hairy. Leaves 3-foliolate, leaflets oblanceolate, elliptic or obovate, 6–18(–25) mm long, petioles long. Flowers 1 or 2(–4), on slender peduncles, large, up to 20 mm long, golden-yellow, standard usually longer than broad, glabrous on back, keel 9–14 mm long and abruptly rounded below middle, with an obliquely projecting twisted beak. Pod shortly stalked, oblong-club-shaped, 20–25 mm long. Aug.–Oct. Rock outcrops or sandy flats, NS, NH, KB, KV, CCR (northern Namaqualand to Malmesbury). **(gce)**

humilis Eckl. & Zeyh. Like **C. excisa** but an annual, without a woody rootstock, rachis with a conspicuous setaceous extension beyond last flower, flowers 2–6(10), standard broader than long, and keel 7–9 mm long and rounded beyond middle, with an upwardly directed beak. Sept.–Oct. Sandy places, G, NS, NH, KV, CCR (Richtersveld to Olifants River Valley). **(gce)**

meyeriana Steud. Low, spreading perennial, stems many, 0.1–0.3(–0.4) m long, mature vegetative parts with dense, long, soft, spreading hairs. Leaves 3-foliolate, leaflets elliptic-obovate, 8–20 mm long. Flowers 6–16, in lax racemes, yellow, standard reddish brown-veined, hairy along midrib of back, keel abruptly rounded slightly below middle, with a straight twisted beak. Pod ± sessile, oblong-elliptic. May–Oct. In sand often near rocks, SN, G (Lüderitz to Richtersveld along Gariep Valley). **(ece)**

pearsonii Baker f. Erect perennial, 0.3–0.4 m tall, mature vegetative parts hairy. Leaves 3-foliolate, leaflets elliptic to obovate, 10–28 mm long, slightly thickened, hairy below. Flowers 8–16, in lax racemes, pale yellow, standard obovate, brown-veined, hairy along midrib of back, keel strongly rounded slightly below middle with a nearly straight, twisted beak. Pod stalked, oblong-club-shaped, 18–35 mm long. Aug.–Sept. Stony slopes, G (S banks of lower Gariep Valley). **(ece)**

CULLEN BLUE CLOVER, BLOUKLAWER ± 34 spp., mostly NW Australia, also Old World tropics and subtropics, 1 sp. endemic to southern Africa

sp. A Prostrate, silvery white-haired, aromatic shrublet, stems up to 1 m long, with rooting runners. Leaves 3-foliolate, leaflets small, obovate, glandular, densely hairy. Flowers 2 or 3 per head, on axillary peduncles, petals purple, only slightly protruding from calyx. Pod reniform-elliptic, densely white-hairy. July–Jan. On seasonally damp flats, KV, TS (through semi-arid interior of southern Africa).

EUCHLORA (= *LOTONONIS* in part) 1 sp., N Cape and W Cape **(gce)**

hirsuta (Thunb.) Druce (= *Lotononis hirsuta* (Thunb.) D.Dietr.) Geophytic perennial, stems slender, up to 0.25 m long, resprouting from large woody rootstock. Leaves usually simple and sessile below, but occasionally 3-foliolate on upper parts, softly hairy. Flowers many, clustered on a ± long slender peduncle, yellow, veined brownish purple on standard, calyx lobes ± equal. Pod oblong, large, strongly inflated laterally, upper suture warty. June–Oct. Sandy or clay flats, NH, WM, CCR (near Kamieskroon to Bokkeveld Plateau and SW Cape, and form with most leaves 3-foliolate from Roggeveld). **(gce)**

INDIGASTRUM 9 spp., Africa, 1 weedy sp. widespread in Palaeotropics to Australia

A. At least some leaves more than 3-foliolate

argyraeum (Eckl. & Zeyh.) Schrire Occasionally woody, mat-forming annual, up to 0.5 m tall, greyish with densely appressed, strigose hairs. Leaves 3–5-foliolate, leaflets alternate, terminal leaflet obovate. Flowers in congested axillary racemes, ± equal to or shorter than subtending leaf, pink, stamens exceeding the lanceolate-lobed calyx. Aug.–June. Open sandy or stony areas, often on limestone, TS (widespread in N Cape to southern Free State, Lesotho, NW KwaZulu-Natal and E Cape).

sp. A (allied to **I. argyraeum** (Eckl. & Zeyh.) Schrire) Annual, with mat-forming stems, covering of appressed strigose hairs. Leaves 3–5(7)-foliolate, leaflets alternate, terminal leaflet obovate. Flowers in congested axillary racemes, shorter than to ± equal to subtending leaf, pink, stamens shorter than or equal to the subulate-lobed calyx. Nov.–May. Sandy plains or dry riverbeds, sometimes on calcareous soils, SN, G (widespread in southern half of Namibia to Richtersveld and Gordonia).

A.' Leaves 1–3-foliolate

argyroides (E.Mey.) Schrire Annual, 0.2–0.5 m tall, stems prostrate, covering of appressed strigose hairs. Leaves unifoliolate or pinnately 2- or 3-foliolate with lateral leaflets subopposite to alternate, terminal leaflet broadly rhomboid-obovate to orbicular. Flowers in congested axillary racemes, shorter than to ± equal to the subtending leaf, purplish, stamens ± as long as calyx. Sept.–May. Alluvial sands, dry riverbeds and open stony areas, SN, G (Namibia through to Sperrgebiet and Richtersveld).

candidissimum (Dinter) Schrire Perennial, cushion-forming, dwarf shrub, up to 0.5 m tall, conspicuously silvery white to greenish yellow with appressed strigose hairs entirely covering most surfaces. Leaves 1-foliolate, petioles up to 40 mm long, thickened, stiffly erect, leaflets ovate to elliptic-lanceo-

late, apex acute to obtuse. Flowers in congested axillary racemes, shorter than subtending leaf, pink, stamens longer than calyx. July–Nov. Open sandy or rocky areas, often on limestone, G (highlands from central Namibia through to Witpütz on southern Namibian Escarpment).

INDIGOFERA ± 750 spp., pantropical

A. Leaves not unifoliolate, leaflets alternate
B. Upper surface of leaflets clearly visible beneath the sparse hair-covering

exigua Eckl. & Zeyh. Perennial, decumbent, multi-stemmed herb, 0.2–0.5 m tall. Leaves 5–11-foliolate. Flowers few, in racemes with rachis shorter than the 30–55(70) mm long peduncle, pink to purple, stamens up to 5 mm long, ± equal to or exceeding the triangular to lanceolate-lobed calyx. July–Sept. Sandy flats, SN, G, NS, NH, KV, CCR (southern Namibia through to Bokkeveld Mountains). **(gce)**

B.' Upper surface of leaflets largely obscured by the dense indumentum

auricoma E.Mey. Annual or perennial, prostrate to spreading, multi-stemmed herb, 0.1–0.5 m tall, hair-covering strigose. Leaves 4–11-foliolate, (15) 30–60 mm long, with terminal leaflet (9)10–30 × 3–16 mm, stipules subulate 3–6 mm long, leaflets elliptic, apex acute to obtuse, upper surface frequently greenish yellow-strigose. Flowers purplish red, stamens ± equal to or exceeding calyx. July–May. Granite plains, dry water courses and sandy areas, SN, G (widespread in Namibia through to Richtersveld and Gordonia).

hololeuca Benth. ex Harv. Annual, 0.2–0.5 m tall, with decumbent stems. Leaves 7–9-folioliate, 15–25(30) mm long, with terminal leaflet 3–9(10) × 2–5 mm, stipules subulate, 1–2(3) mm long, leaflets narrowly to broadly obovate, apex rounded, upper surface silvery grey-strigose. Flowers reddish, stamens shorter than or ± equal to calyx. July–May. Sandy flats and dry riverbeds, SN, G (southern Namibia, Richtersveld and along lower Gariep Valley). **(ece)**

sp. A. (allied to **I. maritima** Baker from coastal southern Angola) Annual or ?perennial herb, 0.2–0.5 m tall, stems prostrate, hair-covering densely white-silky strigose. Leaves 5–7-foliolate, leaflets with long, unequally 2-branched hairs on upper surface at ± 45° to midrib (hairs ± matted above and not aligned in one direction in **I. maritima** sensu stricto). Flowers in racemes ± equal to or twice as long as subtending leaf, magenta, calyx ± 5–6 mm long, lobes plumose setaceous, much longer than tube (calyx 3–4.5 mm long, with lobes lanceolate-subulate in **I. maritima**); style ± 3 mm long (2–2.5 mm long in **I. maritima**). Sept.–Jan. Arid gravel plains, shale hills and dry water beds, G (lower Gariep Valley). **(ece)**

A.' Leaves unifoliolate or leaflets opposite
C. Leaves pinnately 3–15-foliolate
D. Most plant surfaces covered with minute, erect, multicellular, gland-tipped hairs

adenocarpa E.Mey. Prostrate to erect, many-stemmed, greyish white, dwarf shrub, up to 1 m tall, covering on all parts of dense, appressed, strigose hairs and minute, translucent, erect, gland-tipped, multicellular hairs. Leaves pinnately 5–9-foliolate, leaflets obovate, apex obtuse. Flowers many, in lax, arching to erect racemes much longer than subtending leaves, red, calyx slightly shorter than stamens, lobes lanceolate, ± equal to or twice as long as tube, standard spreading pubescent on back. June–Sept. Dry alluvial washes, in coarse sand and gravel, G (lower Gariep Valley and Mountains). **(ece)**

D.' Plant surfaces without gland-tipped hairs

amoena Aiton (= *I. intermedia* Harv.) Robust, suberect to sprawling, resprouting, woody herb or shrub, up to 1 m tall. Leaves pinnately 3-foliolate, leaflets elliptic-oblong or obovate, thinly hairy. Flowers in long-pedunculate racemes, pink, magenta or rose, calyx shorter than stamens, lobes triangular to broadly linear-lanceolate, ± equal to or twice as long as tube, standard glabrous on back, keel apex beak-like. July–Oct. Sandy flats and rocky areas, NH, KV, CCR (from near Bitterfontein to Piketberg). **(gce)**

merxmuelleri A.Schreib. Rigid, divaricately branched, woody shrub, up to 0.5 m tall, stems becoming spine-tipped, young growth on short shoots, densely appressed silvery strigose. Leaves pinnately 11–15-foliolate, small, shortly petiolate, leaflets opposite, minute, conduplicate, thickened. Flowers few in racemes, red, calyx densely appressed-strigose, shorter than stamens, lobes triangular, shorter than to ± as long as tube. Sept. Rocky and sandy areas, often on limestone, G (southern Namibian Escarpment: Witpütz area). **(ece)**

sp. B (in Section *Olygophyllae*) Woody, rigid, divaricately much-branched shrub, 1–2 m tall, branches often exfoliating in longitudinal strips, tips spinescent. Leaves pinnately 3–5-foliolate, ± clustered on woody short shoots, leaflets glaucous, more than twice as long as wide, elliptic-oblong to oblanceolate, apex acute to obtuse, both surfaces sparsely strigose. Flowers in pedunculate racemes, pink, calyx densely minutely strigose to pubescent, shorter than stamens, lobes triangular, shorter than tube, standard pubescent on back, keel apex beak-like, ovary strigose. May–July. Rocky places, KV (Klawer District). **(ece)**

sp. C (in Section *Olygophyllae*) Woody, rigid, divaricately much-branched shrub, up to 1 m tall, branches often exfoliating in longitudinal strips, tips spinescent, young branches geniculate, often conspicuously orange-brown. Leaves pinnately 3–9 foliolate, stipules recurved, spinescent, leaflets glaucous, sub-crassulaceous, ± twice as long as wide, obovate to elliptic, apex rounded to notched, sparsely strigose on both surfaces. Flowers in shortly pedunculate racemes, ?colour, calyx appressed-strigose, shorter than stamens, lobes triangular-lanceolate, ± as long as tube. Pod glabrescent. ?May–?July (fruiting Aug.–Sept.). Montane shrublands, G, NH (from Richtersveld to Spektakel Pass near Springbok). **(ece)**

sp. D (in Section *Digitatae*) Prostrate to decumbent annual, 0.1–0.3 m tall, stem covering of dense, appressed, strigose hairs. Leaves pinnately 3-foliolate, leaflets obovate to oblong, densely strigose beneath, more sparsely so above. Flowers in racemes on peduncles shorter than to ± as long as subtending leaves, red, calyx ± equal to stamens, lobes lanceolate, ± as long as tube, standard sparsely strigose to glabrous on back. Pod laterally compressed, densely strigose, reflexed. June–Sept. Open sandy areas and dry riverbeds, SN, G (Lüderitz region to Richtersveld). **(ece)**

C.' Leaves one or digitately 3–5-foliolate

hantamensis Diels Woody, prostrate to mat-forming, dwarf shrub, stems and leaves densely grey-silky strigose with spreading, ± unequally 2-branched hairs. Leaves digitately 3-foliolate, petiole 1–8(10) mm long, leaflets obcordate, often conduplicate, apex notched. Flowers in shortly pedunculate racemes, deep pink, calyx sericeous, shorter than stamens, lobes lanceolate, ± equal to twice as long as tube, standard with a hairy midline on back. June–Jan. On mountains and scree slopes, WM (Hantamsberg, Keiskieberg and Roggeveld Mountains). **(ece)**

limosa L.Bolus Slender annual, 0.1–0.4 m tall, with diffuse filiform branches, hair-covering strigose. Leaves digitately 3–5-foliolate, leaflets obovate. Flowers several, in lax racemes on filiform peduncles up to ± 60 mm long, purple-pink, calyx shorter than ± 5 mm long stamens, with lanceolate lobes 2 or more times longer than tube, standard strigose on back. Jan. In marshy ground, KB (Kamiesberg Mountains: Leliefontein). **(ece)**

meyeriana Eckl. & Zeyh. Densely many-stemmed, prostrate to decumbent dwarf or scrambling shrub, up to 1 m tall, stems angular, ridged, ± densely greyish strigose, with appressed equally 2-branched hairs. Leaves digitately 3-foliolate, leaflets obcordate, obovate to elliptic, sometimes conduplicate. Flowers in short- to long-pedunculate racemes, pink to purple, calyx densely greyish strigose, shorter than stamens, lobes triangular to lanceolate, ± equal to or twice as long as tube, standard with scattered appressed hairs on back, keel apex acute to apiculate. June–Nov. Sandy to stony areas, NS, NH, KB, KV, WM, TS, CCR (widespread from near Springbok through to SW Cape and Great Karoo).

nudicaulis E.Mey. Many-branched, green-stemmed shrub, 1–2 m tall, branches flexuous, striate with pale parallel ribs, densely and minutely greyish strigose. Leaves unifoliolate, few, distant, linear to narrowly obovate, often conduplicate, apex recurved. Flowers in shortly pedunculate racemes, pink, calyx densely greyish strigose, much shorter than stamens, lobes triangular-ovate, shorter than to ± equal to tube, standard densely silky strigose on back. Sandy or rocky areas, SN, G (lower Gariep Valley). **(ece)**

obcordata Eckl. & Zeyh. Rigid, divaricately branched, woody shrub, up to 0.5(1) m tall, hair-covering appressed-strigose, greyish. Leaves scattered, unifoliolate or digitately 3-foliolate, leaflets subsessile, broadly obcordate to narrowly obovate, often conduplicate, apex notched. Flowers

in subsessile racemes, red, calyx shorter than stamens, lobes triangular to lanceolate, ± as long as tube. June–Dec. Sandy or stony places, TS, CCR (Laingsburg to Swartberg Mountains). **(gce)**

pungens E.Mey. Rounded, spinescent, bushy shrub, up to 1 m tall, stems woody below, rigid, divaricately branched, terete and green, greyish strigose above. Leaves few, digitately 3-foliolate, leaflets obovate-oblong. Flowers in subsessile to shortly pedunculate, stiffly ascending axillary racemes, red, calyx densely strigose, shorter than stamens, lobes subulate, ± as long as tube, standard densely strigose on back. Pod laterally compressed. May–Oct. Dry riverbeds and open sandy areas, often near granite and quartzite outcrops, SN, G (southern Namibia, Richtersveld and along lower Gariep Valley). **(ece)**

sp. E (in Section *Digitatae*) Diminutive, many-stemmed, prostrate to decumbent dwarf shrub, stems very slender, diffuse, branches filiform, appressed-strigose. Leaves small, digitately 3-foliolate, leaflets broadly obovate to obcordate, often conduplicate, apex rounded to notched, terminal leaflet 1.5–6 mm long. Flowers in long-pedunculate racemes, much exceeding leaves, pink to purple, calyx shorter than stamens, lobes triangular-lanceolate, ± as long as tube, standard with a midline of appressed hairs on back. Nov.–Dec. Mountain slopes, KB (Kamiesberg Mountains). **(ece)**

sp. F (in Section *Digitatae*) Woody-based, prostrate to decumbent dwarf shrub, stems with strigose appressed or spreading hairs. Leaves digitately 3-foliolate, petioles compressed, leaflets obovate to elliptic, apex acute to obtuse (if rounded then leaflets longer than 6 mm), terminal leaflet (at least of larger leaves) > 6 mm long. Flowers in long-pedunculate racemes, much exceeding leaves, pink to purple, calyx slightly shorter or ± equal to stamens, lobes lanceolate, up to twice as long as tube, standard sparsely strigose or glabrescent on back. Oct. Montane habitats, WM (Roggeveld, Klein Roggeveld and Nuweveld Mountains). **(ece)**

sp. G (allied to **I. nigromontana** Eckl. & Zeyh. from CCR to eastern Free State and western Lesotho) Woody, rigid, divaricately much-branched shrub, 0.5–2 m tall, branches often exfoliating in longitudinal strips, tips spinescent. Leaves digitately 3-foliolate, ± clustered on woody short shoots, leaflets minute, elliptic-oblong to obovate, subacute, concave or keeled, thick, with rounded ± prominent margins, both surfaces strigose. Flowers few, in subsessile racemes, pink, calyx minutely appressed-strigose to appressed-pubescent (vs. spreading pubescent to tomentose), shorter than stamens, lobes triangular, shorter than to ± as long as tube, standard minutely appressed-strigose on back (vs. spreading pubescent), ovary strigose (vs. glabrous). June–Nov. Granite hills, ?G, NH, KB (uplands from Steinkopf region to Kamiesberg Mountains). **(ece)**

LEBECKIA GANNA 14 spp., Greater Cape Region **(gce)**

ambigua E.Mey. Erect subshrub, up to 0.8 m tall, with large underground lignotuber. Leaves simple, terete, usually 1-sided on branches, articulated near middle, glabrous. Flowers usually many, in long, slender racemes, yellow, glabrous. Pod thin-walled, falcate to linear, slender, dehiscent. Aug.–Dec. Sandy soils, NS, CCR (W of Komaggas, Brand-se-Baai to Bokkeveld Mountains and Langebaan). **(gce)**

pauciflora Eckl. & Zeyh. Suberect or decumbent subshrub, up to 1 m tall. Leaves simple, terete, usually 1-sided on branches, articulated near middle (western populations), glabrous. Flowers numerous in terminal racemes, yellow with purple streaking on standard, glabrous; keel spirally twisted. Pod thin-walled, linear, relatively long, dehiscent. Aug.–Jan. Sandy to rocky soils, KB, WM, CCR (Kamiesberg Mountains to SW Cape to Steytlerville). **(gce)**

LEOBORDEA (= *LOTONONIS* in part) 51 spp., southern and tropical Africa, also the Mediterranean and Eurasia

anthylloides (Harv.) B.-E.van Wyk & Boatwr. (= *Lotononis anthylloides* Harv.) Like **L. pentaphylla** but leaves 3-foliate, inflorescences > 22 mm across (vs. < 20 mm across), flowers 10 mm or more long (vs. < 10 mm long), and bracts large, lanceolate to broadly ovate. Aug.–Sept. Rocky slopes, NH (Steinkopf to Spektakel Pass). **(ece)**

benthamiana (Dummer) B.-E.van Wyk & Boatwr. (= *Lotononis benthamiana* Dummer) Prostrate shrub or shrublet, up to 0.15 m tall**,** woody basally. Leaves mainly 5-foliolate, leaflets oblanceolate to obovate, minutely hairy, petioles long, slender. Flowers 1–4, in congested racemes, yellow, calyx with upper and lateral lobes fused high up, minutely hairy to densely silky, petals ± glabrous, keel very broad. Pod distinctly stalked, oblong-obovate, slightly inflated, short. Nov. Cracks in granite rocks, NH (uplands near Steinkopf and Springbok). **(ece)**

digitata (Harv.) B.-E.van Wyk & Boatwr. (= *Lotononis digitata* Harv.) Prostrate shrublet, up to 0.4 m across, woody basally. Leaves mainly 5-foliolate, ± glabrous, leaflets linear. Flowers 1–4, in short congested racemes, yellow, calyx lobes long, narrow, upper and lateral pairs fused high up, minutely hairy to densely silky, back of standard sometimes minutely hairy on midrib. Pod stalked, linear, distinctly falcate, compressed. Aug.–Sept. Karroid scrub, renosterveld, NH, KB, CCR (Namaqualand and Kouga Mountains). **(gce)**

longiflora (Bolus) B.-E.van Wyk & Boatwr. (= *Lotononis longiflora* Bolus) Prostrate shrublet, stems up to 0.2 m long, base thick, woody. Leaves mainly 5-foliolate, petioles long, slender, leaflets oblanceolate to obovate, often densely silvery-silky. Flowers 1–4, in racemes, yellow, large and showy, calyx with upper and lateral lobes fused high up, standard much shorter than large, apically pointed keel. ?Pod. Sept.–Oct. Granite rocks, G, NH (uplands from near Steinkopf to near Garies). **(ece)**

magnifica (B.-E.van Wyk) B.-E.van Wyk & Boatwr. (= *Lotononis magnifica* B.-E.van Wyk) Like **L. quinata** but larger and more woody, leaflets densely silvery-silky on undersurface (vs. glabrescent), and flowers larger, (10–)15–20 mm long (vs. < 12 mm long). Oct. Soil pockets on granite, KB (Kamiesberg Mountains). **(ece)**

pentaphylla (E.Mey.) B.-E.van Wyk & Boatwr. (= *Lotononis pentaphylla* E.Mey.) Short-lived, densely hairy, prostrate annual, with stems up to 0.25 m long. Leaves mostly 5-foliolate, leaflets oblanceolate to broadly obovate, sparsely hairy or glabrous below. Flowers many, in globose heads, yellow to cream-coloured, bracts inconspicuous, calyx much-inflated, densely hairy, standard usually hairy on back. Pod minute, membranous, indehiscent, enclosed by calyx. Aug.–Oct. Dry stony soils, G, NH, KV (N of Steinkopf through Namaqualand to near Klawer). **(ece)**

plicata (B.-E.van Wyk) B.-E.van Wyk & Boatwr. (= *Lotononis plicata* B.-E.van Wyk) Like **L. digitata** but leaflets oblong to narrowly oblanceolate (not linear), flower slightly smaller, 9–10 mm long (not > 12 mm long), standard more hairy, and pod twisted and folded. Sept. On rocks, NH (SE of Bitterfontein). **(ece)**

polycephala (E.Mey.) B.-E.van Wyk & Boatwr. (= *Lotononis polycephala* (E.Mey.) Benth.) Robust, densely hairy, short-lived annual, with stems up to 0.2 m long. Leaves 3-foliolate, leaflets oblanceolate to broadly obovate, densely silky. Flowers many, in dense globose or elongated heads, yellow, ± 10 mm long**,** bracts large, leaf-like, calyx much-inflated, densely hairy, standard and keel densely hairy. Pod minute, membranous, indehiscent, enclosed by much-inflated calyx. Oct.–Nov. Granite derived soils, KB (Kamiesberg Mountains). **(ece)**

quinata (Thunb.) B.-E.van Wyk & Boatwr. (= *Lotononis quinata* (Thunb.) Benth.) Prostrate, mat-forming shrublet, stems up to 0.1 m long, basally thick and woody, ± glabrous to minutely hairy or densely silky. Leaves mainly 5-foliolate, on long slender petioles, leaflets narrowly linear, glabrescent with age. Flowers 1–4, in short congested racemes, yellow, calyx with upper and lateral lobes fused high up, standard glabrous or minutely hairy along midline of back. Pod stalked, oblong, slightly inflated. July–Sept. Cracks in granite rocks, NH, KB (Kamiesberg Mountains and surrounding uplands). **(ece)**

LESSERTIA BALLOON PEA, BLAAS-ERTJIE ± 55 spp., southern and tropical E Africa

A. Flowers red, 25–35 mm long

frutescens (L.) Goldblatt & J.C.Manning (= *Sutherlandia frutescens* (L.) R.Br.) (including **Sutherlandia humilis** E.Phillips & R.A.Dyer, **S. microphylla** Burch. ex DC.) CANCER BUSH, KALKOENTJIES, KANKERBOS, SCARLET BALLOON PEA Erect or sprawling shrublet, 0.3–1 m tall. Leaves pinnately 13–21-foliolate, leaflets oblong, variable in size, mostly thinly hairy above. Flowers few to many, in short axillary racemes, showy, bright red. Pod stalked, greatly inflated, glabrous, papery. July–Dec. Wide variety of habitats, often disturbed areas, SN, G, NS, NH, KB, KV, WM, TS, CCR (widespread throughout South Africa).

A.' Flowers pinkish, mauve to red or white, up to 15 mm long
B. Pod mostly parallel-sided, linear to oblong in outline, usually more than twice as long as wide, varying from straight to slightly or markedly curved or ring-shaped

annularis Burch. Prostrate or sprawling, resprouting herb, up to 0.5 m tall. Leaves pinnately 13–21-foliolate, leaflets oblong-obovate, appressed hairy on undersurface. Flowers crowded on

peduncles shorter than leaves, whitish with mauve markings. Pods narrowly oblong, compressed, strongly arched into a semi-circle or ring, papery, appressed-hairy. July–Oct. Sandy to rocky soils, SN, TS, CCR (Namibia through to Tanqua Karoo, Little Karoo, Great Karoo and Free State).

eremicola Dinter Decumbent-stemmed subshrub, up to 0.6 m tall, with woody taproot. Stems with slightly zigzagged internodes up to 45 mm long. Leaves pinnately 9–15(19)-foliolate, leaflets linear-oblong, appressed-hairy on undersurface. Flowers few, clustered near ends of racemose inflorescences with axis shorter than leaves, cream-coloured with pink tips. Pod straight, appressed hairy, ± darkly speckled. Aug.–Sept. Sandy plains, SN (Sperrgebiet near Haalenberg and Klinghardt Mountains). **(ece)**

falciformis DC. Decumbent, perennial herb, with trailing stems up to 0.4 m long, from a long, woody taproot. Leaves pinnately 9–17-foliolate, leaflets linear-oblong, with white hairs on undersurface. Flowers 3–6, on inflorescence shorter than leaves, pink or purplish. Pod falcate to ± straight, shortly stalked and narrowed at base, papery. Aug.–Sept. (in W), Jan.–Feb. (in E). In open, often disturbed seasonally dry habitats, NH, KV, WM (Namibia, Botswana and Zimbabwe to Namaqualand, Calvinia and Roggeveld Escarpment).

schlechteri L.Bolus (including **L. pauciflora** var. **canescens** Harv.) Like **L. eremicola** but leaflets closely set, oblong-obovate, with margins rolled in, and pod hardly curved, ± oblong, compressed, thinly strigose, at length nearly glabrous, conspicuously darkly blotched. (Jan.–)Mar.–July. Hill slopes, NH, KV, WM (hills near Bitterfontein, Soutrivier to near Loeriesfontein and SW of Calvinia). **(ece)**

B.' Pod with sides converging ± evenly from middle to base and apex, usually less than twice as long as wide, oblique-ovate to broadly ovate and often gibbous in outline

C. Plants with leaf rachis or inflorescence axis becoming ± spine-tipped

acanthorhachis (Dinter) Dinter Woody shrub, up to 1 m tall, stems straw-coloured, long shoots outwardly curved and ± spine-tipped, axillary short shoots not thorny. Leaves imparipinnate, leaflets covered with felt-like, whitish grey hairs. Flowers few per inflorescence with a short axis, ?pink. Pod small, obovate, inflated, thickly white-haired. June–Sept. Amongst rocks, SN (Sperrgebiet from Rotkuppe and Pomona to Klinghardt Mountains). **(ece)**

fruticosa Lindl. Shrublet, up to 0.5 m tall. Leaves pinnately ± 13-foliolate, leaflets oblong. Flowers on inflorescence with axis ± rigid, exceeding leaves and becoming softly spinescent, pink to purple, pedicels mostly black-haired. Pod obliquely broadly ovate, compressed near margins but subinflated centrally, mostly clearly veined. Aug.–Sept. Stony and sandy flats and slopes, G, NH (Richtersveld and northern Namaqualand). **(ece)**

meyeri Boatwr., T.Nkonki & B.-E.van Wyk Erect, thinly hairy, rigid shrub, up to 1.5 m tall. Leaves pinnately 8–22-foliolate, leaflets linear to linear-lanceolate. Flowers several per inflorescence with axis exceeding leaves, pink to purple. Pod obliquely elliptic to orbicular or falcate, compressed around margins and inflated near middle, papery. July–Nov. Sandy or rocky soil, granite, limestone, and tillite, NS, CCR (Namaqualand along coast to Cape Peninsula). **(gce)**

spinescens E.Mey. Rigid shrublet, up to 1 m tall. Like **L. fruticosa** but axis of inflorescence distinctly spinescent and shorter than leaves. Pod suborbicular and not obviously veined. July–Sept. Stony shale slopes and weathered granite, G, NH, CCR (southern Richtersveld through Namaqualand to Clanwilliam). **(gce)**

C.' Plants not spiny

brachypus Harv. Spreading or erect shrub, up to 1 m tall, minutely white-haired. Leaves pinnately 9–11-foliolate, leaflets elliptic-obovate, mucronate, sparsely hairy on undersurface. Flowers 6–8 per inflorescence with axis shorter than leaves, cream-coloured and purple. Pod obliquely ovate-oblong, compressed, glabrous, papery. July–Aug. Hillsides and mountain slopes, G, NS, NH, WM, TS (Richtersveld Mountains through to northern Namaqualand, Roggeveld Escarpment and eastern Tanqua Karoo). **(ece)**

capitata E.Mey. Decumbent, softly white-haired herb, up to 0.3 m tall, branches trailing from a woody rootstock. Leaves pinnately 15–19-foliolate, leaflets closely set, oblong, both surfaces with spreading hairs. Flowers few per capitate inflorescence with peduncle exceeding leaves, mauve, calyx black-haired. Pod ± obovate, inflated, glabrous, papery, usually obviously veined, shortly beaked. Aug.–Sept. Open sandy places, NH, KB (Spektakelberg to Kamiesberg Mountains). **(ece)**

cryptantha Dinter Tufted annual, 150–200 mm tall, with numerous slender branches arising from a slender taproot. Leaves pinnately 3–5-foliolate, firm, suberect, leaflets narrowly linear, appressed hairy. Flowers 1 or 2 per inflorescence, held near ground level between leaf bases, ?pink. Pod small, irregularly rounded, glabrous. Aug.–Sept. ?Habitat, SN (Klinghardt Mountains). **(ece)**

diffusa R.Br. Softly hairy, sprawling herb, 0.2–0.45 m tall, from a slender taproot. Leaves pinnately 11–17-foliolate, leaflets closely set, oblong-cuneate. Flowers many, in an elongated, suberect inflorescence with axis exceeding leaves, purplish pink. Pod obliquely ovate, semi-lunate, compressed, purple- to red-veined, glabrous. Aug.–Sept. NS, NH, KB (Port Nolloth through to Groenrivier and Springbok to near Loeriesfontein). **(ece)**

globosa L.Bolus Sprawling subshrub, 300–500 mm tall. Leaves imparipinnately 9–21-foliolate, leaflets oblong, pilose beneath. Flowers 4–12, congested on peduncles very much shorter than leaves, white and purple. Pods subglobose, much inflated, papery, thinly adpressed-hairy. July–Sept. Sandy flats, NS, KV, CCR (Koingnaas to Langebaan). **(gce)**

herbacea (L.) Druce Sprawling herb, spreading from taproot, stems 0.3–0.5 m long, minutely bristly with appressed whitish hairs. Leaves distant, pinnately 11–19-foliolate, leaflets narrowly linear. Flowers in ± loose, elongated inflorescences exceeding leaves, dull purple, calyx with blackish hairs. Pod broadly obovate, slightly gibbous, compressed, glabrous, faintly veined, papery, narrowed towards base. Sept.–Dec. Flats and lower slopes TS, CCR (Bokkeveld Escarpment to near Matjiesfontein and SW Cape). **(gce)**

incana Schinz Shrub or undershrub, up to 0.6 m tall, with a thick to ± sparse, whitish to pale grey hair-covering. Leaves pinnately 7–13-foliolate, leaflets obovate to ± wedge-shaped, appressed hairy on both surfaces. Flowers up to ± 12 per inflorescence with a ± rigid spiny axis, whitish and pink, calyx when young covered with blackish hairs. Pod narrowly ovate, glabrous, papery. (Sept.–)Nov.(–Feb.) In sand near rocks, SN, G, NH (Aus to Alexander Bay, Richtersveld and near Springbok). **(ece)**

inflata Harv. Small shrublet, ± 100–200 mm tall, with ± dense greyish hair-covering, rootstock woody. Leaves pinnately 8–10-foliolate, leaflets obovate, grey-hairy beneath. Flowers few, in inflorescences shorter than leaves, pink with purple keel. Pod inflated, ovate-subglobose, glabrous, translucent. Sept. In shaly soils, WM (Calvinia to Upper Karoo).

macrostachya DC. Undershrub, up to 1 m tall, from a woody taproot. Leaves pinnately (3)7–17-foliolate, leaflets oblong-elliptic to ovate, softly hairy on both surfaces. Flowers many, covering three quarters of inflorescence with axis 2–3 times as long as leaves, yellow-purple or violet. Pod flattened, ovate-elliptical, lightly hairy or glabrous, pale green, usually with small red or purple spots. Sept.–Nov. In sand, SN, G (Namibia, Kgalagadi and lower Gariep Valley).

rigida (Thunb.) DC. Erect, thinly hairy, twiggy shrub, up to 1.5 m tall. Leaves pinnately 13–17-foliolate, leaflets lanceolate to elliptic, with acuminate tips, almost glabrous. Flowers several per lax inflorescence with axis exceeding leaves, mauve-pink, pedicels elongating in fruit. Pod compressed, ovate-elliptical, narrowed and distinctly stalked at base, papery. July–Oct. Gentle slopes, WM (W of Calvinia and along Roggeveld Escarpment). **(ece)**

sp. A (including **L. macrostachya** var. **atomaria** Harv.) Semi-sprawling, small shrubs, up to 0.5 m tall. Leaves pinnately 11–15-foliolate, ± distant, leaflets oblong-obovate, sparsely hairy on undersurface. Flowers ± clustered near end of peduncle on inflorescences as long as to longer than leaves, purple to lilac. Pod elliptical, papery, blotched with purple. Aug.–Sept. In shale on S slopes, WM (around Calvinia). **(ece)**

[**Species excluded L. margaritacea** E.Mey. and **L. microcarpa** E.Mey. are poorly understood and possibly conspecific with one of the above.]

LOTONONIS 91 spp., mainly southern Africa, also tropical Africa

*A. Perennial herbs or small shrubs (see also **L. pungens** and **L. tenella**)*
B. Flowering stems resprouting annually from an underground rootstock

involucrata (P.J.Bergius) Benth. Geophytic perennial, with procumbent annual branches up to 0.1–0.3 m long, resprouting from a thick woody rootstock. Leaves mostly 3-foliolate (rarely 5-foliolate in SW Cape), leaflets oblanceolate to narrowly oblanceolate, hairy. Flowers few, clustered on a slender peduncle, yellow, with standard dark-veined, > 20 mm long, calyx with upper and lateral lobes fused high up. Pod ovoid to broadly oblong, strongly inflated laterally, upper suture warty. June–Oct. Sandy flats and slopes, KV, CCR (near Klawer to Bredasdorp). **(gce)**

B.' Flowering stems not resprouting annually from underground rootstock

acutiflora Benth. Prostrate, densely and minutely hairy, perennial herb, ± 0.1 m tall**,** with thick woody base. Leaves mainly 5-foliolate, leaflets linear to narrowly wedge-shaped. Flowers ± 8, clustered on peduncle ± as long as leaves, yellow, calyx with 4 large, triangular lobes much broader than lowermost, keel distinctly beaked. Pod shortly stalked, obovate, much inflated laterally. Nov. Granite derived soil, NH, KB (Kamiesberg Mountains and nearby uplands). **(ece)**

densa (Thunb.) Harv. Often robust, woody, silvery haired shrub, up to 0.6–1.2 m tall. Leaves 3-foliolate, leaflets linear to obovate, glabrous or sparsely hairy above. Flowers few, on a long slender peduncle, yellow, with standard conspicuously dark-veined, calyx with upper and lateral lobes fused high up. Pod ovoid to broadly oblong, much inflated, upper suture ± warty. July–Oct. Stony slopes, NH, KB, KV, CCR (uplands near Springbok, Kamiesberg Mountains, near Vanrhynsdorp and Bokkeveld Mountains to SW Cape). **(gce)**

maculata Dummer Prostrate, densely leafy, short-lived perennial, < 150 mm across. Leaves 3-foliolate, on slender petiole exceeding terminal leaflet, leaflets narrowly elliptic to oblanceolate, densely silky-strigillose. Flowers 1 per node, subsessile, yellow, calyx with lobes as long as tube. Pod obliquely ovate-orbicular, compressed, hardly exceeding calyx. Aug. Stony soil on calcrete, SN, G (Lüderitz area through to Witpütz and Upper Karoo).

mirabilis Dinter Mat-forming, densely leafy, dwarf shrublet, up to ± 0.2 m across, woody at base. Leaves 3-foliolate, leaflets ± wedge-shaped, folded, densely covered with silver silky hairs. Flowers 1 or 2, yellow, peduncle almost absent, standard densely pubescent, wings and keel hairy. Pod closely short-haired. Mar.–May. On rocks, SN (southern Namibia: Aus, Gubub). **(ece)**

mollis (E.Mey.) Benth. Prostrate shrublet, ± 70 mm tall, ± woody towards base, densely silky (including petals). Leaves 3-foliolate, petioles slender, much longer than leaflets, leaflets broadly oblanceolate, folded. Flowers 1–4(5), in short congested racemes, yellow, calyx with upper and lateral lobes fused high up, standard about as long as keel. Pod sessile, small and ovoid. Jan.–Feb. On granite, KB (Kamiesberg Mountains). **(ece)**

A.' Annual 3-foliolate herbs
*C. Flowers blue (see also **L. venosa**)*

maximiliani Schltr. ex De Wild. Sprawling annual, up to 0.8 m across, sparsely to densely hairy (except petals). Leaves 3-foliolate, leaflets obovate to oblanceolate. Flowers 1(2), on slender peduncle, blue, often cleistogamous, calyx lobes equal, long, narrowly triangular, keel short. Pod broadly oblong, slightly inflated laterally, upper suture warty. Sept.–Oct. Stony slopes, WM, TS, CCR (Loeriesfontein, Nieuwoudtville, Calvinia, to near Clanwilliam and through to Roggeveld Escarpment). **(gce)**

C.' Flowers yellow, sometimes partly white, pink, purple or brown

arenicola Schltr. Prostrate, densely silky, silvery-haired annual, up to 0.4 m across. Leaves 3-foliolate, leaflets obovate to obcordate, small, apex notched. Flower 1, not pedunculate, yellow, rarely orange or fading pinkish, calyx lobes narrowly triangular, lowermost narrowest, wings with some hairs along lower edge, keel beaked. Pod oblong, slightly inflated laterally. May–Sept. Sandy soils, NH (near Steinkopf to near Kamieskroon). **(ece)**

carnea B.-E.van Wyk Like **L. stenophylla** but smaller, spreading 0.2–0.6 m across, densely and silky-haired, peduncle shorter than length of flowers, flowers fading pinkish, and calyx lobes widened above base. Sept.–Oct. In sand near rocks, KB, CCR (Kamiesberg to Bokkeveld Mountains). **(gce)**

falcata (E.Mey.) Benth. Prostrate to erect annual, 0.1–0.3 m tall. Leaves 3-foliolate, leaflets linear to oblanceolate, with short appressed usually inconspicuous hairs. Flowers 1–3, shortly or not pedunculate, yellow, long, calyx lobes short, standard fiddle-shaped, keel often brown-tipped. Pod oblong to linear, often falcate, compressed, small or large. May–Sept. Sandy or clay soils, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to Olifants River Mountains to Sutherland and Central Karoo).

lenticula (E.Mey.) Benth. Prostrate, brittle, usually densely hairy annual, with opposite branches near base, up to 0.2 m long. Leaves 3-foliolate, leaflets oblanceolate to obovate. Flower 1, not pedunculate, yellow, calyx subequally lobed, keel distinctly beaked. Pod shortly oblong, slightly inflated, minutely hairy. Aug.–Oct. Karroid scrub, WM, TS (widespread in dry interior, Hantam to Free State and Willowmore).

leptoloba Bolus Like **L. maximiliani** but flowers yellow. Sept.–Oct. Stony or sandy slopes and flats, NS, NH, KV, WM, TS (Namaqualand to southern Karoo). **(ece)**

pachycarpa Dinter ex B.-E.van Wyk Small, divaricately branched annual, up to 0.1 m tall, densely and minutely silky-haired (except petals). Leaves 3-foliolate, leaflets oblanceolate to obovate. Flower 1, not pedunculate, yellow, calyx lobes subequal, short, lowermost narrowest, standard broadly fiddle-shaped, keel acute. Pod ovoid, much inflated laterally, small. Aug. ?Habitat, SN (Lüderitz to near Obib Mountains). **(ece)**

parviflora (P.J.Bergius) D.Dietr. Like **L. falcata** but leaflets with spreading hairs, flowers white and pink, pod straight (not falcate) and tapering to a conspicuous point. Sept.–Oct. Sandy or rocky soil, NH, KB, KV, CCR (near Steinkopf through to Hopefield). **(gce)**

platycarpa (Viv.) Pic.Serm. Mat-forming, hairy annual, stems 0.1–0.2 m long. Leaves becoming opposite on flowering shoots, 3-foliolate, oblanceolate. Flowers 1–many, pedunculate or not, yellow, calyx with upper and lateral lobes fused high up, standard and wings often much shorter than keel. Pod obovoid to broadly oblong, inflated, shorter or ± longer than calyx. All year. Deserts or semi-deserts, SN, G, WM, TS (S, E and N Africa to Mauritania, Cape Verde Islands, Arabia and W Pakistan, through Namibia, lower Gariep Valley to Tanqua, Central and eastern Karoo).

pungens Eckl. & Zeyh. Prostrate or procumbent, short-lived herbaceous perennial or annual, up to 0.2 m tall, sparsely to densely hairy, sometimes silky. Leaves 3-foliolate, leaflets linear to obovate. Flower 1, on a short peduncle, yellow, often cleistogamous, calyx ± equally lobed. Pod ovoid to broadly oblong, strongly inflated laterally. Aug.–Apr. Shale slopes, TS, CCR (Worcester through to southern Karoo, E Cape and Free State).

rabenaviana Dinter & Harms Prostrate, distinctly brittle, densely hairy annual, stems up to 0.15 m long. Leaves 3-foliolate, leaflets elliptic to oblanceolate or obovate. Flower 1, yellow and white, calyx lobes cordate, overlapping near base, keel beaked. Pod ovate-oblong, much inflated, circular in cross-section, densely covered with long thick neatly parallel hairs. Aug.–Nov. Sandy slopes, SN, G, TS (southern Namib to Pofadder, Carnarvon and Laingsburg).

rostrata Benth. Prostrate annual, 0.3–0.5 m across, minutely but conspicuously silky-haired (except petals). Leaves 3-foliolate, leaflets obovate, with notched apex. Flowers 2–12, on a short peduncle, yellow or white, fading pink, calyx with lowermost lobe much narrower than others, standard hairy on back, keel beaked. Pod shortly oblong to obovoid, slightly longer than calyx, slightly inflated. Sept.–Nov. Sandy soils, NH, KB, KV, CCR (near Springbok to SW Cape). **(gce)**

sparsiflora (E.Mey.) B.-E.van Wyk Like **L. rabenaviana** with neatly arranged parallel hairs on pod, but differing by the often cleistogamous flowers, (4–)5–8(–9) mm long (half as large as those in **L. rabenavia**), and calyx lobes not overlapping. Oct.–Jan. ?Habitat, SN, G, WM, TS, CCR (southern Namibia and dry Cape interior to Uitenhage).

stenophylla (Eckl. & Zeyh.) B.-E.van Wyk Prostrate annual, up to 0.7 m across, with sparse minute appressed hairs (except petals). Leaves 3-foliolate, leaflets oblong. Flowers 3–6(–8), on a long slender peduncle up to 135 mm long, yellow, calyx lobes broadly lanceolate, lowermost much narrower than others, keel beaked. Pod shortly oblong, much inflated. Aug.–Oct. Rock outcrops, NH, KV, CCR (near Kamieskroon through to Piketberg). **(gce)**

strigillosa (Merxm. & A.Schreib.) A.Schreib. Prostrate annual, stems 0.1–0.2(–0.3) m long, sparsely to densely long-haired. Leaves 3-foliolate, leaflets oblanceolate to broadly obovate. Flowers 1, rarely 2 or 3 but then peduncle shorter than pedicels or absent, yellow, calyx with ± equal short, triangular, dark lobes, tube pale, standard fiddle-shaped with acute apex. Pod oblong-linear, falcate, compressed. July–Oct. Gravelly or sandy flats and slopes, SN, G (Lüderitz to Richtersveld). **(ece)**

tenella (E.Mey.) Eckl. & Zeyh. Like **L. pungens** but differing in flower colour: standard with conspicuous dark purple veins, and keel with a dark purple apex. Oct.–Jan. In diverse habitats, TS, CCR (Laingsburg to Philipstown and E Cape).

venosa B.-E.van Wyk Small, densely leafy, prostrate annual, up to 0.2 m across. Leaves 3-foliolate, leaflets narrowly oblong to linear, sparsely hairy. Flower 1, on a slender peduncle, pale yellow with grey-green veins, fading blue, calyx of equally long, slender lobes, keel short. Pod oblong, upper suture warty. Sept. In sandy to clay soils, WM (Roggeveld and Klein Roggeveld Mountains). **(ece)**

*LUPINUS ± 220–230 spp., mainly N America, Mediterranean, Asia, Africa

***angustifolius** L. NARROWLEAF LUPIN Erect, hairy, much-branched annual, 0.2–1.5 m tall. Leaves palmately 5–9-foliolate, leaflets linear to narrowly obovate. Flowers in subsessile racemes, alternate to almost whorled, blue, calyx long-haired, 2-lipped, keel apex dark, beaked. Pods acute

or rostrate, compressed, short-hairy. Aug.–Nov. Roadsides and riverbanks, NH, CCR (near Kamieskroon and Olifants River Valley to Stellenbosch, native of Mediterranean region).

*MEDICAGO 83 spp., Mediterranean, W to central Asia

***laciniata** (L.) Mill. CUTLEAF MEDIC Prostrate or ascending, sparsely hairy annual, up to 0.4 m long. Leaves 3-foliolate, leaflets obtriangular, 3–8-lobed or sometimes unlobed, apex notched, margins minutely toothed. Flowers 2, on a peduncle 10–20 mm long and continuing into a thread-like sterile tip, yellow, calyx hairy, lobes narrowly triangular, standard obovate. Pod loosely 3–7-coiled, with spreading straight spines hooked at apex, base grooved. Aug.–Oct. Disturbed areas, riverbanks, salt pans, G, NS, NH, CCR (throughout southern Africa, European weed).

***polymorpha** L. BURR MEDIC Prostrate or ascending, subglabrous annual, stems up to 0.6 m long. Leaves 3-foliolate, leaflets obovate to obcordate, minutely toothed towards apex. Flowers 2–7, in a raceme on peduncle 10(–20) mm long with a terminal awn present or absent, yellow. Pod loosely 1.5–6-coiled, curved or hooked at tip, distinctly reticulate, softly spiny to sometimes spineless or tuberculate. July–Oct. Disturbed areas, dry riverbeds, marshes, salt pans, KB, WM, CCR (throughout South Africa, European weed).

***sativa** L. ALFALFA, LUCERNE Sprawling, sparsely hairy, perennial herb, stems up to 0.8 m long. Leaves 3-foliolate, leaflets obliquely narrowly oblong to obovate, minutely toothed on upper third, apex notched, minutely pointed. Flowers many, in an oblong raceme on peduncle 25–50 mm long, violet or purple. Pod 2–4-coiled, smooth, sparsely hairy, without spines. Oct.–Feb. Disturbed areas, clayey soil, WM, TS, CCR (throughout South Africa, native to Turkey, Iran and Russia).

*MELILOTUS ± 20 spp., Europe, Mediterranean, subtropical Asia, N Africa

***indica** (L.) All. GEELSTINKKLAWER, YELLOW SWEET CLOVER Erect or sprawling annual or biennial, up to 0.5(–1) m tall. Leaves 3-foliolate, petioles slender, leaflets obovate or narrowly obovate, truncate to notched, margins minutely toothed. Flowers minute, clustered in slender, long, pedunculate racemes, yellow. Pod small, ± ovoid, inflated to slightly compressed, surface wrinkled. Sept.–Feb. Disturbed areas, roadsides, salt pans, moist areas, dunes, NH, WM, CCR (throughout southern Africa, European weed).

MELOLOBIUM 15 spp., southern Africa

A. Inflorescence mostly 1–3-flowered, axis ending in a sterile point

candicans (E.Mey.) Eckl. & Zeyh. STROOPBOS Rigid, spiny, glandular shrub, up to 0.5 m tall, branches spreading and white-velvety, glands sessile or rarely stalked on calyx and pod. Leaves 3-foliolate, leaflets oblong to broadly obovate. Flowers in terminal racemes, yellow, fading reddish orange, calyx 2-lipped, hairy, standard rounded. Pod oblong, straight, densely hairy. May–Jan. Diverse habitats, SN, G, NH, KB, KV, WM, TS, CCR (southern Namibia through to Free State and E Cape).

canescens Benth. Like **M. candicans** but stems silky grey-haired, standard ovate-oblong, and pod falcate. June–Sept. Sandy or rocky slopes, SN, WM, TS, CCR (widespread in the W and arid interior of southern Africa).

A.' Inflorescence mostly more than 5-flowered, axis ending in a flower

adenodes Eckl. & Zeyh. Slightly spiny shrublet, up to 0.3 m tall, covered with stalked glands, soon glabrescent. Leaves 3-foliolate, leaflets broadly obovate. Flowers many, in terminal racemes, yellow, calyx 2-lipped, sparsely hairy. Pod oblong-lanceolate, falcate, hairy. Sept.–Oct. Mountains and coastal flats, G, NS, NH, KV, TS, CCR (Richtersveld through Namaqualand to Piketberg to central Karoo).

aethiopicum (L.) Druce Ascending, spineless shrub, up to 0.7 m tall, without glands (rarely present on calyx). Leaves 3-foliolate, leaflets oblanceolate to obovate, apex shortly pointed. Flowers many, in lax terminal racemes, yellow, fading orange, calyx 2-lipped, densely hairy. Pod oblong, straight to falcate, hairy. July–Sept. Coastal dunes and sand plains, NS, NH, KV, CCR (near Nababeep to Cape Peninsula and Bredasdorp). **(gce)**

exudans Harv. Sticky, spineless shrublet, up to 0.6 m tall, with sessile glands (rarely stalked on calyx and pod). Leaves 3-foliolate, leaflets obovate to cuneate, glabrescent, dark green, covered with a white crust. Flowers many, in lax terminal racemes, yellow, fading orange, calyx 2-lipped, sparsely hairy, standard glandular on back. Pod narrowly oblong, straight to falcate, hairy. June–Oct. Coastal sands and inland sandy valleys, TS, CCR (W Coast to Laingsburg and Little Karoo). **(gce)**

humile Eckl. & Zeyh. Like **M. adenodes** but plant conspicuously hairy, spineless, and lower calyx lobes broadly triangular (not narrowly triangular). Sept.–Oct. Sandy places, G, NH, TS, CCR (lower Gariep Valley through Namaqualand to SW Cape). **(gce)**

OTHOLOBIUM SKAAPBOSTEE 61 spp., mainly southern and E Africa

arborescens C.H.Stirt. Slender shrub or small tree, up to 5 m tall, with sparsely leafy, grooved branches, young parts white-haired. Leaves 3-foliolate, leaflets oblanceolate, folded, both surfaces gland-dotted, apex recurved, shortly pointed. Flowers in threes, in congested terminal spikes, creamy-white with conspicuous purple-tipped keel, calyx shortly hairy. Pod elliptic, membranous. Oct.–Dec. S-facing slopes, NH, KB, WM, CCR (Spektakel Pass, Kamiesberg Mountains, Hantam, Worcester and Little Karoo Mountains). **(gce)**

argenteum (Thunb.) C.H.Stirt. Slender, woody shrublet, up to 1 m tall, much branched from base, branches with flattened pustules. Leaves 3-foliolate, leaflets obovate, folded, densely silky, apex shortly pointed. Flowers in threes, in small lax racemes, white with dark-tipped keel, calyx silvery silky. Pod unknown. Nov. Mountain slopes, KB, CCR (Kamiesberg, Bokkeveld and Olifants River Mountains). **(gce)**

flexuosum C.H.Stirt. Dense, much-branched shrub, up to 2.5 m tall. Leaves 3-foliolate, leaflets broadly obovate, partly folded, shiny and glandular above, sparsely silky below, apex recurved, shortly pointed. Flowers in threes, in lax, zigzagged, terminal racemes, white, calyx hairs dark. Pod ovoid, silky, papery. Oct.–Jan. Seasonally damp gullies, NH, CCR (near Kamieskroon, Bokkeveld Mountains and Biedouw Valley). **(gce)**

hamatum (Harv.) C.H.Stirt. Erect, spreading shrub, up to 1.5 m tall, branches striate, pale grey-haired, densely pustulate. Leaves 3-foliolate, leaflets obovate, folded, minutely stiff-haired below, glandular, apex notched. Flowers in threes, in lax terminal spikes, greenish white, calyx conspicuously glandular. Pod ovoid. Nov.–Dec. Seasonal water courses, KB (Kamiesberg Mountains). **(ece)**

incanum C.H.Stirt. Sprawling shrublet, up to 1 m tall, young branches pustulate and hoary. Leaves 3-foliolate, leaflets obovate, hoary, mucronate, terminal leaflet largest. Flowers in threes, in compact heads, pale blue to white, calyx equally lobed, hoary. Pod unknown. Aug.–Nov. Coastal limestone in sandveld, NS, CCR (Vredendal to Lambert's Bay). **(gce)**

pustulatum C.H.Stirt. Tangled shrub, up to 1 m tall, branches pustulate. Leaves 3-foliolate, terminal leaflet largest, leaflets mostly flat, obovate, silky-hairy, apex recurved, shortly pointed, petioles persistent. Flowers in threes, in terminal racemes on straight or arching shoots, white with conspicuous dark-tipped keel, calyx lobes long and narrowly tapering. Pod unknown. Sept.–Oct. Mountain slopes, NH (Spektakel Pass and near Komaggas). **(ece)**

sp. A (= *O. spissum* C.H.Stirt. *ined.*) Densely branched, rounded shrub, up to ± 1 m tall. Leaves 3-foliolate, leaflets glabrous, slightly fleshy, tip recurved and mucronate, Flowers white, calyx black-haired. WM, CCR (northern Roggeveld to Montagu and Caledon). **(gce)**

PARKINSONIA ± 14 spp., N and S America, southern and tropical Africa

africana Sond. GREENHAIR-THORN, GROENHAARDORING, LEMOENHOUT Slender, spiny shrub or small tree, 3–4(–6) m tall, with pale yellowish stems. Leaves often absent at flowering, alternate or clustered in axils of spines, twice pinnate, mainly a bare green rachis, with tiny rachillae and leaflets. Flowers in racemes from spine axils, yellow. Pod long and slender, narrowed at base and apex. Oct.–Dec. In sand and gravel or on rock outcrops, SN, G (Namibia through to Richtersveld and Gordonia).

POLHILLIA 7 spp., mostly W Cape, South Africa **(gce)**

involucrata (Thunb.) B.-E.van Wyk & A.L.Schutte Erect, much-branched, densely leafy shrub, up to 1 m tall, with hairy stems. Leaves 3-foliolate, stipule large, leaf-like and fused to petiole, leaflets folded lengthwise, almost glabrous. Flowers 4–6, in umbel-like clusters on an elongated

terminal internode, yellow, fading purple, pink or white. Pod narrowly oblong, slightly curved, densely hairy, constricted between seeds. Sept.–Oct. Clayey soil or rocky areas, WM (Roggeveld Escarpment). **(ece)**

*PROSOPIS ± 44 spp., mostly S America, Neotropics, Mexico, SW to central Asia, N Africa

***glandulosa** Torr. HONEY MESQUITE Glabrous shrub or tree, up to 10 m tall, with straight spines in pairs or solitary at nodes. Leaves twice pinnate, with 1 or 2 pairs of pinnae, leaflets 10–25 mm long, widely spaced, glabrous. Flowers in axillary spikes, yellow. Pod ± straight, becoming woody, yellowish to purplish, margins slightly constricted between seeds. Invasive along drainage lines, SN, G, NS, NH, KV, WM, CCR (widespread in arid interior of southern Africa, native of the New World).

***velutina** Wooton VELVET MESQUITE Like **P. glandulosa** (and hybridising with it) but all parts, at least when young, covered with short velvety hairs, leaflets small (6–13 mm long) and closely spaced, pod yellowish, ± straight to markedly curved. June–Nov. Invasive along drainage lines, KV, WM, CCR (widespread in dry interior of southern Africa, from N and central America).

PSORALEA BLOUKEURTJIE, BLUE PEA ± 50 spp., southern Africa

glaucescens Eckl. & Zeyh. Lax, weeping, much-branched shrub, up to 3 m tall, glandular with mature parts glabrous. Leaves mostly 3-foliolate, but upper ones 1-foliolate, leaflets linear. Flowers 1(–3) in leaf axils, mostly greenish yellow with a small purple patch on keel. Pod small, ovoid. Nov.–Apr. Upland streamsides, G, NH, KB, CCR (Richtersveld, Anenousberg, Kamiesberg and Bokkeveld Mountains). **(gce)**

tenuifolia L. Tree-like shrub, up to 4 m tall. Leaves 3-foliolate, on distinct slender pedicels, leaflets lanceolate with a prominent midrib, sparsely hairy below, apex shortly pointed. Flowers 1 in leaf axils, white with a blue blotch on keel tip. May–Aug. Seepages, in sandy soil, KV, CCR (near Klawer to W Coast). **(gce)**

RHYNCHOSIA VAAL-ERTJIE ± 230 spp., pantropical

emarginata Germish. Much-branched, woody shrub, up to 0.75 m tall, young branches densely covered with short, appressed, white hairs, leaves less so. Leaves 3-foliolate, leaflets broadly obovate to rounded, mostly notched, undersurface with slightly raised veins and yellowish resin dots. Flowers few, on stout peduncles, yellow with purple veins and purple-tipped keel. Pod ± sickle-shaped, compressed, purple-streaked. Aug.–Sept. Rocky slopes, dry streambeds, G, ?NH (Richtersveld and ?Wildeperdehoek Pass). **(ece)**

schlechteri Baker f. Straggling subshrub, up to 0.4 m tall, branches and leaves covered with long, outspread, broad-based, glandular, white hairs. Leaves 3-foliolate, leaflets ovate-acute, base ± truncate to broadly wedge-shaped, undersurface ± dark veined with scattered yellowish resin dots. Flowers few, on long slender peduncles, yellow with dark veins and darkly tipped keel. Pod obliquely oblong, slightly sickle-shaped, compressed. July–Sept. In shrubs on granite hills, NH, ?KB (Spektakelberg to near Garies). **(ece)**

viscidula Steud. Erect or straggling shrublet, up to 0.3 m tall, young branches and leaves with long, outspread, broad-based, glandular, white hairs. Leaves 3-foliolate, leaflets broadly oblong or ovate, base rounded or tapering, apex shortly pointed, undersurface with raised veins and yellowish resin dots. Flowers few, on slender peduncles, yellow with dark-veins and brownish-tipped keel. Pod obliquely oblong, compressed. June–Sept.(–Feb.) Rocky slopes and crevices, G, NH, KB, CCR (Richtersveld, uplands of Namaqualand to Tulbagh). **(gce)**

SCHOTIA BOERBOON ± 4 spp., southern Africa

afra (L.) Thunb. KAROO BOER-BEAN, KAROO-BOERBOON Much-branched shrub or tree, 3–5 m tall, trunk gnarled, with charcoal-grey bark. Leaves crowded on short spur-branchlets, pinnate, leaflets in 12–18 pairs, linear to oblong. Flowers in congested, branched heads or panicles, up to 25 mm long, showy, red or occasionally pink. Pod shortly oblong, woody, with a persistent hard rim. Aug.–Oct. Usually along dry watercourses, SN, G, CCR (southern Namibia, Richtersveld, Gordonia, E Cape).

SESBANIA RATTLEPOD, SESBANIA ± 60 spp., tropics and subtropics, mostly Africa and Madagascar

pachycarpa DC. Herbaceous annual or perennial, up to 1.2 m tall. Leaves alternate, evenly pinnate, rachis prickly towards base, leaflets in 12–20 pairs, oblong, basally uneven. Flowers in axillary, shortly pedunculate racemes, yellow, often with purple marks, calyx cup-like, subequally short-lobed. Pod linear, curved, smooth, up to 150 mm long, septate. Oct.–Dec. Seasonal rivers, pans, marshes, waterholes, SN (Cape Verde Islands and N Africa through to Namibia).

TEPHROSIA ± 350 spp., pantropical, mostly Africa and Madagascar

dregeana E.Mey. Erect, slender subshrub, up to 0.3 m tall, branching from base, with white appressed hairs. Leaves pinnately 5–9-foliolate, leaflets linear-lanceolate, glabrous above. Flowers in lax terminal racemes, very small, yellow, purple-tipped. Pod oblong, slightly sickle-shaped, pale yellow-green. Mar.–Dec. Dry riverbeds, sand flats and granite slopes, G (Namibia, Richtersveld, Gordonia and Karoo).

*TRIGONELLA ± 55 spp., Mediterranean to central Europe, Africa, Asia, India and Australia

***anguina** Delile Mat-forming, softly hairy, aromatic herb, up to 0.3 m across. Leaves 3-foliate, on slender pedicels, leaflets obovate, with serrated margins, terminal leaflet 4–7 mm long. Flowers in axillary clusters, yellow. Pod oblong, undulate, thick-rimmed, indehiscent. July–Aug. Stony or clay soils, TS (throughout semi-arid regions of Africa).

***hamosa** L. Erect or decumbent herb, with stems up to 0.3 m long. Leaves 3-foliate, on slender pedicels, leaflets obovate, margins serrated, terminal leaflet 5–22 mm long. Flowers in a capitate head as long as or longer than leaves, yellow. Pod sickle-shaped, dehiscent, walls thin but covered with prominent veins. July–Oct. Flats and dry riverbeds, SN, G (semi-arid parts of southern Africa).

*VICIA 160 spp., mostly N temperate, Africa, N and S America

***benghalensis** L. Trailing annual or short-lived perennial herb, up to 0.8 m tall, shaggy-haired. Leaves pinnate, ending in a slender branched tendril, leaflets in 5–9 pairs, linear to narrowly oblong or narrowly elliptic. Flowers 2–12, in axillary racemes, reddish purple. Pod shortly stalked, obliquely oblong, hooked at tip, hairy. Oct.–Nov. Disturbed areas, NH, KB, WM, CCR (throughout southern Africa, Mediterranean in origin).

***hirsuta** (L.) Gray Like **V. benghalensis** but a sparsely hairy, trailing annual, up to 0.6 m tall, with small white or pale blue flowers, and with small pods with constrictions between seeds. Sept.–Nov. Weed of disturbed places, NH, CCR (Namaqualand through to Free State, originally from Europe and Asia).

***sativa** L. COMMON VETCH Like **V. benghalensis** but a sparsely hairy, trailing annual, with linear to obtriangular leaflets in 3–10 pairs, and with 1 or 2, ± sessile flowers in leaf-axils. Sept.–Nov. Disturbed and cultivated areas, often in winter-wet depressions, KB, CCR (Europe, Asia, Middle East and Africa).

WIBORGIA PENNY POD 10 spp., winter rainfall region of South Africa **(gce)**

A. Branches glabrous

fusca Thunb. Erect shrub, 0.6–1.5 m tall, branches slender with greyish, weakly to strongly thorny ends. Leaves 3-foliolate, petiole long, ± flat or channelled and persistent, leaflets oblanceolate, shortly pointed. Flowers (10–)30–50, in long slender racemes with thin pedicels, pale yellow. Pod indehiscent, flat, obliquely oval, with a 3–4 mm wide upper wing reaching beyond style base. Aug.–Oct. Loamy or sandy soils on uplands and lowlands, NS, NH, KB, KV, CCR (Okiep through Namaqualand to Malmesbury). **(gce)**

incurvata E.Mey. Low, spreading, much-branched shrublet, 0.2–0.4(–0.6) m tall, branch tips seldom thorny. Leaves 3-foliolate, pedicels long and persistent, leaflets variable, oblanceolate or

narrowly obtriangular, apex rounded to truncate with a short point. Flowers up to 12(–16), in racemes, cream- to pale lemon-coloured. Pod indehiscent, compressed, papery, with upper wing 4 mm wide. June–Aug. Granite derived soil, NH, KB (near Springbok to Kamiesberg Mountains). **(ece)**

mucronata (L.f.) Druce SILVER WING-PEA, SILWERVLERK-ERTJIE Rigid, spreading shrub, 1–2(–2.5) m tall, lateral branches 60–90° to stem, coarse thorny and rusty brown when young. Leaves 3-foliolate, leaflets oblanceolate-obovate to rounded but distinctly tipped. Flowers ± 10–30, in showy racemes, light to bright yellow. Pod indehiscent, flat, with a 2 mm wide stiff upper wing reaching slightly beyond style base, sides ± prominently net-veined. Aug.–Oct. Sandy or gravelly soils, NH, KB, KV, CCR (near Kamieskroon and Vanrhynsdorp through to Anysberg Mountains). **(gce)**

A.' Branches pubescent, at least when young

monoptera E.Mey. Erect, rigid, thorny shrub, 0.6–1 m tall. Leaves 3-foliolate, leaflets oblanceolate to obovate, apiculate to rounded and pointed, sparsely silvery-haired or glabrous. Flowers (2–)5–15, in racemes with a ± rigid spine-tipped axis, light yellow. Pod indehiscent, compressed, rounded to broadly oval, with upper wing 4–5 mm wide, sides reticulately veined. July–Sept. Rocky or sandy slopes, NS, NH, KB, KV, WM, CCR (Steinkopf through to Clanwilliam District). **(gce)**

obcordata (P.J.Bergius) Thunb. Slender shrub, 1.5–3 m tall, branches stiff or ± pendulous, grey-haired. Leaves 3-foliolate, leaflets narrowly obtriangular-oblanceolate, apex with a rounded notch, glabrous above, sparsely hairy below. Flowers 12–25(–40), in long racemes, bright yellow, keel beaked. Fruit a small stalked nutlet, with a raised upper ridge, sides with a few prominent veins. Aug.–Oct. Sandy flats and slopes, NS, KV, CCR (near Komaggas through to Vanrhynsdorp, Cape Peninsula and Mossel Bay). **(gce)**

sericea Thunb. SILKY WING-PEA, SYVLERK-ERTJIE Erect or spreading, rigid, thorny shrub, 0.3–1.2 m tall. Leaves 3-foliolate, densely grey-haired, leaflets oblanceolate-spathulate to rounded-obtuse. Flowers (1–)2–6(–12), in terminal racemes, light yellow. Pod indehiscent, strongly compressed, orbicular, with a prominent 3 mm or more wide upper wing, both sides laterally ridged or winged and transversally veined. May–Sept. Clayey or loamy soils on mountain slopes, NS, NH, KV, WM, CCR (near Spektakel Pass through to Calvinia, Roggeveld, Cederberg and Witteberg Mountains). **(gce)**

WIBORGIELLA (= *LEBECKIA* in part) 9 spp., N Cape, W Cape and E Cape

leipoldtiana (Schltr. ex R.Dahlgren) Boatwr. & B.-E.van Wyk (= *Lebeckia leipoldtiana* Schltr. ex R.Dahlgren) Much-branched shrub, 0.5–1.2 m tall, old branches ± spine-tipped. Leaves 3-foliolate, petiole 1.5–4 mm long, with a distinct basal tubercle on long-shoots becoming hard and persistent, silky, leaflets narrowly oblanceolate to obovate, notched apically. Flowers 4–9, in short racemes, yellow, calyx sparsely silky, petals usually glabrous. Pod oblanceolate to elliptic-oblong, turgid. July–Oct. Renosterveld, NH, WM, CCR (Nababeepberg to Sutherland). **(gce)**

FRANKENIACEAE

by D.A. Snijman

FRANKENIA SANDANGELIER, SEA-HEATH ± 75 spp., cosmopolitan in saline habitats

pomonensis Pohnert Much-branched, greyish brown shrublet, up to 0.4(–1) m tall, branches densely leafy. Leaves subsessile, minute, needle-like, hairy beneath, margins rolled back. Flowers few, towards branch tips, white to deep lilac or dark pink. Sept.–Mar. Coastal brackish flats and dolomite outcrops, SN (Lüderitz Peninsula to Bogenfels). **(ece)**

pulverulenta L. Spreading annual or perennial, up to 100 mm tall, often forming mats, with ± widely spaced clusters of leaves along stems. Leaves shortly petiolate, ovate, flat or revolute. Flowers numerous, small, solitary in branch forks, lilac. Sept.–Jan. Salt pans or brackish places, SN, NS, NH, KB, KV, WM, CCR (Europe, Africa, Asia, Australia).

repens (P.J.Bergius) Fourc. Prostrate woody shrublet, ± 350 mm across, with short, densely leafy, erect branchlets. Leaves subsessile, subterete with revolute margins. Flowers in congested apical cymes, pink. Sept.–Jan. Salt pans and brackish places, NS, NH, CCR (near Henkries to coastal Namaqualand to SW Cape and to Port Elizabeth).

FUMARIACEAE

by J.C. Manning

1. Upper leaves not tendrilled; style caducous; fruit erect, globose ..... **Fumaria**
1.' Upper leaves developed into tendrils; style persistent; fruit more-or-less pendulous:
2. Flowers racemose, upper petal spurred at base; fruit asymmetrical, suboblong, sharply deflexed, 1-seeded ..... **Trigonocapnos**
2.' Flowers solitary or in few-flowered racemes, upper petal shortly pouched at base; fruit ellipsoid and inflated, several-seeded ..... **Cysticapnos**

CYSTICAPNOS (= *PHACOCAPNOS*) AFRICAN FUMITORY 3 spp., South Africa

cracca (Cham. & Schltdl.) Lidén (= *Phacocapnos cracca* (Cham. & Schltdl.) Bernh.) Straggling annual, up to 1 m tall. Leaves bipinnifid, upper tendrillous, segments broadly obovate, bi- or tripartite, glaucous. Flowers 4–20 in racemes, pink, sepals ovate, 1–1.5 mm long, outer petals narrowly winged, upper shortly saccate, 6–6.5 mm long. Fruits nodding, lanceolate, (5–)9–12 mm long. Aug.–Oct. Gravelly slopes in sheltered places among scrub, KB, CCR (Kamiesberg and Bokkeveld Mountains to Port Elizabeth). **(gce)**

vesicaria (L.) Fedde (= *Cysticapnos grandiflora* Bernh., *C. parviflora* Lidén, *Phacocapnos burmanii* (Eckl. & Zeyh.) Hutch.) KLAPPERTJIES Straggling annual, up to 1 m tall. Leaves bipinnate, upper tendrilled, segments cuneate to broadly obovate, trilobed or tripartite, glaucous or green. Flowers 1–6 in racemes, pink; sepals lanceolate, 2–4 mm long; outer petals broadly winged and flaring, upper shortly saccate, 8–15 mm long. Fruit nodding, inflated-ovoid, (5–)10–30 mm long. July–Sept. Gravelly and sandy flats and rocky slopes in sheltered places among scrub, G, NH, KB, WM, TS, CCR (Richtersveld through central Namaqualand to Calvinia, Clanwilliam and Lambert's Bay to De Hoop). **(gce)**

*FUMARIA FUMITORY ± 50 spp., E Africa and Europe to India

***muralis** Sond. ex W.D.J.Koch DUIWELSKERWEL Sprawling or straggling annual, up to 1 m tall. Leaves bipinnate, segments cuneate, incised and toothed. Flowers 5–15, in racemes, pink with purple tip; sepals ovate-peltate, 1–3 mm long; outer petals connivent, upper with globose spur at base, 6–7 mm long. Fruit globose, erect, 1.5–2 mm long. May–Oct. Weed of waste places and ploughed lands, NH, KB, KV, WM, TS, CCR (widespread European weed).

TRIGONOCAPNOS HEKELTJIES 1 sp., N and W Cape **(gce)**

lichtensteinii (Cham. & Schltdl.) Lidén (= *Trigonocapnos curvipes* Schltr.) Straggling annual, up to 1 m tall. Leaves bipinnate, upper tendrilled, segments elliptic, greyish green. Flowers 4–30, in racemes, pink with purple tip; sepals lanceolate, 0.5 mm long; outer petals slightly winged and flaring, upper spurred at base, 4–5 mm long. Fruit asymmetric, boat-shaped, deflexed, 2–3 mm long. Aug.–Sept. Rocky slopes in sheltered places among shrubs, WM, TS, CCR (Nieuwoudtville and Calvinia to Biedouw Valley). **(gce)**

GENTIANACEAE

by D.A. Snijman

1. Flowers yellow or white; ovary 2-locular ..... **Sebaea**
1.' Flowers pink; ovary 1-locular ..... **Chironia**

CHIRONIA BITTERWORTEL, CENTAURY ± 30 spp., Africa and Madagascar

baccifera L. AAMBEIBOSSIE, CHRISTMAS BERRY Shrublet, up to 1 m tall. Leaves linear, spreading. Flowers pink, corolla tube 3–5 mm long, constricted into a collar-like neck above ovary, stigma truncate. Fruit ± globose, berry-like, red. Nov.–Feb. Sandy flats and slopes, NS, KB, CCR (Kamiesberg Mountains, near Brand-se-Baai and Bokkeveld Mountains to SW Cape and E to KwaZulu-Natal).

linoides L. Shrublet, up to 0.9 m tall. Leaves linear, erect or spreading. Flowers pink, corolla tube 3–5 mm long, bell- to urn-shaped above ovary, stigma truncate. Fruit a capsule, ± half exserted from persistent calyx. Oct.–Jan. Sandy or marshy flats and slopes, KB, CCR (Kamiesberg Mountains and Bokkeveld Mountains to Cape Peninsula to Oudtshoorn and Bredasdorp). **(gce)**

SEBAEA NAELTJIESBLOM, YELLOWWORT ± 60 spp., mainly Africa, also India and Australasia

membranacea A.W.Hill Annual, up to 150 mm tall. Leaves lanceolate. Flowers 5-lobed, yellow, calyx lobes keeled, stamens inserted shortly below corolla sinuses, anthers each with a small, round, shortly stalked, apical gland and 2 bigger, shortly stalked, basal glands, style swelling below or confluent with stigma. Dec. Stream sides, KB, CCR (Kamiesberg Mountains and Hex River Pass). **(gce)**

pentandra E.Mey. Erect annual, 50–300 mm tall. Leaves orbicular-ovate to elliptic. Flowers 5-lobed, yellow, calyx keeled or winged with ± opaque sides, stamens inserted in or anthers each with a shortly stalked, round, apical gland and 2 small, shortly stalked, basal glands, style swelling in basal half of style or absent. Sept.–Dec. Seasonal watercourses, SN, G, WM (dry inland areas of southern Africa).

GERANIACEAE

by D.A. Snijman

1. Flowers irregular; stamens 10, usually only 2–7 with anthers. . . . . **Pelargonium**
1.' Flowers regular or very nearly so; stamens 5–15, all perfect, or alternate ones without anthers:
2. Stamens 5 fertile and 5 staminodes. . . . . **Erodium**
2.' Stamens 15 fertile . . . . . **Monsonia**

*ERODIUM STORK'S-BILL ± 60 spp., Mediterranean to central and SW Asia, Australia and S America, 8 spp. introduced to southern Africa

***brachycarpum** (Godr.) Thell. SHORT-FRUIT STORK'S-BILL Annual herb, tufted or branched with prostrate stems, up to 200 mm tall. Leaves all simple, blade oblong to narrowly ovate, at least the upper deeply cut, with incisions deeper than halfway to midrib, hispid. Flowers 2 per inflorescence, violet. Aug.–Sept. Seepage areas, NH (widespread weed, ± globally and near Grootvlei W of Kamieskroon).

***cicutarium** (L.) L'Hér. RED-STEM STORK'S-BILL Annual herb, with prostrate, hispid to hirsute stems, up to 500 mm tall. Leaves ovate to elliptic, pinnate or often bipinnate, leaflets always divided for more than halfway to midrib. Flowers up to 10 per inflorescence, purplish pink to whitish. Year-round. Various places where moisture collects, NS, NH, KB, KV, WM, TS, CCR (widespread weed ± globally).

***moschatum** (L.) L'Hér. MUSKY STORK'S-BILL Annual herb, tufted or branched, with hispid to pilose stems, up to 500 mm tall. Leaves oblong-ovate, pinnate, leaflets ovate, toothed but with incisions usually less than halfway to midrib. Flowers 5–13 per inflorescence, violet to pink. June–Dec. In disturbed places, NH, KB, WM, CCR (widespread weed ± globally).

MONSONIA (= *SARCOCAULON*) ± 40 spp., Africa, Madagascar, SW Asia

A. Stems soft or slightly woody; petioles not spinescent

deserticola Dinter ex R.Knuth Prostrate, rhizomatous perennial, up to 80 mm tall. Leaves ± crowded in a rosette, blade broadly angular-ovate, ± wedge-shaped at base, coarsely serrate

above, densely hairy and silvery-white. Flowers 3–7 in axillary clusters, small, petals 4–6 mm long, ± entire at apex, white or yellow-white. Feb.–Oct. On slopes in gravelly or stony soils, SN (Haalenberg to Klein Aus). **(ece)**

drudeana Schinz Prostrate, rhizomatous perennial, up to 80 mm tall. Leaves crowded, blade ovate to orbicular, pleated along main veins, cordate at base, entire to ± dentate, densely grey-hairy. Flowers 1–3 per cluster, petals 18–30 mm long, notched at apex, white ageing to yellow, with deep red or violet veins. Aug.–Sept. On sand overlying limestone on riversides and in riverbeds, SN (Sperrgebiet). **(ece)**

ignorata Merxm. & A.Schreib. Erect, rhizomatous perennial, up to 100 mm tall, with a ± deeply buried, water-rich root tuber. Leaves crowded in a rosette, blade broadly ovate, pleated along main veins, cordate at base, ± dentate, whitish-hairy. Flowers 2–12 per cluster, petals 10–15 mm long, notched at apex, white, cream-coloured or orange-yellow. Year-round. On sand dunes, SN (Namib: Kuiseb River to near Lüderitz Bay).

parvifolia Schinz Aromatic, mat-forming perennial, up to 200 mm tall, reaching up to 1 m across, without a rhizome. Leaves ± clustered at nodes along stem, blade broadly ovate to angular ovate, cordate to truncate at base. Flowers 1–3(–5) per cluster, petals 12–20 mm long, emarginate at apex, white to bright yellow or pink. (Feb.–)May–Oct. Hills or flats in sand or gravel and in riverbeds or vlei margins, G, NS (Namibia to Richtersveld to Bushmanland and near Koingnaas).

umbellata Harv. RHABAS Aromatic, ± prostrate perennial, up to 400 mm tall, without a rhizome. Leaves crowded on a stunted stem, blade broadly ovate, usually cordate at base, green, downy. Flowers 2–14 per cluster, petals 7–11 mm long, emarginate at apex, white or creamy-white. Jan.–May. Gravelly, rocky or sandy plains or riverbeds, KV, TS (Angola, Namibia, near Bitterfontein, southern Tanqua Karoo and near Prince Albert Road).

A.' Stems thick and more-or-less succulent; petioles spinescent or rarely spineless
B. Leaves finely divided

herrei (L.Bolus) F.Albers (= *Sarcocaulon herrei* L.Bolus) Like **M. peniculina** but petioles becoming spiny and exceeding 12 mm long, flowers yellow. Sept.–Nov. (& Feb., after showers). Rocky places usually on quartz, G (Eksteenfontein to Steinkopf). **(ece)**

multifida E.Mey. (= *Sarcocaulon multifidum* E.Mey. ex R.Knuth) Like **M. peniculina** but branches thinner (10–20 mm) and carried above ground, when present spines up to 6 mm long, and flowers pink with red throat markings. Mar.–Apr. and July–Dec. Usually in rock cracks, SN, G (N and S sides of lower Gariep Valley). **(ece)**

peniculina (Moffett) F.Albers (= *Sarcocaulon peniculinum* Moffett) Dwarf, prostrate shrublet, up to 80 mm tall, with fleshy stems resting on ground, thicker than 20 mm, spineless or with blunt spines rarely exceeding 2 mm long. Leaves borne on upper side of stems, deeply divided, hairy, segments semi-terete. Flowers up to 36 mm diam., pale pink to rose-pink, without markings. Jan.–Oct. (intermittently). In sand among quartz fragments, SN, G (Rosh Pinah to N bank of lower Gariep). **(ece)**

B.' Leaves coarsely lobed, toothed or entire

ciliata (Moffett) F.Albers (= *Sarcocaulon ciliatum* Moffett) Semi-erect, spiny, stem-succulent, up to 180 mm tall, branches rarely > 10 mm thick, grey-brown, Leaves obovate to elliptic, blade cut ± half way to midrib, usually minutely hairy. Flowers up to 35 mm diam., yellow, sepals with mucro up to 1 mm long, petals apically fringed. Sept.–Dec.(Mar.). On quartz and granite outcrops and in red sandy soil, G, NS (Lekkersing to near Wallekraal). **(ece)**

crassicaulis (S.E.A.Rehm) F.Albers (= *Sarcocaulon crassicaule* S.E.A.Rehm) BOESMANSDORING Spiny stem-succulent, up to 500 mm tall, branches > 10 mm thick, grey or greyish yellow. Leaves ovate to obovate, irregularly pinnatifid with margins crenate to dentate, usually tomentose. Flowers up to 55 mm diam., pale to bright yellow, sepals with mucro > 2 mm long. May–June. Rocky places, SN, G, NH, KV, TS, CCR (southern Namib to Bushmanland to Cederberg Mountains and Prince Albert).

flavescens (S.E.A.Rehm) F.Albers (= *Sarcocaulon flavescens* S.E.A.Rehm) Like **M. ciliata** but erect in habit, leaf blade obovate , elliptic or orbicular, usually incised less than half way to midrib, petals not fringed. Feb.–Nov. (sporadically). Rocky places, on metamorphosed substrates, SN, G, NH (Witpütz to Schakalsberg to near Kubus). **(ece)**

inermis (S.E.A.Rehm) F.Albers (= *Sarcocaulon inerme* S.E.A.Rehm) Semi-erect to prostrate stem-succulent, up to 300 mm tall, branches 10–20 mm thick, grey-brown to whitish, generally spineless. Leaves broadly ovate, hairy beneath, margin minutely toothed, undulate. Flowers up to 30 mm diam., rose-purple to purple, sepals with mucro 1–2 mm long. Feb.–Sept. (intermittently). Base of mountains, often in quartz veins, SN, G (Witpütz to Rosh Pinah). **(ece)**

patersonii DC. (= *Sarcocaulon patersonii* (DC.) G.Don) BOESMANKERS Semi-erect to prostrate stem-succulent, up to 500 mm tall, branches generally > 10 mm thick, pale grey to ± golden, spines thick, ± 2 mm at mid-diam. Leaf entire, with a ± notched apex, glaucous. Flowers up to 32 mm diam., rose, pale magenta or purple, sepals with mucro < 1 mm long. Nearly year-round. In sand and in rock crevices, SN, G, NS (southern Namib to Lüderitz to near Port Nolloth).

salmoniflora (Moffett) F.Albers (= *Sarcocaulon salmoniflorum* Moffett) BOESMANKERS, PINK CANDLE BUSH Spiny stem-succulent, up to 400 mm tall, branches < 4 mm thick, olive-green to grey. Leaves elliptic, entire. Flowers up to 30 mm diam., pink to orange, petals twice as long as wide, sepals with mucro < 0.5 mm long. Mainly Oct.–Dec. Stony flats and slopes, often on quartz patches, NH, TS, CCR (Namibia to Swartruggens and Swartberg Mountains).

spinosa L'Hér. (= *Sarcocaulon l'heritieri* Sweet) GHOENA, YELLOW CANDLE BUSH Spiny stem-succulent, up to 800 mm tall, branches < 10 mm thick, pale olive-green to grey. Leaves long- and short-petioled, obovate to round, emarginate, glaucous. Flowers up to 35 mm diam., yellow, sepals with mucro > 2 mm long. Aug.–Sept. Rocky slopes, G, NS, NH, CCR (Richtersveld to Olifants River Valley). **(gce)**

PELARGONIUM MALVA, PELARGONIUM ± 250 spp., Africa, Madagascar, Middle East, Australia, St Helena

A. Annuals or apparently so

grossularioides (L.) L'Hér. Dwarf, ± prostrate annual. Leaves cordate or ± digitately lobed, often purplish, 50 × 40 mm. Flowers up to 50, ± 8 mm diam., purple; hypanthium ± 3 mm long, shorter than pedicel. Year-round. Damp places, KB, WM, CCR (Kamiesberg Mountains and Roggeveld Escarpment to Clanwilliam to KwaZulu-Natal).

minimum (Cav.) Willd. Prostrate perennial, with tuberous roots. Leaves silvery, simple to pinnatisect with linear segments, up to 20 mm diam. Flowers up to 8, ± 6 mm diam., white to very pale pink or purple; hypanthium very shallow and swollen. Aug.–Nov. Dry, open places, NH, KV, WM, TS, CCR (Namibia and arid areas of South Africa).

nanum L'Hér. Prostrate annual. Leaves cordate and variously lobed, 15–20 mm diam. Flowers up to 6 on short axillary peduncles, ± 8 mm diam., typically bicoloured with upper petals pink and lower whitish; hypanthium 1–3(–8) mm long, shorter than pedicel. Aug.–Dec. Dry open places, NH, KB, CCR (?central Namibia, Namaqualand to George).

redactum Vorster Annual, up to 250 mm tall. Leaves 2- or 3-pinnatifid, up to 200 × 50 mm. Flowers 2–4, on short axillary peduncles, ± 5 mm diam., petals 4, dark wine-red with white at base and on edges, June–Nov. Dry watercourses and washes, SN, NH, KV (throughout southern Namibia to near Vanrhynsdorp).

senecioides L'Hér. Annual, up to 400 mm tall, branching mainly from base. Leaves 2- or 3-pinnatifid, up to 70 × 60 mm. Flowers 2–4, on short axillary peduncles, shortly pedicellate, 8–18 mm diam., petals 5, white, upper 2 with purple marks near base, hypanthium 6–9 mm long. Sept.–Nov. Deep sand, NS, KV, CCR (near Riethuis to Cape Peninsula and Witteberg Mountains). **(gce)**

A.' Perennials, shrubs or geophytes
*B. Geophytes without well-developed stems; leaves mostly in a basal tuft (see also **P. articulatum** and **P. barklyi** under G.')*
C. Tubers with leathery, cracked bark; leaves in a basal tuft and on short branches, usually green at flowering; petals ± equal, obovate

radulifolium (Eckl. & Zeyh.) Steud. Tuberous geophyte, up to 300 mm tall. Leaves pinnate to pinnatifid, up to 160 mm wide, segments cuneate at base, rounded above, glabrous or shortly glandular hairy, margins dentate. Flowers 4–20 in a cluster on an unbranched peduncle, petals 5, dull yellow to pink with maroon to blackish markings, 11–18 mm long, hypanthium 20–55 mm long. Aug.–Apr. Open places on well-drained soil, KV, CCR (Klawer to Port Elizabeth). **(gce)**

sibthorpiifolium Harv. Dwarf geophyte, up to 80 mm tall, with a series of ± spherical tubers. Leaves prostrate, blade kidney- to heart-shaped, 12–20 mm wide, semi-succulent, margin shallowly crenate. Flowers in tight clusters, 3–8 in each, ± subsessile, petals 5, white or pale purple, upper 2 with darker markings, 9–12 mm long, hypanthium 10–15 mm long. May–Oct. In fine sand on low hills, SN, G (Lüderitz to just S of Gariep Mouth). **(ece)**

triste (L.) L'Hér. KANEELTJIE Tuberous geophyte, ± 250 mm tall. Leaves prostrate, 2- or 3-pinnatisect, up to 300 mm diam., segments linear, softly hairy. Flowers in a few clusters, on a stout branched peduncle, up to 20 in each, petals 5, pale yellow or dark maroon to black with pale yellow edges, 10–18 mm long, clove-scented at night, hypanthium 25–35 mm long, much longer than pedicel. Aug.–Feb. Sandy flats and slopes, G, NH, KB, KV, WM, CCR (Richtersveld to Calvinia to SW Cape to Albertinia). **(gce)**

C.' Tuber with numerous, dark brown, peeling tunics; leaves only in a basal tuft, usually dry at flowering; petals often narrow or unequal
D. Flowers magenta or dark wine-red

incrassatum (Andrews) Sims Tuberous geophyte, up to 350 mm tall. Leaves barely green at flowering, pinnate to pinnately lobed, up to ± 110 × 70 mm. Flowers up to 60, in a large umbel-like cluster on a simple peduncle, very shortly pedicellate, petals 5, magenta, upper 2 markedly larger, 17–25 mm long, hypanthium 27–42 mm long. Aug.–Oct. Rocky slopes, G, NH, KB, KV, CCR (Richtersveld to Nardouws Mountains). **(gce)**

pilosellifolium (Eckl. & Zeyh.) Steud. Tuberous geophyte, up to 320 mm tall. Leaves often green at flowering, rarely pinnatisect, up to 100 × 25 mm, grey-green. Flowers in 2 or 3(–5) clusters, on a branched peduncle, up to 10 in each, subsessile, petals 5, wine-red with white to pale pink edges, 8.5–13.5 mm long, hypanthium 8–13 mm long. Oct.–Dec.(–Mar.). In fynbos, KB, WM, CCR (Kamiesberg Mountains, Hantam and Montagu to Ladismith). **(gce)**

D.' Flowers pale pink, white or yellow with reddish markings
E. Petals 2 or 4

leipoldtii R.Knuth Tuberous geophyte, up to 320 mm tall. Leaves trifoliolate, up to 200 mm diam., shortly hairy. Flowers in 2–7(–10) clusters, on a branched peduncle, up to 14 in each, subsessile, petals 2, 4.5–6 mm long, white, with wine-red feathery markings, hypanthium 7–14 mm long. Aug.–Nov. Dry outcrops, often under shrubs, NS, KV, TS, CCR (S of Komaggas to SE of Touwsrivier). **(gce)**

triandrum E.M.Marais Tuberous geophyte, up to 200 mm tall. Leaves dry at flowering, ovate, up to 50 mm diam. Flowers in 2–4(–7) clusters, on a branching peduncle, up to 30 in each, subsessile, petals 4, pale yellow, upper 2 large and ± spoon-shaped, 19–25 mm long, with red feather-like markings, hypanthium 23–32 mm long. Oct.–Nov. Succulent veld and dry fynbos, TS, CCR (Clanwilliam to SW Tanqua Karoo). **(gce)**

E.' Petals 5
F. All stamens shorter than the sepals, sometimes concealed in floral sheath

angustipetalum E.M.Marais Tuberous geophyte, 80–240 mm tall. Leaves dry at flowering, petioles long thin and upright, blade 3–5-palmate, deeply incised, up to 90 mm long, segments 2–7 mm wide, hairy. Flowers in 2–7 clusters on a branched peduncle, 4–12 in each, subsessile, petals 5, cream-coloured to pale yellow, upper 2 narrow, with pink feather-like markings, 21–26 mm long, hypanthium 21–35 mm long. Nov.–Dec. In deep sand, G, NH (Kosies to near Kamieskroon). **(ece)**

aridicola E.M.Marais Tuberous geophyte, 60–140 mm tall. Leaves dry at flowering, erect to spreading, pinnatisect, blade elliptic in outline, up to 120 mm long, densely hairy, segments 3 mm wide. Flowers in 2–9 clusters on a branched peduncle, 3–8 in each, subsessile, petals 5, yellow, upper 2 with red feather-like markings, 13–23 mm long, hypanthium 20–34 mm long. Oct.–Nov. Sandy granite derived soils, G, NH (Kosies to SE of Springbok). **(ece)**

aristatum (Sweet) G.Don Tuberous geophyte, up to 300 mm tall. Leaves dry at flowering, petiolate, blade ± oblong in outline, bipinnatifid, up to 80 mm long, with 1–few hairs at tips. Flowers in up to 8 spreading clusters on a branching peduncle, up to 11 in each, subsessile, petals 5, cream-yellow, upper 2 with red streaking, 14–26 mm long, hypanthium 20–35 mm long. Oct.–Nov. Heavy clay soils, WM (Bokkeveld Plateau, Hantam and Roggeveld Escarpment). **(ece)**

fissifolium (Andrews) Pers. Tuberous geophyte, up to 140 mm tall. Leaves dry at flowering, simple (when juvenile) to bipinnatifid, up to 70 mm long, with segments 1–3 mm wide, usually hirsute. Flowers in 2–5 clusters on a branched peduncle, 4–6(–14) in each, subsessile, petals 5, cream to pale yellow, upper 2 with small wine-red markings, 14–22 mm long, hypanthium 28–65 mm long. Oct.–Nov. Sandstone or shale derived soils, WM, TS, CCR (Roggeveld Plateau to Worcester). **(gce)**

glabriphyllum E.M.Marais Tuberous geophyte, 130–170 mm tall. Leaves dry at flowering, simple (when juvenile) to pinnatisect, up to 145 mm long, oblong in outline, glabrous. Flowers in 3–8 small clusters on a branched peduncle, 3–10 in each, subsessile, petals 5, white, pale pink or salmon-coloured, upper 2 minutely red-marked, 14–15 mm long, hypanthium 16–25 mm long. Oct.–Feb. On flats in clay soils, WM (Nieuwoudtville). **(ece)**

hirtipetalum E.M.Marais Tuberous geophyte, 70–160 mm tall. Leaves pinnatisect, blade elliptic in outline, up to 230 mm long, segments 1–3 mm wide, hairy. Flowers in 2–6 clusters on a branched peduncle, 3–10 in each, subsessile, petals 5, yellow, softly hairy, upper 2 with red feather-like markings, 15–24 mm long, hypanthium 11–25 mm long. Oct.–Nov. In sandy soil, NH, KB (Spektakelberg to Bitterfontein). **(ece)**

longiflorum Jacq. Tuberous geophyte, up to 300 mm tall. Leaves lanceolate, up to 160 × 25 mm. Flowers in 2–6(–10) clusters, on a branched peduncle, 4–15 in each, subsessile, petals 5, narrowly ribbon-shaped, pale yellow to pale pink or orange-pink, upper 2 with red feather-like markings, 20–36 mm long, hypanthium (10–)15–44 mm long. Oct.–Nov. Sandy or stony clay places, NH, KB, KV, CCR (Komaggas to Bokkeveld Mountains to Darling and Worcester). **(gce)**

nervifolium Jacq. Small, tuberous geophyte, up to 130 mm tall. Leaves simple to trifoliolate, blade ovate, up to 35 × 25 mm, reddish purple beneath. Flowers in 3–6(–9) clusters on a branched peduncle, up to 17 in each, subsessile, petals 5, white to pale yellow, upper 2 with central red blotches, 16–19 mm long, hypanthium 30–45 mm long. Sept.–Oct. Quartzite or dolerite outcrops, WM, TS, CCR (Bokkeveld Mountains, Hantam to Karoopoort and Matjiesfontein). **(gce)**

pubipetalum E.M.Marais Like **P. hirtipetalum** but smaller, 50–140 mm tall, with fewer flowers (2–7 in each cluster), sepals outspread (vs. 1 erect and 4 reflexed), petals white and strap-shaped (vs. yellow and spathulate), upper ones 21–26 mm long. Nov.–Dec. ?Amongst granite, KB (Kamiesberg Mountains near Leliefontein). **(ece)**

F.' Anterior stamens or all stamens the same length or longer than the sepals

appendiculatum (L.f.) Willd. Tuberous geophyte, up to 300 mm tall. Leaves 2- or 3-pinnatisect, up to ± 100 mm long, softly hairy, stipules large, ovate. Flowers in 2 or 3 clusters on a branching peduncle, up to 15 in each, subsessile, petals 5, pale yellow, upper 2 marked with red, 17–23 mm long, hypanthium 60–100 mm long. Sept.–Oct. Deep coastal sand, NS, CCR (near Kotzesrus to Leipoldtville). **(gce)**

bubonifolium (Andrews) Pers. Tuberous geophyte, up to 230 mm tall. Leaves erect, irregularly pinnate to bipinnatisect, up to 140 mm long, bearing long, appressed, stiff hairs. Flowers in 2–5 small clusters on a branching peduncle, up to 17 in each, subsessile, petals 5, white, lilac or pale pink, upper 2 with dark red feathery markings, 10–16 mm long, hypanthium 10–17(–20) mm long. Aug.–Oct. In stony heavy soils, SN, G, NH (Witpütz, Steinkopf and Okiep). **(ece)**

caroli-henrici B.Nord. Tuberous geophyte, up to 250 mm tall. Leaves dry at flowering, irregularly pinnatilobed to pinnatisect, up to 100 mm long, densely covered with white hairs. Flowers in 2–5 small clusters on a branched peduncle, usually 10–50 in each, subsessile, petals 5, yellow to cream-coloured, upper 2 with dark red claws, 8–15 mm long, lower 3 with red blotches in centre, hypanthium 22–33 mm long. Oct. Quartz pebble flats, NS, KV (Baievlei, W of Garies to Koekenaap). **(ece)**

confertum E.M.Marais Tuberous geophyte, up to 300 mm tall. Leaves dry at flowering, irregularly bipinnate, up to 240 mm long, densely hairy. Flowers in 2–8 tight clusters on a branched peduncle, mostly 13–24 in each, subsessile, petals 5, pale yellowish to cream-coloured, upper 2 with red feathery markings, 9–11 mm long, hypanthium 11–17 mm long. Nov.–Dec. Rock crevices or under bushes, NH, KB (around Springbok to near Nuwerus). **(ece)**

connivens E.M.Marais Tuberous geophyte, up to 180 mm tall. Leaves dry at flowering, pinnate to bipinnatisect, up to 200 × 60 mm, densely hairy. Flowers in 2 or 3 spreading clusters on a branched peduncle, 10–30 in each, subsessile, petals 5, ± connivent, pale yellow to salmon-pink, upper 2 with V-shaped pink markings, 24–28 mm long, hypanthium 40–55 mm long. Dec.–Jan. WM (Rondekop near Nieuwoudtville). **(ece)**

fumariifolium R.Kunth Tuberous geophyte, up to 230 mm tall. Leaves dry at flowering, pinnate to bipinnatisect, up to ± 140 mm wide, hairy. Flowers in 2–6 clusters on a branched peduncle, up to 25 in each, subsessile, pale yellow, upper 2 with pink V-shaped markings, 8–10 mm long, hypanthium 24–35 mm long. Oct.–Nov. Rocky karroid scrub or renosterveld, NH, WM, CCR (near Springbok to Matjiesfontein). **(gce)**

githagineum E.M.Marais Tuberous geophyte, up to 300 mm tall. Leaves dry at flowering, prostrate, undivided, up to 150 mm long, blade elliptic to triangular, hairy, margin crenate. Flowers in 2–5 tight clusters on a branched peduncle, 6–27 in each, shortly pedicellate, petals 5, white, 6.5–11 mm long, hypanthium 9–20 mm long. Sept.–Oct. Sandstone ridges under bushes, WM, TS (Roggeveld Plateau to Matjiesfontein). **(ece)**

grenvilleae (Andrews) Harv. Small tuberous geophyte, up to 150 mm tall. Leaves prostrate, undivided, up to 150 mm long, blade ovate, glandular-hairy, margin crenulated. Flowers usually in 1 cluster on an unbranched peduncle, 10–28 in each, shortly pedicellate, petals 5, cream-coloured with dark pink claws, upper two 14–19 mm long, hypanthium 25–40 mm long. Sept.–Oct. In sand or loam, often under bushes, NH, KB (Steinkopf to Kamiesberg Mountains). **(ece)**

luteolum N.E.Br. Tuberous geophyte, up to 300 mm tall. Leaves dry at flowering, petiole long, rigid, blade palmate, ± 40 mm diam., with segments up to 5 mm wide. Flowers in 2 or 3 clusters on a branched peduncle, up to 16 in each, subsessile, petals 5, pale yellow, upper 2 hairy along midveins, 7–14.5 mm long, hypanthium 13–24 mm long. Nov.–Mar. Diverse habitats, NH, CCR (Garies and Clanwilliam to Steytlerville). **(gce)**

luteum (Andrews) G.Don Tuberous geophyte, up to 200 mm tall. Leaves sometimes dry at flowering, pinnatisect or to bipinnatisect, up to 120 × 40 mm, with segments ± 2 mm wide, minutely glandular-hairy. Flowers in 4–9(–12) clusters on a branched peduncle, up to 20 in each, subsessile, petals 5, yellow, upper 2 with red V-markings, 11–15 mm long, hypanthium 20–33 mm long. Oct.–Nov. Rocky places, WM, TS, CCR (near Nieuwoudtville to northern Tanqua Karoo). **(gce)**

moniliforme Harv. Tuberous geophyte, up to 400 mm tall. Leaves simple to tripartite, up to 60 mm diam., long-glandular-hairy. Flowers 12–40(–50), usually in 1 large cluster, on an unbranched peduncle, subsessile, sepals wine-red, petals 5, cream-coloured to yellow, often all blotched with red, upper two 13–22 mm long, hypanthium 20–77 mm long. Sept. Diverse habitats, NS, NH, KB, KV, WM, CCR (Holgatrivier to Roggeveld Plateau to Karoopoort and Witteberg Mountains). **(gce)**

nephrophyllum E.M.Marais Delicate, tuberous geophyte, up to 120 mm tall. Leaves dry at flowering, kidney-shaped and shallowly lobed, ± 25 mm diam., reddish purple beneath. Flowers in 2 sparse clusters, on a branched peduncle, up to 7 in each, subsessile, petals 5, pink, blotched orange in centre, 11–14 mm long, hypanthium 20–30 mm long. Feb.–Apr. Stony lower slopes and sandy flats, KV, CCR (S of Vanrhynsdorp to base of Matsikamma Mountains). **(gce)**

oblongatum Harv. Tuberous geophyte, up to 300 mm tall. Leaves dry at flowering, undivided, blade ovate, up to 105 mm diam., shortly hairy, margin dentate. Flowers in 2–5(–7) clusters, on a branched peduncle, up to 24 in each, subsessile, petals 5, cream-coloured, upper 2 with red feathering, 22–35 mm long, hypanthium 33–68 mm long. Oct.–Nov. ?Rocky slopes, G, NH, KB (Stinkfontein Mountains to Kamiesberg Mountains). **(ece)**

parvipetalum E.M.Marais Tuberous geophyte, up to 280 mm tall. Leaves erect, blade pinnatisect or bipinnatisect, up to 140 mm long, covered with long stiff hairs. Flowers in up to 6 tight clusters on a branched peduncle, up to 18 in each, subsessile, petals 5, shorter than sepals, 4.5–8.5 mm long, white, hypanthium 8–16 mm long. Sept. Sandy soil, NH, KV, CCR (Gamoep to Pakhuis Pass). **(gce)**

quarciticola Meve & E.M.Marais Tuberous geophyte, 50–100 mm tall. Leaves erect, pinnate, ± ovate in outline, sticky, with glandular hairs, ± succulent. Flowers in 2 or 3 clusters on a branched peduncle, 2–9 in each, pedicel 1–3 mm long, petals 5, whitish or pale pink, upper 2 with red feather-like markings, 12–16 mm long, hypanthium 8–12 mm long. Aug. Quartz pebble fields, KV (NE and SE of Bitterfontein). **(ece)**

radicatum Vent. Tuberous geophyte, up to 300 mm tall. Leaves dry at flowering, lanceolate, concave, 70–140 mm long, fringed with pale bristles. Flowers in (2)3–7 clusters on a branched peduncle, up to 35 in each, subsessile, petals 5, pale yellow, upper 2 with a small central red dot, 13–20 mm long, hypanthium 40–60 mm long. Oct.–Dec. Sandy soil, NH, CCR (near Springbok to Hopefield). **(gce)**

rapaceum (L.) L'Hér. Tuberous geophyte, up to 400 mm tall. Leaves sometimes dry at flowering, bipinnatisect, up to 250 mm long, segments 1–3 mm wide. Flowers in 2–4 clusters on a branched peduncle, up to 50 in each, pedicel up to 10 mm long, petals 5, white, yellow, or pink, 10–20 mm

long, 3 lower forming a keel, hypanthium 12–55 mm long. Oct.–Feb. Stony slopes and flats, G, NH, KB, KV, WM, TS, CCR (Richtersveld to Grahamstown).

rubiginosum E.M.Marais Tuberous geophyte, up to 200 mm tall. Leaves dry at flowering, bipinnatisect, up to ± 100 mm long, densely covered with white hairs. Flowers in 2–5 clusters on a branched peduncle, 10–30 in each, subsessile, petals 5, white to yellow, with red central markings, 9–16 mm long, hypanthium 14–32 mm long. Oct.–Nov. In rock crevices on foothills and summits, G, NH (Kubus to Kourkamma Mountain). **(ece)**

tripalmatum E.M.Marais Tuberous geophyte, 90–160 mm tall. Leaves dry at flowering, petiole rigid, spreading horizontally then upturned, blade 3-palmate, ± 70 mm wide. Flowers in 2–5 clusters on a branched peduncle, 4–17 in each, subsessile, petals 5, pale yellow, upper 2 with red feather-like markings, ± 15 mm long, hypanthium 10–17 mm long. Nov. ?Habitat, G (Richtersveld near Eksteenfontein). **(ece)**

vinaceum E.M.Marais Like **P. moniliforme** but up to 180 mm tall, leaves dry at flowering, short glandular-hairy, margins bristly, flowers 10–27 in a cluster, fertile stamens 2 or 4 (vs. 5), hypanthium 11–26 mm long. Oct.–Nov. In rock crevices or sand, SN, G (Rosh Pinah to Nigramoep S of Steinkopf). **(ece)**

B.' Shrubs or shrublets; leaves cauline
*G. Stems and branches twig-like and somewhat woody (see also **P. pulchellum** under G.')*

abrotanifolium (L.f.) Jacq. Erect, much-branched, twiggy shrublet, up to 500 mm tall. Leaves small, feather-like, grey-green, aromatic, blade 5–17 mm long. Flowers 1–5 per peduncle, ± 20 mm diam., petals 5, white to pink or purple, upper 2 with darker reddish markings, hypanthium ± 18 mm long, much longer than pedicel. Almost year-round. On rocky outcrops, WM, TS, CCR (near Calvinia and Roggeveld Plateau to southern Cape to Free State).

antidysentericum (Eckl. & Zeyh.) Kostel. ROOISTORM Twiggy shrub, up to 1.5 m tall, with brittle branches from a massive partly exposed tuber. Leaves clustered on short shoots, with slender petioles, blade round, 15–20 mm diam., margin shallowly incised. Flowers 3–5 per very short peduncle, on pedicels 2–10 mm long, ± 20 mm diam., petals 5, purple, hypanthium ± 5 mm long. Mar.–May. Rocky places, G, NH, KB, WM, TS, CCR (near Witpütz to southern Tanqua Karoo). **(gce)**

grandicalcaratum R.Knuth Shrublet, up to 500 mm tall. Leaves somewhat succulent, wedge-shaped, aromatic, 10–15 mm diam. Flowers up to 5, on very short peduncles near branch tips, ± 14 mm diam., not opening widely, pedicel 2–11 mm long, petals 5, white, streaked reddish, hypanthium 5–17 mm long, swollen. Mainly Oct. Rocky, often granite outcrops, SN, G, NH, TS, CCR (Klinghardt Mountains to Matjiesfontein). **(gce)**

karooicum Compton & P.E.Barnes Tufted, twiggy shrublet, ± 400 mm tall. Leaves digitately divided, blade up to 20 mm long, with segments ± 1 mm wide, rarely simple, ± succulent. Flowers 2 on a short, apparently terminal peduncle, subsessile, ± 20 mm diam., petals 5, white or pale yellow or pink, hypanthium 9–14 mm long. Jan.–Apr. Rocky slopes, NS, KV, TS, CCR (near Kleinsee to Oudtshoorn). **(gce)**

magenteum J.J.A.van der Walt Rounded, twiggy shrub, up to 1 m tall. Leaves petiole, blade rotund-cordate, up to 15 mm diam., velvety, shallowly lobed. Flowers 2–9 per cluster on a short peduncle, subsessile, ± 20 mm diam., petals 5, magenta, all with darker markings, hypanthium ± 30 mm long. May–Oct. Rock outcrops, TS, CCR (Botterkloof to foothills of Roggeveld Mountains to Calitzdorp). **(gce)**

myrrhifolium (L.) L'Hér. Sprawling shrublet, ± 300 mm tall. Leaves bipinnatisect, segments linear to ribbon-shaped, ± 50 × 30 mm. Flowers up to 5 per tight cluster, subsessile, 20–25 mm diam., petals 4 or 5, white to pink or pinkish purple, upper 2 markedly wider, hypanthium 4–10 mm long. Aug.–Feb. Open places on stony sand, KB, CCR (Kamiesberg Mountains and Gifberg to Uitenhage). **(gce)**

praemorsum (Andrews) F.Dietr. Woody perennial, with thin zigzagged branches, up to 2 m tall, from a massive, partly exposed tuberous base. Leaves with persistent rigid stipules, blade round and deeply 3–5-lobed, leathery, up to 30 mm diam. Flowers 1 or 2 at branch tips, shortly pedicellate, 15–50 mm diam., petals 4, cream-coloured, upper 2 much larger, with purplish veins, hypanthium 10–40 mm long. Aug.–Apr. Rocky slopes and flats, G, NS, NH, KB, KV, CCR (Richtersveld to Olifants River Valley). **(gce)**

scabrum (Burm.f.) L'Hér. HOENDERBOS Coarse, aromatic shrub, up to 1.2 m tall. Leaves palmatisect, roughly hairy, ± 50 mm diam. Flowers 2–6 per cluster, on short axillary peduncles, ± 20

mm diam., white to purplish; hypanthium 3–12 mm long, ± as long as pedicel. Aug.–Jan. Rocky sandstone slopes, NH, KB, CCR (Steinkopf to SW Cape to Grahamstown).

sericifolium J.J.A.van der Walt Much-branched subshrub, up to 200 mm tall, with ± woody stems covered with old petioles and stipules. Leaves ± palmatisect, up to ± 25 mm long, silky. Flowers (1)2 near branch tips, up to 46 mm diam., shortly pedicellate, petals 5, magenta, with darker central bands, hypanthium 35–60 mm long. July–Oct. Rocky places, NH (Kookfontien to near Sanaggas). **(ece)**

trifidum Jacq. Sprawling, aromatic shrublet, up to 750 mm tall, with brittle slender branches. Leaves almost trifoliolate, up to 40 mm diam. Flowers 3–6 per head, on a long unbranched peduncle, subsessile, ± 30 mm diam., petals 5, white to cream-yellow, with reddish stripes, hypanthium 20–30 mm long. Sept.–Jan. Dry stony slopes and flats, TS, CCR (Worcester to Matjiesfontein to Peddie). **(gce)**

xerophyton Schltr. ex R.Knuth Well-branched, ± cushion-shaped shrublet, up to 600 mm tall, with twiggy ± succulent branches. Leaves with semi-persistent petioles, blade broadly obovate, 3–12 mm wide, ± dentate. Flowers 1(2) per peduncle, ± 35 mm diam., pedicel 1–2 mm long, petals 5, white, upper 2 with red leather-like markings, hypanthium 10–27 mm long. Mar.–Nov. Amongst rocks, SN, G, NH (central Namibia to near Kamieskroon and Bushmanland).

G.' Stems and branches clearly succulent

adriaanii M.Becker & F.Albers Succulent shrublet, up to 500 mm tall, with thickened taproot. Leaves bipinnatipartite, up to 120 mm long. Flowers in 8–12 loose clusters, on a loosely branched axis that persists after flowering, 5–8(–12) in each, pedicels 10–19 mm long, petals 5, 6–7 mm wide, white to pale pink, upper 2 marked with red near base, hypanthium 5–7 mm long. Sept.–Oct. Coastal sands, NS (near Port Nolloth). **(ece)**

articulatum (Cav.) Willd. Semi-geophyte, up to 400 mm tall, with ± necklace-like creeping rhizome and ± trailing stem. Leaves with a long slender petiole, blade round, ± 50 mm diam., ± 5-palmatilobed, silky hairy, often with reddish zonal markings. Flowers in few clusters, on a stout branched peduncle, 2–5 in each, subsessile, 40–50 mm diam., petals 5, white to cream-coloured, upper 2 lined with red, hypanthium up to ± 70 mm long. Oct.–Dec. Rocky slopes, often in partial shade, NH, KB, WM, TS, CCR (Steinkopf to Worcester, Witteberg Mountains and Fraserburg).

barklyi Scott-Elliot Like **P. articulatum** but with a ± globose vertical tuber, leaf margin dentate to shallowly lobed, petals white to cream-coloured, unmarked other than faintly tinged with pink near base, and upper 2 slightly broader than lower 3 (vs. upper 2 more than 2 times as wide as lower 3). Aug.–Oct. S-facing slopes, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

carnosum (L.) L'Hér. (including **P. parviflorum** J.C.Wendl.) Sparsely branched stem-succulent, up to 1 m tall. Leaves pinnatifid to pinnate, up to 200 mm long. Flowers in 6–50 compact clusters, on a loosely branched axis, 4–6 in each, subsessile, 10–15 mm diam., petals 5, 1.8–4 mm wide, white with purple markings or yellowish, hypanthium (4–)8–9 mm long. Sept.–Apr. Flats and slopes, SN, G, NH, KV, TS, CCR (Namibia to Little Karoo).

ceratophyllum L'Hér. Succulent subshrub, up to 200 mm tall, with persistent old leaf bases on stems. Leaves pinnate or bipinnate, up to ± 80 mm long, appearing glabrous, segments linear, semi-terete. Flowers 1–3(4), ± 15 mm diam., in reduced clusters on a sparsely or unbranched peduncle, pedicles 7–13 mm long, petals 5, white, pale yellow or pinkish, upper 2 with fine red markings, hypanthium 4–10 mm long. Aug. On rock outcrops, SN, G, NS, NH (near Lüderitz to Spektakelberg). **(ece)**

cortusifolium L'Hér. Succulent subshrub, up to 300 mm tall, with ± persistent stipules near stem tips. Leaves with petiole 20–90 mm long, blade cordate 17–42 mm diam., ± lobed, silky. Flowers in up to 8 clusters, 6–11 in each, ± 27 mm diam., pedicel 22–33 mm long, petals 5, white to pale pink, upper 2 with fine red markings, hypanthium ± 3 mm long. Flowering opportunistically. Rock crevices, SN (Spencer Bay to Pomona).

crassicaule L'Hér. Dwarf, branched stem-succulent, up to 200 mm tall. Leaves petiolate, blade broadly ovate, 20–50 mm wide, greyish green, silky, margin crenate. Flowers 5–9 in a ± terminal cluster, on a leaf-opposed peduncle, shortly pedicellate, petals 5, white, pale yellow, pink or lilac, upper 2 or sometimes all with reddish markings, hypanthium 15–25 mm long. (Mar.–)June–Oct. Rock outcrops on sandy or gravelly flats, SN, G (Lüderitz to lower Gariep Valley). **(ece)**

crassipes Harv. Nearly unbranched, subshrub-like stem-succulent, up to ± 150 mm tall, covered with hardened remains of stipules. Leaves bipinnate, coarsely hairy, ± 40 mm long. Flowers 2–10, ± 15 mm diam., in a small cluster, pedicel ± as long as 8–10 mm long hypanthium, petals pink,

with ± darker veins. July–Sept. Flats, often under bushes, KV, CCR (Lutzville to Clanwilliam). **(gce)**

crithmifolium Sm. DIKBASMALVA Stem-succulent, up to 1 m tall. Leaves bipinnatifid, up to 120 mm long, with ± terete succulent segments. Flowers 4–6 per cluster, in a much-branched inflorescence that becomes spiny, shortly pedicellate, ± 20 mm diam., petals 5, white, bases of upper 2 crisped, hypanthium ± 5 mm long. Feb.–May and Sept.–Nov. Flats and rocky hills, SN, G, NS, NH, KV, WM, TS, CCR (Aus to Roggeveld Plateau to northern Cederberg and Hex River Mountains). **(gce)**

dasyphyllum E.Mey. ex R.Knuth Woody to subsucculent shrublet, up to ± 300 mm tall, densely branched and becoming cushion-shaped. Leaves pinnate, 10–60 × 10–20 mm, hairy. Flowers 1–4 on a short branched, semi-persistent peduncle, ± 25 mm diam., pedicel 0.5–4 times longer than hypanthium, petals 5, white or very pale pink, upper 2 lined with purplish pink. Aug.–Dec. Rocky slopes, G, NH, TS, CCR (Richtersveld to Clanwilliam and near Matjiesfontein). **(gce)**

desertorum Vorster Aromatic shrublet, up to 300 mm tall, with slender, succulent, well-branched stems. Leaves with persistent petioles 8–50 mm long, blade orbicular, shallowly 5-lobed, 10–25 mm wide. Flowers 2–6 in subterminal clusters, pedicel 20–35 mm long, petals 5, white, 12–13 mm long, upper 2 tinged purple near base, hypanthium 2–23 mm long. June. S-facing slopes on granitic gravel, G (Richtersveld National Park). **(ece)**

echinatum Curtis Sparsely branched, subshrub-like stem-succulent, up to 400 mm tall, covered with persistent thorny stipules. Leaves often ± lobed, cordate, sparsely hairy above, but densely white-hairy beneath, up to 40 × 30 mm. Flowers 3–8 per cluster, subsessile, ± 30 mm diam., petals 5, white or pink or purple, upper 2 with darker markings, hypanthium 30–40 mm long. July–Nov. Granite and sandstone hills, G, NS, NH, KV, CCR (Richtersveld to Clanwilliam). **(gce)**

fulgidum (L.) L'Hér. ROOIMALVA Succulent-stemmed shrublet, up to 400 mm tall. Leaves pinnatifid, densely silky hairy, up to 100 × 70 mm, stipules large and broad. Flowers in few clusters on branched peduncles, 4–9 in each, subsessile, 15–20 mm diam., petals 5, red, hypanthium 20–40 mm long. June–Nov. Rocky outcrops, mostly coastal, G, NS, NH, KV, CCR (Boegoeberg to Yzerfontein). **(gce)**

gibbosum (L.) L'Hér. DIKBEENMALVA Sprawling shrublet, with conspicuously swollen nodes, up to 400 mm tall when unsupported. Leaves pinnatifid, leathery, glaucous, up to 130 × 75 mm. Flowers 3–14 per cluster, subsessile, ± 15 mm diam., petals 5, greenish yellow, hypanthium 20–25 mm long. Nov.–Apr. Rock outcrops near coast, NS, CCR (near Hondeklipbaai to Cape Peninsula). **(gce)**

hystrix Harv. Low subshrub, up to 200 mm tall, branches succulent, covered with stipular spines. Leaves few at branch tips, bipinnatisect, up to 35 × 20 mm. Flowers in a few clusters, on a stout branching peduncle, up to 13 in each, subsessile, ± 25 mm diam., petals 5, cream-coloured, hypanthium 30–45 mm long. Oct.–Nov. In shaley soils, often under shrubs, WM, TS, CCR (Calvinia and Matjiesfontein to Nougaspoort). **(gce)**

klinghardtense R.Knuth Stem-succulent, up to 800 mm tall, with glaucous-green stems. Leaves on short shoots, petiolate, obovate-spathulate, up to 120 × 45 mm, succulent, margin undulate. Flowers in small clusters, on a dichotomously branched peduncle, 2–4 in each, pedicel 4–25 mm long, petals 5, white, hypanthium 3–6 mm long. (Mar.–)May–Sept.(Oct.). On or near rock outcrops, SN, G (Klinghardt Mountains to lower Gariep Valley).

paniculatum Jacq. Stem-succulent like **P. crithmifolium** but with a much-branched, nonpersistent panicle-like inflorescence with numerous white, cream or light pink flowers and persistent leaf bases that form a geometric pattern on the stem. June–Sept. On rocky outcrops, SN, G (SW Namib). **(ece)**

polycephalum (E.Mey. ex Harv.) R.Knuth Like **P. carnosum** but flowers in tight clusters, 10–15 in each, flowers developing ± simultaneously, with a short duration, petals 3–4 mm wide, and hypanthium 3–4 mm long. Aug.–Sept. Rocky hills, G, NH, KV (Steinkopf to Vredendal). **(ece)**

pulchellum Sims Small subshrub, up to 500 mm tall, stem contracted, succulent to ± woody with age, covered with persistent large stipules fused to petiole. Leaves with oblong-ovate, pinnate blade, 30–150 mm long, coarsely hairy. Flowers in few terminal clusters on a branched peduncle, 6–25 in each, ± 30 mm diam., pedicel 2–9 mm long, petals 5, white, lower 3 with red markings, hypanthium 25–50 mm long. July–Oct. On granite outcrops, G, NS, NH, KB (near Steinkopf to near Nuwerus). **(ece)**

spinosum Willd. Spiny shrub, up to 1.3 m tall, stem ± succulent, armed with persistent petioles up to 110 mm long. Leaves of 2 kinds, small leaves deciduous, in axils of large, kidney-shaped leaves, margin dentate. Flowers 3–10 per cluster, on an unbranched peduncle, ± 35 mm diam., pedicel

10–40 mm long, petals 5, white to pale pink, upper 2 with purple feather-like markings, hypanthium 10–23 mm long. Rain-dependent. On rocky or sandy slopes, SN, G, NH (Namuskluft to Ratelskraal near Springbok to Aggenys).

stipulaceum (L.f.) Willd. Subshrub-like stem-succulent, up to 300 mm tall, covered with persistent and broad stipules. Leaves crowded apically, cordate and variously incised, aromatic, ± 40 × 30 mm. Flowers in a few clusters, on a branched peduncle, 2–5 in each, subsessile, ± 25 mm diam., petals 5, cream-coloured, hypanthium 40–60 mm long. Oct. In shade usually between rocks, G, NH, WM, TS, CCR (Lekkersing to Kamieskroon to Matjiesfontein). **(gce)**

tenuicaule R.Knuth Straggling, much-branched, ± succulent shrublet, up to 250 mm tall, with brittle stems. Leaves petiolate, blade digitately 5-lobed, 30–50 mm wide, margins toothed. Flowers paired at tips of peduncles, ± 45 mm diam., pedicel 2–4 mm long, petals 5, white to cream-coloured, upper 2 with large wine-red blotches, hypanthium 18–20 mm long. Sept.–Dec. On flats or slopes among rocks, G, NS (Namuskluft to S of Kleinsee and ?Gordonia).

tetragonum (L.f.) L'Hér. Sprawling, often leafless shrublet, with angular fleshy branches ± 7 mm diam. Leaves often palmatifid, sometimes with red zonal markings, up to 40 mm diam. Flowers in pairs, petals 4, cream-coloured to pale pink with reddish veins, ± 40 mm diam., markedly asymmetric, stamens well-exserted; hypanthium 25–60 mm long, much longer than pedicel. Sept.–Dec. Rock outcrops, TS, CCR (Worcester to Graaff-Reinet and Bedford).

torulosum E.M.Marais Much-branched shrublet, up to 160 mm tall, with succulent and irregularly beaded stem. Leaves tufted at stem apex, shortly stipulate, bipinnate, up to 65 mm long, hairy. Flowers in 2 or 3 clusters per branched peduncle, 4–8 in each, subsessile, ± 35 mm diam., petals 5, ± pale yellow, upper 2 with feather-like red markings, hypanthium 45–55 mm long. Nov. Sandy places under bushes, WM, TS (Roggeveld Plateau and near Matjiesfontein). **(ece)**

[**Uncertain record** **P. capillare** (Cav.) Willd. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

[**Imperfectly known species** **P. gilgianum** Schltr. ex R.Knuth]

GISEKIACEAE

by D.A. Snijman

GISEKIA ± 4 spp., Old World tropics

africana (Lour.) Kuntze Sprawling annual or perennial, stems 50–500 mm long, glabrous or with short rough hairs, often tinged red. Leaves in tufts, linear to obovate, 10–50 mm long, green above, whitish beneath. Flowers in umbel-like cymes at nodes and branch tips, opening in succession, small, usually reddish. Fruit of 5 warty achenes. Aug.–Apr. Sandy soil in woodland and water courses, SN, G (tropical and southern Africa to Asia).

pharnacioides L. Like **G. africana** but stamens 5 (not 10–15), flowers opening together, white or yellow. Aug.–Apr. Woodland, riverbanks, sand dunes and disturbed places, SN (tropical and southern Africa, Mascarene Islands to India and Sri Lanka).

LAMIACEAE

by D.A. Snijman

1. Calyx 2-lipped; fertile stamens 2, anther thecae separated by a long connective . . . . . **Salvia**
1.' Calyx 2-lipped or 5–many-lipped; fertile stamens 4:
2. Corolla small, 2–5 mm long; stamens equally spreading, 2 directed upwards and 2 downwards . . . . . **Mentha**
2.' Corolla > 5 mm long; stamens all directed to upper side of corolla tube or lip of corolla:
3. Stamens included in corolla tube . . . . . **Acrotome**
3.' Stamens reaching mouth of corolla tube or exserted:
4. Calyx 6–many-toothed . . . . . **Ballota**
4.' Calyx ± equally 5-toothed . . . . . **Stachys**

ACROTOME 8 spp., Africa S of the equator

pallescens Benth. Minutely glandular-hairy shrublet, 0.45–0.5 m tall, branching from a woody rootstock. Leaves ovate to ovate-lanceolate or linear-oblong, ± glabrous to minutely hispidulous. Flowers in 2–6, well-spaced, axillary verticils, few–12 in each, calyx sharply 5-toothed, corolla small, white. (Mar.–)Aug.–Oct. Sandy soils among rocks, G (through Namibia to Richtersveld and Gordonia).

BALLOTA HOREHOUND, KATTEKRUIE ± 33 spp., mostly Mediterranean and Eurasia, also Africa

africana (L.) Benth. Aromatic, soft, greyish shrublet, up to 1.2 m tall. Leaves cordate, softly hairy, toothed. Flowers in ± globose, well-spaced, axillary verticils, many in each, pink to purple, calyx 10–20-toothed, slightly enlarged in fruit. May–Nov. Rocky or disturbed places, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Namibia to SW and E Cape to Free State).

MENTHA MINT ± 25 spp., cosmopolitan, mainly temperate

longifolia (L.) Huds. WILDEKRUISEMENT Straggling, aromatic shrublet, up to 1.5 m tall, usually coarsely hairy. Leaves sessile, lanceolate, sometimes sparsely toothed. Flowers crowded in spike-like, terminal verticils, white to mauve, calyx 5-toothed. Nov.–Apr. Along rivers or seeps, G, NH, KB, WM, TS, CCR (southern and N Africa to Europe).

SALVIA SAGE, SALIE 800–900 spp., cosmopolitan

A. Fruiting calyx not enlarged in fruit, cylindrical-campanulate,

disermas L. GROOTBLOUSALIE Aromatic, viscid shrub, up to 1.2 m tall. Leaves ± crowded below, roughly hairy, ovate, toothed. Flowers usually in a branched inflorescence in verticils, calyx glandular-hairy, corolla whitish to mauve, 15–30 mm long, upper lip deeply hooded, calyx cylindrical campanulate, with 3 upper teeth connivent. Aug.–May. Slopes and seasonal water courses, NH, KV, WM, TS, CCR (Namibia and Steinkopf to Bokkeveld Plateau to Roggeveld to NW Province).

namaensis Schinz Strongly aromatic, ± viscid, velvety shrublet, 0.3–1.2 m tall. Leaves leathery, lyrate-pinnatifid, markedly rugose, roughly hairy. Flowers in up to 14 verticils, crowded above, calyx glandular-hispidulous, not enlarging in fruit, corolla white, mauve or blue. Sept.–May. Rocky slopes, TS, CCR (Namibia, Laingsburg, Oudtshoorn to Prince Albert to Karoo and Free State).

verbenaca L. Like **S. disermas** but leaves usually with ± deeply dissected margins, corolla shorter (8–12 mm long), light blue to purple, with upper lip almost straight. May–Oct. SN, NH, WM, CCR (Mediterranean, Europe, Canary Islands and Asia, probably naturalised in dry western half of southern Africa, and naturalised in Australia and N America).

A.' Fruiting calyx enlarged in fruit, campanulate with widely diverging lips

africana-caerulea L. BLOUBLOMSALIE Grey-hairy shrub, up to 2 m tall. Leaves obovate, sometimes toothed. Flowers in verticils, calyx glandular-silky, enlarging up to ± 14 mm long in fruit, corolla mauve to blue or pink with darker spots, 16–28 mm long, upper lip hooded, 8–18 mm long. June–Jan. Sandy flats and rocky slopes, KV, CCR (just S of Vanrhynsdorp to Cape Peninsula to Montagu). **(gce)**

africana-lutea L. BRUINSALIE, STRANDSALIE Aromatic, grey shrub, up to 2 m tall. Leaves grey-hairy, obovate, sometimes toothed. Flowers mostly paired in axils of persistent bracts, calyx shortly hairy and gland-dotted, enlarging up to 30 mm long in fruit, corolla golden brown, 30–50 mm long, upper lip hooded, up to ± 25 mm long. June–Dec. Coastal dunes and rocky slopes, NS, NH, CCR (Port Nolloth and near Steinkopf along coast to SW Cape to Port Alfred).

dentata Aiton Like **S. africana-caerulea** but leaves usually grey-hairy and toothed to pinnatifid and calyx shortly hairy and gland-dotted. June–Jan. Rocky hillsides and water courses, G, NS, NH, KB, WM, TS, CCR (Richtersveld to Langberg to Gifberg to Hantam to Gannaga Pass). **(gce)**

garipensis E.Mey. ex Benth. Aromatic, much-branched shrub, 0.6–1.2 m tall, with pale ± striate stems. Leaves ovate to ± rotund, green, smooth to rough above, often conspicuously net-veined beneath.

Flowers in verticils, calyx enlarging up to 16 mm long in fruit, corolla white or pale blue to mauve. July–Oct. Stony hillsides and water courses, G, (central Namibia to Richtersveld and Gordonia).

lanceolata Lam. Like **S. africana-lutea** but inflorescence usually branched, bracts deciduous, and corolla dull rose to grey-blue, 25–35 mm long, upper lip up to 20 mm long. Sept.–June. Mainly coastal sands and rocky outcrops, NS, NH, KB, KV, CCR (near Springbok through to Cape Peninsula and Montagu). **(gce)**

STACHYS TEEBOS, WOUNDWORT ± 450 spp., cosmopolitan, mainly temperate and subtropical

*A. Flowers with a yellow corolla (see also **S. rugosa**)*

aurea Benth. GEELTEEBOSSIE Aromatic, yellowish felted shrub, up to 1 m tall. Leaves ± sessile, small, obovate, coarsely toothed above. Flowers in verticils, calyx yellowish woolly, corolla yellow. Sept.–Feb. Clay and sandy slopes, KV, WM, TS, CCR (Klawer to Bokkeveld and Cederberg Mountains, Loeriesfontein and western Karoo). **(gce)**

flavescens Benth. Rigid, branched shrub, 0.6–1 m tall, branches densely yellowish felted when young, greyish when old. Leaves lanceolate to oblong, densely yellowish felted on both sides. Flowers in several closely placed verticils, calyx densely stellate-felted, yellowish, corolla yellow. Sept.–Dec. Rocky slopes, G, NH, KB, CCR (near Gariep Mouth, northern Namaqualand to Kamiesberg and Bokkeveld Mountains and Matsikammaberg). **(gce)**

lamarckii Benth. Shrub, 0.2–1 m tall, white-woolly stellate-pubescent on young parts, older stems glabrescent and often shiny and brownish purple. Leaves elliptic or ovate-elliptic, more densely woolly beneath. Flowers in few to several verticils, calyx densely white to creamy woolly-stellate, corolla yellow. Aug.–Oct. Among rocks, G, WM (Richtersveld to Steinkopf, Gordonia, Loeriesfontein to Roggeveld).

A.' Flowers with a pink, mauve or purple corolla

cuneata Banks ex Benth. Aromatic, grey-felted shrub, 0.6–1 m tall. Leaves obovate to oblanceolate, cuneate at base, paler beneath. Flowers in several verticils, calyx stellate-tomentose, corolla pink, mauve or purple. Sept.–Nov. Dolerite hills, WM (Hantamberg to Roggeveld to upper and central Karoo).

linearis Burch. ex Benth. BOESMANTEE Foetid, grey-felted shrublet, up to 0.5 m tall. Leaves sessile, linear, ± smooth, folded, both surfaces grey stellate-felted, entire. Flowers mainly in pairs in terminal leaf axils, calyx grey-felted, corolla pink to mauve. Sept.–Feb. Clay and sandy flats, WM, TS, CCR (Pakhuis Mountains to western and southern Karoo to Free State).

rugosa Aiton VAALTEE Aromatic grey-felted shrub, up to 1.2 m tall. Leaves sessile, lanceolate, usually conspicuously rugose, ± dark above, whitish beneath, entire or slightly toothed. Flowers in verticils, (2–)6(–8) in each, calyx grey-felted, corolla pink to purple or yellow, often mottled. Sept.–Dec. Rocky clay or sandy slopes, SN, G, NH, KB, KV, WM, TS, CCR (southern Namibia and western Karoo to Piketberg to Lesotho).

zeyheri Skan Sulphurous smelling, twiggy shrub, ± 1 m tall, with glabrescent branchlets. Leaves small, ovate, densely and shortly white tomentose on both sides, margin crenulate. Flowers in sparse verticils, on short shoots in axils of terminal leaves, calyx stellate-tomentose, corolla pink. Aug.–Jan. Among rocks, NH, WM (Kliprand to southern Bushmanland to Langberg and northernmost Bokkeveld Mountains).

LIMEACEAE

by D.A. Snijman

LIMEUM KOGGELMANDERVOET, LIZARD'S FOOT 26 spp., tropical Africa to W Cape and India

aethiopicum Burm.f. AARBOSSIE Stunted, woody shrublet with annual shoots, up to 400 mm tall. Leaves alternate to subopposite, oblong to elliptic, margins revolute. Flowers in terminal

and axillary umbel-like clusters on erect peduncles, white with green keel, pedicels ± 2 mm long. Mericarp never winged, ± hemispherical, surface honeycomb-like. Feb.–Mar. Dry, rocky slopes, SN, G, NS, TS, CCR (Zimbabwe to southern Africa).

africanum L. Sprawling annual or perennial, with long, trailing, prostrate branches. Leaves obovate to oblanceolate, ± fleshy, margins sometimes revolute. Flowers in crowded, terminal cymes on prostrate peduncles, white with green keel, pedicels 3–10 mm long. Mericarp never winged, ± hemispherical, distinctly pitted and ± sharply ridged, blackish. Mainly Aug.–Nov. Flats and dry rocky slopes, G, NS, NH, KB, KV, CCR (Richtersveld to Bokkeveld Plateau to Cape Peninsula). **(gce)**

argute-carinatum Wawra ex Wawra & Peyr. Spreading annual, with prostrate stems. Leaves alternate, oblong- to linear-lanceolate. Flowers in dense, terminal, umbel-like clusters, white with green keel, pedicels ± 2 mm long. Mericarp never winged, ± hemispherical, with pits outlined by sharply scalloped and pointed ridges, blackish. After rain. Sandy flats and washes, SN, ?NH (Angola, Namibia, northern areas of South Africa and Mozambique).

fenestratum (Fenzl) Heimerl Erect or procumbent annual or short-lived perennial, up to ± 900 mm tall, irregularly branched. Leaves alternate or in clusters, linear or lanceolate, ± glaucous. Flowers in a diffuse branching cyme, subsessile, green with a broad white border. Mericarp disc-like, with tubercles radiating from centre, wingless or surrounded by a transparent, radiately nerved wing. June–Apr. Sandy soils, often in disturbed places, SN, G, NS, NH (Angola, Zimbabwe, Mozambique and southern Africa).

LOASACEAE

by D.A. Snijman

KISSENIA 2 spp., southern Arabia, Somalia, Ethiopia and western southern Africa

capensis Endl. Scabrid shrublet, 0.25–1.2 m tall, with whitish bark. Leaves petiolate, ovate to ovate-oblong, usually 3–5-lobed, margin toothed. Flowers in a terminal scorpioid cyme, calyx of 5 oblong-spatulate lobes, longer than white petals and lengthening in fruit. Fruit indehiscent, densely hairy, crowned with enlarged calyx lobes. Feb.–Oct. Sandy soils between boulders and in dry water courses, SN, G (Namibia to Richtersveld and Gordonia).

LOBELIACEAE (= *CAMPANULACEAE* in part)

by D.A. Snijman

1. Petals separate, free or partly cohering by their claws above base; capsule 2-locular, many-seeded; often with twining stems, growing from an underground tuber . . . . . **Cyphia**
1.' Petals united; capsule 1- or 2-locular, few- to many-seeded; never twining or tuberous:
2. Stigmatic lobes short, subrotund or oval; flower resupinate (corolla cleft at the top of flower) **Lobelia**
2.' Stigmatic lobes elongate, filiform; flowers not resupinate (corolla cleft at base of flower) **Monopsis**

CYPHIA BAROE ± 60 spp., Africa, mainly South Africa

A. Stems erect to spreading

comptonii Bond Erect to spreading, tuberous geophyte, 100–150 mm tall, with spreading branches from base. Leaves densely arranged along stem, sessile, outspread, wedge-shaped or rarely elliptic, usually divided in upper half. Flowers 1 in upper leaf-axils, bilabiate, with petals free to base, 8–10 mm long, whitish to pale pink or blue, often with dark speckling on upper petals, ovary half inferior. June–Aug. In sandy washes and gravelly plains, TS (southern Tanqua Karoo). **(ece)**

oligotricha Schltr. Erect, tuberous geophyte, 50–300 mm tall, occasionally with a few suberect branches from base. Leaves spathulate or rarely elliptic to ovate, entire or rarely toothed, diminishing in size upwards. Flowers 1 per axil of upper leaves, bilabiate, with petals free to base, 8–12

mm long, white to pale mauve with purple speckling, ovary half inferior. June–Aug. On floodplains and limestone hills, KV (southern Knersvlakte). **(ece)**

A.' Stems twining

crenata (Thunb.) C.Presl Twining, tuberous geophyte. Leaves linear-lanceolate to ovate, toothed, often shortly lobed below, usually ascending. Flowers 1–3 in upper leaf-axils, bilabiate, laterally split, white to mauve, 9–11 mm long, calyx truncate below, divided almost to base, ovary ± superior, stamens 5–6 mm long, all anthers bearded. July–Sept. Sandy flats and slopes, ?G, NH, KV, CCR (?Richtersveld, northern Namaqualand to Cape Peninsula). **(gce)**

digitata (Thunb.) Willd. Twining, tuberous geophyte. Leaves sessile, 3–7-digitate, lobes linear, sometimes linear-lanceolate and obscurely toothed. Flowers in upper axils, bilabiate, laterally split, white to pale mauve with conspicuous purple markings, 7–11 mm long, stamens 5–7 mm, all or 2 anthers bearded. Mainly July–Oct. Sandstone and clay slopes, ?G, NH, KB, KV, WM, TS, CCR (?Richtersveld, Namaqualand and Roggeveld to Port Elizabeth). **(gce)**

longiflora Schltr. Twining, tuberous geophyte, up to 300 mm tall. Leaves sessile, linear to narrowly elliptic, sparsely dentate or undulate, ± revolute, fleshy. Flowers 1 per axil of upper leaves, 11–13 mm long, bilabiate, hairy on back, petals connate into a ± curved tube 7–8 mm long, white with violet markings, stamens 5 mm long, anthers hairy dorsally. June–Aug. Among rocks and shrubs, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

schlechteri E.Phillips (including **C. salteri** E.Wimm.) Twining, tuberous geophyte. Leaves linear to lanceolate, slightly toothed. Flowers 1 per axil of upper leaves, bilabiate, laterally split, pedicels and calyx pubescent to woolly white to mauve, 7–12 mm long, stamens 6–7 mm long, all anthers bearded. July–Sept. Stony slopes, KV, CCR (Vanrhynsdorp and Bokkeveld Mountains to Clanwilliam). **(gce)**

volubilis (Burm.f.) Willd. Twining, tuberous geophyte. Leaves linear-lanceolate, toothed (not lobed in CCR). Flowers in upper axils, showy, bilabiate, laterally slit, white to pale grey-mauve with small, dark, indigo spots ± hidden in the mouth, 14–20 mm long, stamens 3–4 mm long, all anthers bearded. Aug.–Sept. Sandy flats and mountain slopes, KB, CCR (Kamiesberg Mountains, Clanwilliam to Cape Peninsula, Worcester to Swellendam). **(?gce)**

[**Species insufficiently known** The collections from the Kamiesberg Mountains treated here as **C. volubilis** may represent a new species. Also requiring further study are the collections from southern Namibia, referred to by Roessler (1981) as the Cape species **C. dentariifolia** C.Presl, which still need to be correctly determined.]

LOBELIA (= *UNIGENES*) LOBELIA ± 300 spp., cosmopolitan

dregeana (C.Presl) A.DC. Sprawling or erect perennial herb, 40–300 mm tall. Leaves sessile to shortly petiolate, spathulate to cuneate, shallowly toothed above. Flowers 1 per axil of upper leaves, pedicellate, corolla ± 8 mm long, bright to pale blue with white tube, rarely pure white. Fruit glabrous. Sept.–Feb. In seasonally damp places, WM (dry interior of southern Africa to Roggeveld Escarpment and Nuweveld Mountains).

thermalis Thunb. Sprawling perennial, with trailing stems up to 500 mm long. Leaves sessile to shortly petiolate, elliptic-obovate, sharply toothed. Flowers scattered, 1 per leaf-axil, shortly pedicellate, corolla 16–18 mm long, pale blue, rarely white. Fruit retrorsely hairy. Feb.–Mar. Marshy slopes, WM, TS, CCR (Angola and Zimbabwe to Great Karoo to Hantamsberg and Roggeveld to Ceres).

MONOPSIS 13 spp., tropical and southern Africa

debilis (L.f.) C.Presl Loosely erect or tufted annual, up to 250 mm tall. Leaves elliptic-oblanceolate, slightly toothed. Flowers on long pedicels, purple, subactinomorphic, petals subrotund, without bracteoles. Mostly Sept.–Nov. Damp sandy slopes and flats, NS, NH, KB, KV, CCR (near Steinkopf to SW Cape to Langeberg Mountains). **(gce)**

flava (C.Presl ex Eckl. & Zeyh.) E.Wimm. Glabrous or shortly hairy perennial, 200–500 mm tall. Leaves linear-oblanceolate, sharply toothed. Flowers subsessile, crowded in pseudoracemes, bilabiate, yellow, pedicels bracteate at base. Oct.–Dec. Mountain slopes, KB, CCR (Kamiesberg Mountains to Bokkeveld Mountains to Ceres). **(gce)**

LOPHIOCARPACEAE

by D.A. Snijman

LOPHIOCARPUS 4 spp., southern Africa and Mozambique

polystachyus Turcz Much-branched, perennial herb, up to 500 mm tall, ± woody near base. Leaves in close-set clusters, linear, ± fleshy, glabrous, with a sharply pointed tip. Flowers minute, in long, slender, spike-like inflorescences, white or greenish yellow. Fruit a ridged achene. Sept.–Oct. In sandy riverbeds and inland dunes, SN, G (widespread in southern Africa).

LORANTHACEAE

by D.A. Snijman from Wiens & Tölken (1979a) & Polhill & Wiens (1998)

1. Flowers 4-merous . . . . . **Septulina**
1.' Flowers 5-merous:
2. Flowers radially symmetrical following anthesis and not producing a V-shaped split . . . . **Plicosepalus**
2.' Flowers bilaterally symmetrical following anthesis by tube bearing a V-shaped unilateral split:
3. Style ± filiform throughout . . . . . **Moquiniella**
3.' Style skittle-shaped in upper half . . . . . **Tapinanthus**

MOQUINIELLA MATCH STICKS, VUURHOUTJIES 1 sp., South Africa

rubra (A.Spreng.) Balle KOOTJIE-NAM-NAM Glabrescent stem parasite, up to 1 m tall. Leaves elliptic-lanceolate. Flowers 3–6 in axillary umbels, tubular, base swollen, mouth V-shaped, 5 lobes coiling back, glabrous, orange-red and black-tipped. Berry red. Mar.–June. On species of *Acacia*, *Diospyros, Euclea* or *Searsia*, G, NH, KB, WM, TS, CCR (through Namaqualand to Great Karoo to E Cape).

PLICOSEPALUS 12 spp., Middle East and Arabia through dry areas of Africa

undulatus (E.Mey. ex Harv.) Tiegh. Glabrous stem parasite, up to ± 1 m tall. Leaves oblong-linear to broadly ovate, variable in size. Flowers mostly paired in axils, curved and appearing tubular below, mouth radially symmetrical, 5 lobes coiled back, orange-yellow to red. Berry yellow, warty. Sept.–Feb. Mostly on species of *Acacia*, SN, G (through Namibia to lower Gariep Valley).

SEPTULINA CANDLES, KERSIES 2 spp., western part of southern Africa

glauca (Thunb.) Tiegh. Stellate-pubescent stem parasite, up to 0.5 m tall. Leaves oblanceolate-obovate, greyish. Flowers 2 or 3 in axils, tubular, base ± swollen, mouth narrowly V-shaped, 4-lobed, surface mealy with clusters of stellate hairs, greyish green flushed red. Berry red. Feb.–Sept. Frequently on *Lycium*, G, NS, KV, WM, TS, CCR (southern Namibia and Karoo to Cape Peninsula and Swartberg Mountains).

ovalis (E.Mey. ex Harv.) Tiegh. Like **S. glauca** but up to 1 m tall, leaves obovate to oblong-elliptical, flowers 1 or 2 in axils, corolla woolly stellate-pubescent at maturity, berry 11–12 mm long (not 7–8 mm long). Sept.–May. Mostly on species of *Tamarix* but also of *Lycium*, SN, G (lower Gariep Valley and near Kuruman).

TAPINANTHUS ± 31 spp., N Yemen and throughout Africa

oleifolius (J.C.Wendl.) Danser NAM-NAMBOS Stem parasite, up to ± 1 m tall. Leaves mostly ovate-elliptic, but highly variable. Flowers 3 or 4 in axillary clusters, tubular, base conspicuously swollen, mouth deeply V-shaped, 5 lobes reflexed, reddish pink with green at base and tips. Berry reddish orange. Year-round. Mostly on species of *Acacia* plus of several other genera, SN, G, NS, NH (widespread in dry parts of Africa S of equator).

MALVACEAE (= STERCULIACEAE, TILIACEAE)

by D.A. Snijman

1. Style simple, apex shortly lobed:
2. Fruit indehiscent . . . . . **Grewia**
2.' Fruit dehiscent:
3. Epicalyx absent. . . . . **Hermannia**
3.' Epicalyx of 12 linear, tomentose bracts . . . . . **Radyera**
1.' Style divided apically into distinct branches:
4. Fruit a loculicidally dehiscent capsule; style 5-branched, epicalyx of 5–12 bracts. . . . . **Hibiscus**
4.' Fruit of dehiscent follicles, achenes or pseudo-achenes arranged around a central columella and sometimes separating from it; style and epicalyx, when present, various:
5. Epicalyx absent. . . . . **Abutilon**
5.' Epicalyx present:
6. Stigmas ± apical, capitate or club-shaped . . . . . **Anisodontea**
6.' Stigmas decurrent on adaxial side of filiform to narrowly clavate style branches:
7. Epicalyx bracts fused below into a cup . . . . . **Lavatera**
7.' Epicalyx bracts free to base, mostly linear to lanceolate . . . . . **Malva**

ABUTILON WILDEMALVA ± 150 spp., cosmopolitan

pycnodon Hochr. Erect, semi-herbaceous shrub, up to ± 2 m tall. Leaves long-petiolate, heart-shaped, grey-green, finely hairy, coarsely toothed. Flowers 1–5 at branch tips and in upper leaf axils, petals whitish, yellowish, apricot or pink, sometimes darker red towards base, calyx bowl-shaped, carpels with 1 ovule. Jan.–Sept. Amongst rocks and along watercourse, SN, G (arid areas of southern Africa).

ANISODONTEA AFRICAN MALLOW, BERGROOS ± 20 spp., southern Africa

anomala (Link & Otto) Bates Velvety felted, spreading shrub, up to 1 m tall. Leaves shallowly to deeply 3–5-palmatifid, coarsely crenate. Flowers 1–5 in upper axils, 30–60 mm diam., pink to magenta, epicalyx of 3 ovate lobes, adnate below to calyx, carpels 4–10 mm long, with 2–6 ovules. Mainly Sept.–Dec. Stony slopes, often near streams, G, NH, KB, WM, TS, CCR (Richtersveld, Namaqualand and Klein Roggeveld to Hopefield and Witteberg Mountains). **(gce)**

bryoniifolia (L.) Bates Densely rough-hairy shrublet, up to 2 m tall. Leaves thick, deeply 3–5-lobed, central lobe largest, coarsely crenate. Flowers 1–few in tight axillary clusters, white to pink, epicalyx of 3 linear to oblanceolate lobes, carpels 2–6 mm long, with 1 ovule. Mainly Aug.–Oct. Stony slopes, G, NH, CCR (Vioolsdrif and Namaqualand to Tulbagh). **(gce)**

racemosa (Harv.) Bates Low, slender shrub, up to ± 800 mm tall, stems and leaves stellate-pubescent. Leaves deeply 3-parted into ± obovate to oblong divisions, middle lobe apically toothed but otherwise entire, side lobes irregularly toothed, yellow-green. Flowers on long, slender, ± leafless stems, 1–3 per node, pale pink with darker centre, epicalyx of 3 ovate bracts. Dec. On flats in heavy soils, WM, CCR (Hantam and Cederberg Mountains). **(gce)**

triloba (Thunb.) Bates Shortly hairy to velvety shrub, up to 1.5 m tall. Leaves often thick, broad, shallowly 3–5-lobed. Flowers 1–4 in axils, pink, epicalyx of linear to lanceolate lobes, carpels 2–6 mm long, with 1 ovule. Mainly Sept.–Oct. Rocky slopes and stream sides, KB, WM, TS, CCR (Kamiesberg Mountains and Hantamsberg to Roggeveld to Oudtshoorn). **(gce)**

sp. A Prostrate, sparsely stellate-hairy subshrub, from a woody rootstock, trailing stems up to 250 mm long. Leaves turned to one side, 3-lobed, with each lobe bluntly tri- or rarely many-furcate. Flowers showy, solitary in axils of leaves, white with reddish stripes leading into throat, epicalyx of 3 elliptical lobes, calyx softly stellate-pubescent. Oct.–Nov. Stream sides in rock crevices, WM (Roggeveld Escarpment). **(ece)**

GREWIA CROSS-BERRY, KRUISBESSIE 400+ spp., Africa, Asia and Australia

robusta Burch. KAROO-KRUISBESSIE Shrub, up to 3 m tall, grey-velvety when young. Leaves discolorous, grey-velvety beneath, often clustered on short shoots, ovate, finely toothed. Flowers solitary opposite leaves, pink. Fruit 4-lobed, purplish. Sept.–Dec. In dense scrub, TS, CCR (George and Oudtshoorn, southern Karoo to E Cape).

HERMANNIA DOLL'S-ROSE, POPROSIE ± 120 spp., dry tropics and subtropics, mostly southern Africa

A. Filaments cruciform, anther base not overlapping the expanded portion of filament
B. Flowers yellow or orange when fresh, turning reddish when faded

linnaeoides (Burch.) K.Schum. Small, creeping perennial, stems up to 200 mm long, sometimes rooting at nodes. Leaves small, ovate, round-toothed. Flowers 1 or 2 on slender pedicels in leaf axils near branch tips, pendulous, ± bell-shaped, orange. Mar.–May and Oct. In seasonally wet depressions, TS (central Karoo to near Prince Albert).

pulchella L.f. SKITTERYBOSSIE Erect, shrub, up to 500 mm tall, with resinous leaves and stems. Leaves narrowly oblong, cut almost to midrib. Flowers 2 on a short peduncle in axils of upper leaves, yellow, narrowed towards mouth. Aug.–Sept. Stony slopes, G, NH (Namibia, Richtersveld, northern and eastern Namaqualand and arid interior of South Africa).

sp. A (= *Hermannia glabripedicellata* De Winter *ms*) Sprawling, densely branched shrub, up to 500 mm tall. Leaves narrowly wedge-shaped, coarsely toothed. Flowers 1 or 2 at branch tips and in axils of upper leaves, pendulous, cup-shaped, yellow, sweetly scented. Aug.–Sept. Sandy flats and lower slopes, KV, CCR (just N of Vanrhynsdorp to Olifants River Valley). **(gce)**

sp. B (= *Hermannia stipitata* De Winter *ms*) Sprawling subshrub, up to 200 mm tall, with a woody rootstock, stems and leaves with pin-shaped glands. Leaves widely spaced, oblong to elliptic, bluntly lobed or toothed. Flowers 2 per peduncle on branch tips and in upper leaf axils, pendulous, ± bell-shaped, pink, yellow to orange. July–Sept. On granite hills, NH (Spektakelberg to Nuwerus). **(ece)**

*B.' Flowers pink, mauve, purple, violet or red when fresh (see also **sp. C**)*

coccocarpa (Eckl. & Zeyh.) Kuntze Glabrescent, twiggy shrublet, up to 300 mm tall. Leaves linear-oblanceolate, toothed. Flowers 1 or 2 on slender axillary peduncles, pendulous, pink to purple. Capsule oblong, 2–3 times longer than calyx. Sept.–May. Rocky slopes or seasonally wet depressions, TS, CCR (dry parts of southern Africa to Swartberg Mountains).

erodioides (Burch. ex DC.) Kuntze Dwarf, prostrate shrublet, up to ± 40 mm tall, stems growing from top of a deep woody taproot. Leaves clustered near base, but turned to one side along stems, ± oblong, shallowly lobed. Flowers 1 or 2 in upper leaf axils, on slender peduncles, pendulous, cup-shaped, pale mauve to deep purple. Sept.–Mar. On flats or slopes in loamy or clay soils, WM (Hantam, Roggeveld and central Karoo).

glabrata L.f. Low, spreading shrublet, ± 150 mm tall, from a woody base. Leaves ± widely spaced, narrowly oblong, shallowly lobed. Flowers 1 or 2 on slender peduncles in upper leaf axils, pendulous, pink, petals furled and twisted over each other near apex. July–Sept. On sandy soils, KV, WM, ?TS (near Loeriesfontein, Vredendal, Hantam, and Roggeveld and ?Matjiesfontein). **(ece)**

grandiflora Aiton Erect, rounded shrub, up to ± 1 m tall. Leaves oblong-cunetae, coarsely lobed or toothed. Flowers showy, ± covering entire shrub, 2 at each branch tip and in upper axils, on slender pedicels, pendulous, widely funnel-shaped below but widening to a ± outspread divided rim, scarlet. Capsule hornless. Aug.–Oct. In dry seasonal washes, WM, TS (near Calvinia, Roggeveld, Tanqua Karoo, southern and Great Karoo).

heterophylla (Cav.) Thunb. (= *Hermannia humifusa* Hochr.) Sprawling to prostrate, slightly viscid shrublet, up to 500 mm tall. Leaves oblanceolate, toothed above, with leafy stipules. Flowers 1 or 2 on slender axillary and terminal peduncles, mauve, petals tightly furled, with bracts partly united in a small cup. Sept.–Oct. Sandy, often coastal flats, NS, CCR (Brand-se-Baai to Cape Peninsula). **(gce)**

jacobeifolia (Turcz.) R.A.Dyer Prostrate subshrub, up to 200 mm tall, stems spreading from a deep woody taproot. Leaves widely spaced, deeply cut almost to midrib. Flowers 2, on long peduncles in axils of upper leaves, pendulous, cup-shaped, pink to pinkish blue. Sept.–Oct.(–Apr.). In dry streambeds and amongst rocks, NH, TS (eastern Namaqualand to eastern parts of South Africa).

meyeriana R.Glover (= *Mahernia multifida* E.Mey.) Semi-prostrate, greyish-villose subshrub, stems spreading from woody rootstock. Leaves bi-pinnatipartite, lobes linear, thinly stellate-pubescent. Flowers 1 or 2 per peduncle inserted near branch tips, pendulous, cup-shaped, petals pink with red central bands. Sept.–Oct. Sandy flats, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

stricta (E.Mey. ex Turcz.) Harv. Like **H. grandiflora** but flowers solitary in upper leaf axils, rose pink to bright red, and capsule topped with 5 bifid, recurved horns. Flowering after rain. In

stony or sandy soil, SN, G (Namibia to Richtersveld, northern Namaqualand, Bushmanland and Gordonia).

sp. C (= *Mahernia nana* Eckl. & Zeyh.) Dwarf subshrub, up to ± 60 mm tall, stems emerging from a compact head on a woody rootstock. Leaves crowded basally, elliptical to ovate, bluntly toothed. Flowers 2 each on several, long, slender, erect peduncles, pendulous, bell-shaped with petals rolled back near blunt apex, violet-blue. Sept.–Jan. ?Stony slopes, TS (near Matjiesfontein to Koup Karoo).

sp. D Sprawling shrublet, up to ± 150 mm tall, with a woody base. Leaves ± elliptical, broadly lobed to ± halfway to midrib. Flowers 2 on long slender peduncles in axils of reduced upper leaves, bell-shaped, dark red and white. Amongst dolomite rocks, KV (Wiedouw River S of Vanrhynsdorp). **(ece)**

A.' Filaments oblanceolate, anther base overlapping the expanded portion of filament

C. Flowers pink, mauve, purplish or violet, rarely reddish when fresh

affinis K.Schum. Like **H. spinosa** but branches stellate-tomentose and becoming hard and spine-like (vs. branchlets sparsely stellate-pubescent or glabrous and usually the enlarged peduncles becoming spike-like). Jan.–July. Rocky hills and slopes, SN (Namibia to W of Aus to Bushmanland and northern Karoo).

engleri Schinz Rounded shrub, up to 900 mm tall. Leaves linear to narrowly oblong, tip acuminate to truncate and lobed, finely stellate-pubescent, veins prominent beneath. Flowers solitary in axils of leaves, mauve to pink, petals shorter than calyx. Capsule with 5 blunt horns. Aug.–Sept. In sand, SN, G (near Bethanien to Sendelingsdrif).

gariepina Eckl. & Zeyh. Much-branched shrublet, up to 750 mm tall. Leaves ± cuneate towards base, thick-textured, densely grey stellate-tomentose, entire or round-toothed. Flowers solitary in leaf axils (upper leaves often reduced in size), bell-shaped, pink, purplish or violet. Capsule usually hidden in persistent calyx. Apr.–Sept. Sandy open areas, SN, G, NH (Namibia and Gordonia to northeastern Namaqualand).

spinosa E.Mey. ex Harv. STEEKBOSSIE Spinescent, gnarled shrublet, up to 400 mm tall, with whitish grey branches. Leaves obovate, slightly toothed. Flowers solitary in axils, dark pink to red, bell-shaped, peduncles stiff and becoming woody and thorn-like. Capsule horned. Mainly Aug.–Sept., but also after rain. Stony slopes and flats, G, WM, TS, CCR (Namibia, Gordonia to Loeriesfontein to Tanqua Karoo, Little Karoo and southern Karoo).

trifurca L. KOERHASSIE Roughly hairy, much-branched shrublet, up to 1.5 m tall, with branch tips becoming spiky. Leaves clustered and solitary, oblong, often 3-toothed, ± stellate-pubescent. Flowers solitary in upper leaf axils, turned to one side on horizontal stems, bell-shaped, mauve with dark venation. Capsule shortly horned. Aug.–Oct. Stony or sandy soils, SN, G, NS, NH, KV, WM, CCR (Klinghardt Mountains to Hantam to SW Cape). **(gce)**

sp. E Like **H. trifurca** but flowers in pairs at branch tips and in axils of upper leaves. Aug.–Sept. Deep sands, in arid fynbos, NS (between Kleinsee and Koiingnaas, near Hondeklipbaai and near Kotzesrus). **(ece)**

C.' Flowers yellow or orange when fresh, turning reddish when faded

althaeifolia L. Softly hairy, mealy, grey-green shrublet, up to 500 mm tall, sometimes erect and single-stemmed. Leaves long-petiolate, ovate to elliptic, toothed and crisped, with broad, leafy stipules. Flowers in terminal and axillary clusters, yellow, petals twisted, calyx reddish fading to cream, inflated. Aug.–Oct. Clay, granite and limestone slopes, NH, KB, WM, CCR (near Springbok to Hantamsberg to Langkloof). **(gce)**

amoena Dinter ex Friedr.-Holzh. Erect, much-branched subshrub, up to 600 mm tall, covered with greyish stellate pubescence. Leaves ovate-oblong, rounded at base and apex, corrugated when young, nerves prominent beneath. Flowers 2 or 3 at tips of slender, often dark, branches and occasionally in upper leaf axils, golden yellow, turning orange-red when old, calyx ± inflated, sometimes suffused with pink. July–Oct. Granite hills and valleys, SN, G, NS, NH, KV (Witpütz to near Vredendal). **(ece)**

aspera J.C.Wendl. Stiffly hairy, erect shrublet, up to 1 m tall. Leaves crowded, 1 or more per node, oblanceolate to obovate, coarsely toothed, margins revolute. Flowers in dense terminal clusters, yellow fading reddish. Mainly Sept.–Oct. Granite and sandstone slopes, KB, CCR (Kamiesberg and Bokkeveld Mountains to Ladismith). **(gce)**

comosa Burch. ex DC. Like **H. johanssenii** but leaves, especially the lower, long-petioled and flowers not clearly turned to one side in leaf axils, but 2 or 3 at tips of branches and in axils of upper leaves, and calyx whitish cream, often suffused with green, yellow or pink and with stalked tufted hairs. Sept.–Mar. Deep sand or gravelly soils, SN (Namibia through Lüderitz District to arid interior of South Africa to Free State).

cuneifolia Jacq. Roughly scaly, twiggy shrub, up to 1 m tall. Leaves cuneate, coarsely toothed above, sometimes appearing clustered. Flowers 1 or 2, turned to one side on branch tips or 3–5 clustered at tips of short lateral branches, yellow often fading reddish, sweetly scented. Mainly Aug.–Oct. Clay and granitic slopes, G, NS, NH, KB, KV, WM, TS, CCR (Richtersveld to E Cape and Lesotho).

denudata L.f. (including **H. erecta** N.E.Br.) Glabrous, stiffly erect shrub, up to 2 m tall. Leaves ascending, oblanceolate, toothed above, stipules leafy. Flowers in elongate, terminal branches, few per node, pale yellow. Sept.–Oct. Sandstone and granite slopes, often near streams, KB, WM, CCR (Kamiesberg Mountains to near Vanrhynsdorp and Calvinia to Cederberg Mountains and Mpumalanga to Swaziland).

desertorum Eckl. & Zeyh. Subshrub, up to 600 mm tall, with chestnut-brown stems. Leaves suborbicular, cuneate at base, deeply round-toothed, grey-tomentose. Flowers few in terminal clusters, yellow, calyx thin-textured, subinflated, shallow, 5-gibbose at base. Apr.–Sept. On hills and in pan-like depressions, SN, G, NH, KV, WM, TS (Witpütz to near Vanrhynsdorp to near Graaff-Reinet).

disermifolia Jacq. Like **H. amoena** but calyx densely stellate-tomentose (vs. pubescence of longer softer hairs at calyx base and ± shaggy) and not inflated. Apr.–Sept.(–Nov.). Rocky hills and dry riverbeds, G, NS, NH, KB (Richtersveld and Bushmanland to central Namaqualand).

filifolia L.f. Glabrescent, twiggy shrublet, up to 1 m tall. Leaves and stipules subequal, often in tufts, linear, margins revolute. Flowers on slender, elongated branches, few per node, orange to reddish, calyx shorter than or as long as petals, lobes usually spreading and papery. Capsule 5-knobbed. Aug.–Oct. Sandy or clay slopes, TS, CCR (Cold Bokkeveld to Klein Roggeveld to Port Elizabeth, Karoo and Free State).

incana Cav. Grey-mealy shrub, up to 2 m tall. Leaves ovate to elliptic, cuneate at base, toothed above, softly stellate-tomentose. Flowers in small terminal clusters, with some in leaf axils, yellow, calyx ± inflated, bell-shaped. July–Oct. Mainly dry clay slopes, TS, CCR (Laingsburg to Worcester to Albertinia and Prince Albert). **(gce)**

johanssenii N.E.Br. Low subshrub, up to 300 mm tall, many stemmed from a woody base. Leaves suborbicular, ± cuneate at base, unevenly round-toothed, densely yellowish stellate-pubescent. Flowers 1 or 2(3) in leaf axils, turned to one side, petals twisted, golden yellow, shortly exserted from a pale green, inflated calyx. July–Oct. In loamy sand and clay soils, often between dolerite boulders, WM, TS (Calvinia to Sutherland to Laingsburg). **(ece)**

macra Schltr. Slender, erect perennial, 300–500 mm tall, from a woody base. Leaves mostly basal, ± oblong, coarsely and unevenly lobed, but never to midrib, appressed stellate-pubescent to glabrescent. Flowers in a much-branched inflorescence, 1 or paired in erect, terminal, leafless cymes, yellow to orange-red. Sept.–Oct. Sandy flats and dry riverbeds, SN, G, NS (Witpütz to Sendelingsdrift to near Komaggas and Bushmanland).

minutiflora Engl. Like **H. vestita** but flowers consistently small, < 5 mm long (vs. 5.5–10 mm long) and calyx not subinflated. July–Sept. Rocky hills, valleys and dry riverbeds, usually in sand, SN, G (central Namibia to Richtersveld and Bushmanland).

muricata Eckl. & Zeyh. Stiffly hairy shrublet, up to 500 mm tall, often much-branched from base. Leaves narrowly oblong, rounded at base, slightly toothed, white-tomentose beneath. Flowers in long lax, terminal clusters on wiry branches, yellow. Sept.–Nov. Dry clay and granite slopes, NH, KB, WM, TS, CCR (near Kamieskroon, Kamiesberg Mountains and Calvinia to Olifants River Valley to southern Karoo and George). **(gce)**

paucifolia Turcz. SKITTERYBOSSIE Like **H. macra** but leaves ovate and usually lobed to midrib, with lower leaves palmatisect, and flowers larger, ± 10 mm (vs. up to 6 mm) long. June–Nov. Sandy soils often near rocks, SN, G, NH, WM (Aus to Bitterfontein, Hantam and upper Karoo).

pfeilii K.Schum. Much-branched subshrub, up to 800 mm tall, with prominent leaf scars on stems. Leaves obovate-cuneate, often broader at apex than long, entire or 3- or more-lobed, covered with minute fringed pitted grey scales. Flowers few at branch tips, turned to one side, bright yellow, calyx dish-shaped, subinflated. May–Oct. In sand, SN, NS (Lüderitz to just S of Port Nolloth). **(ece)**

pulverata Andrews Sparsely branched, ± herbaceous perennial, up to 300 mm tall, from a woody base, branches silvery with fringed pitted scales. Leaves mostly near base, ovate-oblong, coarsely toothed to deeply divided, silvery stellate-pubescent. Flowers 1 or paired at branch tips and in

upper leaf axils, dirty yellow, calyx silvery. Sept.–Nov. Vleis, river courses and rocky kloofs, WM, TS, CCR (arid interior of South Africa and Little Karoo).

rigida Harv. Rigid shrublet, ± 1 m tall, branches pubescent with fringed scales. Leaves obovate, cuneate at base, round-toothed above, ± crisped, ± whitish and prominently nerved beneath. Flowers 1–3 in lax terminal clusters on short stiff pedicels, bright yellow, fading reddish. Capsule 5-knobbed, with persistent calyx at base. Mainly Aug.–Sept. Clay or granite or sandstone slopes, NH, KB, CCR (near Nababeep to Kamiesberg and Bokkeveld Mountains to Ceres). **(gce)**

scordifolia Jacq. Sprawling, semi-herbaceous shrub, with lax stems up to 1.5 m long, ± woody at base. Leaves with ± oblong blade, upper surface minutely stellate-hairy or glabrescent, whitish and soft-velvety beneath. Flowers in lax terminal cymes, yellow, fading orange. Capsule short and subglobose. Aug.–Oct. Sandy flats and slopes, NS, KV, CCR (Koekenaap to near Saldanha). **(gce)**

vestita Thunb. Erect, bushy shrub, up to ± 600 mm tall. Leaves broadly ovate to suborbicular, truncate or cuneate at base, stellate-tomentose, strongly corrugated towards margins, nerves prominent beneath. Flowers 1–3 in axils of upper leaves and at branch tips, orange to lemon yellow. July–Feb. Mountain slopes, hillsides and riverbanks, TS (through arid interior of South Africa to southern Karoo).

[**Taxa insufficiently known**: herbarium records suggest that the genus has several undescribed species and that many taxa from the arid areas need to be revised.]

HIBISCUS HIBISCUS, WILDE-STOKROOS ± 300 spp., cosmopolitan

***trionum** L. Stiffly hairy annual, up to 1.5 m tall. Leaves mostly 3–5-palmatisect, toothed. Flowers pedunculate in upper axils, yellow with dark eye, epicalyx of 10–12 linear lobes, calyx bell-shaped, purple-veined, swollen in fruit. Sept.–Feb. Riverbanks, stony slopes and forest margins, G, CCR (widespread in southern Africa, introduced from Old World tropics).

*LAVATERA TREE MALLOW ± 25 spp., Eurasia

***arborea** L. Glabrescent, thick-stemmed annual or short-lived perennial, up to 2 m tall. Leaves velvety, 3–5-lobed, toothed. Flowers in axillary clusters, mauve, epicalyx cup-shaped and 3-lobed, becoming enlarged in fruit. Mainly Sept.–Nov. Waste places, dunes, SN, CCR (Eurasian weed on western and southern coastal belt).

*MALVA ± 30 spp., Old World, several spp. weedy and cosmopolitan

***parviflora** L. Prostrate or decumbent herb, up to 400 mm tall. Leaves long-petiolate, blades reniform to suborbicular, round-toothed. Flowers clustered in leaf axils, pale pink to white, petals scarcely longer than calyx, epicalyx of 3 linear lobes. July–Nov. Weed in disturbed places, SN, G, NH, WM (native of Eurasia).

RADYERA 2 spp., one each in Australia and southern Africa

urens (L.f.) Bullock KAROO PUMPKIN, PAMPOENBOSSIE Coarse, roughly hairy perennial, with trailing stems up to 1 m long, from a woody rootstock. Leaves long-petiolate, blades suborbicular-cordate, crispulate, paler beneath. Flowers at ground level, axillary, concealed beneath leaves, deeply cup-shaped, reddish orange with a dark centre, epicalyx of 12 linear lobes. (Oct.–)Dec.–Mar. Dry flats, especially in disturbed places, NH, WM, TS, CCR (dry parts of southern Africa).

MELIACEAE

by D.A. Snijman

NYMANIA CHINESE LANTERNS, KLAPPERBOS 1 sp., South Africa and Namibia

capensis (Thunb.) Lindb. Rigid, evergreen shrub, up to 5 m tall. Leaves leathery, oblanceolate, tufted on short shoots. Flowers solitary and axillary, dull red. Fruit an inflated, papery capsule,

pink turning straw-coloured. Oct.–Dec. Karroid scrub, SN, G, TS, CCR (central Namibia to Richtersveld to near Kimberley and Little Karoo to E Cape).

MELIANTHACEAE

by D.A. Snijman

MELIANTHUS KALKOENTJIEBOS, KRIEKIEBOS, TURKEY BUSH 8 spp., southern Africa

comosus Vahl Like **M. elongatus** but leaves also thinly hairy above, margins not revolute and flowers in axillary racemes nodding below leaves, petals shorter than sepals, and capsule thinly hairy. Aug.–Oct. Stony slopes and stream banks, G, WM, TS, CCR (widespread in southern Africa).

elongatus Wijnands (= *Melianthus minor* L.) Foetid shrub, up to 2 m tall. Leaves imparipinnate, leaflets toothed, margins revolute, white-felted beneath. Flowers in axillary, erect racemes extended above leaves, petals red, longer than sepals. Fruit an inflated, 4-lobed, velvety capsule. July–Sept. Sandstone or granite slopes and flats, G, NS, KV, CCR (Richtersveld to Langebaan). **(gce)**

gariepinus Merxm. & Roessler Like **M. pectinatus** but leaflets 7–9 and dentate, inflorescences drooping below leaves, and capsule 2-seeded (not 4-seeded). Aug. Rocky slopes, G (southern Namibia: Udabib Mountains to Namuskluft Mountains).

major L. KRUIDJIE-ROER-MY-NIE Foetid shrub, up to 2 m tall. Leaves glaucous, imparipinnate, leaflets toothed, glabrous. Flowers in stout, terminal, ± erect racemes, petals red, shorter than greenish or liver-coloured sepals. Fruit an inflated, 4-lobed, glabrous capsule. Aug.–Sept. Sandstone slopes, often along streams, WM, CCR (Bokkeveld Plateau to Roggeveld to SW and E Cape).

pectinatus Harv. Foetid shrub, up to 1 m tall. Leaves imparipinnate, leaflets 11–27, sinuate to serrate, stellately hairy, densely so beneath. Flowers in ± terminal, erect racemes, emerging above leaves, petals red, longer than sepals. Fruit a sharply 4-winged, glabrous capsule, with conspicuous parallel veins. June–Aug. Among rocks and dry riverbeds, G, NH, KB (Richtersveld to near Garies and E to Bushmanland).

MENISPERMACEAE

by D.A. Snijman

1. Sepals and petals in female flowers 2 . . . . . **Antizoma**
1.' Sepals and petals in female flowers 1 . . . . . **Cissampelos**

ANTIZOMA 2 spp., southern Africa

miersiana Harv. BLOUBOS Evergreen, dioecious, greyish, rigid, twiggy shrublet, up to 1 m tall. Leaves discolorous, oblanceolate, often tufted, petioles 0.5–5 mm long with minute spines or tubercles at base. Flowers axillary, tiny, green, male cymose, female 1 or 2. Drupe ovate, purple. July–Dec. Dry rocky slopes, G, NH, KB, WM, CCR (Richtersveld to Bokkeveld Plateau to Gifberg and Biedouw Valley). **(gce)**

CISSAMPELOS ± 30 spp., pantropical

capensis L.f. BITTERBOS Evergreen, dioecious, twining or sprawling shrublet with a straight main branch, up to 1.7 m tall. Leaves ovate or trowel-shaped, ± conspicuously veined beneath, rarely sparsely hairy, glaucous, petioles up to 25 mm long. Flowers axillary, tiny, ± woolly, greenish, male cymose, female 1 or 2. Drupe ± globose, orange. Feb.–May. In scrub or among rocks, SN, G, NS, WM, TS, CCR (southern Namibia to Bokkeveld Plateau to SW Cape to Laingsburg to Port Elizabeth). **(gce)**

MOLLUGINACEAE (see also LIMEACEAE)

by D.A. Snijman

1. Flowers with petals; petals few to ± 20, resembling linear to strap-like filaments divided at apex **Glinus**
1.' Flowers without petals:
2. Ovules basal, solitary in each carpel:
3. Carpel 1; fruit indehiscent ..... **Adenogramma**
3.' Carpels 2 or more; fruit capsular and dehiscent:
4. Ovary 2-locular; sepals fimbriate; leaves reduced and imbricate; stipules large, fimbriate, adnate to base ..... **Polpoda**
4.' Ovary 3–5-locular; sepals entire; leaves various; stipules small or 0 ..... **Psammotropha**
2.' Ovules axile, many in each carpel:
5. Sepals united for at least half their length; stamens attached to perianth. ..... **Coelanthum**
5.' Sepals free or united slightly at base; stamens attached to receptacle:
6. Stipules small, entire, free from leaf base, often caducous ..... **Mollugo**
6.' Stipules attached to leaf base, persistent:
7. Inflorescence a simple umbel; stipules entire. ..... **Hypertelis**
7.' Inflorescence a compound cyme; stipules lacerate:
8. Hypogynous disc present ..... **Pharnaceum**
8.' Hypogynous disc absent ..... **Suessenguthiella**

ADENOGRAMMA muggiesgras 10 spp., Namibia to W Cape **(gce)**

A. Perennials or subshrubs

teretifolia (Thunb.) Adamson Brittle, stiffly erect shrublet, up to 300 mm tall, with opposite lateral branches and pustulate branches from base. Leaves densely whorled, terete, bristle-tipped, stipules filiform, membranous. Flowers in small axillary clusters, white and green. Fruit top-shaped, minutely pitted. Sept.–Oct. Granite or sandy slopes, NH, CCR (near Komaggas to St. Helena Bay). **(gce)**

A.' Annuals

glomerata (L.f.) Druce Diffusely branched, sprawling, wiry-stemmed annual, mostly 100–150 mm tall. Leaves usually in whorls of 6, linear, sometimes elliptic, bristle-tipped, stipules filiform, membranous. Flowers in small axillary clusters, white. Fruit obliquely top-shaped, minutely pitted. Aug.–Oct. Sandy slopes, SN, NH, KV, CCR (Klinghardt Mountains to Bokkeveld Mountains to Humansdorp). **(gce)**

littoralis Adamson Prostrate, much-branched, soft annual, up to 50 mm tall. Leaves closely whorled, oblanceolate, rounded apically, bristle-tipped, stipules filiform, membranous. Flowers in small axillary clusters, white. Fruit top-shaped, minutely pitted. Oct.–Dec. Deep sands, NS, CCR (near Hondeklipbaai to False Bay). **(gce)**

mollugo Rchb.f. (including **A. congesta** Adamson) Like **A. glomerata** but stems stiff and suberect, up to 300 mm tall, calyx enlarging and ultimately dropping off, and fruit depressed-globose, abruptly narrowed into a prominent, rough, compressed beak. Sept.–Oct. Damp sand or loam, sometimes on quartz fields, KB, KV, CCR (Kamiesberg Mountains and near Kotzesrus and Bokkeveld Mountains to Stilbaai). **(gce)**

COELANTHUM 2 spp., Namibia to W Cape **(gce)**

semiquinquefidum (Hook.f.) Druce (including **C. grandiflorum** E.Mey. ex Fenzl) Delicate tufted annual, mostly 80–120 mm tall, with wiry stems swollen at base. Leaves in a basal tuft and whorled on branches, basal ones oblanceolate to obovate-spathulate, bristle-tipped, upper ones linear, in sets of 1 or 2 whorls, stipules membranous, fimbriate-laciniate. Flowers in lax, branched cymes, white. Oct.–Nov. Sandy flats, SN, G, NS, NH, KV, CCR (Klinghardt Mountains to Cape Peninsula and Worcester). **(gce)**

verticillatum Adamson Like **C. semiquinquefidum** but basal leaves soon withering, upper leaves in sets of 4–8 whorls, flowers in ± compact, condensed cymes. Oct.–Mar. Coastal sands, KV, CCR (southwestern Knersvlakte to Bokbaai). **(gce)**

GLINUS ± 6 spp., ± cosmopolitan

lotoides L. DAMASCISA Much-branched, prostrate annual, stems 150–500 mm long, covered with stellate and simple hairs. Leaves alternate below, with upper ones in whorls, narrowly elliptic to ovate, ± fleshy, without stipules. Flowers 1 or 3–8 in axillary cymes, sepals with acute mucronate tips, yellowish to whitish green on inside, inner 3 with membranous edges, stamens 10–20 or more. Mar.–Oct. In seasonally moist places, G, WM (native to Eurasia and Africa, naturalised in tropical and warm temperate regions worldwide).

HYPERTELIS 7 spp., Africa, St Helena and Madagascar

angrae-pequenae Friedrich Much-branched, dwarf shrublet, 100–200 mm tall, woody at base. Leaves crowded, oblong-spathulate, succulent, flattened, stipules membranous, adnate to leaf base, entire, with spreading acuminate apex. Flowers 1, rarely 2 or 3 per inflorescence, peduncle and pedicel smooth, sepals whitish or pink, stamens 10–15. Dry riverbeds near coast, SN, NS (central Namibia to Lüderitz to near Hondeklipbaai).

salsoloides (Burch.) Adamson BRAKSURING Dwarf, tufted, glaucous shrublet, up to 300 mm tall, often much-grazed. Leaves terete, fleshy, stipules membranous, adnate to leaf base, entire, with acuminate apex. Flowers in umbels on ± erect peduncles and slender pedicels with projecting glandular warts, deflexing when fading, sepals reflexed, white to pink, stamens 12–15. Sept.–Mar. Dry calcareous and saline flats, SN, G, NS, NH, KV, WM, TS, CCR (Namibia to Clanwilliam, Little Karoo to Zimbabwe).

spergulacea E.Mey. ex Fenzl Dwarf, rigid shrublet, 100–300 mm tall, woody at base. Leaves in whorls of 6 or 7 along stem, terete, succulent, glaucous, stipules of basal leaves with a knob-shaped to falcate projection on upper margin, those adnate to stem leaves without projections. Flowers 3 or 4(–6) in umbels on slender peduncles, pedicels smooth, spreading or deflexed on fading, sepals white to pink, stamens 20–30. Sandy or rocky places, often in riverbeds, G (Namibia, Richtersveld and Bushmanland).

MOLLUGO 20 spp., cosmopolitan

cerviana (L.) Ser. ex DC. Delicate, tufted annual, up to 200 mm tall, with wiry stems. Leaves in a basal rosette, and in whorls of ± 6 on stem, basal ones short-lived, linear to spathulate, stipules inconspicuous or absent. Flowers in terminal and axillary cymes usually pedunculate, with wiry pedicels, white and green, stamens (3–)5. Jan.–Mar. Sandy flats and slopes, G, NH, KB, WM, TS, CCR (Namibia and Botswana to False Bay).

namaquensis Bolus Dwarf, tufted annual, up to 50 mm tall. Leaves basal, oblanceolate, persistent, those on stem few and small, with 1–4 at top of peduncle, stipules inconspicuous or absent. Flowers in short, 1-sided, rigid pseudoracemes on slender peduncles, green. Aug.–Sept. Sandy flats and slopes, NH, NW, CCR (Nababeep to Roggeveld to Velddrif). **(gce)**

pusilla (Schltr.) Adamson (including **M. tenella** Bolus) Delicate, tufted annual, up to 80 mm tall. Leaves in a basal rosette, oblanceolate to oblong-ovate, pseudopetiolate, prostrate, stipules inconspicuous or absent. Flowers in elongate pseudoracemes on thread-like peduncles, whitish. Aug.–Sept. Sandy flats and slopes, G, NH, CCR (southern Namibia to Riviersonderend). **(gce)**

PHARNACEUM SNEEUVYGIE 25 spp., southern Africa

A. Non-woody annuals or perennials
*B. Leaves distantly whorled (see also **P. dichotomum**)*

lineare L.f. Sprawling perennial, up to 100 mm tall, with elongate internodes. Leaves in whorls, linear, terete, stipules membranous, fimbriate-laciniate. Flowers in lax, branched, axillary cymes on long peduncles, white, 5–8 mm long. June–Nov. Sandy slopes and flats, KV, CCR (southeastern Knersvlakte to Bredasdorp). **(gce)**

B.' Leaves basally crowded

croceum E.Mey. ex Fenzl Tufted annual, up to 100 mm tall. Leaves mostly basal, subterete, succulent, stipules membranous, fimbriate-laciniate. Flowers in long-pedunculate cymes, pink, yellow or white,

sepals reflexed, 3–4 mm long. Aug.–Sept. Sandy flats, especially coastal, SN, NS, NH, WM, CCR (Haalenberg through Namaqualand to Calvinia to Roggeveld Escarpment to George). **(gce)**

exiguum Adamson Tufted annual, sometimes up to 300 mm tall. Leaves crowded basally, linear, stipules membranous, fimbriate-laciniate. Flowers in lax cymes, green and white, up to 2 mm long. Aug.–Sept. Sandy flats, SN, NS, NH, KV, CCR (southern Namibia to Cape Peninsula). **(gce)**

A.' Shrublets or perennials, woody at base

albens L.f. Like **P. aurantium** but stipules shorter, up to 2 mm long, leaves often reflexed. Aug.–Oct. Rocky slopes, G, NH, WM, CCR (Namibia and Namaqualand to Calvinia to Olifants River Mountains). **(gce)**

aurantium (DC.) Druce Sprawling or erect shrublet, up to 800 mm tall, woody at base. Leaves scattered and alternate mostly near base, linear, stipules sheathing at base. Flowers in lax cymes on long, purplish, white-glaucous peduncles, 3–4 mm long, white. Sept.–Oct. Stony gravel slopes and flats, G, NS, NH, KB, WM, CCR (Namibia to Namaqualand to Hantamsberg to Upper Karoo to Gourits River).

confertum (DC.) Eckl. & Zeyh. Like **P. incanum** but with sprawling branches, up to 1.2 m long, stipules larger, floral disc red to orange. Aug.–Oct. Stony slopes and flats, SN, G, NS, NH, KV, CCR (Sperrgebiet to Malmesbury and Worcester). **(gce)**

dichotomum L.f. Erect or sprawling shrublet, up to 300 mm tall, woody at base. Leaves mostly in a basal tuft, also distant along stem in whorls, linear, stipules membranous, fimbriate-laciniate. Flowers in terminal and axillary cymes on long peduncles, white, ± 3 mm long. July–Nov. Dry slopes, NH, CCR (eastern Namaqualand to SW Cape to Great Karoo).

elongatum (DC.) Adamson Like **P. incanum** but stipules cut to base into hair-like lobes and floral disc red to yellow. Aug.–Oct. Dry slopes, NH, KV, CCR (Garies to Klawer to Cape Peninsula to Albany District).

incanum L. Sprawling or erect shrublet, woody at base, with whitish branches, up to 400 mm tall. Leaves crowded near base, linear-filiform, stipules sheathing at base. Flowers in long-pedunculate cymes, 3–4 mm long, white. Aug.–Oct. Rocky slopes, KB, CCR (Kamiesberg Mountains and Olifants River Valley to Hopefield and Worcester). **(gce)**

lanatum Bartl. Like **P. aurantium** but stipular hairs curled and forming a silky or woolly tuft. Aug.–Oct. Sandy flats and slopes, NS, NH, KB, WM, CCR (between Alexander Bay and Port Nolloth to Nuweveld Mountains to Cape Peninsula).

microphyllum L.f. DROËDASKRUIE Tangled shrublet, mostly up to 200 mm long, appearing grey-woolly. Leaves oblong, fleshy, stipules prominent, imbricate, curled and forming a woolly mass hiding young leaves. Flowers in umbellate cymes on wiry, terminal peduncles, white, 3–4 mm long, bracts woolly. Sept.–Oct. Coastal sands and limestones, NS, CCR (between Alexander Bay and Port Nolloth to Hondeklipbaai to Saldanha Bay). **(gce)**

[**Taxonomic note** The species' circumscriptions of **Pharnaceum** proposed over 50 years ago (Adamson 1958) are no longer satisfactory and need to be revised.]

POLPODA 2 spp., Namaqualand to W Cape **(gce)**

capensis C.Presl Silvery, lycopodium-like shrublet, up to 500 mm tall. Leaves alternate, ovate, adpressed, densely imbricate, with fringed, papery stipules longer than leaves, large and fimbriate. Flowers solitary in upper leaf axils, minute, 4-merous, whitish, stamens far exserted. Mainly Apr.–July. Dunes and sandstone and gravel slopes, NS, CCR (W of Komaggas to Mossel Bay). **(gce)**

[**Taxonomic note** The inclusion of this poorly known genus into the Molluginaceae is dubious (Endress & Bittrich 1993).]

PSAMMOTROPHA 11 spp., southern Africa to tropical Africa

frigida Schltr. Dwarf, cushion-forming perennial, up to 20 mm tall, often purplish, with wiry branches. Leaves crowded at branch tips, incurved-obovate, margins whitish, stipules small, laciniate or absent. Flowers in clusters on thread-like peduncles, greenish. Sept.–Dec. Shallow soil among rocks at high altitudes, WM, CCR (Cederberg Mountains and Roggeveld to Swartberg Mountains). **(gce)**

quadrangularis (L.f.) Fenzl Closely leafy, gnarled, lycopodium-like shrublet, up to 300 mm tall, mostly branching from base. Leaves 4-ranked, linear-attenuate, ascending, imbricate, spine-tipped, margins rolled back, stipules absent. Flowers in dense clusters on wiry peduncles, greenish cream to pinkish. Sept.–Oct. Stony slopes, KB, CCR (Kamiesberg and Bokkeveld Mountains to Villiersdorp and Willowmore). **(gce)**

SUESSENGUTHIELLA 1 sp., Namibia, N Cape and W Cape

caespitosa Friedrich Dwarf, cushion-forming, perennial herb, 10–40 mm tall, base ± woody. Leaves pseudo-verticillate, linear, tip shortly apiculate, stipules persistent, white, membranous, with fimbriate margins. Flowers usually 3 in leaf axils, sepals with membranous margins, stamens 5. June. On granite outcrops, SN (Aus). **(?ece)**

scleranthoides (Sond.) Friedrich Prostrate, mat-forming annual, with wiry branches. Leaves in a basal rosette and in whorls on stem, linear-subterete, apiculate, fleshy, stipules membranous, fimbriate, whitish. Flowers crowded at nodes, green and white. July–Sept. Sandy flats, SN, G, NH, CCR (Klinghardt Mountains to Namaqualand to Gordonia and Bushmanland to Clanwilliam).

MONTINIACEAE

by D.A. Snijman

MONTINIA PEPERBOS 1 sp., southern Africa

caryophyllacea Thunb. Dioecious, erect shrub, up to 1.5 m tall. Leaves oblanceolate, sometimes tufted, pale green to glaucous. Flowers terminal, small, with 4 white waxy petals, male cymose, female 1 or 2. Capsule spindle-shaped, ± woody, splitting in half lengthwise. May–Oct. Rocky slopes, SN, G, NS, NH, KB, KV, WM, TS, CCR (southern Angola through Namibia and Bushmanland to SW and E Cape).

MORACEAE

by D.A. Snijman

FICUS FIG ± 1 000 spp., pantropical and warm temperate

cordata Thunb. NAMAKWA-ROTSVY, NAMAQUA ROCK FIG Evergreen or rarely deciduous tree, 1–7 m tall, with an upright crown and pale grey bark. Leaves ovate, base ± heart-shaped. Figs axillary, on terminal branches, sessile, 5–7 mm diam., yellowish green when ripe. Aug.–Oct.(–Jan.) Rock outcrops, SN, G, NH, KV, WM, CCR (southern Angola through Namibia, Gordonia, Namaqualand to Worcester).

ilicina (Sond.) Miq. KLIPVY, LAUREL FIG Low-growing, evergreen or rarely deciduous, monoecious shrub or small tree, up to 5 m tall, roots and stems ± flattened, creeping over rocks, bark white. Leaves elliptic. Figs axillary, pedunculate, 5–8 mm diam., red when ripe. June–Dec. Rock outcrops, G, NS, NH, CCR (southern Angola through Namibia and Namaqualand to near Vanrhynsdorp).

MYRICACEAE

by D.A. Snijman

MORELLA (= *MYRICA* in part) WASBESSIE ± 50 spp., cosmopolitan

quercifolia (L.) Killick (= *Myrica quercifolia* L.) MAAGPYNBOSSIE Dioecious, spreading shrub, up to 0.6 m tall. Leaves obovate, attenuate below, usually pinnatifid, gland-dotted. Flowers in

axillary spikes. Fruit warty, 3–4 mm diam. July–Sept. Mostly sandy flats and slopes, KB, CCR (Kamiesberg Mountains and near Redlinghuis to SW and E Cape).

NEURADACEAE

by D.A. Snijman

GRIELUM DUIKERWORTEL, SAND PRIMROSE ± 5 spp., dry and winter-rainfall southern Africa

grandiflorum (L.) Druce White-woolly perennial, with sprawling annual shoots up to 0.3 m long. Leaves pinnatisect or bipinnatisect, lobes mucronate, firm. Flowers yellow with a green eye, sepals lanceolate-acuminate, at first cobwebby, then glabrous. Fruit depressed-pentagonal, with a peripheral wing and central spines. Mainly Sept.–Oct. Sandy and stony coastal flats, G, NS, KV, CCR (near Port Nolloth to Cape Peninsula). **(gce)**

humifusum Thunb. PIETSNOT Prostrate, thinly white-woolly perennial, with trailing annual shoots up to 0.6 m long. Leaves pinnatisect, becoming glabrous above, lobes rounded, soft. Flowers yellow with a pale eye, sepals ovate, acuminate, persistently softly hairy. Fruit depressed-pentagonal, with a peripheral wing and central spines. Mainly July–Oct. Sandy lower slopes and flats, SN, G, NS, NH, KV, WM, TS, CCR (southern Namibia, through Namaqualand, Hantam, Tanqua Karoo to Robertson). **(gce)**

sinuatum Licht. ex Burch. Like **H. humifusum** but whole plant densely covered with a white woolly indumentum, and sepals short and broadly 3-angular, obtuse or subacute, densely and persistently woolly. May–Sept. In sand near seasonal washes, SN, G, NH, (through Namibia to eastern Namaqualand to Bushmanland).

sp. A Like **G. humifusum** but flowers small and white. Oct. Sandy places, G (Richtersveld near Eksteenfontein). **(ece)**

NYCTAGINACEAE

by D.A. Snijman

PHAEOPTILUM 1 sp., semi-arid southern Africa

spinosum Radlk. BROSDORING Deciduous, densely branched shrub, up to 3 m tall, with spine-like lateral branches. Leaves in clusters, linear-cuneiform, greyish green. Flowers on leafless branches, funnel-shaped, 6–8 mm long, creamy yellow, scented. Fruit 4-winged, papery, turning pink, red or purple with age. Oct.–Feb. Rocky, gravelly and sandy soils, G (Namibia, Botswana, Richtersveld through Gordonia to Free State).

OLEACEAE

by D.A. Snijman

1. Low shrublet; fruit a membranous capsule . . . . . **Menodora**
1.' Trees; fruit a drupe. . . . . **Olea**

MENODORA ± 25 spp., America and southern Africa

juncea Harv. Stiff, erect, sparsely leafy shrublet, up to 1.6 m tall, with silvery hairy branches. Leaves sessile, linear, adpressed. Flowers 1–few in terminal cymes, showy, yellow, faintly scented. Fruit a subglobose capsule. Sept.–Jan. Rocky arid slopes and sandy valleys, G, NH, CCR (Richtersveld and northern Namaqualand and Great Karoo to Little Karoo).

OLEA OLIVE ± 35 spp., Old World

europaea L. WILD OLIVE Evergreen tree, up to 14 m tall, with warty branchlets. Leaves narrowly elliptic, shiny dark green above, pale greyish scaled beneath. Flowers in loose axillary and terminal panicles, small, white. Fruit an ovoid, purplish black drupe. Oct.–Mar. Open rocky slopes, in riverside bush and forests, G, NH, KB, KV, WM, CCR (Richtersveld to Bokkeveld Plateau to E Cape and to N Africa).

ONAGRACEAE

by D.A. Snijman

EPILOBIUM WILLOWHERB ± 220 spp., pantemperate and tropical mountains

*__tetragonum__ L. SQUARE-STALKED WILLOWHERB Glabrescent perennial, up to 1.8 m tall, producing leafy basal rosettes in autumn. Leaves narrowly lanceolate, sessile, finely toothed. Flowers solitary in upper axils, pink, stigma club-shaped. Nov.–Jan. Seasonally damp places, WM, CCR (Europe, N Africa, Mpumalanga to Hantam to Cape Peninsula, probably introduced to southern Africa from Europe).

OROBANCHACEAE

by D.A. Snijman

1. Plants ± leafy, not fully parasitic . . . . . **Bartsia**
1.' Plants with reduced scale-like leaves, fully parasitic:
2. Flowers bilabiate, lobes separated by prominent folds; filaments usually thickened or flattened near base; ovary 1-locular with parietal placentas . . . . . **Orobanche**
2.' Flowers 3- or 5-lobed; filaments linear; ovary 2-locular with axile placentation:
3. Flowers 3-lobed; anthers 1-thecous . . . . . **Hyobanche**
3.' Flowers 5-lobed; anthers 2-thecous with 1 fertile and 1 barren theca . . . . . **Harveya**

*BARTSIA ± 60 spp., N temperate and tropical mountains

*__trixago__ L. Erect, glandular, hemiparasitic annual, up to 500 mm tall. Leaves coarsely lobed. Flowers sessile, in a terminal spike, bilabiate, cream-coloured with a red lip. Oct.–Jan. Stream sides and damp places, KB, WM, CCR (Eurasian weed, Kamiesberg Mountains, Roggeveld and CCR to tropical Africa).

HARVEYA INKBLOM, INK FLOWER ± 41 spp., Africa, Madagascar and Yemen

capensis Hook. Like **H. purpurea** but corolla tube strongly compressed laterally, segments white to cream-coloured or slightly tinged with pink at tips, stigma green. Nov.–Jan. Near seasonally wet places, recorded once from an unspecified locality in Namaqualand, (Namaqualand to near Humansdorp). **(gce)**

pauciflora (Benth.) Hiern Parasitic perennial, up to 640 mm tall, with dull red to dusky purple stem and scales. Flowers in a loose raceme, corolla expanding abruptly near top of tube, creamy-white, pale pink or yellow, segments pink to purple, calyx divided to ⅓ of its length or less. Oct.–Jan. Habitat widely variable, KV, CCR (near Koekenaap to SW Cape to Swaziland).

purpurea (L.f.) Harv. ex Hook. Parasitic perennial, up to 340 mm tall, with red stems and leaves. Flowers in short or loose racemes, broadly funnel-shaped, tube not compressed, white to yellow, segments yellow (in KB) or pink to purple, calyx deeply divided, stigma white or yellow. Sept.–Jan. In sand or clay soils on slopes or flats, KB, CCR (Kamiesberg Mountains, Bokkeveld Mountains to SW and E Cape).

squamosa (Thunb.) Steud. JAKKALSKOSINKBLOM Parasitic perennial, up to 400 mm tall, usually with orange to red-orange stems and leaves. Flowers sessile in dense long spikes, tubular with

short petals, orange with yellow throat, calyx shortly lobed, stigma subglobose. Sept.–Nov. Deep sandy soils, mostly coastal, NS, KB, KV, CCR (NE of Port Nolloth and Kamiesberg Mountains to Cape Peninsula). **(gce)**

HYOBANCHE KATNAELS, RED BROOMRAPE, WOLWEKOS 7 spp., southern Africa

barklyi N.E.Br. Root parasite with scale-like leaves, up to 150 mm tall. Flowers in an orange-red, ± lax, corymbose inflorescence, bracteoles linear, shortly dilated at tip, sparsely pubescent, corolla hairy above, ± helmeted, as long as stamens. July–Sept. Rocky outcrops on sandy hills, SN, G, NS, NH (Klinghardt Mountains to near Port Nolloth to near Garies). **(ece)**

glabrata Hiern Root parasite with scale-like leaves, up to 80 mm tall. Flowers in scarlet red, sparsely hairy, tube subcylindrical, ± straight, stamens exserted. July–Oct. Sandy slopes and flats, KV, WM, CCR (southern Namaqualand to Roggeveld to Bredasdorp). **(gce)**

sanguinea L. Root parasite with scale-like leaves, up to 120 mm tall. Flowers in a crimson-red or pinkish, dense, elliptical or conical inflorescence, bracteoles obtuse, corolla hooded, densely hairy, tube subcylindrical, stamens included. Aug.–Oct. Sandy slopes and flats, G, NH, KB, CCR (southern Namibia to E Cape).

sp. A Root parasite with scale-like, yellow leaves, bracteoles blackish purple. Flowers dark purple to blackish. Sept. ?Habitat, KB (Kamiesberg Mountains). **(ece)**

[**Taxonomic note** The treatment of several species of **Hyobanche** is still uncertain. The **H. sanguinea** complex in particular may represent several undescribed species on the coastal lowlands (A. Wolfe pers. comm.).]

*OROBANCHE BROOMRAPE ± 150 spp., more-or-less cosmopolitan

***ramosa** L. BLOUDUIWEL Yellowish, achlorophyllous, thinly glandular-hairy root parasite, up to 300 mm tall, often branched. Leaves scale-like. Flowers in a dense, usually branched spike, blue-mauve, calyx acutely 4-lobed, subtended by 2 thread-like bracteoles. July–Nov. Parasitic mostly on Asteraceae, NH, KV, WM, CCR (European weed, Spektakelberg to Bokkeveld Plateau to SW Cape, also tropical Africa).

OXALIDACEAE

by D.A. Snijman, L.L. Dreyer & K.C. Oberlander

OXALIS SORREL, SURING ± 500 spp., cosmopolitan, chiefly South Africa and S America

A. Plants aquatic or semi-aquatic

dines Ornduff Aquatic geophyte, with branching stems, 60–200 mm tall. Leaves arranged along stems, base of petioles with large papery stipules, leaflets 3, obcordate, floating. Flowers 1 per peduncle, shallowly bell-shaped, white, with a yellow cup, scented. June–Aug. In seasonal pools and pans, KV, CCR (northern Bokkeveld Escarpment to near Vanrhynsdorp, Lokenberg and Clanwilliam). **(gce)**

dregei Sond. Acaulescent, aquatic or semi-aquatic geophyte, 35–70 mm tall. Bulb tunics few, papery, brown. Leaves loosely overlapping at base, simple, blade bilobed and kidney-shaped, often folded lengthwise. Flowers 1 per peduncle, white, with broad, shallow, yellow cup. May–Sept. Seasonal pans and streams, 300–500 m, NH, KB, CCR (near Springbok to Kamiesberg Mountains to Worcester). **(gce)**

A.' Plants not aquatic or semi-aquatic
B. Peduncle more than 1-flowered

compressa Thunb. Like **O. pes-caprae** but petioles flattened, leaflets sometimes purplish below, and peduncles 3–6-flowered. Flowers yellow, rarely cream with yellow centre, petals sometimes

purple-margined below. May–Sept. Loamy or sandy flats and slopes, 100–200 m, KB, KV, CCR (Kamiesberg Mountains and N of Vanrhynsdorp to Caledon). **(gce)**

copiosa F.Bolus Acaulescent geophyte, 60–140 mm tall. Bulb tunics hard and longitudinally ribbed, ashy grey. Leaves numerous, suberect, in a basal rosette, petioles submembranous towards base, leaflets 3, broadly obcordate. Flowers 1 or 2 per peduncle, yellow. June–Aug. In gorges, SN, G, NH (southern Namibia: Rosh Pinah District to Messelpad). **(ece)**

knuthiana T.M.Salter (including **O. schaeferi** R.Knuth) Robust geophyte, up to 700 mm tall, with a branched succulent stem. Bulb tunics numerous, papery, blackish brown, with paler margins. Leaves undeveloped or developing at flowering, spreading, petiole up to 50 mm long, leaflets 3, up to 3 mm long. Flowers 3–7 per peduncle, yellow, with a narrow, reddish purple margin beneath. Mar.–June. Among granite rocks in sandy soil, SN, G, NS, NH, KB (Aus to Kamiesberg Mountains). **(ece)**

luederitzii Schinz Acaulescent geophyte, ± 80 mm tall. Bulb tunics with 3 longitudinal ridges, dark brown, often splitting, pointed at base and apex. Leaves with unequal petioles, up to 400 mm long, leaflets 3, kidney-shaped. Flowers 2–5 per peduncle, pale yellow or white, with pale yellow tube. Mar.–Apr. Sandy places, SN (Lüderitz Bay to near Aus). **(ece)**

pes-caprae L. GEELSURING Robust acaulescent or caulescent geophyte, up to 300 mm tall. Bulb tunics soft, brown. Leaves usually basal, suberect, often long-petiolate, leaflets 3, cuneate-obcordate, usually glabrous above, pubescent beneath. Flowers 3–20 per peduncle, yellow. June–Oct. Widespread and common, 50–500 m, G, NS, NH, KV, WM, TS, CCR (Namibia through Namaqualand to E Cape).

pseudo-cernua R.Knuth Acaulescent or shortly stemmed geophyte, up to ± 100 mm tall. Bulb tunics longitudinally ridged, brown. Leaves unequally long, leaflets 3, broadly cuneate-obcordate, thinly hairy beneath. Flowers 3–5 per peduncle, white, with a widely funnel-shaped, yellow tube, petals sometimes violet beneath on margin. Mar.–June. S-facing slopes, SN (Aus to Schakalskuppe). **(ece)**

*B.' Peduncle 1-flowered (see also **O. copiosa**)*
*C. Leaves unifoliolate (see also **O. flava**)*

salteri L.Bolus Acaulescent geophyte, up to 160 mm tall. Bulb tunics hard and pale brown. Leaves prostrate in a basal cluster, simple, blade suborbicular to elliptical, sometimes slightly incised at apex, brownish-purple beneath. Flowers 1 per peduncle, yellow or rarely white with a yellow tube and purple-streaked near throat. May–July. Damp clayey flats and in quartz patches, KV (from foot of Gifberg to W of Vanrhynsdorp and near Klawer). **(ece)**

*C.' Leaves usually 4- or more-foliolate or rarely 1- or 2-foliolate (see also **O. obtusa, O. reclinata**)*

capillacea E.Mey. ex Sond. Erect, caulescent pubescent or ± glabrous geophyte, 60–140 mm tall. Bulb tunics lanceolate, brown, pilose with recurved coppery hairs. Leaves terminally congested on filiform petioles, leaflets 5–9 (rarely 3 in CCR), linear to linear-cuneate, developing many linear black streaks when dry, apically notched. Flowers 1 per peduncle, with 2 alternate bracts in upper half, white, yellow or rose, with a yellow tube, often purple-margined beneath. May–July. Stony lower slopes and sandy flats, TS, CCR (southern Tanqua Karoo and Ceres to near Caledon). **(gce)**

cathara T.M.Salter Acaulescent or short-stemmed geophyte, up to ± 100 mm tall. Bulb tunics forming a neck from long filiform tips. Leaves suberect, petiole with broad membranous wings at base, leaflets 8–12, linear to linear-cuneate, notched at apex. Flower 1 per peduncle, white or lemon-yellow, with a pale yellow tube. June–July. Granite slopes and flats, NH (Garies to Bitterfontein). **(ece)**

flava L. (= *O. fabifolia* Jacq.) BOBBEJAANSURING, VINGERSURING Acaulescent or rarely short-stemmed, fleshy geophyte, 30–250 mm tall. Bulb tunics soft, thin, pale brown. Leaves spreading, petiole articulated and with a cushion-like apex and a large brown scale-like base, leaflets (1)2–12, linear to obovate, often folded, leathery, glaucous. Flowers 1 per peduncle, yellow, white or lilac, with yellow tube. May–June. Flats and lower slopes, in sand or clay, 50–600 m, G, NS, NH, KV, WM, CCR (Richtersveld through Namaqualand to Riversdale). **(gce)**

flaviuscula T.M.Salter Dwarf, acaulescent, downy to glabrous geophyte, up to 35 mm tall. Bulb tunics undulate, papery, brown. Leaves often with ± flattened petioles, leaflets 5–9, linear-oblong,

sometimes ± cuneate, folded, margin cartilaginous. Flower 1 per peduncle, yellow throughout, rarely with a purple midvein beneath. June–July. In gravel, NH (Steinkopf to Kamieskroon). **(ece)**

odorata J.C.Manning & Goldblatt Like **O. pulvinata** but leaflets 3 or 4, rarely 5, narrowly elliptical-oblanceolate, upper surface papillate-puberulous, lower surface sparsely pubescent, and flowers with a green tube and darker green or purple throat, sweetly scented. May–June. Seasonally wet flats and margins of seasonal pools on dolerite sills, WM (Hantamsberg and Roggeveld Escarpment: Middelpos to Verlatekloof Pass). **(ece)**

palmifrons T.M.Salter SOPZURING Dwarf, acaulescent geophyte, up to 40 mm tall. Bulb tunics hard, dark brown. Leaves often undeveloped at flowering, in a prostrate rosette, petioles compressed, leaflets 20–29, palmate, oblong, pubescent beneath. Flowers 1 per peduncle, white, with a yellow tube. May–June. Stony slopes and flats, WM, TS (Roggeveld Escarpment near Sutherland to near Ceres and Laingsburg). **(gce)**

pulvinata Sond. Dwarf, acaulescent, glabrous geophyte, up to 40 mm tall. Bulb tunics papery, pale brown. Leaves few, with rigid petioles, abruptly swollen at apex and base, leaflets 7–13, linear, channelled, ± falcate towards tip, greyish green. Flower 1 per peduncle, pale rose, with yellowish tube, base of each petal with 2 red swellings on margin. Apr.–May. On ridges in sandy clay, WM (Langberg to S of Loeriesfontein). **(ece)**

quinata Savign. Shortly caulescent geophyte, with stem up to 120 mm tall. Bulb tunics loose, with sharply acute ends, reddish brown. Leaves clustered apically, covered with white hairs, slender-petiolate, leaflets 5, cuneate-obovate, notched apically. Flowers 1 per peduncle with alternate bracts in upper half, rose, with a narrow tube, petals hairy on backs. May. ?Habitat, NH (south-eastern Namaqualand and western edge of Bushmanland).

zeyheri Sond. Shortly caulescent geophyte, with stem up to 30 mm tall. Bulb tunics vertically grooved, brown. Leaves terminal, closely overlapping, leaflets 7–15, linear-cuneate, thinly glandular-hairy beneath. Flowers 1 per peduncle, rose to lilac, with narrow yellow tube. Apr.–May. Arid flats and slopes, 300–650 m, WM, TS, CCR (Hantam to Ceres to Montagu). **(gce)**

sp. A (allied to **O. saltusbelli** Dreyer & Roets) Acaulescent geophyte, ± 60 mm tall. Bulb tunics unknown. Leaves with slender sticky petioles, becoming sandy, leaflets 6 or 7, linear, ± succulent, radially arranged around a ± swollen pulvinus, margins rolled inwards, sparsely pilose beneath. Flowers 1 per peduncle with 2 subopposite bracts near calyx, pink, petals pubescent beneath, with a few dark streaks towards margins. May. In sandy level ground, WM (southern Roggeveld Escarpment). **(ece)**

*C.'' Leaves trifoliolate (see also **O. fabifolia, O. flava, O. odorata**)*

*D. Peduncular bracts inserted opposite or rarely subopposite each other at an articulation near the base or at a secondary articulation in the upper part of the peduncle (see also **O. melanograpta**)*

*E. Leaves bifurcate to middle or below (see also **O. obtusa**)*

comosa E.Mey. ex Sond. Branching, caulescent geophyte, 300–800 mm tall. Bulb tunics extended into an apical beak, shining, with short capitate hairs, brown, undulate at base. Leaves mostly in tufts at ends of stem and branches, petiolate, leaflets 3, broadly cuneate-obcordate, bilobed to ± middle. Flowers 1 per peduncle with ± opposite bracts in upper half, pale rose, with yellow tube. July–Sept. On slopes in shade of rocks and shrubs, NH, KB (Okiep to Kamiesberg Mountains). **(ece)**

heterophylla DC. Caulescent or rarely acaulescent geophyte, up to 300 mm tall, often branching. Bulb tunics woolly, sometimes with bulbils in leaf axils. Leaves often subsessile along stem but petiolate near apex, leaflets 3, bilobed to middle, often silky beneath, sometimes with a few, oblong, tan-coloured calli beneath. Flowers 1 per peduncle with ± opposite bracts in upper half, red to purple, with yellow tube, petals with reddish purple margins beneath. Aug.–Oct. S-facing slopes and mountains, 150–400 m, KB, WM, CCR (Kamiesberg Mountains and Roggeveld to Worcester to Prince Albert). **(gce)**

E.' Leaves subentire or ± incised, never bifurcate below middle

adenodes Sond. Acaulescent geophyte, 30–80 mm tall. Bulb tunics hard, smooth, blackish brown. Leaves in a ± upright rosette, leaflets 3, central one cuneate-rotund to cuneate-rhomboid, lateral ones smaller, glabrous or densely glandular-pubescent, sometimes fringed with straw-coloured hairs, occasionally purple beneath. Flowers 1 per peduncle with opposite bracts in lower half,

white, with a ± narrow, pale yellow tube, petals often purple-spotted on margin beneath, peduncle arching below leaves in fruit. May–Aug. Between rocks, on koppies and stream sides, NH, KB, WM (Steinkopf to Hantam). **(ece)**

ambigua Jacq. Acaulescent or shortly stemmed, ± finely pubescent geophyte, 40–120 mm tall. Bulb tunics ± hard, gummy, dark brown. Leaves clustered basally or at stem apex, leaflets 3, black-dotted beneath, cuneate-rotund to cuneate-oblong, entire or often notched, pubescent, rarely mixed with glandular hairs. Flowers 1 per peduncle with opposite bracts in upper half, white, yellow or cream-coloured, with a wide yellow tube, petals purplish near margin, peduncle arching below leaves in fruit. June–July. Among granite rocks and in deep sand, NH, KB (Kamieskroon and Kamiesberg Mountains to Bitterfontein). **(ece)**

crispula Sond. Caulescent or rarely acaulescent geophyte, up to 100 mm tall. Bulb tunics gummy, blackish, with rufous hairs at apex. Leaves congested, green or brown, leaflets 3, cuneate-oblong, hairy, often black-dotted, apex entire, margins undulate. Flowers 1 per peduncle with opposite bracts at ± middle, pale yellow, petals outlined with purple beneath, peduncle arching below leaves in fruit. May–June. Granite flats and slopes, NH (between Bitterfontein and Eenkoker). **(ece)**

lasiorrhiza T.M.Salter Acaulescent geophyte, up to 40 mm tall. Bulb tunics brown with pale brown longitudinal nerves. Leaves in a basal tuft, leaflets 3, broadly obcordate, densely silky-haired above and beneath, hairs yellowish. Flowers 1 per peduncle with opposite bracts in upper half, sulphur-yellow, margins of petals sparsely hairy beneath. Apr.–June. Amongst dolerite boulders, WM (near Nieuwoudtville). **(ece)**

luteola Jacq. Acaulescent geophyte, 50–80 mm tall. Bulb tunics dark brown, gummy, acute. Leaves with hairy or glabrescent petioles, leaflets 3, cuneate-rotund, glabrous or pubescent, sometimes black-dotted beneath. Flowers 1 per peduncle with bracts opposite ± above middle, yellow, peduncle arching below leaves in fruit. May–June(–Aug). Coastal flats and lower slopes, often in sand, NS, KV, CCR (Koingnaas to Groenrivier Mouth to Cape Peninsula to Albertinia). **(gce)**

marlothii Schltr. ex R.Knuth Acaulescent geophyte, up to 190 mm tall. Bulb tunics shortly beaked and woolly on bulbils. Leaves basal, leaflets 3, broadly obcordate, broadly incised at apex, sparsely adpressed pubescent beneath. Flowers 1 per peduncle with opposite bracts near calyx, large, rosy-violet, with a yellow tube. Oct. High altitude plateau on shale- and sandstone-derived soils, WM (Roggeveld: Sneeukrans and Vondelingsfontein). **(ece)**

obtusa Jacq. GEELOOGSURING Acaulescent or rarely caulescent geophyte, 50–150 mm tall, with recurved hairs on petioles and peduncles. Bulb tunics hard, deeply pitted, blackish brown. Leaves basal or apically congested, leaflets 3 or rarely 5, obcordate, narrow-cuneate to rarely linear, hairy, ± callus-dotted. Flowers 1 per peduncle with opposite bracts above middle, pink, brick-red, yellow or white, with darker veins and a yellow tube, petals rarely pilose on outer margin. June–Oct. Mostly clay and granite, 50–600 m, SN, G, NS, NH, KB, WM, TS, CCR (Sperrgebiet to Bushmanland and Namaqualand to Roggeveld to Port Elizabeth).

rhomboidea T.M.Salter Erect caulescent or rarely acaulescent geophyte, 50–120 mm tall. Bulb tunics hard, brown. Leaves apically congested, leaflets 3, rhomboid-oval, shallowly notched, glabrous or sparsely hairy, digitately veined, purple beneath. Flowers 1 per peduncle with opposite bracts a little above middle, yellow, often purple-streaked on margin beneath, peduncle arching below leaves in fruit. June–July. Hillsides, NH (near Bitterfontein and Nuwerus). **(ece)**

virginea Jacq. Caulescent geophyte, 40–60 mm tall. Bulb tunics needle-pointed, loose, brown to blackish. Leaves in clusters at apex and with some along stem, leaflets 3, rounded, rarely notched at apex, pubescent, minutely black-dotted. Flowers 1 per peduncle with opposite bracts close to calyx, small, plain white, petals sparsely hairy beneath. May–July. On granite hills, NH (near Garies). **(ece)**

D.' Peduncular bracts alternate, rarely subopposite or lacking, peduncle without an upper articulation

F. Plants acaulescent; leaflets flat and fleshy, often small, with large epidermal cells that become pitted when dry

annae F.Bolus Acaulescent geophyte, up to 60 mm tall. Bulb extended into a long apical beak, reddish brown. Leaves ± membranous near base of petioles, leaflets 3, rotund-obcordate, glabrous or villose with simple white hairs. Flowers 1 per peduncle with alternate bracts on upper part, yellow, copper-pink or white, with a yellow tube, petals sometimes purple-spotted or pubes-

cent on margins. June–Aug. Sandy to loamy flats, sometimes near rocks, NS, NH, KV, TS, CCR (Springbok to Tanqua Karoo to Swartberg Mountains). **(gce)**

bullulata T.M.Salter Acaulescent geophyte, ± 25 mm tall. Bulb tunics rough, puckered and brown. Leaves with petioles slightly widened at base, leaflets 3, glabrous, central one broadly cuneate-attenuate, lateral ones smaller, obliquely rotund, distinctly pitted when dry. Flowers 1 per peduncle with minute alternate bracts in upper half, yellow. June–July. Sandy soils amongst rocks or stones, SN, G, NS, NH (Buchuberg to near Nuwerus). **(ece)**

depressa Eckl. & Zeyh. Acaulescent, mostly glabrous geophyte, 40–140 mm tall. Bulb tunics hard, conspicuously nerved and narrowly keeled, dark brown. Leaves with winged petioles near base at least in some, leaflets succulent, cuneate-suborbicular, with large epidermal cells, sometimes ciliate. Flowers 1 per peduncle with alternate bracts near calyx, white, lilac or pink, with a yellow tube, often present before leaves. Mar.–June. Rocky or gravelly soils, NH, WM, TS, CCR (Zimbabwe and Namibia to central Namaqualand, Bokkeveld Plateau and Cold Bokkeveld).

fergusoniae T.M.Salter Small, acaulescent geophyte, 100–150 mm tall, often with bulbils clustered in leaf axils. Leaves broadly dilated below, leaflets 3, rotund, glandular-ciliate and with black calli along margin, epidermal cells large. Flowers 1 per peduncle with alternate bracts in upper half, rose or white with yellow tube. Sept.–Oct. Dry flats and slopes and near stream banks, KV, WM, TS, CCR (Holrivier and Cold Bokkeveld Mountains to Roggeveld to Little Karoo). **(gce)**

foveolata Turcz. Like **O. pulchella** but leaflets glabrous or pilose above, ± pilose beneath, sometimes callose on margin, alternate bracts above middle, longest styles and stamens 14 mm (vs. < 10 mm) long, flowers yellow, and corolla tube ± cylindrical (vs. funnel-shaped). Apr.–May. In stony soil, NH, KV (Springbok and Augrabies to southeastern Namaqualand and northern Knersvlakte).

grammopetala Sond. Dwarf, acaulescent geophyte, 15–40 mm tall. Bulb tunics pinnate-nerved, brown. Leaves broadly dilated below, leaflets 3, broadly obcordate, ± succulent with conspicuous midrib. Flowers 1 per peduncle with alternate bracts below middle, ± subterranean with only the spreading petals above ground-level, pale yellow, petals violet-veined beneath. May–July. S-facing slopes, in sandy soils, NH, WM, TS (eastern Namaqualand and Bushmanland to Koup Karoo).

inaequalis Weintroub Like **O. bullulata** but bulb with ± smooth tunics, bulbils sometimes present in leaf axils, and flowers yellow or coppery rose, with unequal sepals. July–Aug. Rocky slopes, TS (SE Tanqua Karoo to near Matjiesfontein). **(ece)**

lichenoides T.M.Salter Dwarf, acaulescent, glaucous geophyte, up to 35 mm tall. Bulb tunics longitudinally concave, shining, brown, with margins forming undulate, crenate wings, bulbils sometimes present in leaf axils. Leaves on slender petioles, leaflets 3, small, broadly rotund. Flowers 1 per peduncle with alternate bracts near apex, white with a yellowish tube. June. Shale flats, KV (S of Bitterfontein and N of Soutrivier). **(ece)**

pocockiae L.Bolus Like **O. depressa** but often short-stemmed, bulb square and 4-angled, and sometimes with aerial bulbils in leaf axils. May–June. Varied habitats, 350–600 m, WM, TS, CCR (Bokkeveld Plateau and Roggeveld to Cape Peninsula and Swartberg Mountains). **(gce)**

pulchella Jacq. (= *O. beneprotecta* Dinter ex R.Knuth) Acaulescent, rather fleshy geophyte, 30–60 mm tall. Bulb tunics rough, gummy, dark brown. Leaves with densely hairy petioles, fleshy, leaflets 3, suborbicular towards apex, epidermal cells large beneath, becoming scurfy when dry, coarsely pubescent beneath and along veins above. Flowers 1 per peduncle with alternate bracts near base, white, pale yellow or salmon-rose, with a pale yellow tube. May–June. Sandy lower slopes and flats, 250–450 m, NH, KB, CCR (SE Namibia, Steinkopf to Worcester to Swellendam).

reflexa T.M.Salter Acaulescent or rarely short-stemmed, glabrous geophyte, ± 45 mm tall. Bulb tunics hard, sharply acute at apex, dark brown. Leaves basal or terminally congested, with membranous wings on petiole near base, leaflets 3, broadly rotund, notched apically. Flowers 1 per peduncle with alternate bracts near calyx, small, reddish purple or white, with a yellow tube, petals narrow, short and reflexed. May–June. Stony hillsides, KV (N of Vanrhynsdorp). **(ece)**

senecta T.M.Salter Acaulescent, densely white-haired geophyte, 20–40 mm tall. Bulb tunics loose, acute at apex, shining, pale brown. Leaves spreading, leaflets 3, thin, cuneate, glabrous above or entirely hairy, deeply notched at apex, cells pitted when dry. Flowers 1 per peduncle with alternate bracts near calyx, white, with a yellow tube. June–July. Sandy flats and banks of dry watercourses, NH, KV (S of Nuwerus and S of Kliprand to Soutrivier). **(ece)**

F.' Plants caulescent or if acaulescent then leaflets not as above
*G. Stems leafy; leaves with at least the lower ones subsessile or sessile; peduncles often cauline (see also **O. clavifolia, O. reclinata**)*

crocea T.M.Salter Erect, caulescent geophyte, 50–100 mm tall, often branching. Bulb tunics loose, rough, blackish brown. Leaves densely arranged along stem on short, scale-like petioles, leaflets 3, cuneate-clavate, conduplicate, hairy beneath, deeply notched at apex. Flowers 1 per peduncle with alternate bracts towards calyx, axillary, bright yellow, petal margins sometimes purple-streaked beneath. June. Clays and coarse gravelly slopes, G, NH (Gariep Valley to Port Nolloth and Steinkopf and inland of Kleinsee). **(ece)**

grammophylla T.M.Salter Like **O. massoniana** but a dwarf plant, 30–40 mm tall, outer bulb tunics not pleated, flowers terminally congested, yellow with an orange-red margin. May. ?Habitat, WM (Bokkeveld Plateau to Doornbosch). **(ece)**

hirta L. Softly hairy, caulescent geophyte, with leafy stem, 50–300 mm tall, often branching. Bulb tunics papery, pale brown. Leaves often congested, leaflets 3, grey-green, ± sessile, linear-obovate, hairy beneath, without calli. Flowers 1 per peduncle with alternate bracts a little below calyx, axillary, mauve, magenta or white with yellow tube, petals sometimes reflexed. Apr.–June. Flats and lower slopes, KV, CCR (near Vredendal and Bokkeveld Mountains to Cape Peninsula). **(gce)**

massoniana T.M.Salter Tufted, caulescent geophyte, 40–60(–240) mm tall, with densely leafy stems. Bulb tunics brown to dark brown, acute at apex, pleated, reflexed pilose. Leaves subsessile to shortly petiolate below, leaflets 3, linear, margins rolled inwards, pilose beneath, becoming black-streaked when dry. Flowers 1 per peduncle with 2 alternate bracts in upper part, inserted some distance along stem, yellow, with brick red markings in upper third near margin. May–June. On sandstone- and tillite-derived soils, WM, CCR (Bokkeveld Mountains and Nieuwoudtville). **(gce)**

melanograpta T.M.Salter Dwarf, caulescent geophyte, 20–40 mm tall. Bulb tunics needle-pointed, shining brown. Leaves closely overlapping on upper half of stem, subsessile, leaflets 3, linear, conduplicate or rolled inwards, developing small black streaks when dry. Flowers 1 per peduncle with ± opposite bracts a little below calyx, axillary, rose-red, with a yellow tube. May–July. Shale koppies, KV (NE of Vanrhynsdorp). **(ece)**

sp. B (allied to **O. lineolata** T.M.Salter) Short, caulescent geophyte, up to 100 mm tall. Bulb tunics loose, recurved-velvety below, pointed apically. Leaves distinctly petiolate, apically congested, leaflets linear-cuneate, conduplicate, ± falcate, sparsely hairy, conspicuously black-streaked when dry. Flowers 1 per peduncle with 2 alternate bracts in upper half, a few cauline, pale to bright yellow. May–June. On dolerite outcrops, WM, TS (Roggeveld Escarpment and southern Tanqua Karoo). **(ece)**

G.' Leaves apically congested or if arranged along stem then distinctly petiolate
*H. Leaflets usually less than twice as long as broad (see also **O. argillacea**)*

ausensis R.Knuth Like **O. sonderiana** but entirely glabrous and flowers yellow with a widely funnel-shaped tube, and peduncular bracts alternate or subopposite in upper half. Apr. In coarse granite-derived sand, SN (near Aus). **(ece)**

callosa R.Knuth Acaulescent or shortly caulescent, stoloniferous geophyte, up to 100 mm tall. Bulb tunics thin, minutely pitted, brown. Leaves terminal, leaflets 3, obovate, discolorous, densely hairy beneath. Flowers 1 per peduncle with alternate bracts in upper part, rose-red, with a purple throat and yellow tube. May–June. Seasonally damp clay and loamy flats, WM, CCR (Bokkeveld Mountains and Hantamsberg). **(gce)**

campylorrhiza T.M.Salter Erect, caulescent geophyte, up to 150 mm tall, often shortly branched. Bulb tunics subrigid, splitting at base, brown. Leaves congested terminally, rarely a few along stem, petioles glandular pubescent, leaflets 3, obcordate, pinnately veined, with pluricellular hairs beneath. Flowers 1 per peduncle with alternate bracts above middle, rarely absent, white or rarely pale rose, with a yellow tube, purple at base. May–July. ?Habitat, NH (Steinkopf to Kamieskroon). **(ece)**

fibrosa F.Bolus Acaulescent, glandular-hairy geophyte, up to 70 mm tall, covered with ± viscous, pluricellular hairs. Bulb tunics black or dark brown, needle-pointed. Leaves slender-petiolate, leaflets 3, cuneate-obovate, glandular-hairy. Flowers 1 per peduncle with 1 or 2 minute bracts in lower half or bractless, lilac or mauve with a subcylindrical yellow tube, petals sparsely pu-

bescent, anthers sagittate. Apr.–June. Rocky shale slopes, TS, CCR (Montagu to Ladismith and southern Karoo). **(gce)**

inconspicua T.M.Salter Slender, acaulescent geophyte, up to 60 mm tall. Bulb tunics smooth and shining, dark brown. Leaves prostrate, leaflets 3, broadly cuneate-obcordate, speckled with oblong brown calli beneath. Flowers 1 per peduncle with alternate bracts in upper half, white, with a ± inflated yellow tube, petals purple-margined beneath. June–July. Gravelly hill slopes, NH (near Steinkopf, Sannagas and Kamieskroon). **(ece)**

melanosticta Sond. Acaulescent geophyte, 20–140 mm tall. Bulb tunics gummy and blackish brown. Leaves in a dense rosette, leaflets 3, cuneate-obcordate, hairy on both sides or with a fringe of soft shining hairs, rarely glabrous, minutely orange- to black-dotted. Flowers 1 per short, densely pilose peduncle with alternate bracts, yellow or rarely cream-coloured. May–Aug. Mountain slopes and flats in clayey soils, 500–600 m, WM, TS, CCR (Bokkeveld Escarpment to Roggeveld to near Montagu). **(gce)**

petraea T.M.Salter Like **O. sonderiana** but densely covered with minute capitate hairs, leaflets densely glandular pilose, with numerous brown calli, particularly near margin, bracts alternate in upper half of peduncle, flowers dull pink or white, with a yellow tube. May–June. Fissures in shale outcrops, KV (northern Knersvlakte N to near Vanrhynsdorp). **(ece)**

psammophila G.Will. Acaulescent, succulent geophyte, ± 75 mm tall. Bulb tunics acute at apex, rough, brown. Leaves basal, leaflets 3, broadly cuneate-obcordate, rough above, dark red with prominent veins beneath, margin thickened. Flowers 1 per peduncle with alternate bracts, large, pink to white, with a pale yellow to pinkish yellow tube. May–Sept., after rain. Dry riverbeds in coarse granite-derived sands, G (northern Richtersveld). **(ece)**

purpurea L. Acaulescent geophyte, up to 150 mm tall. Bulb tunics gummy, blackish brown. Leaves spreading or prostrate, petioles sometimes ± compressed, leaflets 3, ± cuneate-rotund or rarely rhomboid-oblong, hairy and purple beneath, pellucid-streaked when fresh, black-streaked when dry, ciliate. Flowers 1 per peduncle with alternate bracts in lower half, purple, pink, yellow or white, with a yellow tube. May–Sept. Flats and slopes, 50–500 m, NH, KB, KV, WM, TS, CCR (Steinkopf to western Karoo to Cape Peninsula to Port Elizabeth). **(gce)**

rubro-punctata T.M.Salter Like **O. melanosticta** but smaller, 20–30 mm tall, bulb tunics pilose with brown hairs at apex, leaflets very dark green above, deep purple beneath, with numerous, minute, translucent red dots or glands, bracts alternate or subopposite near base of peduncle, flowers white with purple margin. May. ?Habitat, WM (Onder Bokkeveld: between Koebee and Bloukrans Mountains). **(ece)**

sonderiana (Kuntze) T.M.Salter Acaulescent geophyte, 20–40 mm tall, often in congested tufts, minutely glandular-pubescent on petioles and peduncles. Bulb tunics loose, apically pointed, shining, brown. Leaves prostrate, leaflets 3, suborbicular, leathery, glaucous above, obscurely dotted with brown calli in upper part, margin minutely glandular-ciliate. Flowers 1 per peduncle with alternate bracts a little below calyx, plain yellow or white with a yellow tube, sepals marked with 6–12 elongate calli. May–June. Rocky slopes, 150 m, G, NH, KV, CCR (lower Gariep Valley to Springbok to Graafwater). **(gce)**

stenoptera Turcz. Acaulescent geophyte, 40–100 mm tall, with pluricellular hairs. Bulb tunics vertically nerved, splitting, brown. Leaves crowded, leaflets 3, broadly obcordate, sometimes sparsely pilose beneath, fringed, often marked with brown calli, lateral ones smaller than central one, margins sometimes undulate. Flowers 1 per peduncle with long alternate bracts ± embracing calyx, yellow or white, with a yellow tube, calyx nearly clasped by bracts. May–July. Seasonal washes and granite slopes, NH, KV (Kamieskroon to near Nuwerus). **(ece)**

tenella Jacq. Slender, caulescent geophyte, up to 100 mm tall. Bulb tunics soft, papery, brown. Leaves terminal, leaflets 3, cuneate-obovate to cuneate-oblong, shortly hairy beneath, ciliate. Flowers 1 per peduncle sometimes sessile, bracts alternate in upper half, yellow, white or pale lilac, with a yellow tube. May–July. Clay flats and shale slopes, KV, CCR (Vanrhynsdorp to Piketberg). **(gce)**

*H.' Leaflets usually at least twice as long as broad (see also **O. callosa**, **O. purpurea, O. tenella**)*

albiuscula T.M.Salter Dwarf, acaulescent geophyte, up to 30 mm tall. Bulb tunics papery, dark brown. Leaves in a basal tuft, leaflets 3, linear-oblong, ± conduplicate, acute at base and apex, adpressed-pubescent beneath. Flowers 1 per peduncle with alternate bracts often overlapping calyx, white with a yellow tube, petals sometimes rosy margined beneath. June. In open ground, NH (Kamieskroon). **(ece)**

argillacea F.Bolus Small, shortly caulescent geophyte, up to 90 mm tall, bearing pluricellular hairs. Bulb tunics apically beaked, dark brown. Leaves apically congested, leaflets 3, cuneate to linear-cuneate, conduplicate, hairy beneath. Flowers 1 per peduncle with alternate bracts in upper half, yellow with widely flared tube, petals sometimes purple-margined beneath, deeply notched. May–July. Hard gravelly soils, 200–500 m, KV, CCR (southeastern Knersvlakte, and Vanrhyns Pass to Clanwilliam). **(gce)**

blastorrhiza T.M.Salter Slender, ± tufted, caulescent geophyte, 30–50 mm tall. Bulb tunics papery, enclosing spreading bulbils. Leaves apically congested, leaflets 3, linear-oblong, conduplicate-falcate, pubescent beneath. Flowers 1 per peduncle, with bracts often overlapping calyx, pale lilac or white, with a yellow tube, petals violet-veined, with 2 short, purple, marginal streaks in lower half. July. ?Habitat, KV (just N of Vanrhynsdorp). **(ece)**

burkei Sond. Caulescent geophyte, up to 100 mm tall, with a wiry erect stem. Bulb tunics pale chestnut-brown. Leaves congested terminally, leaflets 3, linear-conduplicate, often falcate, ± thinly hairy beneath, usually with 2 or more reddish calli near apex. Flowers 1 per peduncle with alternate bracts a little below calyx, rose, lilac or white, with a yellow tube, throat sometimes marked purple. May–June. Stony soils, 300–600 m, TS, CCR (Ceres to Montagu and Komsberg Pass and Gannaga Pass). **(gce)**

campicola T.M.Salter Slender, caulescent geophyte, 40–70 mm tall, with erect rigid stem. Bulb tunics papery, brown. Leaves apically congested, leaflets 3, linear, conduplicate, ± falcate, sparsely pubescent. Flowers 1 per peduncle with alternate bracts near apex, white, with a yellow tube, petals often outlined with purple beneath, sepals dark purple on margins near base, orange-callose above. May–July. ?Habitat, KV, WM (near Vanrhynsdorp and Onder Bokkeveld: between Koebee and Bloukrans Mountains). **(ece)**

ciliaris Jacq. Caulescent, ± pubescent geophyte, up to 200 mm tall. Bulb tunics thin and brown. Leaves mostly terminal, leaflets 3, linear-elliptic, often conduplicate and ± falcate, obscurely pustulate, midrib pilose beneath, ciliate. Flowers 1 per peduncle with alternate bracts towards calyx, salmon, pink, rose, lilac or white, with yellow tube. Apr.–July. Slopes or flats in sandy or clayey soils, TS, CCR (base of Verlatekloof Pass to Ceres to Alexandria).

clavifolia Sond. Erect, caulescent geophyte, 50–200 mm tall. Bulb tunics thin, reddish brown. Leaves congested terminally or in whorls in upper part of a sometimes branched stem, leaflets 3, cuneate to linear-cuneate, conduplicate, dilated and notched at apex, with capitate hairs beneath. Flowers 1 per peduncle with bracts minute or absent, yellow or white, glandular, petals often purple-margined beneath. May–July. Seasonally damp pockets between rocks, NH, CCR (Kamieskroon to Eenkoker to S of Olifants River: Knakiesberg). **(gce)**

creaseyi T.M.Salter Shortly caulescent geophyte, 30–40 mm tall. Bulb tunics papery, brown. Leaves densely overlapping near stem apex, leaflets 3, linear to narrowly elliptic, conduplicate, silky with adpressed hairs beneath, with a brush-like apical tuft. Flowers 1 per peduncle, with alternate bracts embracing calyx, white, with a pale yellow tube. June. Granite slopes and flats, NH, KB (Garies and Kamiesberg Mountains). **(ece)**

cuneata Jacq. Erect, caulescent geophyte, with unbranched stem, 40–80 mm tall. Bulb tunics loose, smooth, brown. Leaves with slender petioles, leaflets 3, cuneate, densely pubescent above and below. Flowers 1 per peduncle with alternate bracts close to calyx, white, with a yellow tube, calyx covered with coarse grey hairs. May–June. Quartz patches on undulating plains of reddish soil, KV (Bitterfontein to Vanrhynsdorp). **(ece)**

deserticola T.M.Salter Erect, caulescent geophyte, 50–180 mm tall, densely covered with spreading capitate hairs. Bulb tunics longitudinally ridged, many-nerved. Leaves apically congested, leaflets 3, linear-cuneate, conduplicate, upper surface glabrous. Flowers 1 per peduncle with alternate bracts, towards apex, white or pale pink, with a yellow tube, petals ± streaked with purple beneath. May–July. On stony koppies, KV (NE of Vanryhnsdorp). **(ece)**

ericifolia Oberlander & Dreyer Slender, clump-forming, acaulescent geophyte, 40–70 mm tall. Bulb tunics papery, dark brown to black. Leaves erect, with rigid wiry petioles, densely glandular hairy when young, leaflets 3, edges rolled inwards, ± covering upper surface with translucent papillae. Flowers 1 per peduncle, with alternate bracts in upper half, bell-shaped, white, base of petals wine-red. June. SW side of rocky ridge, KV (NE of Vanrhynsdorp). **(ece)**

exserta T.M.Salter Like **O. linearis** but leaflets hairy on both surfaces and stem unbranched. Apr.–June. In sandy soils, NH, KB (northern Namaqualand from Concordia to Kamiesberg Mountains). **(ece)**

furcillata T.M.Salter Acaulescent or caulescent geophyte, 60–80 mm tall, stem rarely branched. Bulb tunics thin, rough, brown. Leaves basal to apically congested, leaflets 3, cuneate, bilobed to

± middle, lobes linear-oblong, subglaucous, pilose beneath with long pluricellular hairs. Flowers 1 per peduncle with alternate bracts towards apex, white, with a short yellow tube, petals often purple margined beneath. June–July. Granite-derived soil, NH, KB (Steinkopf to Kamiesberg Mountains). **(ece)**

gracilis Jacq. Caulescent geophyte, with a branched, wiry, polished, brown stem up to 300 mm tall. Bulb tunics rather loose, dark brown. Leaves mostly terminally congested, leaflets 3, linear-conduplicate, ± falcate, finely hairy beneath. Flowers 1 per peduncle with alternate bracts in upper half, orange, pink or white, with a yellow tube, margin of petals minutely pubescent beneath. May–June. Sandy flats and slopes, 50–150 m, NH, KV, CCR (near Garies to Clanwilliam). **(gce)**

helicoides T.M.Salter Like **O. gracilis** but stem spiral or conspicuously undulate (vs. straight to slightly undulate), flowers dark ruby red or white, with a yellow tube, petals often reflexed, and capsule not exserted from calyx. May–June. In granite-derived soils, NH (Springbok to Garies). **(ece)**

kamiesbergensis T.M.Salter Dwarf, acaulescent geophyte, 20–30 mm tall. Bulb tunics brown and papery. Leaves in a basal tuft, leaflets 3, linear-oblong to cuneate-oblong, conduplicate, falcate, hairy beneath. Flowers 1 per short peduncle, with alternate or subopposite bracts close to calyx, rose to white with a yellow tube. June. In open places, KB (Kamiesberg Mountains). **(ece)**

linearis Jacq. Erect, caulescent, occasionally branching geophyte, 10–140 mm tall, densely white-haired. Bulb tunics loose, with sharply acute ends, dark brown. Leaves terminally clustered, leaflets 3, linear to oblong-cuneate, often conduplicate and falcate, hirsute beneath, softly fringed. Flowers 1 per peduncle, with bracts embracing calyx, pale rosy violet, with a ± subcylindrical, pubescent, yellow tube, petals pubescent on margin beneath. May–July. Gravelly flats, NH, KV (southern Namaqualand to near Vanrhynsdorp). **(ece)**

louisae T.M.Salter Acaulescent, glabrous geophyte, 50–140 mm tall, readily falling apart at articulations when dry. Bulb tunics papery, transversely wrinkled, pale brown. Leaves with a flattened petiole swollen at base, leaflets 3, articulated to petiole, ± 2 times as long as broad, central one cuneate, shortly incised at apex, lateral ones smaller, sometimes ± black-dotted. Flowers 1 per peduncle, with 2 linear bracts close to calyx, pale cream-coloured, with a yellow tube. May–June. Shady places, NH (near Kamieskroon). **(ece)**

namaquana Sond. Like **O. louisae** but up to 200 mm tall, petiole terete but scale-like and brown near base, leaflets at least 4 times as long as broad, sometimes conduplicate, with 2 small, brown, apical calli, flowers bright yellow, with 3 large oblong-lanceolate bracts close to calyx. May–Sept. In stream beds and seasonally damp places, NH, KB (near Steinkopf to Kamiesberg Mountains). **(ece)**

primuloides R.Knuth Slender, caulescent geophyte, 30–150 mm tall. Bulb tunics papery, brown. Leaves apically congested, sometimes a few along stem, leaflets 3, linear-oblong to narrowly elliptical, ± conduplicate and falcate, shortly hairy beneath. Flowers 1 per peduncle, with alternate bracts near calyx, lilac, corolla tube cylindrical, pubescent, calyx often dull brick-red. May–July. Stony soils, NH, WM, TS (Kamieskroon and Bokkeveld Plateau to Hantamsberg, Roggeveld and Onder Bokkeveld: between Koebee and Bloukrans Mountains). **(ece)**

reclinata Jacq. Erect, caulescent and branched or rarely acaulescent geophyte, up to 300 mm tall, minutely pubescent with whitish hairs. Bulb tunics soft, papery, brown. Leaves clustered terminally and on short branches along stem, leaflets 3 or 5, linear-cuneate or narrowly cuneate-obovate, usually conduplicate-falcate, notched at apex. Flowers 1 per peduncle, with alternate bracts towards calyx, salmon pink or pale lilac, with a yellow or greenish yellow tube. May–July. In coarse granite-derived soils, NH, KV (Kamieskroon to near Klawer). **(ece)**

stenopetala T.M.Salter Caulescent geophyte, with slender stem, 80–200 mm tall. Bulb tunics hard, dark brown to black. Leaves apically congested, leaflets 3, narrowly linear, conduplicate, sometimes ± falcate, glabrous or sparsely pubescent beneath, margins often black-dotted. Flowers 1 per peduncle, with alternate bracts in upper half, white with yellowish tube. May–July. ?Habitat, WM, CCR (Bokkeveld Plateau to Clanwilliam). **(gce)**

suteroides T.M.Salter Glandular-hairy, caulescent geophyte, with rigid branched stem up to 250 mm tall. Bulb tunics thin, brown, undulate. Leaves terminal on branches, leaflets 3, oblong-cuneate, glandular-ciliate, shortly hairy beneath. Flowers 1 per peduncle, with alternate bracts ± in upper half, pale lilac with yellow tube streaked with purple. May–June. Shale flats, KV, CCR (Bokkeveld Mountains and Vanrhynsdorp). **(gce)**

sp. C Acaulescent geophyte, ± 30 mm tall. Bulb tunics flaky, uneven, reddish brown. Leaves in a basal tuft, leaflets 3, elliptical, conduplicate, falcate, shortly white-pubescent beneath. Flowers 1 per peduncle, with alternate bracts towards calyx, white, with a cream-coloured, subcylindrical

tube, petals outlined with cream-colouring beneath, nocturnal. June. Open places in stony soil, WM (base of Hantamsberg). **(ece)**

sp. D Shortly caulescent geophyte, 50–120 mm tall. Bulb tunics dark brown, pointed at both ends. Leaves with long slender petioles, leaflets 3, narrowly elliptic-cuneate, apically notched, glabrous, with conspicuous dark linear streaks beneath. Flowers 1 per peduncle with alternate bracts in upper half, pale purple with subcylindrical, pale yellow tube, sweetly scented. May. In loose calcareous shale on riverbank, TS (southern Tanqua Karoo). **(ece)**

[**Species insufficiently known** Poorly known and possibly conspecific with one of the above: **O. calvinensis** R.Knuth, **O. laxicaulis** R.Knuth, **O. ligulata** E.Mey ex Sond., **O. neglecta** R.Knuth]

PAPAVERACEAE

by D.A. Snijman

1. Corolla creamy white or yellow; sepals with conspicuous stiff apical processes; capsule opening by slits ..... **Argemone**
1.' Corolla red, pink or purple; sepals without stiff apical processes; capsule opening by pores beneath stigmas ..... **Papaver**

*ARGEMONE ± 23 spp., N and S America

***ochroleuca** Sweet BLOUDISSEL, MEXICAN POPPY Spiny annual, up to 0.9 m tall. Leaves grey or bluish green, fringed with straw-coloured spines. Flowers solitary in leaf axils, pale yellow or creamy white. Fruit a spiny capsule, oblong in outline. Sept.–Jan. Disturbed areas and watercourses, SN, G, NH, WM, TS, CCR (native to central America, widespread weed in southern Africa).

PAPAVER POPPY 80 spp., Europe, Cape Verde Islands, South Africa

***hybridum** L. ROUGH POPPY Annual, up to 600 mm tall. Leaves pinnate, lower ones in a rosette. Flowers solitary, small, terminal or axillary, red to purplish, with dark basal spot, sepals bristly. Fruit an obovoid-ellipsoid to subglobose, densely and firmly setose capsule. Sept. Disturbed places, WM, CCR (native of Europe, a weed in South Africa).

PEDALIACEAE

by D.A. Snijman

1. Fruit with unequal locules, horns, if present, below middle ..... **Rogeria**
1.' Fruit with equal locules, horns, if present, apical ..... **Sesamum**

ROGERIA 6 spp., Africa and Brazil

longiflora (Royen) J.Gay ex DC. Coarse, ± unbranched annual, up to 2 m tall. Leaves ovate, large, on long outspread petioles. Flowers clustered in leaf axils, trumpet-shaped, tube ± gibbous at base, narrowing to throat, greenish white, segments white, lined reddish in throat. Fruit woody, narrowly ovoid, with prominent apical beak and 2 recurved spurs near base. May–Dec. Slopes and flats, SN, G (central Namibia to Richtersveld to Bushmanland).

SESAMUM ± 15 spp., Africa, Mascarene Islands, S Europe to India and Sri Lanka

capense Burm.f. Glabrous annual, up to 1 m tall, with mucilage glands at nodes. Leaves polymorphic, with the lower ones 3–7-foliolate or -partite with obovate-oblong to linear leaflets, upper ones ± mealy glandular. Flowers 1 per leaf axil, ± broadly trumpet-shaped, purple-violet. Fruit

woody, ± cylindrical, with short apical beak and basal knobs. Flowering after rain. Open habitats, G, NH, KV, WM (eastern winter rainfall region and central southern Africa).

PLANTAGINACEAE

by D.A. Snijman

1. Stemless herbs; leaves alternate or rosulate, usually entire; flowers in dense spikes; calyx usually with membranous margins; stamens 4; capsule circumscissile . . . . . **Plantago**
1.' Herbs with erect or creeping stems; leaves (at least lower) opposite, usually toothed; flowers solitary or in racemes; calyx foliose; stamens 2; capsule loculicidal or septicidal . . . . . **Veronica**

PLANTAGO PLANTAIN ± 265 spp., cosmopolitan

cafra Decne. CAPE PLANTAIN Softly hairy annual, up to 150 mm tall, often tussock-forming. Leaves linear or filiform. Flowers in loose, oblong or subglobose, softly hairy spikes, whitish. Aug.–Sept. Sandy or clay slopes and flats, G, NH, WM, TS, CCR (Richtersveld to Cape Peninsula through Little Karoo to Ladismith). **(gce)**

crassifolia Forssk. FLESHY PLANTAIN Hairy, rhizomatous perennial, up to 300 mm tall. Leaves fleshy or leathery, usually woolly in axils, linear-oblanceolate, sometimes pinnatifid. Flowers in dense, narrowly cylindrical spikes, whitish, corolla tube hairy. Nov.–Mar. Coastal sands, limestone and salt pans, TS, CCR (Saldanha Bay to tropical Africa).

VERONICA 250 spp., ± cosmopolitan

anagallis-aquatica L. WATER SPEEDWELL Annual or short-lived perennial, 300–600 mm tall, stems creeping to erect, weakly 4-angled. Leaves in opposite pairs, ovate-lanceolate, toothed. Flowers in elongated racemes, petals 4, pale blue, violet, pinkish or white, stamens 2. Oct.–Apr. In damp and aquatic habitats, SN, G, WM, TS, CCR (widespread in wet areas, ± cosmopolitan, possibly introduced from Europe).

PLUMBAGINACEAE

by D.A. Snijman based on Dyer (1963), **Limonium** by L. Mucina & D.A. Snijman

1. Calyx setose with long, often glandular, bristle-like hairs . . . . . **Plumbago**
1.' Calyx thinly membranous or papery, without bristles:
2. Calyx membranous, segments appearing winged . . . . . **Dyerophytum**
2.' Calyx thin-textured and dry, with an almost truncate to shortly lobed tube . . . . . **Limonium**

DYEROPHYTUM 3 spp., southern Africa, Socotra and India

africanum (Lam.) Kuntze Shrub, up to 1 m tall. Leaves widely spaced, ± spathulate, up to 200 × 12 mm, ± coated with calcareous granules. Flowers in dense terminal spikes, calyx appearing 5-winged, transversely wrinkled, persistent, corolla funnel-shaped, red, pink, yellow or cream-coloured. Fruit a capsule, as long as calyx. Mar.–Sept. Granite domes and sandy beds of seasonal semi-desert streams, SN, G, NS, NH (Angola through Namibia to northern and eastern Namaqualand and to Gordonia along Gariep Valley).

LIMONIUM PAPIERBLOM, SEA-PINK ± 350 spp., sub-cosmopolitan, especially maritime and arid N hemisphere

A. Herbs with winged stems

***sinuatum** (L.) Mill. WAVYLEAF SEA-LAVENDER Roughly hairy biennial or perennial, 250–400 mm tall. Leaves mostly basal, lyrate-pinnatifid, ± 90 mm long. Flowers showy, in clusters of 3

or 4 on branchlets arising from a prominently winged axis, corolla white, calyx blue or mauve. Sept.–Feb. Roadsides and other disturbed habitats, NH, KV, TS, CCR (Garies to Prince Albert, introduced weed, native to the Mediterranean).

A.' Subshrubs and shrubs with stems never winged
B. Shrubs and sometimes dwarf shrubs; calyx 10–20 mm diam. at maturity; expanded corolla limb > 10 mm diam. at anthesis; stigmas capitate

amoenum (C.H.Wright) R.A.Dyer Low growing shrub, like **L. namaquanum** but with flowers staggered along the branches. Flowers white with a pink calyx. Dec.–Jan. Succulent shrublands on stony shale slopes, TS, CCR (Swartruggens to Touwsrivier). **(gce)**

namaquanum L.Bolus Gnarled, sturdy shrub, up to 300 mm tall, with woody base easily splitting into strips. Leaves many near base, in 2 opposite rows, spathulate, up to ± 35 mm long, greyish, leathery. Flowers congested in a stunted inflorescence, calyx ?cream-coloured. Sept.–Oct. Quartz patches, NS (Riethuis and Wallekraal regions). **(ece)**

teretifolium L.Bolus Erect shrub or shrublet, up to 800 mm tall, with old bark splitting into strips. Leaves many near base, erect, linear, up to 60 mm long, terete and succulent. Flowers in dense clusters near tips of branching inflorescence, calyx whitish. Aug.–Sept. Drainage lines in quartz patches, KV (Knersvlakte: NE of Bitterfontein and Soutrivier). **(ece)**

sp. A (= *Limonium dagmarae* Mucina *ms*) Creeping shrub, ± 300 mm tall, branches leafy towards tips. Leaves linear-spathulate, 20–50 mm long, leathery, often with a recurved apical mucro. Flowers showy, scattered along ± arched branchlets of a prominent inflorescence, calyx mauve. Oct.–Nov. Deep red coastal dunes and upper beaches, NS (Hondeklipbaai to southern-most Namaqualand coast near Doringbaai). **(ece)**

sp. B (= *Limonium desmetii* Mucina *ms*) Pustulate-scurfy, rounded shrub, ± 400 mm tall, leafy towards branch tips. Leaves oblanceolate, 18–22 mm long, leathery. Flowers in clusters of 5 along a zigzagged flowering stem, calyx purplish. Oct. Salt-encrusted drainage lines, NH (near Nababeep). **(ece)**

B.' Subshrubs; calyx 5 mm diam. at maturity; expanded corolla limb < 10 mm diam. at anthesis; stigmas filiform

decumbens (Boiss.) Kuntze Mat-forming, perennial herb, up to ± 100 mm tall, with densely leafy, stoloniferous stems, often rooting at above-ground nodes. Leaves in basal rosette long and narrow, those on creeping stems smaller, spathulate and sharply mucronate. Flowers inconspicuous, with pale pink calyx. Sept.–Feb. Coastal cliffs, edges of coastal lagoons and upper intertidal salt marshes, NS, CCR (southern Namaqualand and West Coast). **(gce)**

dregeanum (C.Presl) Kuntze Broom-like, perennial herb to subshrub, up to 300 mm tall, branches arising from a thick woody tap root, often splitting from base into new clones. Leaves in a basal rosette, ± linear-spathulate, 10–40 mm long. Flowers numerous, inconspicuous, lavender to pale pink, calyx whitish. Oct.–Apr. Saline alluvia of intermittent rivers and seasonal wet depressions on shales, G, NH, KB, WM (Keetmanshoop to Hantam and possibly Buffelsrivier near Laingsburg).

dyeri Lincz. Tufted, perennial herb, up to 150 mm tall. Leaves in a basal rosette, oblanceolate, up to ± 30 mm long, upper surface distinctly pustulate. Flowers numerous, inconspicuous, calyx whitish, bracts on peduncles conspicuous, becoming almost entirely white-membranous with age. Dec. Desert flats and coastal cliffs, SN (Namib coast near Lüderitz and on some small islands offshore). **(ece)**

equisetinum (Boiss.) R.A.Dyer Densely mat-forming or a solitary, tangled, erect, perennial herb, up to 100 mm tall, forming extensive clones connected by long underground stolons. Leaves in a basal rosette, oblanceolate to obovate, 10–30 mm long. Flowers numerous, inconspicuous, lavender to mauve, with ?whitish calyx. Sept.–Jan. Deep sands on coastal flats, saline in places, NS, CCR (southern Namaqualand: Brand-se-Baai and to Darling on the West Coast). **(gce)**

[**Taxonomic note**: The genus is presently under revision and several new species, apparently allied to **L. dregeanum, L. dyeri** and **L. equisetinum**, are likely to be described.]

PLUMBAGO PLUMBAGO ± 10 spp., ± cosmopolitan

tristis Aiton Roughly glandular-hairy shrublet, up to 300 mm tall. Leaves obcordate-cuneate, 5–10 mm long. Flowers in terminal spikes, dark orange-red, calyx viscid, with long, dark, non-capitate, glandular hairs. Oct.–Mar. Dry sandy slopes, TS, CCR (Little Karoo and southern Karoo). **(gce)**

POLYGALACEAE

by D.A. Snijman

1. Sepals subequal or unequal; stamens 7; fruit a horned capsule or fleshy drupe; mostly ericoid or thorny shrubs ..... **Muraltia**
1.' Sepals very unequal, laterals much larger than the others, often coloured and wing-like; stamens (4 or 5) 8 (9); fruit a compressed capsule without horns; unarmed herbs or shrubs ..... **Polygala**

MURALTIA 119 spp., South Africa, with 1 sp. extending into Tanzania

A. Leaves solitary; flowers on distinct pedicels; capsule obtuse or shortly toothed

horrida Diels Twiggy shrublet, up to 0.6 m tall, with rigid, spine-tipped branches. Leaves shortly petiolate, oblong, 4–7 mm long, slightly fleshy, mucronate. Flowers 1–few in leaf axils, pale pink to white. Fruit a capsule, topped with 2 teeth. Aug.–Jan. Rocky slopes, WM, CCR (Bokkeveld Mountains to Hantamsberg and Roggeveld to Cederberg Mountains). **(gce)**

rigida E.Mey. ex Turcz. Densely branched, rigid shrub, up to 0.4 m tall. Leaves sessile, oblong, 1.5–3 mm long, thick and fleshy. Flowers 1 or 2 in leaf axils, white or pale pink. Fruit a capsule with 2 short teeth 1 mm long. May–Oct. Among granite boulders, KB (Kamiesberg Mountains). **(ece)**

spinosa (L.) F.Forest & J.C.Manning (= *Nylandtia spinosa* (L.) Dumort.) SKILPADBESSIE, TORTOISE BERRY Rounded, thorny shrub, up to 1 m tall, lateral branchlets short and pungent. Leaves subsessile, oblong, 5–10 mm long. Flowers solitary in axils, purplish or pink and white. Fruit red or orange and fleshy to yellow and leathery. Mainly June–July. Sandy flats and slopes, G, NS, NH, KB, KV, CCR (Richtersveld through Namaqualand to SW Cape to E Cape).

A.' Leaves fascicled (sometimes solitary); flowers sessile or on short pedicels; capsule with prominent apical horns

macrocarpa Eckl. & Zeyh. Like **M. namaquensis** but flowers with inner sepals equal to or slightly longer than side petals. July–Dec. Dry koppies and mountains, WM, CCR (Montagu to Nuweveld Mountains to Great Karoo).

namaquensis Levyns Spreading, much-branched shrub, up to 0.6 m tall, with puberulous young stems. Leaves clustered or solitary, linear or linear-lanceolate, 7–12 mm long, spine-tipped and hooked, margin scabrous, secondary ones smaller. Flowers sessile, white or pale pink, sepals two thirds as long as side petals. Capsule sparsely to minutely hispid, with prominent horns. July–Sept. Stony slopes, NH (near Springbok to Spektakelberg to Komaggas Mountains). **(ece)**

obovata DC. Spreading, glabrescent shrublet, up to 0.4 m tall. Leaves usually solitary, obovate to oblanceolate, 5–8 mm long, thick, shortly spine-tipped and often reflexed. Flowers ± sessile, axillary, pink or white. Capsules hispid, prominently horned. May–Sept. Dry, sandy slopes and flats, NS, KV, CCR (Bitterrivier to near Klawer to Saldanha). **(gce)**

vulnerans Levyns Erect, much-branched shrub, 0.2–0.8 m tall, branchlets often spiny. Leaves clustered, narrowly linear, 4–13 mm long, spine-tipped, straight or rarely ± reflexed, minutely ciliolate near base, secondary ones smaller. Flowers sessile, axillary, white, with dark purple keel. Capsule with prominent leaf-like horns. Aug.–Nov. On dry koppies, WM, TS, CCR (near Laingsburg through to Great Karoo).

POLYGALA BUTTERFLY BUSH, ERTJIEBLOM ± 500 spp., cosmopolitan

ephedroides Burch. Many stemmed, erect, sparsely leaved shrub, up to 2 m tall. Leaves linear, 1–1.5 mm wide. Flowers in long, slender, terminal racemes, pale to dark pink, lateral sepals suborbicular to ± oblong-elliptical, broad. Aug.–Feb. Loamy soils on flats or slopes, NH, KB, KV, WM (through Namaqualand to central Karoo).

lasiosepala Levyns Like **P. teretifolia** but leaves persistently crisped-hairy, sepals often shortly hairy, and side petals with dorsal lobe shorter than sickle-shaped lower lobe. Sept.–Oct. Dry rocky slopes, NH, KB, CCR (near Steinkopf, Kamiesberg Mountains and Nardouw Mountains). **(gce)**

leptophylla Burch. Erect, sparsely to much-branched shrub, up to 2 m tall. Leaves linear-elliptic, leathery. Flowers in elongate, terminal racemes, mauve, side petals entire. May–Oct. Stony slopes, SN, G, NS, NH, KV, TS, CCR (southern Namibia to Namaqualand and Karoo to Cederberg Mountains).

microlopha DC. (including **P. levynsiana** Paiva) Sparsely leafy shrub, up to 0.6 m tall. Leaves leathery, linear to elliptic, usually shortly ciliate. Flowers in short, terminal, umbel-like racemes, purple, side petals unequally bilobed with lower lobe linear and elongate, crest of keel reduced and short. Mainly Aug.–Nov. Rocky sandstone and clay slopes, TS, CCR (Montagu to E Cape).

mossii Exell (= *Polygala subcarnosa* Schinz) Dwarf shrub, up to 0.1 m tall, much-branched from woody base. Leaves oblong-ovate, 4–6(–8) mm wide, obtuse or shallowly notched at apex, slightly fleshy. Flowers in short racemes, purple. Aug.–Oct. Rocky slopes, SN, G (Lüderitz area to Richtersveld). **(ece)**

myrtifolia L. SEPTEMBERBOS Sprawling or erect shrub, up to 2 m tall, often velvety on young parts. Leaves ascending, linear with margins slightly revolute to elliptic-obovate and flat. Flowers large, in short terminal racemes, purple, side petals bilobed, lower lobe much longer than dorsal. Mainly July–Oct. Rocky slopes, WM, TS, CCR (Bokkeveld Mountains to Calvinia to SW Cape to KwaZulu-Natal).

pallida E.Mey. Annual herb, up to 0.15 m tall, branching from near base. Leaves sparse, linear, ± 1 mm wide. Flowers in slender racemes, ?colour. Seeds conical, entirely pubescent. G (southern Angola through Namibia to Richtersveld).

pungens Burch. Spiny, densely branched, almost leafless shrub, up to ± 0.6 m tall, with pungent branch tips. Leaves mostly absent. Flowers 1–4 in short, pseudolateral racemes, pink, lilac or magenta. May–Sept. Stony flats and hillsides, WM (Roggeveld Escarpment to Great Karoo).

scabra L. (= *Polygala affinis* DC.) Sprawling, sparsely leafy shrublet, up to 0.4 m tall, hairy on young parts. Leaves linear-lanceolate, margins slightly revolute, shortly hairy. Flowers few in slender, axillary racemes, purple, outer sepals often shortly hairy, side petals shortly and equally lobed. July–Oct. Rocky slopes, G, NH, KB, KV, WM, TS, CCR (Richtersveld, Spektakelberg, Kamiesberg and Bokkeveld Mountains to SW Cape, Roggeveld to Little and Great Karoo).

teretifolia L.f. Rounded shrublet, up to 0.8 m tall, with stems slender and shortly velvety. Leaves linear, spreading-upcurving, often crisped-hairy when young, margin revolute. Flowers few in short lateral or sometimes terminal racemes, purple to pink, side petals deeply bilobed, dorsal lobe larger. Mainly Oct.–June. Dry, stony, karroid slopes, WM, TS, CCR (near Laingsburg through Little Karoo to near Prince Albert). **(gce)**

POLYGONACEAE

by D.A. Snijman

1. Outer perianth segments bearing short, sharp spines ..... **Emex**
1.' Outer perianth segments without spines:
2. Perianth segments usually 6; inner 3 segments increasing in size, with entire, dentate or wavy margins ..... **Rumex**
2.' Perianth segments 4 or 5, not increasing in size:
3. Sheathing stipules silvery hyaline or rarely brownish, becoming lacerated ..... **Polygonum**
3.' Sheathing stipules brown, membranous, truncate, fringed with cilia or bristles or entire **Persicaria**

EMEX DEVIL'S THORN, DUIWELTJIE 2 spp., southern Africa, Mediterranean basin

australis Steinh. Monoecious annual, up to 300 mm tall, with sprawling to prostrate branches. Leaves long-petiolate, hastate. Flowers in axillary clusters, greenish. Fruit spiny. Sept.–Oct. Sandy and stony flats and lower slopes, G, NS, NH, KV, TS, CCR (Gariep Mouth to NW Province through Namaqualand and Lambert's Bay to Uitenhage).

PERSICARIA (= *POLYGONUM* in part) ± 150 spp., cosmopolitan

decipiens (R.Br.) Wilson SLANGWORTEL, SLENDER KNOTWEED Erect or decumbent, slender annual or perennial, up to ± 700 mm tall. Leaves narrowly lanceolate-elliptic, margin ciliate,

sheathing stipules membranous, brown, truncate, thinly covered with short bristle-like hairs and fringed with stiff bristles 10–12.5 mm long. Flowers in a raceme, deep to pale pink or white. Oct.–May. In marshes, swamps and along rivers, SN, G (throughout southern Africa and ± cosmopolitan in temperate and tropical climates).

***lapathifolia** (L.) Gray HANEKAM, SPOTTED KNOTWEED Like **P. decipiens** but leaves gland-dotted and sheathing stipules entire, without a fringe of bristles, but readily tearing. Sept.–May. In vleis and along rivers and streams, G (almost cosmopolitan, probably introduced in southern Africa and N America).

POLYGONUM KNOTGRASS ± 600 spp., cosmopolitan

***aviculare** L. VARKGRAS Sprawling to prostrate annual, up to 1 m long, with striate stems. Leaves linear to narrowly elliptic, margin sometimes revolute, sheathing stipules silvery, papery, lacerate. Flowers (1–)3–5 in axils, 5-merous, pink, white or greenish. Fruit shorter than perianth. Mainly Sept.–Mar. Disturbed places and saline marshes, WM, TS, CCR (Eurasian weed).

***kitaibelianum** Sadler Like **P. aviculare** but nut shiny and pale to yellowish brown rather than matt and dark brown to black. Sept.–Mar. Sandy soils in dry riverbeds, NH (naturalised in southern Africa, native of Europe).

maritimum L. COAST KNOTGRASS, SEASIDE KNOTWEED Sprawling or prostrate shrublet, up to 500 mm tall. Leaves elliptic, grey, imbricate, margins revolute, sheathing stipules conspicuous, papery, lacerate with age. Flowers 1–3 in axils, 5-merous, white to pink. Fruit longer than perianth. June–Feb. Sandy beaches, SN, G, NS, CCR (Gariep Mouth to Cape Peninsula to Hermanus). **(gce)**

snijmaniae S.Ortiz Much-branched, reed-like shrub, up to 1.5 m tall, stems longitudinally grooved, underground rootstock woody. Leaves short-lived, narrowly elliptic, thick, sheathing stipules deeply lacerated, brownish. Flowers 1(2) in axils, partially surrounded by silvery bracts, 5-merous, white. Mar. On sand dunes, NS (northern Namaqualand). **(ece)**

RUMEX SORREL ± 200 spp., cosmopolitan

***acetosella** L. BOKSURING, SHEEP SORREL Dioecious, rhizomatous perennial, up to 300 mm tall. Leaves often basally tufted, oblanceolate-hastate, long-petiolate, sheathing stipules conspicuous, silvery, papery. Flowers in axillary clusters on branched spikes, red, very small. Fruit small, up to 2 mm long, articulating at pedicel apex. Mainly Sept.–Nov. Disturbed places, ?NH, CCR (cosmopolitan weed).

cordatus Poir. TONGBLAAR Like **R. lativalvis** but often prostrate and leaves mostly basal, ovate-cordate, long-petiolate. July–Sept. Sandy flats and slopes, NS, NH, WM, CCR (Namaqualand and W Karoo to E Cape).

lanceolatus Thunb. Perennial herb, up to 500 mm tall. Leaves narrowly to broadly lanceolate, narrowed to base. Flowers in a ± condensed panicle, only lower flower or none subtended by a leaf, green. Oct.–Mar. In vleis and along seepage zones and rivers, TS (near Laingsburg through Klein Roggeveld to Mpumalanga).

lativalvis Meisn. Monoecious, tuberous perennial, spreading on creeping rhizomes, mostly up to 250 mm tall. Leaves mostly basal, sagittate-hastate, long-petiolate. Flowers in axillary clusters on branched spikes, whitish to greenish. Fruit enclosed in enlarged, papery, red sepals, forming triangular-cordate wings, articulated below middle of pedicels. Aug.–Oct. Mostly clay and limestone slopes and flats, NH, CCR (Namaqualand to Clanwilliam to Agulhas Plain and ?Uitenhage).

[**Insufficiently known species R. garipensis** Meisn.]

PROTEACEAE

by D.A. Snijman

1. Flowers unisexual. . . . . **Leucadendron**
1.' Flowers bisexual:

2. Inflorescence an axillary capitulum ..... **Leucospermum**
2.' Inflorescence terminal:
3. Capitulum surrounded by large, highly coloured, involucral bracts; perianth separated to base into 2 parts, an adaxial sheath of 3 fused segments and a free abaxial segment **Protea**
3.' Capitulum surrounded by small, insignificant, involucral bracts; perianth segments fused below to form a distinct tube 3–8 mm long ..... **Vexatorella**

LEUCADENDRON CONE BUSH, TOLBOS 84 spp., N Cape to KwaZulu-Natal, mainly W Cape

brunioides Meisn. Dioecious, resprouting shrub, up to 2 m tall, with many slender stems. Leaves linear to oblong, ± 23 mm long; involucral leaves similar. Male flowerheads ± 17 mm diam., female ± 11 mm diam., yellow, foetid. Oct.–Nov. Sandy flats, NS, CCR (near Koiingnaas, Hondeklipbaai, Kotzesrus and Bokkeveld Mountains to Piketberg and Bonteberg to Swellendam). **(gce)**

LEUCOSPERMUM LUISIESBOS, PINCUSHION 48 spp., Zimbabwe to South Africa, mainly W Cape

praemorsum (Meisn.) E.Phillips Large shrub or tree, up to 5 m tall. Leaves petiolate, oblanceolate, with 3–5 apical teeth. Flowerheads subglobose, ± 70 mm diam., orange to red, style 50–60 mm long, pollen presenter narrowly ellipsoid, involucral bracts silky. Mainly July–Sept. In deep acid sands, NS, CCR (near Komaggas to Wallekraal to Cederberg Mountains). **(gce)**

rodolentum (Salisb. ex Knight) Rourke Erect or spreading shrub, up to 3 m tall. Leaves elliptic to cuneate, densely grey-velvety, with 3–6 apical teeth. Flowerheads globose, 30–35 mm diam., bright yellow, style 15–25 mm long, pollen presenter ellipsoid; involucral bracts ovate. Aug.–Nov. Sandy flats and lower slopes, NS, CCR (near Hondeklipbaai to Cape Peninsula). **(gce)**

PROTEA ± 115 spp., tropical and southern Africa, mainly W Cape

namaquana Rourke KAMIESBERG SUGARBUSH Erect, widely spreading shrub, 1–2 m tall, with a single trunk. Leaves curved upwards, oblanceolate to linear-spathulate, 30–60 × 4–10 mm, glabrous. Flowerheads pendulous, widely cup-shaped, involucral bracts pale green, broadly outlined with dull carmine, perianth with golden tawny hairs in upper half. June–Sept. Upper granite slopes, KB (Kamiesberg Mountains). **(ece)**

?SOROCEPHALUS 11 spp., ?Namaqualand, W Cape

[**Uncertain record S. lanatus** (Thunb.) R.Br. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

VEXATORELLA FALSE PINCUSHION 4 spp., Namaqualand to W Cape **(gce)**

alpina (Salisb. ex Knight) Rourke Dense, erect, widely spreading shrub, 2–3 m tall. Leaves obovate to elliptic, 30–45 × 5–13 mm. Flowerheads usually of 2–6-stalked headlets of 15–30 flowers, perianth densely hairy, cream-coloured with dark pink apex. Sept.–Dec. Upper granitic slopes, KB (Kamiesberg Mountains). **(ece)**

RANUNCULACEAE

by D.A. Snijman

RANUNCULUS BUTTERCUP, CROWFOOT ± 400 spp., cosmopolitan, mainly temperate

multifidus Forssk. BUTTERCUP Tufted, silky perennial, up to 0.9 m tall. Leaves in a basal rosette and along stem, pinnatisect or bipinnatisect, segments toothed. Flowers in simple or compound

cymes, yellow. Achenes warty, 1.5–2 mm long. Aug.–Mar. Damp places, SN, G, KB, WM, CCR (near Gariep Mouth, Kamiesberg and Bokkeveld Mountains to Cape Peninsula through Nuweveld Mountains to Arabia).

rionii Lagger WATER BUTTERCUP, WATER CROWFOOT Submerged, soft, branched, aquatic annual or occasionally perennial, up to ± 500 mm tall. Leaves finely dissected, segments filiform. Flowers emergent, solitary, opposite leaves, white, with yellow centre. Achenes wrinkled, ± 1 mm long. Sept.–May. In permanent or seasonal pools or streams, WM, CCR (SW Cape, Roggeveld to Great Karoo, almost worldwide).

RESEDACEAE

by D.A. Snijman from Leistner (1970)

OLIGOMERIS 3 spp., mainly N hemisphere

dipetala (Aiton) Turcz. BITTERAARBOSSIE Perennial or rarely annual, up to 700 mm tall, often rough. Leaves linear, (2–)4–14 (–35) × 0.3–1.5(–3) mm, often tufted. Flowers in long, slender, terminal spikes, small, whitish, stamens mostly 8–12. Fruit a ± spherical to oblong-ovoid capsule, 3–6 × 2–3.5 mm. Dec.–Mar. Alkaline and limestone flats, SN, G, CCR (Namibia and Botswana to Montagu to Uitenhage).

RHAMNACEAE

by D.A. Snijman, S. Haemmerli and N.A. Helme

1. Stipules absent ..... **Phylica**
1.' Stipules present:
2. Stipules not thorny; fruit a capsule ..... **Trichocephalus**
2.' Stipules thorny; fruit a drupe ..... **Ziziphus**

PHYLICA HARDEBOS, PHYLICA ± 150 spp., Africa, Madagascar, S Atlantic islands

A. Flowers in racemes or spikes

cryptandroides Sond. Slender-branched, closely leafy shrub, up to 3 m tall. Leaves needle-like, 10–15 mm long, rough, margins closely revolute. Flowers in dense racemes grouped in panicles, 1.5–2 mm long, white, sometimes pinkish. Mainly Sept.–Oct. Granite and sandstone slopes, KB, CCR (Kamiesberg and Bokkeveld Mountains to Piketberg). **(gce)**

oleaefolia Vent. BLINKHARDEBOS Rigid shrub, up to 2 m tall. Leaves lanceolate to ovate to broadly elliptic, 15–15 mm long, white-felted beneath, margins slightly revolute. Flowers in short, terminal racemes sometimes forming small panicles, ± 2.5 mm long, cream-coloured. Mar.–May. Rocky slopes, NH, KB, CCR (Nigramoep to Spektakelberg to Toringberg to Bokkeveld Mountains to Moorreesburg and Worcester). **(gce)**

pearsonii Pillans Rigid, branched shrub, ± 600 mm tall, covered with ± shaggy hairs. Leaves closely set, narrowly linear, 10–15 mm long, semi-terete, minutely scabrid above, margins closely revolute, nearly covering lower surface. Flowers in spikes, sessile, 5 mm long, covered with ± coarse grey hairs. Dec. Middle slopes on granite outcrops, NH, KB (near Kharkams and Kamiesberg Mountains). **(ece)**

A.' Flowers in heads

cephalantha Sond. Densely branched shrub, 400–900 mm tall. Leaves linear, 5–8 mm long, margins closely revolute. Flowers in solitary or panicled capitula, 1.7–2 mm long, brownish, stipitate,

bracts with silky buff hairs. Apr.–Sept. Sandy flats and lower slopes, NS, CCR (Sonnekwa area to near Kotzesrus to Olifants River Mouth and Cederberg Mountains to Cape Peninsula). **(gce)**

montana Sond. Branched shrub, ± 1.5 m tall, rigid below, often with virgate branches. Leaves linear to linear-lanceolate, 8–14 mm long, finely tubercled above, closely revolute covering lower surface, subcordate at base. Flowers in ± rounded heads, 3.5–5 mm long, shortly pedicellate, silky pubescent, whitish. Aug.–Oct. On rocky granite slopes, NH, KB (near Steinkopf, Spektakelberg and Kamiesberg Mountains). **(ece)**

retrorsa E.Mey. ex Sond. Dwarf, sprawling shrub, ± 500 mm tall, branches slender, clothed with short, dense, grey hairs. Leaves stubby, closely set, ovate, 1.5–2.5 mm long, cordate at base, tubercled above, margins revolute, ± covering lower surface, apex tufted with caducous white hairs. Flowers in small hemispheric heads, sessile, 2.7–3 mm long, covered with long caducous hairs. Aug.–Oct. N-facing granite slopes at high altitudes in fynbos, KB (Kamiesberg Mountains: Rooiberg and Eselkop). **(ece)**

stenopetala Schltr. Closely leafy shrub, up to 600 mm tall, branchlets grey-haired. Leaves linear-lanceolate, 3–7 mm long, cordate at base, margins revolute ± covering lower surface. Flowers in small, flattened, solitary capitula, 1.7–2.5 mm long, white. June. Stony flats and granite slopes, NH, CCR (Toringberg and Saldanha to Gouda). **(gce)**

[**Taxonomic note** **P. rigidifolia** Sond., with one record on the Kamiesberg by *Pearson 5919* (SAM), is possibly conspecific with **P. cryptandroides**.]

[**Uncertain record** **P. insignis** Pillans. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

TRICHOCEPHALUS DOGFACE, HONDEGESIG 1 sp., W Cape **(gce)**

stipularis (L.) Brongn. (= *Phylica stipularis* L.) Rounded shrublet, sometimes up to 900 mm tall, resprouting from persistent rootstock. Leaves with small, dry stipules, linear-lanceolate, 7–15 mm long, rough, margins closely revolute. Flowers in solitary, rounded capitula, pink, densely white-hairy on outside. May–Sept. Sandy flats and lower slopes, NS, CCR (near Kotzesrus and Cederberg Mountains to Knysna). **(gce)**

ZIZIPHUS ± 86 spp., mostly E Asia and East Indies, 6 spp. in southern Africa

mucronata Willd. BLINKBLAAR-WAG-'N-BIETJIE, BUFFALO THORN Thorny shrub or small tree, 1–2(–20) m tall. Leaves drooping, ovate, 3-nerved from base, glossy, dentate, stipules paired, usually thorny, one straight and one hooked. Flowers in compact axillary cymes, green. Fruit a round drupe, with reddish brown to dark red leathery skin. Oct.–Apr. Dry riverbeds and forests, SN, G (± throughout southern Africa to Ethiopia and Arabia).

ROSACEAE

by D.A. Snijman

1. Shrubs or trees, up to 1 m or more tall, with ± ericoid leaves ..... **Cliffortia**
1.' Low perennial herbs or subshrubs, up to 300 mm tall, with ± soft leaves:
2. Flowers with distinct petals ..... **Potentilla**
2.' Flowers apetalous ..... **Acaena**

ACAENA ± 100 spp., mainly S temperate, also Hawaii, California and South Africa

latebrosa Aiton Silky, tufted perennial with woody base, stems up to 300 mm tall. Leaves pinnate, leaflets oblong, toothed. Flowers on elongated spikes, green. Fruit woolly and barbed. Aug.–Oct. Granite and clay slopes above 1 000 m, KB, WM, CCR (Kamiesberg Mountains and Roggeveld Escarpment to Swartberg Mountains). **(gce)**

CLIFFORTIA CLIMBER'S FRIEND ± 120 spp., N Cape to tropical Africa

A. Leaves unifoliolate

ruscifolia L. STEEKBOS Monoecious or dioecious shrub, up to 1.5 m tall. Leaves simple, pungent, vegetative leaves oblong-lanceolate, channelled, sparsely hairy, 10–12 mm long, fertile leaves shorter, tridentate, densely hairy. Male flowers: pedicel 1–2 mm long, stamens ± 12; female flowers: receptacle 3–4 mm long, ovoid, brownish, sulcate. Aug.–Oct. Rocky sandstone soils, G, NH, KB, CCR (Ploegberg to Kamiesberg and Bokkeveld Mountains to Humansdorp). **(gce)**

A.' Leaves trifoliolate

acockii Weim. Monoecious or dioecious shrublet, up to 250 mm tall. Leaves trifoliolate, leaflets needle-shaped, 3–4 mm long, apex with distinctive red awn. Male flowers: unknown; female flowers: receptacle ovoid-oblong, 3.5 mm long, sulcate, dull rusty red, style 1 mm long. June–Nov. Granite hills, NH, CCR (Namaqualand: Toringberg and Paarl). **(gce)**

amplexistipula Schltr. Monoecious or dioecious, glabrous shrublet, 0.15–1.5 m tall. Leaves trifoliolate, leaflets thick, subterete, young spathulate, older elliptic, scabrid, 2–3 mm long. Male flowers: stamens 6; female flowers: receptacle narrowly oblong, slightly curved, 7(8)-ribbed with 2 ribs flattened and extended around base forming a continuous wing. July–Apr. Dry rocky sandstone or granite slopes, KB, CCR (Kamiesberg and Bokkeveld Mountains to Anysberg). **(gce)**

arborea Marloth STERBOOM Shrub or rarely a tree, 3–5(–10) m tall, resprouting from roots, with stringy bark on old stems and shortly hairy and aromatic bark on young stems. Leaves trifoliolate, leaflets narrowly lanceolate, 15–25 mm long, densely hairy, margins strongly revolute, tip pungent. Male flowers: stamens 6; female flowers: receptacle 3-angled in cross section, 3 mm long, ribbed. Nov. S-facing rocky slopes, WM (Hantamsberg, Roggeveld Escarpment to Nuweveld Mountains). **(ece)**

hantamensis Diels Closely leafy, densely branched, hairy, monoecious or dioecious shrub, up to 1 m tall. Leaves trifoliolate, leaflets flat, oblong-ovate, obtuse, densely long-hairy, 2–3 × 1–2 mm. Male flowers: sepals 4, ± 3 mm long, connate in lower half, apices acute recurved and hairy, stamens 8; female flowers: sepals as for male but smaller, styles 2. Sept.–Oct. High sandstone slopes, WM, CCR (Hantamsberg, Roggeveld Escarpment and Cederberg Mountains to Waboomsberg). **(gce)**

ramosissima Schltr. Much-branched, monoecious or dioecious shrub, up to 3 m tall. Leaves trifoliolate, leaflets nearly flat, midvein raised abaxially, 4–6 × 0.5–1 mm. Male flowers: stamens 6; female flowers: receptacle ± 3 mm long, ribbed, green with a lilac tinge, walls membranous and semi-transparent. Apr.–May. Flats and slopes, WM, CCR (Roggeveld to Bredasdorp and Swartberg Mountains to Mpumalanga).

teretifolia L.f. Monoecious or dioecious shrub, up to 1 m tall. Leaves trifoliolate, leaflets terete, mucronate, 4–8 mm long. Male flowers: sepals with long dorsal spine; female flowers: receptacle ± 3 mm long, 3- or 4-winged. Mainly Sept.–Dec. Mountain slopes, NS, NH, KB, CCR (Spektakelberg to Piketberg, Witteberg Mountains and Anysberg). **(gce)**

POTENTILLA ± 500 spp., mainly N temperate

supina L. SPREADING CINQUEFOIL Spreading annual or biennial herb, branches up to 200 mm long. Leaves 3-foliolate or pinnate with 2–5 pairs of leaflets, pilose or glabrescent, margin obtusely serrate. Flowers in a terminal cyme and axillary in lower parts of stem, petals shorter than sepals, yellow, notched. Achenes wrinkled, apex acute. Oct. Wet, often saline places on slopes and flats, SN (possibly naturalised in southern Namibia to KwaZulu-Natal, native to central Europe and W Asia).

RUBIACEAE

by D.A. Snijman

1. Ovules many per locule ..... **Kohautia**
1.' Ovule 1 per locule:

2. Style well-developed, branches ending in a capitate stigma:
3. Diffusely branched, weak herbs with 4-angled branches . . . . . **Galium**
3.' Foetid shrublets or shrubs . . . . . **Gailloma**
2.' Style ± 0; stigmas filiform, feathery:
4. Dioecious dwarf shrubs with ericoid leaves; cymes 1-flowered; stigmas usually purple . . . . . **Nenax**
4.' Polygamous shrubs or perennials with ericoid or oblong leaves; cymes few- to many-flowered; stigmas mostly white or greenish . . . . . **Anthospermum**

ANTHOSPERMUM 39 spp., Africa and Madagascar, mostly southern Africa

dregei Sond. Dwarf, non-dioecious shrub, up to 0.4 m tall. Leaves 4-ranked, in clusters, ovate to oblong-lanceolate, tough and thickish, mostly papillate on one or both surfaces, ± discolorous. Flowers in axillary clusters, ± sessile, yellowish to reddish purple. Aug.–Oct. Among rocks on granite or sandstone slopes, SN, G, NH, KB, KV, CCR (Keetmanshoop District, Aus through Namaqualand to Tulbagh).

rigidum Eckl. & Zeyh. Suberect, non-dioecious, dwarf shrub, ± 0.2–0.4 m tall. Leaves 4-ranked, in clusters, narrowly ovate to linear-lanceolate, ± rough and thickish, midrib often reddish brown beneath. Flowers in axillary clusters, ± sessile, but sometimes pedicellate in fruit, greenish to yellowish. Sept.–Nov. On rock outcrops, WM (northern Namibia to Hantamsberg through to Zimbabwe).

spathulatum Spreng. Suberect, dioecious shrub or dwarf shrub, ± 0.3–1.5(–2) m tall. Leaves 4-ranked, in clusters, obovate to lanceolate to linear-lanceolate, glabrous, shiny above. Flowers in axillary clusters, ± sessile, but sometimes pedicellate in fruit, yellow to greenish or whitish yellow. June–Feb. Sandy flats and rocky slopes and ridges, NS, NH, KB, KV, WM, CCR (Bushmanland and Kamieskroon to SW and E Cape).

GAILLONIA 9 spp., NE Africa and Arabia and SW Africa

crocyllis (Sond.) Thulin Suberect, many stemmed, intricately branched, foetid shrub, ± 0.6–1.5 m tall, with whitish grey stems, often ± cushion-like with spine-tipped branches. Leaves 4-ranked, tightly clustered on older parts, ± terete, fleshy. Flowers shortly pedicellate, in terminal clusters on new growth, whitish, ovary densely hairy. Aug.–Oct. Sandy or gravel flats or on rocky slopes, SN, G (southern Namibia and along lower Gariep Valley into Bushmanland).

GALIUM GOOSE-GRASS 621 spp., cosmopolitan

capense Thunb. TINY TOTS Scrambling, glabrescent perennial, up to 0.9 m tall. Leaves in whorls of 6–10, linear-ericoid with margins revolute. Flowers many in axillary cymes, anthers exserted, yellowish. Sept.–Dec. Rocky, damp places, WM, TS, CCR (most of South Africa).

spurium L. CLEAVERS, GOOSE-GRASS Straggling annual, up to ± 2 m long, with recurved prickles on angles of stem. Leaves in whorls of 6–8, linear-lanceolate to obovate, midvein and margin prickly. Flowers 1–4 in leaf axils, anthers subsessile, ovary prickly, greenish to whitish. Sept.–Dec. Among boulders, forest margins and stream banks, WM, CCR (Bokkeveld Plateau to tropical Africa).

tomentosum Thunb. KLEEFGRAS, ROOISTORM Dioecious, scrambling perennial, up to 3 m tall, with recurved prickles on angles of stem. Leaves in whorls of 6–8, obovate to ± lanceolate, midrib and margins prickly. Flowers many in axillary cymes, peduncles woolly, anthers subsessile, yellowish. Sept.–Nov. In shrubs or between boulders, G, NS, NH, KB, WM, TS, CCR (southern Namibia to E Cape and Free State).

KOHAUTIA 31 spp., Africa, Socotra, Arabian Peninsula, Iran, Pakistan, India, Cape Verde Islands, Madagascar

caespitosa Schinzl. Suberect, annual or perennial herb, up to 0.8 m tall. Leaves sessile, opposite, mostly narrowly linear-lanceolate to lanceolate elliptic, rarely linear. Flowers in terminal panicle-like inflorescences, usually 2 per node, white, cream or yellowish, darker beneath, scented. Capsule subglobose, with coarse rounded or flattened triangular, white papillae or hairs. Aug.–May. Mostly in sandy soils, SN, TS (widespread in Africa to Sinai and Arabian Peninsula).

cynanchica DC. Annual or perennial, occasionally an erect or dwarf shrub, 0.06–1 m tall. Leaves sessile, opposite, half to slightly longer than internodes. Flowers in terminal panicle-like inflorescences, 1 or 2 at a node, one subsessile and other pseudopedicellate, white- to cream-coloured and brownish or dirty cream beneath, scented. Capsule ± hemispherical-obconic, glabrous or slightly scabrid. Sept.–May. Near ephemeral watercourses, SN, NH (SW Angola, Namibia, Botswana, Mozambique, South Africa).

ramosissima Bremek. Annual or perennial herbs or occasionally small, dwarf shrubs, 0.2–0.6 m tall. Leaves sessile, opposite, much shorter than internodes, filiform to narrowly linear, falling off early. Flowers in spreading inflorescences, 1 or 2 at a node, both distinctly pedicellate. Capsule ± hemispherical-obconic, glabrous. Aug.–Sept. Sandy areas near ephemeral watercourses, SN, G (Botswana, southern Namibia and lower Gariep Valley).

NENAX 11 spp., southern Africa, mostly W Cape

arenicola Puff Dioecious, intricately branched, dwarf shrub, 0.2–0.75(–1) m tall. Leaves 4-ranked, sometimes ± whorled, linear, glabrous or margin papillate. Flowers 1 or 2 in leaf axils, yellowish, sometimes tinged purple. Fruit indehiscent, glabrous, 5–8 × 2–3.5 mm. July–Aug. Coastal sands and on stony foothills, NS, CCR (near Hondeklipbaai to Graafwater). **(gce)**

cinerea (Thunb.) Puff Dioecious, rigid, intricately branched shrub, 0.1–1 m tall, often cushion-like with branches spine-tipped. Leaves 4-ranked, ovate- or linear-lanceolate, densely covered with shortish, curly, whitish hairs or papillae. Flowers 1(2) or rarely clustered in leaf axils, yellowish to greenish, occasionally tinged reddish, usually densely papillate. Fruit inflated, ± heart-shaped. Aug.–Sept. Edges of rock sheets or in crevices and along ephemeral watercourses, SN, NH, WM, TS (Klein Karas Mountains to near Leeu-Gamka).

namaquensis Puff Dioecious, intricately branched dwarf shrub, 0.15–0.6 m tall, often cushion-forming with spine-tipped branches. Leaves 4-ranked, often slightly curved, narrowly ovate- to linear-lanceolate, glabrous, margin papillate. Flowers 1(2) in leaf axils, yellowish, tinged reddish. Fruit small, not inflated, 2.1–2.6 × 1–1.4 mm. Aug.–Oct. Sandy to gravelly soils among rocks, NH, KB, WM (Spektakelberg to Roggeveld Escarpment). **(ece)**

sp. A Much-branched, dwarf shrub, with greyish stems. Leaves 4-ranked, widely spaced. Ovate- to linear-lanceolate. Flowers unknown. Fruit indehiscent, ± soft, ± 3.5–4.5 wide, shortly hairy. ?Flowering time. ?Habitat, TS (Laingsburg District). **(ece)**

RUTACEAE

by T.H. Trinder-Smith

1. Flowers in terminal and/or axillary clusters; staminodes present; style ± as long as petals, longer than claw; fruit 1–5-chambered. . . . . **Agathosma**
1.' Flowers solitary or few; staminodes absent or winged; style much shorter than petals; fruit 5-chambered:
   2. Petals minutely pubescent or glabrous in the throat . . . . . **Diosma**
   2.' Petals transversely bearded in the throat . . . . . **Euchaetis**

AGATHOSMA BOEGOE, BUCHU ± 150 spp., South Africa, mostly W Cape

capensis (L.) Dummer BOEGOE Resprouting shrub, up to 0.9 m tall, sweetly spice-scented. Leaves alternate, ovate, with translucent gland dots. Flowers in lax terminal clusters, white, pink or purple. Fruit 3-chambered. Aug.–Oct. Slopes and flats on shale, granite or coastal sands, less often on acid sand, NS, CCR (near Hondeklipbaai to SW Cape to Port Elizabeth). **(gce)**

namaquensis Pillans Shrub or dwarf shrub, up to 1.3 m tall, ± pine-scented. Leaves opposite, ovate or elliptic, ± as long as internodes, with dark gland dots beneath. Flowers 1–4 in axils of leaves, white or pink. Fruit 5-chambered. Sept.–Dec. Sandy and rocky slopes on granite, NH, KB (Springbok to Kamiesberg Mountains). **(ece)**

sp. A (= *Agathosma nickhelmei* Trinder-Smith *ms*) Dense, cushion-like shrub, up to 0.5 m tall, with old branches grey, younger branchlets white. Leaves minute, elliptical, petiole short. Flowers in lax, terminal clusters on main branchlets and short shoots, 4–12-flowered, petals purple-

mauve in bud, fading pale lilac-pink to almost whitish. Mainly Sept.–Oct. Stony soil on dolerite outcrops, WM (Great Escarpment near Sutherland). **(ece)**

DIOSMA FALSE BUCHU 28 spp., Namaqualand to E Cape **(gce)**

acmaeophylla Eckl. & Zeyh. Finely leafy, single-stemmed, aromatic shrub, up to 2.5 m tall. Leaves sessile, linear-subterete, ± curved, with a recurved mucro. Flowers terminal, solitary on loosely clustered, short branchlets, white, petals minutely pubescent, sepals oval. Mainly Aug.–Oct. Rocky granite or sandstone slopes, NH, KB, CCR (Springbok to Kamiesberg and Bokkeveld Mountains to Witteberg Mountains). **(gce)**

ramosissima Bartl. & H.L.Wendl. Finely leafy, aromatic shrub, up to 1.5 m tall, many-branched from base. Leaves sessile, linear-subterete, straight, obtuse or with an apical callus. Flowers terminal, solitary or paired on loosely clustered, short branchlets, white, petals minutely pubescent outside, sepals triangular. Mainly Aug.–Nov. Sandy and rocky places, NS, NH, CCR (Spektakelberg to near Hondeklipbaai and Cederberg Mountains to Worcester). **(gce)**

EUCHAETIS 23 spp., W Cape and E Cape **(gce)**

pungens (Bartl. & H.L.Wendl.) I.Williams Rigid, single-stemmed, well-branched shrub, up to 1.2 m tall, leafy near branch tips. Leaves opposite, in 4 rows, ovate, sessile, with recurved tips. Flowers terminal, solitary or paired, white, petals with well-developed, transverse hairs across throat, sepals white, green-tipped, margins ciliate. June–Aug. Sandy places, NS, CCR (NW of Olifants River Mouth and Breede River Valley). **(gce)**

SALICACEAE (= *FLACOURTIACEAE* in part)

by D.A.Snijman

SALIX WILLOW ± 400 spp., mainly N hemisphere

mucronata Thunb. CAPE WILLOW Monoecious shrub or small tree, up to 12 m tall, with rough, scaly bark, branches sometimes drooping. Leaves lanceolate, silvery hairy, finely toothed, paler beneath. Flowers in spikes on axillary shoots; seeds woolly. Sept.–Oct. Along rivers and streams, SN, G, NH, KB, WM, CCR (throughout southern Africa).

SANTALACEAE (= *VISCACEAE*)

by D.A. Snijman

1. Aerial parasites; flowers unisexual, monoecious ..... **Viscum**
1.' Rooted plants:
2. Flowers unisexual; tepals and stamens 4 ..... **Thesidium**
2.' Flowers bisexual; tepals and stamens 5 ..... **Thesium**

THESIDIUM 4 or 5 spp., Namaqualand, W and E Cape

fragile (Thunb.) Sond. (including **T. microcarpum** (A.DC.) A.DC. & **T. podocarpum** (A.DC.) A.DC.) Dioecious, brittle, hemiparasitic shrublet, up to 500 mm tall, often yellowish. Leaves and bracts adpressed, scale-like, shorter than flowers, lower leaves occasionally longer and spreading. Flowers in spikes, greenish. Fruits whitish with orange calyx. Year-round. Sandy flats and slopes, NH, CCR (uplands near Komaggas, Saldanha Bay, Little Karoo and through to E Cape).

fruticulosum A.W.Hill (including **T. minus** A.W.Hill) Dioecious, sexually dimorphic, hemiparasitic shrublet, up to 400 mm tall. Leaves and bracts very much larger in female, spreading or ascending, lanceolate, keeled, longer than flowers. Flowers in spikes, greenish. Fruits greenish.

Year-round. Sandstone and limestone flats and slopes, NS, CCR (SW of Komaggas: Kapvlei, Cape Peninsula to Humansdorp).

THESIUM > 300 spp., Old World

A. Tepals with an apical beard of stiff or woolly hairs, margins ± hairy

aggregatum A.W.Hill Nearly leafless, hemiparasitic shrublet, up to 500 mm tall. Leaves minute, terete, ascending. Flowers arranged in oblong heads, whitish, with margins of bracts toothed; perianth with a ring of short, down-turned hairs in tube. Aug.–Jan. Sandstone flats and slopes, KV, CCR (near Klawer to Cape Peninsula and through to Humansdorp). **(gce)**

elatius Sond. Erect to sprawling, succulent, hemiparasitic shrublet, up to 500 mm tall. Leaves boat-shaped, abruptly narrowed to a mucronate, ± down-turned tip, grey-green when young. Flowers arranged in subcapitate spikes, greenish, with conspicuous, white-fringed margins; perianth with a ring of short hairs in tube. Aug.–Oct.(Nov.). Sandy slopes and coastal flats, NS, KV, CCR (near Port Nolloth to Olifants River Mouth, Klawer and Bokkeveld Plateau). **(gce)**

hillianum Compton Woody, branched, glabrous, hemiparasitic shrub, ?height. Leaves spreading, linear-lanceolate, falcate. Flowers in lax racemes, tepals ovate-oblong, with a pencil of hairs behind each anther, anthers free from perianth at apex. Sept. ?Habitat, TS (Matjiesfontein near Laingsburg). **(ece)**

polycephalum Schltr. Woody, much-branched, hemiparasitic shrub, up to 0.75 m tall. Leaves linear, channelled, few and distant. Flowers in small, capitate clusters at ends of branches, whitish; anthers attached to perianth by a tuft of hairs at apex. Aug.–Sept. Flats or moderate slopes, in sandy loam, NH (Spektakelberg to near Kamieskroon to near Bitterfontein). **(ece)**

pubescens A.DC. Sprawling, densely leafy, hemiparasitic shrublet, up to 300 mm tall, with reflexed hairs on branchlets. Leaves linear, keeled beneath, triangular in section, shortly pubescent on margins or throughout. Flowers in small, crowded, leafy clusters, whitish; anthers attached to perianth by a tuft of hairs at apex. Aug.–Nov. Sandstone slopes, NS, NH, CCR (Grootvlei, SW of Kamieskroon to near Kotzesrus, Olifants River Mountains and SW Cape). **(gce)**

scabrum L. Densely leafy, hemiparasitic shrub, up to 1 m tall. Leaves linear, triquetrous, margins scabrid-serrulate. Flowers in dense globose heads, whitish; anthers attached to perianth by a tuft of hairs at apex. June–Jan. Sandstone slopes, WM, CCR (Roggeveld, Hex River Mountains to Cape Peninsula and Agulhas). **(gce)**

urceolatum A.W.Hill Woody, erect or sprawling, hemiparasitic shrublet, up to 200 mm tall. Leaves leathery, thick, oblong, channelled above, keeled beneath, greyish, tips mucronate. Flowers in crowded spikes becoming lax later, whitish; perianth with a ring of short, down-turned hairs in tube. July–Sept. Sandy, stony loam on elevated plateaux, NH, CCR (near Garies to Bokkeveld Mountains). **(gce)**

sp. A (like **T. imbricatum** Thunb. from E Cape Mountains) Much-branched, conifer-like shrub, with stout, woody stems, up to 0.5 m tall. Leaves dense, ± overlapping, rigid, keeled, with shortly ciliate margins. Flowers few, in terminal heads, whitish. Sept. Well-drained, loamy soil on slopes or flats, WM (Roggeveld Escarpment near Uitkyk). **(ece)**

sp. B Woody, erect, loosely leafy, hemiparasitic shrub, up to 300 mm tall, with grooved stems. Leaves well developed, linear, persistent on branches below inflorescences. Flowers in elongated, simple racemes, whitish; beard at apex of tepals of long, sometimes branched hairs; anthers attached to perianth by a tuft of hairs at apex. Sept. Amongst dolerite koppies, WM (Nieuwoudtville). **(ece)**

A.' Tepals glabrous or fringed with minute to long papillae but without an apical beard
B. Tepals with a marginal fringe of long papillae

archeri Compton Sprawling, glaucous, leafless shrub, up to 0.6 m tall, with stout, rigid, outspread, spine-tipped branches. Flowers in short, compact, dense racemes, tepals fringed with a few, long papillae, whitish. Sept.–Oct. Shaly, rocky soil on elevated flat ground, TS (near Laingsburg and Matjiesfontein). **(ece)**

horridum Pilg. Low, spreading, hemiparasitic shrublet, up to 150 mm tall, with stiff, spine-tipped branches covered with leaves pressed to stem. Leaves ± imbricate with acute tips. Flowers in

axillary cymules, tepals fringed with long papillae, whitish. Sept. Elevated, shaly plateaux, WM (Hantamsberg, Roggeveld Escarpment near Sutherland to Klein Roggeveld). **(ece)**

B.' Tepals glabrous or with a marginal fringe of minute papillae
C. Flowers in cymules variously arranged in loose heads or panicles

dissitiflorum Schltr. Sprawling, twiggy, hemiparasitic shrublet, up to 1 m tall, branchlets spine-tipped. Leaves sparse, linear-terete. Flowers in axillary cymules, arranged in head-like clusters, whitish, bracts dropping early. Sept.–Jan. Sandstone slopes, WM, CCR (Bokkeveld Mountains and Roggeveld Escarpment to Cold Bokkeveld). **(gce)**

nudicaule A.W.Hill Nearly leafless, divaricately branched, hemiparasitic shrublet, up to 1 m tall. Leaves scale-like, ovate-triangular, margins fimbriate-ciliate. Flowers in small, terminal clusters, whitish, with conspicuous external glands, margins of tepals finely ciliate. Sept.–Nov. Sandy slopes and coastal flats, NS, CCR (near Hondeklipbaai to Olifants River Valley and Hopefield). **(gce)**

strictum P.J.Bergius (including **T. occidentale** A.W.Hill) TERINGBOS Sparsely leafy, broom-like shrub, up to 2 m tall. Leaves lanceolate to needle-like, adpressed. Flowers crowded in dense, terminal corymbs, whitish. Sept.–Feb. Granite and sandstone slopes, G, NS, NH, KB, CCR (Stinkfontein Mountains to SW Cape to Grahamstown).

C.' Flowers solitary in bract axil and arranged in simple racemes or spikes

lineatum L.f. Rigid, nearly leafless, hemiparasitic shrub, up to 2 m tall, with grooved, rigid, ± upright, spine-tipped stems. Leaves linear, soon deciduous. Flowers mostly solitary in bract axil, arranged in simple, short racemes on spinescent branchlets, whitish, bracteoles similar to bracts and as long as or longer than flowers. Aug.–Feb. Dry stony slopes and flats, G, NH, KB, KV, WM, TS, CCR (Namibia through Namaqualand and Karoo to Cederberg Mountains and Swartberg Mountains).

namaquense Schltr. Somewhat woody, non-spiny, hemiparasitic shrublet, up to 2 m tall, with slender branches. Leaves linear, ± fleshy. Flowers mostly solitary in bract axil, arranged in simple racemes, whitish, bracteoles much shorter than bracts and flowers. Aug. On slopes in loamy sand, G, NH (Richtersveld Mountains to near Nuwerus). **(ece)**

pungens A.W.Hill Spiny, much-branched, rigid, hemiparasitic shrub, up to 0.6 m tall, greyish green. Leaves spreading horizontally, subterete, pungent with spiny tips, not decurrent on stem. Flowers solitary in bract axil, arranged in simple racemes, whitish. July–Sept. Weathered granite slopes G, NH, KB (Richtersveld Mountains to Kamiesberg Mountains and S to near Bitterfontein). **(ece)**

spinosum L.f. Spiny, densely branched, rigid, hemiparasitic shrub, up to 1 m tall, often grey-glaucous. Leaves spreading horizontally, triangular-terete, spine-tipped, decurrent on stem. Flowers mostly solitary in bract axil, arranged in simple racemes, whitish. Aug.–Jan. Coastal plain, NS, CCR (Hondeklipbaai to Yzerfontein). **(gce)**

spinulosum A.DC. Slender, hemiparasitic shrublet, up to 150 mm tall, upper branches ± herbaceous, angular and spine-tipped. Leaves needle-like, uppermost spine-tipped. Flowers mostly solitary in bract axil, arranged in flexuose racemes, whitish. Oct.–Feb. Sandy slopes, KB, CCR (Kamiesberg Mountains, more commonly from Cederberg Mountains to Caledon). **(gce)**

whitehillense Compton Sprawling, sparsely leafy, non-spiny, hemiparasitic shrublet, up to 200 mm tall. Leaves linear, adpressed and decurrent on stem, mucronate. Flowers arranged in dense, simple racemes, whitish. Aug.–Sept. Stony shale slopes and flats, WM, TS, CCR (Nieuwoudtville and Matjiesfontein). **(gce)**

[**Species excluded T. marlothii** Schltr., no description is known, but specimens in South African herbaria with this name belong to **T. archeri** Compton.]

[**Uncertain record T. juncifolium** DC. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

VISCUM LIDJIESTEE, MISTLETOE, VOËLENT ± 65 spp., Old World tropical and temperate regions

capense L.f. Dioecious, stem parasite, up to 0.5 m tall, internodes of distal branches (6–)8–12(–15) × 2–3 mm. Leaves scale-like. Inflorescence unisexual. Berry sessile, smooth, white and wa-

tery. July–Oct. Parasitic on various shrubs including *Chrysanthemoides, Euclea, Maytenus* and *Pterocelastrus*, G, NS, NH, WM, TS, CCR (central Namibia through Namaqualand to Caledon with outliers in Mpumalanga and Limpopo Province).

continuum E.Mey. ex Sprague Dioecious, stem parasite, up to 1 m tall, leafless, internodes of distal branches (10–)15–25 × 1(–2) mm, younger shoots half as wide as older stems. Inflorescence unisexual. Berry smooth, pale yellow, on a stout pedicel. July–Aug. Parasitic on *Acacia* only, TS, CCR (Worcester to E Cape).

dielsianum Dinter ex Neusser Dioecious, stem parasite, ± 0.5 m tall, internodes of distal branches (15–)20–30(–35) × 1–2 mm. Leaves scale-like. Inflorescence unisexual. Berry sessile, rotund, 4 mm long, smooth, white. Parasitic on species of *Boscia*, *Euclea* and possibly *Acacia*, SN, G (Tiras Mountains to Richtersveld).

hoolei (Wiens) Polhill & Wiens Like **V. capense** but monoecious, distal internodes 10–15 mm long and tapering apically to 1 mm wide, male flowers with united anthers. June–July. Parasitic, mainly on *Searsia*, TS, CCR (Caledon to Lesotho).

rotundifolium L.f. Leafy, monoecious, stem parasite, < 0.5 m tall, internodes of distal branches 12–20 × 1–1.5 mm, 6-ribbed. Leaves ovate to ± circular to elliptic-oblong. Inflorescence of both male and female flowers. Berry 4–5 mm long, smooth, orange, shortly pedicillate. Feb.–May. Parasitic on various trees including *Acacia*, *Euclea*, *Olea* and *Searsia*, SN, G, TS, CCR (through Namibia to SW Cape to Zimbabwe).

schaeferi Engl. & K.Krause Like **V. rotundifolium** but smaller (< 0.2 m tall) and more robust (distal internodes 8–12 × 1–2 mm), with much-branched habit, and small pale yellow berry (3 mm long). Parasitic, often on species of *Boscia*, G (through Namibia to Richtersveld to Gordonia to NW Province).

SAPINDACEAE

by D.A. Sijman

1. Leaves compound with 5–12 pairs of leaflets ..... **Erythrophysa**
1.' Leaves simple:
2. Petals (4)5(6); ovary 2- or 3-locular, with a single ovule in each locule; fruit globose. ..... **Pappea**
2.' Petals 0; ovary 2–6-locular, with 2 axile ovules in each locule; fruit angled or winged; young leaves sticky ..... **Dodonaea**

DODONAEA ± 60 spp., widespread, mostly Australia

viscosa Jacq. SAND OLIVE, SANDOLIEN Dioecious or bisexual, small tree, up to 3–5(–10) m tall. Leaves linear-oblanceolate, resinous, pale green. Flowers in small, rounded axillary and terminal panicles, greenish yellow. Fruit winged. July–Oct. Riverine thicket and rocky outcrops, G, NH, KB, KV, WM, TS, CCR (Cornellsberg, Namaqualand to Roggeveld and SW Cape to Little Karoo to tropical Africa).

ERYTHROPHYSA 5 spp., Africa and Madagascar

alata (Eckl. & Zeyh.) Hutch. NAMAKWA-ROOIKLAPPERBOS, NAMAQUA RED BALLOON Dioecious, rigid, small tree, 3–4 m tall. Leaves with 4 pairs of opposite leaflets plus a terminal one, obovate, rachis conspicuously winged. Flowers in racemose corymbs, small, showy, red. Fruit inflated, 3-lobed, red. Mar.–June. On rocky hillsides, NH (Naukluft Mountains and Spektakelberg to lower slopes of Kamiesberg Mountains).

PAPPEA 1 sp., Africa

capensis Eckl. & Zeyh. DOPPRUIM, JACKET-PLUM Dioecious or bisexual, small to medium-sized tree, 3–7(–13) m tall, with a dense crown, velvety on young parts. Leaves crowded at branch tips, oblong, minutely toothed to entire. Flowers in axillary racemes, yellowish. Fruit globose, velvety. Nov.–Mar. Rocky slopes and open woodland, NH, CCR (southeastern Namibia to northeastern Namaqualand and Little Karoo to E tropical Africa).

SCROPHULARIACEAE (= *BUDDLEJACEAE*)

by D.A. Snijman, **Diascia, Hemimeris** and **Nemesia** by K.E. Steiner

1. Flowers actinomorphic and tetramerous with 4 sepals and 4 petals:
2. Inflorescence a paniculate cyme; shrubs or trees with discolorous leaves . . . . . **Buddleja**
2.' Inflorescence a terminal raceme; suffrutex; leaves not discolorous . . . . . **Gomphostigma**
1.' Flowers pentamerous, ± zygomorphic:
3. Ovary with 1 apical, pendulous ovule in each fertile locule:
4. Calyx 1- or 2-lobed; corolla split down front for ± half length of tube, lacking lower lip and expanded above into 4-lobed upper lip; stamens 4:
5. Calyx spathe-like, subhyaline, adnate to supporting bract. . . . . **Hebenstretia**
5.' Calyx 2-lobed, free from supporting bract . . . . . **Dischisma**
4.' Calyx 3–5-lobed; corolla usually with a lower lip, but if not, then stamens 2:
6. Ovary with one locule aborted or barren:
7. Calyx adnate to subtending bract. . . . . **Microdon**
7.' Calyx free from subtending bract. . . . . **Globulariopsis, Gosela** (cce)
6.' Ovary bilocular with both locules fertile (rarely one aborting):
8. Leaves alternate, usually in axillary fascicles on short shoots; upper lip glabrous; perennial herbs or shrublets . . . . . **Selago**
8.' Leaves opposite, at least below, never on short shoots; upper lip bearded with one-celled hairs near base; annual or perennial herbs . . . . . **Cromidon**
3.' Ovary with 4–many ovules in each locule:
9. Leaves alternate (rarely opposite); corolla without basal inflation or spur; flowers blue or purple:
10. Fertile stamens 2; erect herbs . . . . . **Anticharis**
10.' Fertile stamens 4 (posterior 2 may be smaller than others or rarely empty); low undershrubs or subherbaceous plants:
11. Anthers all perfect; capsule ovoid-conical . . . . . **Peliostomum**
11.' Anthers of posterior pair of stamens smaller than others, often empty; capsule short, obcordate . . . . . **Aptosimum**
9.' Leaves opposite, at least near base; flowers variously coloured:
12. Corolla tube pocketed, sacculate or spurred:
13. Corolla often personate, with 1 pocket or spur at base:
14. Capsule septicidal; plants never creeping; flowers various colours. . . . . **Nemesia**
14.' Capsule loculicidal; plants creeping with suborbicular leaves; flowers white to mauve **Diclis**
13.' Corolla funnel-shaped, with 2 pockets:
15. Corolla tube longer than lobes; softly pilose, lithophytic shrublet; seeds arillate . . . . . **Colpias**
15.' Corolla tube shorter than lobes; glabrous to glandular-villous or hirsute annual or perennial herbs or shrublets:
16. Stamens 2; flowers yellow; capsule mostly loculicidal . . . . . **Hemimeris**
16.' Stamens 4; flowers usually pink to orange; capsule septicidal:
17. Corolla split to base between 2 smaller lobes; pedicels resupinate, largest corolla lobe uppermost . . . . . **Alonsoa**
17.' Corolla not split; pedicels not resupinate, largest corolla lobe lowermost. . . . . **Diascia**
12.' Corolla tube without pockets or spurs:
18. Fruit fleshy:
19. Ovules usually 4 in each locule; flowers solitary, white . . . . . **Oftia**
19.' Ovules many in each locule; flowers in cymes or subfasciculate, blue . . . . . **Teedia**
18.' Fruit capsular:
20. Anther thecae parallel; corolla tube funnel-shaped or subcylindrical, lobes ovate or oblong . . . . . **Freylinia**
20.' Anther thecae confluent:
21. Marsh or aquatic herbs. . . . . **Limosella**
21.' Mainly dryland herbs, undershrubs or shrubs:
22. Stigma very short, stigmatic surface ± terminal:
23. Leaves opposite and decurrent to form ridges or narrow wings down stem; seeds black . . . . . **Lyperia**
23.' Leaves alternate or at least on upper part of stem or if opposite then not decurrent; seeds brown or reddish to greyish brown:
24. Corolla tube funnel-shaped; large staminode (a filament lacking an anther) near base of tube on posticous side. . . . . **Antherothamnus**
24.' Corolla tube cylindrical, abruptly dilated above; staminodes absent . . . **Jamesbrittenia**
22.' Stigma tongue-like, stigmatic surface comprising 2 marginal bands:
25. Posticous filaments not decurrent down corolla tube:

26. Posticous stamens included, inserted halfway up corolla tube or higher, anticous stamens either included or anthers just visible in mouth ..... **Manulea**
26.' One or both pairs of stamens exserted at anthesis:
27. Flowers solitary in leaf axils; corolla lobes glabrous on upper surface **Chaenostoma**
27.' At least some cymules present in every inflorescence; mouth of corolla hairy **Sutera**
25.' Posticous filaments decurrent down corolla tube, often to base:
28. Bract adnate to pedicel and at most base of calyx tube; corolla with an orange/yellow patch at base of anticous lip; seeds pallid, greenish or amber, sinuously wrinkled ..... **Trieenea**
28.' Bract adnate at least halfway up calyx tube (rarely less):
29. Calyx distinctly bilabiate, anticous lip ± 2-toothed, posticous lip 3-toothed, strongly 5-ribbed and plicate in flower; staminodes absent or rarely present; corolla actinomorphic and hypocrateriform, or strongly zygomorphic with one lip 4-lobed, rarely resupinate; seeds ± angled, sometimes narrowly winged, testa pallid or mauve-grey ..... **Zaluzianskya**
29.' Calyx bilabiate or not but never plicate; corolla various, often zygomorphic but then lips either 2- or 3-lobed:
30. Hairs on stems always spreading, gland-tipped; seeds 3-angled or 3-winged, testa translucent and loose ..... **Polycarena**
30.' Hairs on stems either eglandular or mixed, nearly always downward facing; seeds never winged, testa opaque and tight ..... **Phyllopodium**

ALONSOA MASKED MEN, RUITERTJIES ± 12 spp., mostly S and central America, South Africa

unilabiata (L.f.) Steud. Erect annual, up to 400 mm tall. Leaves lanceolate to ovate, dentate to pinnatifid. Flowers in racemes, resupinate, ± 10–18 mm long, split to base above, brick-red to pink to orange with 2 yellow sacs on upper lip, filaments magenta to purple, strongly curved and thickened below, anthers yellow to blue-green with blue to purple cilia. July–Sept. Coastal and inland sands or clay, WM, TS, CCR (Bokkeveld Plateau to Elandsbaai hills and Roggeveld to near Laingsburg). **(gce)**

ANTHEROTHAMNUS 1 sp., southern Namibia, Botswana, Zimbabwe, N Cape, NW Province and Limpopo

pearsonii N.E.Br. Well-branched shrub, up to 1–3 m tall, branchlet tips becoming ± spinescent. Leaves usually tufted, oblanceolate, bases swollen, persisting on stems. Flowers in racemes or panicles on lateral branches, small, corolla tube funnel-shaped, yellow or rarely purplish, lobes white with reddish lines on some, sweetly scented. Nov.–May. Rocky slopes, G (southern Namibia to Richtersveld to Gordonia to Zimbabwe).

ANTICHARIS DESERT VIOLET ± 10 spp., Namibia, Botswana, N Cape, Limpopo to Arabia and India

scoparia (E.Mey. ex Benth.) Hiern ex Benth. & Hook.f. Much-branched, densely glandular hairy, dwarf shrub, 100–450(–900) mm tall, with longitudinally ridged stiff branches. Leaves sparse, alternate, narrowly lanceolate, ± 15 × 2 mm, entire. Flowers 1 per leaf axil, scattered, pedicellate, corolla tube funnel-shaped, lobes spreading, ± equal, mauve to dark purple with darker markings around throat, stamens 2, included. Apr.–Oct. On rocky slopes, G (Namibia to Richtersveld).

APTOSIMUM KAROO VIOLET ± 20 spp., tropical and southern Africa

albomarginatum Marloth & Engl. KOEGAD, TSOEGAB Erect or decumbent, dwarf shrub, 80–600 mm tall, densely branched from base. Leaves linear-lanceolate, with thickened white margins. Flowers sessile, corolla tube ± funnel-shaped, streaked with white, lobes pale blue to purple. Flowering after rain. Sandy or gravelly flats, SN, (widespread in Namibia, Sperrgebiet, Botswana, NW Province and N Cape).

indivisum Burch. ex Benth. Dwarf, tufted shrublet, 10–70 mm tall. Leaves narrowed below into a petiole, oblong-spathulate and spine-tipped, crowding and exceeding flowers. Flowers sessile,

± corolla tube funnel-shaped, lobes blue and violet with darker patches at base, throat whitish. Aug.–Dec. Dry stony flats, G, NH, KB, WM, TS, CCR (Botswana, eastern Richtersveld and Namaqualand to Hantam to Little Karoo and Great Karoo).

procumbens (Lehm.) Steud. Gnarled, woody, mat-forming shrublet, up to 1 m diam., with a woody base and leafy side shoots. Leaves narrowed below into a petiole, small, rounded to narrowly lanceolate. Flowers sessile, corolla tube ± funnel-shaped, lobes blue to violet with darker patches near base, throat whitish. Aug.–Dec. Dry stony flats, NH, WM, TS, CCR (eastern Namaqualand and throughout central Karoo to Little Karoo to Uitenhage).

spinescens (Thunb.) Emil Weber Spreading shrublet, with erect branches, up to 250 mm tall. Leaves linear, rigid, becoming spiny with age, sessile. Flowers sessile, corolla tube ± funnel-shaped, fawn, lobes blue and purple with violet patches near base. Mainly Oct.–Dec. Rocky karroid slopes and flats, SN, G, NH, KV, WM, TS, CCR (Namibia to Gordonia to Clanwilliam and southern Karoo).

viscosum Benth. Like **A. spinescens** but plant viscid, densely clump forming, branches thickly covered with stalked glands. Sept. Stony and rocky hills and on sandy flats, SN, G (Aus to Richtersveld and ?Bushmanland).

[**Insufficiently known species A. tragacanthoides** E.Mey. ex Benth.]

BUDDLEJA SAGEWOOD ± 100 spp., tropics and subtropics of America, Africa, and Asia

saligna Willd. UMNCEBA, WITOLIENHOUT Shrub or tree, up to 7 m tall. Leaves petiolate, discolorous, lanceolate to narrowly elliptic. Flowers in velvety, paniculate cymes, cup-shaped with anthers exserted, cream-coloured with orange throat. Fruit an oblong capsule. Aug.–Jan. Rocky slopes and scrub, G, CCR (Richtersveld and Bokkeveld Mountains to SW Cape to tropical Africa).

salviifolia (L.) Lam. IGQANGE Willowy shrub or tree, up to 8 m tall. Leaves sessile, discolorous, lanceolate, margins crenate, base auriculate. Flowers in terminal, paniculate cymes, tubular with anthers included, white to purple with orange throat. Fruit an ellipsoid capsule. Aug.–Oct. Forest margins, along streams and rocky slopes, KB, WM, CCR (Kamiesberg Mountains and southern and eastern parts of southern Africa to tropical Africa).

CHAENOSTOMA (= *SUTERA* in part) SKUNK BUSH, STINKBOSSIE 46 spp., mainly South Africa but also tropical Africa

A. All 4 stamens exserted

archeri (Compton) Kornhall (= *Sutera archeri* Compton) Dwarf, twiggy, glandular-puberulous shrublet, up to ± 350 mm tall, stems with hairs up to ± 0.1 mm long. Leaves linear to narrowly elliptic, base clasping stem, entire, rarely minutely toothed. Flowers on long pedicels in axils of upper leaves, corolla tube broadly funnel-shaped, 5–8 mm long, lobes nearly regularly arranged, mauve, rarely white, throat yellow to orange. May–Oct. Rocky hillsides, WM, TS (Nuweveld Mountains to Beaufort West to Laingsburg to Prince Albert).

caeruleum (L.f.) Kornhall (= *Sutera caerulea* (L.f.) Hiern) Erect, glandular-hairy perennial, up to 1 m tall, stem with hairs 0.25–1 mm long. Leaves oblong, sometimes coarsely toothed, tip acute. Flowers in long racemes, corolla tube shortly funnel-shaped, 3–4.5 mm long, mauve or violet with tube yellow, style glandular-hairy. July–Oct. Flats and hill slopes, KV, WM, CCR (southern Knersvlakte to Hantam to Roggeveld and Clanwilliam to Worcester to Humansdorp). **(gce)**

pauciflorum Benth. (= *Sutera pauciflora* (Benth.) Kuntze) Twiggy, glandular-hairy shrublet, up to 450 mm tall, stem with hairs up to 0.5–0.8 mm long. Leaves suborbicular to broadly elliptic, toothed, contracted to broad petiolar part. Flowers axillary, panicled, corolla tube broadly funnel-shaped, 5.5–7.5 mm long, mauve with tube yellow. Sept.–Apr. Rocky mountain slopes, WM, CCR (Roggeveld to Nuweveld Mountains to Three Sisters to Great Swartberg Mountains).

A.' Upper 2 stamens included

comptonii (Hilliard) Kornhall (= *Sutera comptonii* Hilliard) Dwarf shrublet, ± 150–250 mm tall, stems glandular-pubescent with delicate hairs up to 0.4–1 mm long, leafy at least on upper parts.

Leaves linear, base clasping stem, margins strongly rolled back. Flowers axillary in upper parts, forming short racemes, corolla tube funnel-shaped, 10.5–12.5 mm long, lobes nearly regularly arranged, mauve, throat yellow. Oct.–Nov. Rocky slopes, TS, CCR (Swartruggens to Karoopoort to Witteberg Mountains to Pienaarskloof). **(gce)**

multiramosa (Hilliard) Kornhall (= *Sutera multiramosa* Hilliard) Dwarf, glandular puberulous shrublet, becoming twiggy and gnarled, up to ± 130–300 mm tall, with coarse hairs up to ± 0.2–0.25 mm long. Leaves narrowly elliptic, base decurrent on stem in a narrow wing or ridge. Flowers axillary, forming leafy terminal racemes, corolla tube narrowly funnel-shaped, 8.5–13 mm long, lobes almost regularly arranged, pink, mauve or blue, tube yellow or orange. Apr.–July. In sand among rock outcrops, NS, CCR (Vredendal to Strandfontein). **(gce)**

paniculatum (Hilliard) Kornhall (= *Sutera paniculata* Hilliard) Like **C. revolutum** but up to ± 750 mm tall, hairs on stem 0.3–1 mm long, flowers in long, narrow panicles, corolla tube 6.5–9.5 mm, pink or mauve, throat yellow to orange. Mostly May–Sept. Sandy stream banks or rocky slopes in scrub, KB, CCR (Kamiesberg Mountains and Bokkeveld Mountains to Clanwilliam). **(gce)**

revolutum (Thunb.) Benth. (= *Sutera revoluta* (Thunb.) Kuntze) Glandular-hairy shrublet, up to 0.6 m tall, hairs on stem up to 0.1 mm long. Leaves narrow, clasping stem at base, margins ± rolled back. Flowers axillary, forming racemes or narrow panicles, corolla tube funnel-shaped, 5–13 mm, white, pink or mauve with yellow to orange in throat. Mar.–Nov. Stony shale slopes, WM, CCR (Roggeveld Escarpment to Botrivier to Baviaanskloof Mountains). **(gce)**

violaceum Schltr. (= *Sutera violacea* (Schltr.) Hiern) Glandular-hairy shrublet, 0.5–1.5 m tall, hairs on stem 0.1–0.4 mm long. Leaves linear, base stem-clasping, margins revolute. Flowers axillary, forming simple racemes, occasionally in cymules, corolla tube 11–15 mm long, mauve or purple, throat yellow to orange. Apr.–Nov. Rocky slopes, WM, CCR (Bokkeveld Plateau to Komsberg Pass to De Rust). **(gce)**

COLPIAS KLIPBLOM 1 sp., N Cape and Namaqualand **(gce)**

mollis E.Mey. ex Benth. Softly hairy, sometimes glabrous, cushion-forming shrublet, up to 200 mm tall. Leaves long-petiolate, ± ovate, serrate. Flowers axillary, on slender pedicels, broadly funnel-shaped, 2-saccate below, pale yellow to white, scented, limb 20–30 mm diam. July–Sept. (–Dec.). Rock crevices, mostly in granite, G, NH, CCR (Richtersveld to near Kamieskroon and Bokkeveld Mountains). **(gce)**

CROMIDON 12 spp., Namibia and South Africa

austerum Hilliard Annual herb, ± 20–180 mm tall, with acute, retrorse hairs up to 0.2 mm long. Leaves elliptic, tapering to a petiolar part, entire or with 1 or 2 pairs of teeth. Flowers in many heads arranged in panicles, 5-lobed, corolla tube 2.8–4 mm long, white sometimes tinged mauve, with a yellow to orange patch at base of upper lip. Sept. Elevated flats and stony ridges, WM (around Calvinia and Victoria West).

confusum Hilliard Prostrate or decumbent annual, 5–100 mm tall, with acute, retrorse hairs. Leaves elliptic, tapering to a broad flat petiolar part up to half total length. Flowers in congested heads, 4-lobed, corolla tube 1 mm long, white. July–Sept. On well-drained sandy and stony flats, NH, WM, TS (near Steinkopf to N of Vanrhynsdorp to Onder Bokkeveld to Matjiesfontein to Carnarvon and Fraserburg).

corrigioloides (Rolfe) Compton Prostrate or decumbent annual, ± 10–150 mm tall, with acute, retrorse hairs. Leaves with 1 or 2 pairs of basal ones, elliptic, petiolar apart ± equalling or longer than blade, cauline ones spathulate. Flowers in congested heads, 5-lobed, corolla tube 1.5–2.5 mm long, limb bilabiate, white or cream, with orange patch at base of upper lip, violet outside in bud. July–Oct. In seasonally damp places, WM (Roggeveld to Great Karoo to southern Free State).

decumbens (Thunb.) Hilliard Bushy, sprawling, aromatic, perennial herb, 60–400 mm tall, stems and leaves with spreading to retrorse acute hairs. Leaves ovate, contracted into petiolar part near base, toothed. Flowers in crowded heads, corolla tube broadly funnel-shaped, 2–3.5 mm long, bilabiate, normally 5-lobed, white. Sept.–Nov. Sheltering under rocks, WM, TS, CCR (Hantamsberg to Roggeveld to near Graaff-Reinet to Waboomsberg to Baviaansberg to Witteberg Mountains).

dregei Hilliard Twiggy, perennial herb, up to ± 120 mm tall, branchlets with spreading, acute hairs. Leaves contracted to a petiolar part, ± equalling to half as long as blade, glandular-puberulous, toothed. Flowers in small, capitate racemes, corolla tube funnel-shaped, 2–2.5 mm long,

5-lobed, limb bilabiate, upper lip bilobed, white or cream. Oct.–Dec. Under overhanging rocks, KB (Kamiesberg Mountains). **(ece)**

hamulosum (E.Mey.) Hilliard Annual, ± 55–110 mm tall, with retrorse hairs. Leaves sparse, elliptic, tapering to petiolar part up to half total length, entire. Flowers many, in narrow spikes, forming a loose panicle, 4-lobed, regular, corolla tube ± 1.2 mm long, upper lip shallowly notched, ?white. Aug. ?Habitat, NH (northern Namaqualand). **(ece)**

microechinos Hilliard Sprawling, hairy annual, up to 100 mm tall, with acute, retrorse hairs. Leaves elliptic, tapering to broad, flat petiolar part, hairy, sometimes obscurely toothed. Flowers in heads, sometimes these in panicles, 4-lobed, white, calyx spiky with long spreading hairs. Sept.–Nov. Rocky slopes in seasonally damp places, KB, CCR (Kamiesberg Mountains to Cederberg Mountains to Hex River Mountains to Swartberg Mountains). **(gce)**

plantaginis (L.f.) Hilliard Sprawling, shortly hairy annual, up to 100 mm tall, with acute, ± retrorse hairs. Leaves mostly basal, ovate, cauline ones similar but with less pronounced petiole, entire or obscurely toothed. Flowers in heads, 1–few in corymbs or panicles, 5-lobed, corolla tube 2–3 mm long, limb bilabiate, white. Aug.–Nov. High plateaux and shaley slopes, WM, CCR (Swartruggens to Cold Bokkeveld and Roggeveld). **(gce)**

varicalyx Hilliard Annual, up to 100 mm tall, with short, acute, retrorse hairs. Leaves elliptic, with petiolar part up to half total length, glandular-hairy, entire or with 1–3 pairs of teeth. Flowers in heads in corymbs, 5-lobed, corolla tube 2.7–3.2 mm long, white with orange patch at base of lower lip. Sept.–Oct. Clay flats and dolerite outcrops, WM, CCR (Bokkeveld Plateau, Roggeveld and Hex River). **(gce)**

DIASCIA HORINKIES, TWINSPURS ± 70 spp., southern Africa

[**Note** In ***Diascia*** the morphologically lower (*anterior*) stamens are twisted to lie above the morphologically upper (*posterior*) ones. The stamens are described here in relation to their morphological position and not apparent disposition.]

A. Flowers in terminal racemes
B. Corolla without spurs or sacs

alonsooides Benth. Annual, up to 500 mm tall. Leaves ovate to lanceolate, subentire to dentate. Flowers greyish violet, corolla subrotate, limb 10–13 mm long, with two yellow spots at base of upper lip, stamens projecting forward, densely white villous, posterior filaments bent upwards at ± 90°, strongly thickened at bend. Capsule ovoid, ± 8 mm long. Aug.–Nov. On S-facing slopes in loamy soil, WM (Sutherland to Murraysburg).

B.' Corolla with spurs or sacs
C. Spurs > 7 mm long

macrophylla (Thunb.) Spreng. Annual, up to 600 mm tall. Leaves ovate, subentire to sharply serrate. Flowers grey violet, corolla limb 14–21 mm long, tube below upper lobes with concave, bilobed depression, spurs 10–18 mm long, usually exceeding lower lip, stamens projecting forwards, nearly glabrous to glandular puberulent, posterior filaments ± straight or with a small, terete projection near middle. Capsule narrowly elliptic to linear, 8–13 mm long. July–Nov. Renosterveld and karroid flats in clay loam from shale or dolerite, WM, TS (Calvinia to Matjiesfontein). **(ece)**

C.' Spurs or sacs < 7 mm long

dissimulans Hilliard & B.L.Burtt Annual, up to 450 mm tall. Leaves ovate, subentire to sharply serrate. Flowers greyish violet, corolla limb 9–17 mm long, with two yellow spots in depression below upper lobes, spurs 3–6 mm long, stamens projecting forward, sparsely glandular pubescent, posterior filaments bent strongly upwards with thickened appendage at bend. Capsule linear, 12–18 mm long. July–Sept. Under shrubs in clay or loamy soils, WM (Hantam plateau, Hantamsberg and Roggeveld). **(ece)**

parviflora Benth. (including **D. burchellii** Benth.) Annual, up to 400 mm tall. Leaves ovate, serrate. Flowers bilabiate, violet or reddish purple, corolla limb 6–12 mm long, with 2 yellow spots

below upper lobes, sacs 2.5–3.5 mm long, stamens projecting forwards, posterior filaments strongly recurved just below anthers. Capsule oblong-ovoid, 4–12 mm long. Aug.–Oct. Renosterveld and karroid flats in loam, WM, TS, CCR (Bokkeveld Mountains, Roggeveld to Kouga Mountains). **(gce)**

veronicoides Schltr. Annual, up to 750 mm tall. Leaves ovate, serrate. Flowers in racemes, 2-spurred, deep violet with yellow windows, 8–13 mm long, spurs ± 3–4.5 mm long, projecting backwards and diverging, posterior stamens straight. Capsule linear, more-or-less straight or curved. Aug.–Sept. Renosterveld and karroid flats in clay loam, NH, KV, WM, CCR (Kamieskroon to Hantam, Roggeveld to Porterville). **(gce)**

A.' Flowers axillary and long-pedicellate
D. Flowers subrotate without spurs
E. Posterior filaments bent

nodosa K.E.Steiner Annual, up to 210 mm tall. Leaves ovate to elliptic. Flowers with lanceolate- acuminate calyx lobes, corolla orange with reddish and yellow centre, limb 9.3–12.6 mm long, posterior filaments sharply bent upwards with thickening at bend, lower portion and bend densely covered with dark purple trichomes. Capsule 3.8–6 mm long. Aug. Under shrubs or in dry streambeds in sand or loam on S-facing slopes, G (Richtersveld). **(ece)**

E.' Posterior filaments ± straight

rudolphii Hiern Annual, up to 550 mm tall. Leaves ovate to elliptic, entire to irregularly lobed or divided. Flowers with lanceolate-acuminate calyx lobes, corolla orange with yellow centre, limb 13.3–20.2(–25) mm long, filaments densely pubescent with dark purple or white trichomes. Capsule falciform-ovoid, 7.4–9 mm long. June–Sept. In clay or sandy soils on flats or slopes, NH, KB, KV (Kamiesberg Mountains to Vanrhynsdorp). **(ece)**

runcinata E.Mey. ex Benth. Annual, up to 360 mm tall. Leaves ovate to elliptic, entire to irregularly lobed or divided. Flowers with broadly ovate-caudate calyx lobes, corolla greyish orange with yellow centre, limb 9.5–14.5 mm long, stamens villous with translucent to whitish clavate trichomes. Capsule broadly ovoid, 4.5–6.5 mm long. May–Sept. In seasonal washes and S-facing slopes, SN, G, NH, TS (Aus to Springbok to southern Succulent Karoo). **(ece)**

D.' Flowers bilabiate with twin sacs or spurs
F. Flowers with sacs or spurs > 10 mm long

hexensis K.E.Steiner Annual, up to 220 mm tall. Leaves ovate or obovate to elliptic, pinnatifid to pinnatisect. Flowers with white-fringed, lanceolate-attenuate calyx lobes, corolla light violet with greyish magenta centre and 2 or 3 small yellow dots in an oblique line below each upper lobe, limb 11–15 mm long, spurs ± 9.5–11.5 mm long. Capsule lanceolate and falcate, 9.5–11.5 mm long. June–Oct. Renosterveld and karroid flats in loam, WM, CCR (Klein Roggeveld and Little Karoo). **(gce)**

namaquensis Hiern Annual, up to 390 mm tall. Leaves, obovate to elliptic, irregularly lobed or divided. Flowers with caudate to falciform-ovate, acuminate calyx lobes, corolla greyish rose to lilac (rarely white), limb 10–19.6 mm long, tube below sinus of upper and lateral lobes with a yellow, elliptical patch, spurs 5.5–20 mm long, acute to rounded, stamens projecting forward, ± straight, posterior filaments thickened or bent slightly backwards from near middle, glabrous except for tuft of purple trichomes at bend or thickening. Capsule ovoid, 5–6.8 mm long, equalling or exceeding calyx. July–Sept. In sandy loam on flats or slopes, G, NH, KB, WM (Richtersveld to Calvinia). **(ece)**

nana Diels Rosulate annual, up to 130 mm diam. Leaves ovate to elliptic, rounded to acute, entire or irregularly lobed. Flowers with lanceolate-acute calyx lobes, corolla red with yellow spur openings, limb 9–12.5 mm long, spurs projecting back and downward, divergent, 11–13 mm long, stamens projecting forwards, filaments ± straight, densely glandular pubescent. Capsule broadly ovoid, 5–7.5 mm long. July–Oct. Hard-packed clay flats and surrounding drainage lines, KV, WM, TS, CCR (Holrivier to Klipwerf and Fraserburg, S to near Montagu). **(gce)**

tanyceras E.Mey. ex Benth. Annual, up to 400 mm tall. Leaves, obovate to elliptic, irregularly toothed to divided. Flowers with ovate to falciform-ovate, acuminate calyx lobes, corolla greyish magenta, limb 14–24 mm long, tube below each upper lobe with a pair of yellow spots, spurs

± 18–25(–28) mm long, projecting and diverging backwards, filaments projecting forwards, ± straight, densely pubescent with dark purple trichomes. Capsule deltoid, 7–9 mm long, exceeding calyx. July–Sept. Under shrubs in loam or sandy loam soil, NH, KB (Kamieskroon to Nuwerus). **(ece)**

sp. A (= *D. floribunda* K.E.Steiner *ined.*) Annual, up to 330 mm tall. Leaves obovate to elliptic, irregularly toothed to divided. Flowers with ovate-acuminate calyx lobes, corolla greyish violet to greyish magenta (rarely white), tube below each upper lobe with an oblique line of 2–4 narrowly elliptical yellow spots, limb 13–25 mm long, spurs 12–15 mm long, projecting downwards and diverging, filaments projecting forwards, densely pubescent with purple trichomes. Capsule falciform-ovoid, 5–6 mm long, scarcely exceeding calyx. July–Oct. In heavy doleritic clay or shale-derived loam, KB, KV, WM, TS (Kamiesberg Mountains to Matjiesfontein). **(ece)**

sp. B (= *D. tenuis* K.E.Steiner *ined.*) Annual, up to 270 mm tall. Leaves, obovate to elliptic, margins irregularly cleft to divided. Flowers with lanceolate to falciform-ovate, acute to attenuate calyx lobes, corolla greyish magenta, limb 9.7–21 mm long, tube below each upper lobe with triangular to rectangular yellow spot, spurs (3–)8.3–15 mm long, projecting downward, nearly parallel or diverging in distal third, filaments projecting forwards, ± straight, densely pubescent with dark purple trichomes. Capsule ovoid, 4.8–6.8 mm long, scarcely exceeding calyx. July–Oct. Sandy flats to rocky slopes in dolerite or shale derived soils, WM, TS (Loeriesfontein to Matjiesfontein to near Fraserburg). **(ece)**

F.' Flowers with sacs or spurs < 10 mm long (see also ***D. hexensis, D. namaquensis, D. sp. B*** *above)*

batteniana K.E.Steiner Annual, up to 380 mm tall. Leaves ovate to obovate. Flowers with lanceolate to narrowly ovate calyx lobes, corolla greyish magenta, limb 13–21 mm long, tube below upper lobes with 3–5 distinct or partially coalesced yellow spots, staminal boss with wedge-shaped yellow patch on sides behind stamens, spurs strongly divergent, 7.2–9.5 mm long, filaments erect, densely pubescent with dark purple trichomes. Capsule ovoid, 4.6–8.5 mm long. Aug.–Sept. Sandy soil on inland dunes, NS (Hondeklipbaai to Kotzesrus). **(ece)**

cardiosepala Hiern Annual, up to 230 mm tall. Leaves ovate to elliptic, lobed or divided. Flowers with cordate to reniform calyx lobes, corolla lilac to greyish magenta, limb 14–23 mm long, tube below upper lobes dark purple with 1–3 small yellow dots and 1 or 2 larger yellow patches at sac openings, sacs 1–2.5 mm, acute, filaments projecting out and downwards, densely covered with purple trichomes, posterior ones branched into fertile and nonfertile arms. Capsule ovoid, 3–6 mm long. Aug.–Oct. Clay flats and adjacent sandy washes, WM, TS (Nieuwoudtville to Matjiesfontein). **(ece)**

fragrans K.E.Steiner Rosulate annual, up to 200 mm tall. Leaves ovate to elliptic, obtuse, entire to 3-lobed. Flowers with widely ovate-acuminate calyx lobes, reddish lilac to greyish violet, limb 15–22 mm long, sacs 2.5–2.7 mm long, openings connected by a yellow stripe spanning central part of flower, stamens erect or projecting forward, filaments ± straight, densely pubescent with dark purple trichomes. Capsule broadly ovoid, 4–5 mm long, scarcely exceeding calyx lobes. July–Sept. Clay flats and adjacent sandy washes, WM, TS (Loeriesfontein to Nieuwoudtville and southeastern Tanqua Karoo). **(ece)**

humilis K.E.Steiner Annual, up to 250 mm tall. Leaves ovate to obovate, dentate to pinnatifid. Flowers with lanceolate-acuminate calyx lobes, corolla pastel red to greyish magenta with yellow patches below lateral lobes, limb 6–8 mm long, tube below upper lobes with 2 yellow sacs ± 1.5–2 mm long, stamens erect, posterior filaments with a sharp bend just below anthers towards upper lip, bend thickened or lobed, with dark purple trichomes. Capsule falciform-ovoid, 5–6.5 mm long. Aug.–Oct. Renosterveld or fynbos in loam, especially after fire, KB, WM, TS, CCR (Kamiesberg and Bokkeveld Mountains to Roggeveld to near Willowmore). **(gce)**

maculata K.E.Steiner Annual, up to 320 mm tall. Leaves ovate to oblong, entire to pinnatisect. Flowers with lanceolate-acuminate calyx lobes, corolla greyish magenta to peachy orange with 4 yellow patches in tube, limb 6.5–11 mm long, tube below upper and lower corolla lobes gibbous or obscurely bisaccate, sacs up to 1 mm long, stamens projecting forward. Capsule falciform-ovoid, 5–6 mm long. Aug.–Oct. Fynbos or renosterveld in loam, KB, CCR (Kamiesberg and Bokkeveld Mountains, Hex River Pass). **(gce)**

minutiflora Hiern Annual, up to 350 mm tall. Leaves obovate to elliptic, margins irregularly lobed to divided. Flowers with ovate to falciform ovate-acuminate to caudate calyx lobes, corolla greyish magenta to greyish violet, limb 7–13.5 mm long, tube below upper corolla lobes with yellow

patch at each sac opening, sacs 1–1.5 mm long, acute, stamens projecting forwards, ± straight, pubescent in lower half with purple trichomes. Capsule falciform-ovoid, 4–5.3 mm long, scarcely exceeding calyx. July–Sept. Renosterveld or karroid flats in sandy loam, SN, G, NH, CCR (southern Namib to Swartberg Mountains). **(gce)**

pachyceras E.Mey. ex Benth. Annual, up to 320 mm tall. Leaves elliptic to obovate, pinnatifid or pinnatisect. Flowers with lanceolate-acuminate calyx lobes, corolla greyish to deep magenta, limb 12.5–26.5 mm long, tube with small yellow spot below each upper lobe and 3 larger yellow patches in tube at base of lower lobe, sacs ± 2.5–4 mm long, curving upwards, filaments erect, densely pubescent with dark purple trichomes, posterior ones bent backwards towards upper lip. Capsule 5.6–8.5 mm long, ovoid to oblong-ovoid. July–Oct. In loose inland sands, NS, KV, CCR (Kotzesrus and Vanrhynsdorp to Leipoldtville). **(gce)**

sacculata Benth. Annual, up to 300 mm tall. Leaves ovate to elliptic, entire to dentate. Flowers with lanceolate-acuminate calyx lobes, corolla greyish magenta, limb 9–11 mm long, tube with 2–4 yellow dots in an oblique line below each upper lobe, spurs 3–3.5 mm long, acute, turned upwards, stamens projecting forwards with scattered trichomes. Capsule linear to oblong, falciform, 10–12 mm long. July–Oct. Renosterveld and karroid slopes and flats in loam or clay-loam, NH, KB, CCR (Namaqualand to Worcester to Joubertina). **(gce)**

DICLIS DWARF SNAPDRAGON ± 10 spp., Africa and Madagascar

petiolaris Benth. Prostrate annual, 20–250 mm across, with short, stalked glands or subglabrous. Leaves long-petiolate, elliptic or spathulate, wedge-shaped at base, entire or obscurely toothed. Flowers axillary, long-pedicellate, bilabiate, corolla tube with a broad spur, white with yellow and purple spots in throat. May–Aug. Damp places and riversides, SN, G (Namibia to Botswana, Zambia and lower Gariep Valley to summer rainfall region of southern Africa).

DISCHISMA BASTERSLAKBLOM, FALSE SLUGWORT 11 spp., Namibia to W Cape **(gce)**

A. Perennial herbs or annuals

clandestinum E.Mey. Erect, hairy annual, 100–200 mm tall. Leaves narrow, spreading, bracts broad and hairy below, drawn out into leaf-like tips. Flowers in elongate spikes, tiny, white, calyx lobes narrow, hairy on margins. Aug.–Nov. Rocky slopes and flats, NH, KB, CCR (northern Namaqualand to northern Cederberg Mountains). **(gce)**

spicatum (Thunb.) Choisy Erect, hairy annual, up to 300 mm tall, with ascending, cobwebby branches. Leaves narrow and spreading with sparse teeth, bracts hairy. Flowers in elongate spikes, white, calyx lobes narrow, hairy on margins. July–Oct. Sandy flats, SN, G, NS, NH, KV, CCR (Aus to lower Gariep Valley to Piketberg). **(gce)**

A.' Shrublets

leptostachyum E.Mey. Subshrub, up to 300 mm tall, with ascending, cobwebby branches from a woody rootstock. Leaves well-spaced, narrow, spreading, obscurely toothed, bracts hairy. Flowers in elongate spikes, white, sweetly scented, calyx lobes narrow, hairy on margins. Sept.–Oct. Coastal dunes and inland sandy flats, NS, CCR (S of Gariep Mouth to northwestern Namaqualand to Rocher Pan). **(gce)**

squarrosum Schltr. Minutely hairy shrublet, up to 600 mm tall. Leaves overlapping, broadly ovate, sometimes minutely toothed. Flowers in compact spikes, white, calyx lobes ciliate. Aug.–Oct. Sandy flats, KV, CCR (near Klawer to Clanwilliam and Graafwater). **(gce)**

struthioloides Killick Erect shrublet, 300–600 mm tall, branches thick, densely leafy, glabrous. Leaves spreading, narrowly lanceolate, entire. Flowers in thick, compact spikes, cream-coloured to magenta, calyx lobes plumose-haired. Sept.–Nov. Coastal sands, G, NS (NE of Port Nolloth to Hondeklipbaai to near Wallekraal). **(ece)**

FREYLINIA BELL BUSH, KLOKKIESBOS 9 spp., southern and central Africa

lanceolata (L.f.) G.Don HEUNINGKLOKKIESBOS Small tree, 2–4(–6) m tall. Leaves linear-lanceolate, glabrous or shortly hairy, ascending, margins slightly revolute, 40–120 mm long. Flowers

in densely branched panicles, funnel-shaped, 10–15 mm long, cream-coloured to yellow fading orange to brown, honey-scented. Feb.–July. Stream banks, often overhanging water, KB, CCR (Kamiesberg Mountains and Bokkeveld Mountains to SW and E Cape).

GOMPHOSTIGMA 2 spp., southern Angola and southern Zaire, Zimbabwe, southern Africa

incomptum (L.f.) N.E.Br. Divaricately branched, greyish shrub, 3–9 m tall. Leaves small, ± 2.4 × 0.5–1 mm, opposite and in axillary clusters. Flowers in terminal racemes, corolla tube 3 mm long, lobes spreading, white. Fruit an oblong capsule, ± 3 mm long. ?Flowering time. Riverbanks, WM (Roggeveld through Karoo to near Colesberg).

virgatum (L.f.) Baill. Slender, willowy, closely leafy shrublet, up to 1 m tall. Leaves opposite, linear, 10–60 × 2–5 mm, usually greyish. Flowers in long, narrow racemes, corolla tube 2–4 mm long, lobes spreading, white, scented. Fruit a many-seeded capsule, ± 7 mm long. Nov.–Sept. In perennial watercourses among pebbles and boulders, SN, G, KV, WM, TS, CCR (southern Angola, southern Zaire, Zimbabwe, and through southern Africa).

HEBENSTRETIA SLAKBLOM, SLUGWORT ± 40 spp., southern and tropical Africa

A. Shrublets

cordata L. Shrublet, up to 300 mm tall, with closely leafy, suberect branches. Leaves crowded, heart-shaped, succulent, sessile. Flowers crowded in short, dense spikes, white, anthers subsessile, calyx large, glabrous. Fruit ± circular, mericarps ± equal, vacuolate. Mainly Sept.–Feb. Coastal sands, SN, G, NS, CCR (Sperrgebiet to Cape Peninsula to Port Alfred).

kamiesbergensis Roessler Branched shrub, ± 500–600 mm tall, with densely leafy branches. Leaves recurved to reflexed, linear, copiously toothed. Flowers in dense or elongate spikes, white with yellow spots, anthers subsessile, calyx glabrous. Fruit ovoid-ellipsoid, swollen on 1 side, of 2 unequal mericarps, upper one shield-shaped. Sept.–Dec. Upper slopes, KB (Kamiesberg Mountains). **(ece)**

namaquensis Roessler Small shrub, 150–400 mm tall, with stem and branches minutely papillate or ± glabrous. Leaves spreading, linear-lanceolate, entire or inconspicuously toothed. Flowers in mostly dense spikes, white, yellow-spotted, anthers on short filaments, calyx glabrous. Fruit ovoid-ellipsoid, of 2 unequal mericarps, upper one shield-shaped. July–Sept. Stony slopes, SN, G, NS, NH, KB, CCR (southern Namibia to near Bitterfontein and Olifants River Valley). **(gce)**

robusta E.Mey. Shrublet, 200–500 mm tall, with erect branches. Leaves spreading, linear, slightly toothed. Flowers in elongate spikes, white with orange to red marks, honey-scented, anthers subsessile, calyx glabrous. Fruit ellipsoid, of 2 unequal mericarps, upper mericarp shield-shaped. Aug.–Oct. Sandy, clay or rocky soils, G, NS, NH, WM, TS, CCR (Richtersveld to near Port Nolloth to Bokkeveld Plateau to Roggeveld to SW Cape to Great Karoo).

A.' Perennial herbs or annuals
B. Fruit not separated into 2 distinct mericarps

anomala Roessler Laxly branched annual, 100–150 mm tall, branches shortly hairy. Leaves narrowly linear-lanceolate, sparsely dentate. Flowers in dense spikes, white, with yellow spots, anthers on short filaments, calyx ± fringed. Fruit oblong, not splitting into 2 mericarps. Sept. ?Habitat, WM (near Calvinia). **(ece)**

sarcocarpa Bolus ex Rolfe Annual, ± 100–200 mm tall. Leaves linear-lanceolate, usually entire. Flowers in spikes, white, pink or yellow with orange spots, anthers on short filaments, calyx glabrous. Fruit spherical, not divided into 2 mericarps, without vacuoles. Aug.–Sept. Sandy soils and among rocks, G, NS, NH (NW of Steinkopf to Port Nolloth and Grootvlei). **(ece)**

B.' Fruit comprising 2 distinct mericarps

dentata L. Erect, sparsely hairy annual, up to 400 mm tall, with ascending branches. Leaves linear and toothed. Flowers white with orange marks, anthers subsessile, calyx glabrous. Fruit ellipsoid,

mericarps unequal, upper one shield-shaped. July–Oct. Sandy soils, NS, KV, CCR (near Vredendal to Vanrhynsdorp to Cape Peninsula to Stilbaai). **(gce)**

glaucescens Schltr. Annual, 30–150 mm tall, with procumbent side branches. Leaves linear to linear-lanceolate, entire. Flowers in short, compact spikes, whitish, anthers as long as filaments, calyx glabrous. Fruit broadly oblong, of equal mericarps or, if unequal, then upper one deeply concave on inner face and lower one with 2 deep longitudinal grooves along inner face. July–Sept. On open flats, KV, WM, TS (southern Knersvlakte to southern Bushmanland to near Calvinia to Tanqua Karoo).

hamulosa E.Mey. Erect annual, 50–150 mm tall, much-branched from base, branches pubescent with coarse retrorse hairs. Leaves linear, entire to obscurely toothed. Flowers in spikes, white, anthers subsessile, calyx hairy, bracts recurved and hook-shaped. Fruit of 2 equal mericarps, each round in cross section. Aug.–Oct. On slopes, NH (Steinkopf to near Bitterfontein). **(ece)**

minutiflora Rolfe Spreading annual or perennial herb, 50–200 mm tall, branched from base. Leaves linear-lanceolate, toothed. Flowers in spikes, white, anthers subsessile, calyx minutely fringed. Fruit oblong, of 2 equal mericarps. Sept.–Dec. S-facing slopes, KB (Kamiesberg Mountains). **(ece)**

parviflora E.Mey. Erect, sparsely hairy annual, up to 300 mm tall, with ascending branches. Leaves linear and toothed. Flowers white with orange marks, anthers subsessile, calyx glabrous. Fruit oblong, upper mericarp deeply concave on inner face, lower one with 2 deep longitudinal grooves along inner face. July–Oct. Rocky soils, SN, G, NS, NH, KV, WM, CCR (southern Namibia and Gordonia to Namaqualand to Malmesbury to Oudtshoorn and Great Karoo).

repens Jaroscz Sprawling, branched annual, up to 450 mm tall, branches suberect terminally. Leaves narrow, sparsely toothed. Flowers in elongate spikes, white, anthers stalked, calyx glabrous. Fruit top-shaped, pointed, mericarps ± equal. July–Oct. Sandy flats and slopes, NS, NH, KV, CCR (N of Port Nolloth to Bushmanland to Cape Peninsula to Albertinia).

HEMIMERIS GEELGESIGGIE, YELLOW-FACES 6 spp., N Cape and W Cape **(gce)**

A. Flowers saccate or minutely spurred, sacs much shorter than lower corolla lip

racemosa (Houtt.) Merr. (including **H. montana** L.f.) Annual, 35–440 mm tall, with pubescent stems. Leaves ovate, toothed. Flowers bilabiate, axillary to umbelliform, 2-spurred, yellow, corolla limb ± 7.5–13 mm long, upper lip with 2 orange or maroon spots, spurs ± 1.5–3 mm long, style position dimorphic, erect or lying along lower corolla lobe. July–Oct. Coastal and inland sands and clay loam, G, NS, NH, KB, KV, WM, TS, CCR (Richtersveld to Port Elizabeth). **(gce)**

sabulosa L.f. Annual, 30–500 mm tall, with glabrous stems. Leaves pinnatifid, sometimes toothed. Flowers bilabiate, axillary to umbelliform, yellow, corolla limb 9–11.5 mm long, upper lip with 2 orange spots flecked with red, sacs inconspicuous, ± 1–2 mm long, style lying along lower corolla lobe. July–Oct. Sandy coastal flats and inland valleys, NS, KV, CCR (N of Groenrivier to Stilbaai). **(gce)**

A.' Flowers spurred, spurs longer than lower corolla lip

centrodes Hiern Annual, branching from base, up to 300 mm tall. Leaves ovate, entire or toothed. Flowers axillary, bilabiate, pale yellow with a brown spot on each upper corolla lobe, limb 8–15 mm long, spurs projecting backwards and curving downwards, 10–12 mm long. Aug.–Oct. Karroid flats in doleritic clay, WM, TS, CCR (Bokkeveld Mountains to Oudtshoorn). **(gce)**

gracilis Schltr. Annual, up to 300 mm tall. Leaves broadly ovate, sharply toothed. Flowers bilabiate, axillary to umbelliform, yellow with 2 orange spots with red blotches on upper lip, corolla limb 5–8 mm long, spurs usually divergent, ± 4–5 mm long. July–Oct. Moist shaded spots around rocks or small streams, KV, WM (Calvinia to Holrivier and Wiedouwrivier). **(ece)**

nana Diels Erect annual, branching from base, up to 150 mm tall. Leaves ovate, entire or toothed. Flowers bilabiate, with lanceolate to broadly ovate, subacute to rounded calyx lobes, corolla pale yellow with a brown spot on each upper lobe, limb 6.3–13 mm long, spurs projecting backwards, diverging and curving upwards, 4–5 mm long. Aug.–Oct. Karroid flats in clay (mostly dolerite derived), WM, TS, CCR (Loeriesfontein to Hantam to southern Karoo and Little Karoo). **(gce)**

JAMESBRITTENIA 83 spp., mainly central and southern Africa, 1 sp. extending to India

A. Annuals or perennial herbs

adpressa (Dinter) Hilliard Mat-forming, well-branched, aromatic, perennial herb, ± 20–300 mm tall, leafy throughout. Leaves often clustered, elliptic, deeply divided into ± entire lobes, with glistening glands. Flowers axillary, corolla tube ± 6.3–10 mm long, lobes oblong-elliptic, golden yellow. May–Sept. In sandy riverbeds and around pans, NH (Namibia to eastern Namaqualand).

amplexicaulis (Benth.) Hilliard Foetid, glandular-villous, perennial herb, ± 200–450 mm tall, stems basally tufted from woody rootstock, Leaves ascending, overlapping, broadly elliptic. Flowers 1 in each upper leaf axil, corolla tube 6.5–9 mm long, limb small, bilabiate, lobes creamy white to pale yellow, streaked basally with brown. July–Oct. In dry streambeds, gorges or ravines, G, NH (Vioolsdrif to near Garies to Eenkokerboom to near Loeriesfontein).

glutinosa (Benth.) Hilliard Erect, aromatic, annual or perennial herb, 20–450 mm tall, glandular-pubescent, hairs broad and flattened at base. Leaves ovate, serrate. Flowers in each leaf axil, often forming stout crowded pseudoracemes, corolla tube 16–24 mm long, limb nearly regular, mauve, lilac, rose or white with 3 deep violet bars near base, throat orange-yellow, mouth compressed laterally. July–Sept. Sandy or rocky watercourses and rocky mountain slopes, G (Namus Mountains to Klein Karas Mountains to Sendelingsdrif to near Goodhouse).

pedunculosa (Benth.) Hilliard Sprawling, leafy annual, 45–400 mm tall. Leaves ovate, coarsely lobed and toothed. Flowers on long, slender, spreading pedicles, in all leaf axils, corolla tube ± 4–7.5 mm long, campanulate above, upper lip larger than lower and slightly hooded at base, lobes bright yellow, with a dark patch at back of inflated part of tube. May–Dec. Shady seasonally moist places, NH, KB (near Steinkopf to Kamiesberg Mountains to near Kliprand). **(ece)**

primuliflora (Thell.) Hilliard Perennial herb, 25–600 mm tall, glandular-pubescent, hairs sometimes stout. Leaves ovate, coarsely serrate. Flowers in leaf axils ± from base of plant, corolla tube 9–20 mm long, limb nearly regular, lobes pale violet to lilac, sometimes white, throat orange-yellow extending into 3 points at base of lobes, each point sometimes tipped with dark violet streak. Year-round. Rocky plateaux and slopes, G (near Windhoek to Namuskluft).

racemosa (Benth.) Hilliard Erect, aromatic annual, 50–600 mm tall, stems leafy, glandular-pubescent. Leaves elliptic, toothed. Flowers in upper axils, forming long pseudoracemes, corolla tube 15.5–18 mm long, lobes deeply notched up to 3 mm deep, white to mauve, with dark veins, mouth with trident-shaped purplish to orange patches. July–Oct. In sandy places, NS, NH, KB, KV (near Henkries to Bitterfontein to southern Knersvlakte).

thunbergii (G.Don) Hilliard Like **J. racemosa** but flower lobes more shallowly notched (at most up to 2 mm deep) and with inconspicuous veins, mouth yellow-orange extending into a 3-fid patch outlined with purple at base of each lobe. June–Oct. In open sandy or shaley patches, KV, WM, TS, CCR (Bushmanland to near Calvinia to southeastern Knersvlakte, Roggeveld, Laingsburg and Gamkaberg).

A.' Shrublets

atropurpurea (Benth.) Hilliard SAFFRAANBOSSIE Wiry shrublet, up to 1 m tall, young parts with glistening glands, appearing varnished. Leaves clustered, spathulate, mostly entire. Flowers axillary, corolla tube 15–24 mm long, 2-lipped, lobes narrow, oblong to cuneate, yellowish to brown. Dec.–Apr. Stony or rocky slopes in karroid scrub, KV, WM, CCR (Namibia, Botswana to northern Knersvlakte to Hantam to Free State to Caledon to Joubertina).

bicolor (Dinter) Hilliard Twiggy shrublet, up to ± 100–500 mm tall, glandular-pubescent. Leaves petiolate in lower ones, elliptic, entire or rarely few-toothed. Flower axillary in upper parts, forming long, crowded racemes, corolla tube 9–13 mm long, limb bilabiate, lobes yellowish to white with orange-yellow veins, throat yellow. Aug.–Nov. Mountain slopes, SN (Klinghardt Mountains to Witpütz District). **(ece)**

fruticosa (Benth.) Hilliard Well-branched, foetid shrublet, up to ± 1.3 m tall, becoming black when dry. Leaves outspread, elliptic, tip subacute, entire or minutely toothed, thinly hairy. Flowers axillary, corolla tube ± 20–26 mm long, limb nearly regular, glandular-puberulous outside, white to blue, purple or mauve, base of each lobe darkly barred. (July–)Aug.–Sept.(–Jan.). In sand among rocks or on coastal dunes, SN, G, NS, NH, KB, KV (Lüderitz to Witpütz and southwards to Wiedouwrivier). **(ece)**

incisa (Thunb.) Hilliard Dwarf, twiggy shrublet, up to 300 mm tall, densely glandular-pubescent. Leaves clustered, ovate to elliptic, divided ± up to midrib, with glistening glands beneath. Flowers in upper axils, corolla tube 18–28 mm long, limb oblique, with club-shaped hairs in throat, lobes oblong, white with red-brown central bar. May, Sept. Among dolerite boulders, WM (NE of Calvinia to near Sutherland towards Fraserburg).

integerrima (Benth.) Hilliard Dwarf shrublet, 100–600 mm tall, leafy mainly on lower parts. Leaves elliptic to oblanceolate, pubescent, axillary leaf tufts few and small, entire or obscurely toothed. Flowers in long racemes or panicles, corolla tube (7–)9.5–12(–17) mm long, limb oblique, lobes cuneate-oblong, truncate to notched, white, cream-coloured or yellow, throat yellow to orange. Jan.–Dec. Among rocks, G (southern Namibia and Richtersveld to Bushmanland to Upper Karoo).

major (Pilg.) Hilliard Like **J. sessilifolia** but with long, straight, ascending branches vs. short twiggy and often flexuose, and flower lobes lilac pink to violet (not white). July–Nov. In dry riverbeds and mountains slopes, G (near Klein Karas to E of Sendelingsdrif to Tatasberg).

merxmuelleri (Roessler) Hilliard Stout, dwarf, twiggy shrublet, 150–600 mm tall, old lateral shoots becoming subspinescent, young parts glandular-pubescent. Leaves close-set, broadly obovate to spathulate, thick. Flowers axillary, corolla tube 9.5–14 mm long, limb ± regular, lobes rounded or shallowly notched, throat with club-shaped hairs, white to pale yellow with brownish patches. May–Oct. In rock crevices, SN, NS (Lüderitz to Kleinsee). **(ece)**

namaquensis Hilliard Twiggy, dwarf shrublet, ± 80–600 mm tall, twigs crowded with leaf clusters. Leaves spathulate, entire to toothed, glandular-pubescent. Flowers axillary, corolla tube 17–22 mm long, 2-lipped, lobes oblong, chocolate-brown, glands on back of lobes glistening. May–Sept. Rocky and stony sites, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

ramosissima (Hiern) Hilliard Dense, rounded, aromatic shrublet, 0.3–1.5 m tall, branches subspinescent at tips, covered with stalked glistening glands. Leaves broadly ovate, toothed, cuneate to truncate at base. Flowers in upper axils, corolla tube ± 4–6 mm long, limb nearly regular and hairy above, lobes blue or mauve to white, throat yellow with a dark patch on back. May–Oct. Shelter of rocks on steep slopes, G (southern Namibia to Richtersveld to Gordonia).

sessilifolia (Diels) Hilliard Twiggy shrublet, 0.25–1 m tall, often with flexuose stems. Leaves alternate in upper parts, distinctly petiolate, elliptic, glandular-pubescent. Flowers axillary, long-pedicellate, corolla tube 16–21 mm long, limb nearly regular, lobes white with dark lines, throat yellow. June–Jan. In dry riverbeds and ravines, G (Bethanien District to near Sendelingsdrif).

tortuosa (Benth.) Hilliard Glandular-hairy shrublet, up to 200 mm tall. Leaves mostly entire, small and tufted. Flowers in racemes, corolla tube 9.5–12 mm long, lobes cuneate-oblong, white to mauve with dark median streaks. Sept.–Dec. Stony and shaley slopes or flats in karroid scrub, TS, CCR (Prince Albert to E Cape).

LIMOSELLA MUDWORT ± 15 spp., almost cosmopolitan

grandiflora Benth. Submerged, aquatic perennial or sometimes annual, stems short and corm-like or long, flexible and with well-spaced nodes. Leaves in rosettes or widely spaced, petioles short to long, blade elliptic to ovate to oblong. Flowers in leaf axils, pedicels somewhat shorter than leaves, petals longer than calyx, whitish to pale blue or purplish, minutely hairy and yellow in throat. Aug.–Nov. Pools and marshes, NH, KB, KV, WM, CCR (near Springbok to Kamiesberg Mountains to Klawer to SW Cape to Roggeveld to Mpumalanga).

LYPERIA TRAANBLOMMETJIE, WIDOW'S-PHLOX 6 spp., Namibia to W Cape **(gce)**

antirrhinoides (L.f.) Hilliard Glandular-hairy annual, ± 25–300 mm tall. Leaves elliptic, coarsely toothed. Flowers laxly racemose, corolla tube 14–18 mm long, funnel-shaped, lobes oblong-elliptic, white to cream-coloured with dark patch at base of each, fertile stamens 2. July–Oct. Stony ground, NH, CCR (Spektakelberg and Piketberg to Oudtshoorn). **(gce)**

tenuiflora Benth. Glandular-hairy annual, up to 200 mm tall. Leaves narrowly elliptic, sometimes toothed. Flowers in racemes, corolla tube 24–32 mm long, inflated above, lobes broadly spathulate, pink to mauve, rarely cream-coloured, with yellow star in throat, often with radiating dark lines around mouth, fertile stamens 2. June–Oct. Sandy or gravelly flats, TS, CCR (Swartruggens to Tanqua Karoo to Groot Swartberg Mountains). **(gce)**

tristis (L.f.) Benth. Glandular-hairy annual, up to 600 mm tall. Leaves elliptic, sometimes toothed. Flowers in racemes, corolla tube 20–29 mm long, inflated above, lobes narrow, whitish to yellow or brown, clove-scented at night, fertile stamens 4. Mainly July–Oct. Sandy, gravelly or stony ground, often in scrub, SN, G, NS, NH, KV, WM, TS, CCR (Namibia to SW Cape to Willowmore to Great Karoo).

MANULEA FINGER-PHLOX, VINGERTJIES 74 spp., southern and S tropical Africa, mainly W Cape

A. Stigma usually shortly exserted, much longer than style

calciphila Hilliard Glandular-hairy annual, up to 150 mm tall. Leaves mostly basal, 2-ranked, ± elliptic, tapering below, usually toothed. Flowers in ± dense racemes, corolla tube 3.2–4 mm long, shortly funnel-shaped, yellow, lobes oblong-obovate, blunt at apex, white. July–Nov. Damp sandy soil on coastal limestone outcrops, NS, CCR (near Wallekraal and Bredasdorp to Stilbaai). **(gce)**

latiloba Hilliard Minutely glandular-hairy annual, up to 120 mm tall. Leaves crowded basally, oblanceolate, tapering below, sometimes shallowly toothed. Flowers in ± compact racemes, corolla tube 2–2.5 mm long, shortly funnel-shaped, yellow, lobes ovate, blunt to subacute at apex, white, outer calyx lobes broad. July–Oct. Damp sand or clay soils, TS, CCR (Tanqua Karoo to Ladismith). **(gce)**

nervosa E.Mey. ex Benth. Annual, 30–210 mm tall. Leaves mostly basal, 2-ranked, with bases of pairs fused, ± elliptic, tapering below, entire. Flowers in racemes, corolla tube 8–13 mm long, limb almost regular, showy, lobes obovate, white to blue, mouth yellow. June–Sept. On sandy flats, NH (near Springbok to Bushmanland to Platbakkies).

A.' Stigma well included, shorter than to longer than style
B. Stamens inserted in middle of corolla tube; tube 6.5–15 mm long

altissima L.f. Glandular-hairy, foetid, short-lived perennial, up to 1 m tall. Leaves crowded basally, oblanceolate, obscurely toothed. Flowers crowded in capitate racemes, 8–10 mm long, corolla tube 8–10 mm long, inflated above, mouth laterally compressed, lobes rounded, white with yellowish centre, scented. July–Sept. Deep sandy soils, NS, NH, KB, KV, CCR (Springbok to Malmesbury). **(gce)**

androsacea E.Mey. ex Benth. Annual or ?short-lived perennial, ± 65–280 mm tall. Leaves basal, oblanceolate to broadly elliptic, tapering below, entire or serrulate, glandular-puberulous. Flowers in capitate racemes, almost regular, corolla tube 6.8–7 mm long, lobes oblong-elliptic, blunt at apex, entire, white with yellow to orange around mouth and inside upper half of tube. July–Sept. In deep sand, SN, G, NS, NH (Aus to Klinghardt Mountains to near Springbok to near Komaggas). **(ece)**

cephalotes Thunb. Coarse, glandular-hairy shrublet, up to 1 m tall, stems sometimes sparsely leafy. Leaves oblong to oblanceolate, toothed or entire, pubescent with broad-based glandular hairs. Flowers in panicles, sometimes solitary and ?aborted, corolla tube 5.5–9 mm long, inflated above, lobes rounded, obtuse and entire at apex, yellow to brown, with club-shaped hairs in a star-shaped pattern around mouth. Dec.–Apr. Rocky slopes, NH, KB, ?WM, CCR (Kamiesberg Mountains, Damsberg and Bokkeveld Mountains to Ceres and ?Roggeveld). **(gce)**

ramulosa Hilliard Rigid, twiggy shrublet, up to ± 450 mm tall, lower branches spreading from base, upper branches erect, densely scabrid-pubescent. Leaves oblanceolate to oblong, base decurrent down stem in 2 narrow ridges, dentate, densely pubescent, tips often recurved. Flowers in short racemes, ± regular, corolla tube ± 7 mm long, lobes rounded, entire, cream-coloured to yellowish to ± brownish. July. Rocky hills, KV (hills E of Klawer). **(ece)**

robusta Pilg. Shrublet, ± 300–600 mm tall, with rod-like stems from a woody rootstock, densely glandular-pubescent. Leaves oblanceolate to elliptic, toothed, apex acute. Flowers in long, lax racemes, ± regular, corolla tube 11–14 mm long, lobes rounded, often with rolled back margins, orange to red-brown, with club-shaped hairs in a star-shaped pattern around mouth. Apr.–Oct. Rocky places, SN, G (Klein Aus to Cornellsberg). **(ece)**

B.' Stamens inserted in upper third of corolla tube; tube 3–7.5 mm long
C. Perennial herbs, either shrubby or ± simple-stemmed from a woody rootstock

cinerea Hilliard Ashy-grey, aromatic, dwarf shrub, up to ± 600 mm tall, puberulous with shining hairs, appearing felt-like. Leaves opposite, elliptic, entire. Flowers in long, lax thyrses, corolla tube ± 6–7 mm long, purple, limb bilabiate, ochre- to green-yellow, turning red-brown or purple-brown. Oct. Coastal dunes, NS (near Port Nolloth to Hondeklipbaai to S of Groenrivier Mouth). **(ece)**

incana Thunb. Hoary, perennial herb, up to 130 mm tall, stems in a tuft from a woody rootstock, with balloon-tipped hairs. Leaves opposite, basally crowded, elliptic, toothed. Flowers in racemes, corolla tube 5.5–7 mm long, limb bilabiate, lobes oblong, entire, yellow with a dark reddish patch at back of throat. Sept.–Oct. Sandstone slopes, WM (Hantamsberg and Roggeveld Escarpment). **(ece)**

C.' Annual herbs

acutiloba Hilliard Erect annual, 30–110 mm tall. Leaves basal, elliptic, entire to obscurely toothed, glandular-pubescent. Flowers in racemes, almost regular, corolla tube 4–5.5 mm long, lobes deeply bilobed above, white or sometimes ?blue or ?mauve, with a yellow star-shaped patch around mouth and extending down back of tube. Aug.–Sept. ?Habitat, NH (between Springbok and Garies). **(ece)**

aridicola Hilliard Erect annual, ± 50–270 mm tall, stems remotely leafy. Leaves elliptic, tapering below, ± serrate. Flowers in narrow thyrses, bilabiate, corolla tube 2.4–2.8 mm long, dull pale yellow to orange, often with a dark violet patch at back, lobes very narrow, with rolled back margins. Sept. Sandy riverbeds and rocky slopes, SN, G (Sperrgebiet to eastern Richtersveld).

chrysantha Hilliard Minutely glandular-hairy annual, up to 150 mm tall. Leaves crowded basally, ± toothed. Flowers in racemes, sometimes bilabiate, corolla tube 3–4.5 mm long, inflated above, lobes elliptic-oblong, entire, bright yellow with orange patch down back of throat. Apr.–Oct. Riverbeds and gravel patches, TS, CCR (Beaufort West to Swartberg Mountains to Uitenhage).

decipiens Hilliard Glandular-hairy annual, up to 400 mm tall. Leaves crowded near base, ovate to elliptic, tapering below, ± toothed. Flowers in many cymules, bilabiate, corolla tube 3.5–5.5 mm long, inflated above, lobes very narrow, cream-coloured or yellow to brown or maroon, with rolled back margins. Aug.–Oct. Sandy and stony slopes, G, NS, NH, CCR (Richtersveld National Park to Steinkopf to Clanwilliam). **(gce)**

diandra Hilliard Tufted annual, 25–100 mm tall. Leaves basal, elliptic to ovate, tapering below, entire or serrate, glandular-pubescent. Flowers in subcapitate racemes, bilabiate, corolla tube 4.5–6.2 mm long, lobes oblong-elliptic, entire, entirely yellow, with glistening glands on backs. July–Oct. In seasonally moist shallow soil, WM (Roggeveld Escarpment to Nuweveld Mountains). **(ece)**

fragrans Schltr. Tufted annual, 10–150 mm tall. Leaves in a basal spreading rosette, elliptic, tapering at base, entire or serrate. Flowers in dense racemes, bilabiate, corolla tube 3.5–4.5 mm long, lobes entire or shortly bifid, white to pale yellowish or pale to deep mauve with a yellow star-shaped patch around mouth and down back of throat, strongly scented. May–Oct. Sandy flats and stony clay, NH, KV, WM, TS (Springbok to Bushmanland to Knersvlakte to Hantam, Roggeveld to Great Karoo).

gariepina Benth. Erect annual, 70–360 mm tall. Leaves basal, oblanceolate to elliptic, entire or serrate, glandular-puberulous. Flowers in racemes or lax panicles, bilabiate, corolla tube 5–7 mm long, often blackish violet, lobes very narrow, cream to yellow to brown or reddish brown, with margins strongly rolled back. Apr.–Oct. In sand, sometimes over calcrete, G, NH (southern Namibia to Springbok to Gordonia to near Kimberley).

gariesiana Hilliard Erect or decumbent annual, ± 30–150 mm tall. Leaves mostly crowded near base, elliptic to oblanceolate, tapering below, entire to serrate, glandular-pubescent. Flowers in racemes, ± regular, corolla tube 3–4.5 mm long, lobes bilobed or twice bilobed at apex, white (?to mauve in hybrids with **M. silenoides**), with yellow to orange star-shaped patch around mouth, extending into throat. July–Sept. Sandy or clay soils between rocks or pebbles, NH, ?KV (Garies to near Bitterfontein and ?between Nuwerus and Vanrhynsdorp). **(ece)**

minuscula Hilliard Erect annual, 15–150 mm tall. Leaves basal, ovate, tapering below, entire to toothed. Flowers often in racemes, bilabiate, corolla tube 2.5–3.5 mm long, with a dark violet patch at back of throat, lobes very narrow, yellow to orange, with margins ± rolled back and ses-

sile glistening glands on backs. July–Oct. Sandy watercourses and on coarse sandy flats, SN, G, NS (Klinghardt Mountains to lower Gariep Valley to near Holgatrivier). **(ece)**

namibensis (Roessler) Hilliard Erect or ?prostrate annual, 60–350 mm tall. Leaves basal, ovate to elliptic, entire to serrate, glandular-pubescent. Flowers in terminal thyrses, bilabiate, corolla tube 5–7.5 mm long, lobes oblong, entire, margins ± rolled back, greenish brown to orange, dark brown or reddish brown, tube often dark violet, yellowish to orange. June–Oct. Riverbeds and sandy flats, SN (Lüderitz to Klein Aus to near Rosh Pinah). **(ece)**

praeterita Hilliard Glandular-hairy annual, 30–300 mm tall, stems tufted from base. Leaves crowded basally, elliptic, tapering below, obscurely toothed. Flowers in racemes, corolla tube 3–4 mm long, inflated above, lobes elliptic to triangular, bilobed or sometimes twice bilobed at apex, white to mauve with a yellow centre. May–Dec. Sandy slopes and flats, KV, CCR (Bokkeveld Mountains to near Klawer to Clanwilliam). **(gce)**

pusilla E.Mey. ex Benth. Minutely glandular-hairy, often dwarf annual, up to 120 mm tall, hairs on stems balloon-tipped. Leaves crowded basally, rounded, tapering below, mostly entire. Flowers in racemes, bilabiate, corolla tube 2.8–4 mm long, inflated above, lobes very narrow, yellow to brown or maroon, with rolled back margins. July–Sept. Dry rocky places in sand, NH, KV, WM, TS, CCR (northeastern Namaqualand to Calvinia to Little Karoo). **(gce)**

silenoides E.Mey. ex Benth. Erect or decumbent annual, ± 30–300 mm tall. Leaves mostly basal, elliptic to oblanceolate, tapering below, ± serrate. Flowers in racemes, almost regular, corolla tube 3.5–5.5 mm long, lobes bilobed or twice bilobed at apex, mauve to blue, rarely cream-coloured, with yellow to orange star-shaped patch at mouth and extending down tube. Aug.–Sept. Sandy or stony soils often on granite hills, NH, WM (Nababeep to near Komaggas to Garies to near Loeriesfontein). **(ece)**

MICRODON (= *AGATHELPIS*) CAT'S-TAIL BUSH, KATSTERTBOS 7 spp., Namaqualand and SW Cape **(gce)**

dubius (L.) Hilliard Densely leafy shrublet, up to 700 mm tall. Leaves oblong-linear, bracts ovate, keeled, less than half as long as corolla tube. Flowers in a long spike, long-tubed, yellow often with maroon to brown lobes. Mainly Sept.–Jan. Rocky granite and sandstone slopes, KB, CCR (Kamiesberg Mountains and Cederberg Mountains to Ladismith). **(gce)**

NEMESIA CAPE SNAPDRAGON, LEEUBEKKIES ± 60 spp., southern Africa

A. Perennials; leaves mostly with 5 veins from base

fruticans (Thunb.) Benth. (= *N. capensis* (Spreng.) Kuntze, *N. foetens* Vent.) Lax, perennial shrub, up to 800 mm tall. Leaves linear-lanceolate, slightly toothed, margins slightly revolute. Flowers in racemes, white or lilac to pink with a raised yellow palate, hairy in throat, upper lobes oblong, spur ± 4 mm long. Capsule as long as or longer than wide. Mainly Sept.–Nov. Stony slopes, WM, CCR (widespread in southern Africa).

lanceolata Hiern Perennial shrublet, up to 400 mm tall. Leaves lanceolate to narrowly triangular, sessile or subsessile. Flowers in lax terminal racemes, calyx lobes lanceolate, glandular pubescent, corolla white to pink (rarely salmon-pink), upper lip with oblong lobes, lower lip with convex pubescent palate with twin yellow bosses, spur ± 4–6 mm long, projecting downwards. Capsule oblong-ovate, apex emarginate. June–Oct. In crevices on rocky slopes, G, NH (Richtersveld to Kourkammaberg). **(ece)**

A.' Annuals; leaves with a single main vein from base
B. Corolla pouched or saccate
C. Flowers bicoloured (white to pale lilac upper and blue lower)

barbata (Thunb.) Benth. Annual, up to 300 mm tall. Leaves ovate, toothed. Flowers in compact racemes, calyx lobes oblanceolate, up to 5.4 mm long, corolla 15–19 mm long, bicoloured, upper lip white to pale lilac, lobes small, rounded, lower lip sky blue to deep purple, palate densely hairy, sac conical, obtuse, up to 2 mm long. Capsule up to 14 mm long, widely ovate. Aug.–Oct., often after fire. Sandy or loamy flats and slopes in fynbos and renosterveld, KB, CCR (Kamiesberg and Bokkeveld Mountains to Riversdale). **(gce)**

C.' Flowers not bicoloured or colours not as above

aurantia K.E.Steiner Annual, up to 400 mm tall. Leaves ovate to elliptical, margins entire. Flowers in lax racemes, calyx lobes linear to oblanceolate, acute, densely glandular pilose, corolla 13.1–18.8 mm long, upper lip orange distally and pale yellow with brownish streaks at base, lower lip deep orange with dark brown, densely villous, bilobed palate at base, base of corolla tube broadly saccate, ± 1 mm long. Capsule 3.8–8.3 × 4.5–7 mm, apex bilobed. Aug.–Sept. Sandy slopes above river, NH (Swart Doringrivier). **(ece)**

leipoldtii Hiern Annual, up to 300 mm tall. Leaves ovate, toothed. Flowers in lax racemes, calyx lobes broadly ovate, glabrous or with a few, scattered, glandular trichomes, corolla 12–23 mm long, white or greyish blue, lower lip with convex greenish yellow to yellow palate at base, floor of corolla tube with narrow medial pubescent invagination, base of corolla tube rounded or with obtuse conical sac < 2 mm long. Capsule broadly oblong-ovate, as wide as long. Aug.–Sept. Clay flats, WM, TS, CCR (Bokkeveld Mountains and Calvinia to Matjiesfontein). **(gce)**

saccata E.Mey. ex Benth. Annual, up to 300 mm tall. Leaves linear, entire. Flowers in lax racemes, calyx lobes oblong to obovate, glandular puberulent, corolla ± 10 mm long, white to lilac, upper lobes linear oblong, obtuse, with red lines at base, lower lip broadly ovate, wider than long, white with maroon base, palate scarcely raised with two white spots edged in blue, tube maroon, sac short, conical, ± 1.4 mm long, maroon. Capsule triangular, as wide as long. Aug.–Oct. Reddish brown sandy slopes around low shrubs, G, NS (Richtersveld to Hondeklipbaai). **(ece)**

violiflora Roessler Annual, up to 250 mm tall. Leaves broadly ovate, margins entire to shallowly toothed. Flowers in lax racemes, calyx lobes linear-lanceolate, corolla upper lip blue to grey-violet with red spot at base, lower lip with prominent convex palate in lower half, upper surface of palate with single narrow yellow boss, shallowly saccate, lower side yellow. Capsule narrowly oblong, > 2 times as long as wide, apex bilobed, lobes acute. July–Oct. Shaded wet places under rocks, SN, G (Sperrgebiet: Rooiberg to Numeis). **(ece)**

B.' Corolla with distinct tubular spur
D. Floor (hypochile) of corolla tube glabrous

karroensis Bond Annual, up to 250 mm tall. Leaves ovate, entire, acute. Flowers in lax racemes, calyx lobes lanceolate, acute, glandular pilose, strongly reflexed, corolla 14–23 mm long; upper lip with narrowly linear or oblong lobes, white with purplish base; yellow patch with vertical purplish lines just above spur mouth, lower lip yellow with darker yellow palate, floor of corolla tube and palate glabrous, spur 9.5–12.3 mm, projecting back and downwards, tip strongly recurved. Capsule ovate, ± 7 × 5 mm. Clay loam flats and drainage lines, TS (Tanqua Karoo). **(ece)**

williamsonii K.E.Steiner Annual, up to 280 mm tall. Leaves lanceolate-ovate to ovate, apex acute, base rounded to cuneate. Flowers in lax racemes, calyx lobes lanceolate, acute, sparsely glandular pilose, margins entire to toothed, corolla 10–16 × 10–15 mm, upper lip orange, lower lip orange with strongly convex yellow palate in lower half, spur projecting backwards, mostly 3.1–4.2 mm long, not strongly recurved apically. Capsule oblong, 4.5–13 × 3.6–7 mm, bilobed. June–Sept. Quartzitic sands on flats and slopes, SN, G (Fish River Canyon to Richtersveld National Park).

sp. A Annual, up to 200 mm tall, densely viscid-pubescent, often coated with sand. Leaves linear to lanceolate, margins entire. Flowers in compact racemes, calyx lobes oblong, glandular pilose, corolla 5.4–8 mm long, glabrous throughout, upper lip yellow with brownish markings at base, lower lip yellow with convex palate, ± 2.5 mm long, ending in a single, protruding, deep yellow boss or callosity, spur projecting back and curving upwards, acute, 4.5–4.6 mm long. Capsule narrowly oblong, ± 7.5–8 × 4 mm, densely glandular pilose, apex bilobed, on recurved pedicel. Aug.–Sept. White or reddish brown sands at coast or somewhat inland, NS (Port Nolloth to Groenrivier Mouth). **(ece)**

D.' Floor (hypochile) of corolla pubescent
E. Base of capsule strongly oblique

anisocarpa E.Mey. ex Benth. Annual, up to 600 mm tall. Leaves elliptic-lanceolate, slightly toothed. Flowers in lax racemes, calyx lobes lanceolate, glandular pubescent, corolla 15–26 mm long, upper lip with narrowly oblong lobes, white or pale orange with yellow rectangular spot at base, lower lip yellow or pale orange, with strongly convex bilobed palate at base, palate glabrous, yellow or orange, smooth or cristate, often with red or brown veining, tube pubescent

within, spur 3.5–5.4 mm long, projecting downwards. Capsule narrowly oblong, longer than wide. Aug.–Sept. Stony flats, G, NS, NH, KB, KV, WM, TS, CCR (Richtersveld to Baviaanskloof Mountains). **(gce)**

fleckii Thell. Annual, up to 300 mm tall. Leaves ovate, toothed to nearly entire. Flowers in lax racemes, calyx lobes lanceolate, glandular pubescent, corolla 15–20 mm long, greyish magenta, upper lip with greenish yellow rectangular spot at base, lower lip with convex palate at base, upper surface of palate greenish yellow, with two diverging glabrous bosses, spurs projecting backwards, ± straight, pinkish white. Capsule oblong to oblong-ovate. Apr.–Sept. Reddish brown sands with quartz pebbles, SN (Haalenberg, Klinghardt Mountains and Klein Karas).

maxii Hiern Annual, up to 300 mm tall. Leaves ovate, entire or sparsely toothed. Flowers in lax racemes, calyx lobes lanceolate to ovate, glandular pilose, corolla 17–20 mm, upper lip pink, fading to lilac with yellow rectangular spot at base, lower lip violet-red, with prominent convex palate at base, palate yellow or greenish yellow, smooth or cristate, ± half length of lower lip, with twin yellow bosses, spur 4–5 mm long, greyish white, projecting downward and curving slightly forward. Capsule oblong to oblong-ovate, 7.5–8 × 3–4 mm. May–Oct. Reddish brown sandy flats, NH (Springbok to Kakamas).

E.' Base of capsule not strongly oblique

azurea Diels Annual, up to 300 mm tall. Leaves elliptic, shallowly toothed. Flowers in lax racemes, calyx lobes oblong to ovate, corolla 14–25 mm long, pale violet, occasionally yellow, with deep yellow or orange palate, spur 6–7 mm long, projecting backwards and bent sharply downward in distal half. Capsule longer than wide. Aug.–Sept. Well-drained soil, WM (Calvinia to Komsberg). **(ece)**

bicornis (L.) Pers. Diffuse annual, up to 800 mm tall, branching above. Leaves narrowly elliptic-lanceolate, toothed to pinnatifid. Flowers in lax, branched racemes, calyx lobes lanceolate to ovate, glandular pilose, corolla 11–22 mm long, upper lip with linear-oblong lobes, white to pale lilac (sometimes yellow), with grey or red veining at base, lower lip white to pale lilac (sometimes yellow), with convex palate at base, palate white-pubescent, with 2–4 orange pubescent bosses, spur ± 4–5 mm long, projecting back and deflected downward in distal half. Capsule triangular, bilobed at apex, lobes acute, often turned outwards. Aug.–Oct. Coastal and inland sandveld, NS, NH, CCR (Port Nolloth to Agulhas Plain). **(gce)**

calcarata E.Mey ex Benth. Annual, up to 300 mm tall. Leaves elliptic-lanceolate, slightly toothed. Flowers in lax racemes, calyx lobes ovate, glandular pubescent, corolla up to 26 mm long, upper lip white or pale yellow, lower lip yellow to orange-yellow, palate with 2 orange glabrous bosses, spur ± 12 mm long, projecting downwards or deflected forward, ± straight, acute, exceeding lower lip, glandular pubescent. Capsule broadly ovate, ± 9 × 8 mm, glandular pubescent. Aug.–Oct. Sandy slopes and flats, WM, TS, CCR (Loeriesfontein to Hex River Valley). **(gce)**

cheiranthus E.Mey. ex Benth. Annual, up to 400 mm tall. Leaves elliptic-lanceolate, slightly toothed. Flowers in lax racemes, calyx lobes lanceolate, glandular pubescent, corolla 17–26 mm long, upper lip ± 2× length of lower lip, lobes linear, white or lavender, with orange rectangular spot at base, often surrounded by blue and marked with purple, lower lip yellow or white, with a convex palate at base, palate glabrous with 2 orange bosses, spur 3–5 mm long. Capsule oblong emarginate, ± 8 × 5.4 mm. Aug.–Sept. Sandy slopes and clay loam flats, NH, WM, CCR (Komaggas and Nieuwoudtville to Citrusdal). **(gce)**

euryceras Schltr. Annual, up to 300 mm tall. Leaves: lower spathulate to elliptic, upper lanceolate to sublinear. Flowers in lax racemes, calyx lobes lanceolate to ovate, glandular pilose, corolla 15–17 mm long, upper lip pale violet with red-violet lines, lower lip pale violet, with a convex palate at base, palate white to greenish yellow, spur ± 2 mm long, conical. Capsule ovate-oblong, ± 4 × 5 mm. July–Aug. Sandy flats, KV (Vanrhynsdorp and Vredendal to Griquatown).

hemiptera K.E.Steiner Wiry-stemmed annual, up to 310 mm tall. Leaves lanceolate to ovate, subglabrous to sparsely glandular puberulous, entire to shallowly dentate. Flowers small, axillary or in lax racemes, calyx lobes narrowly lanceolate, acute, glandular pilose, corolla 6.2–9.6 mm long; white with brown rectangular spot above mouth, spur nib-like, 0.5–0.8 mm long. Capsule ovate to oblong, ± as wide as long, 3.4–4.6 × 3.5–4.5 mm. Mainly Aug.–Sept. Sandy slopes at base of large granite outcrops, NH, KB (Bowesdorp to Garies). **(ece)**

ligulata E.Mey. ex Benth. (= *N. macroceras* Schltr.) Annual, up to 400 mm tall. Leaves elliptic or lanceolate, slightly toothed. Flowers in lax racemes, calyx lobes oblong to ovate, glandular pilose, corolla 15–18 mm, upper lip white or pale yellow, with linear to narrowly oblong lobes and yel-

low to orange rectangular spot at base, lower lip yellow or orange with convex palate at base, palate with 2 orange bosses, glabrous, spur 5.5–7 mm long, projecting downward, obtuse, curving forward, obtuse or slightly swollen at tip. Capsule ± 7.2 × 5.9 mm, oblong, apex emarginate. Aug.–Oct. Sandy slopes and flats, G, NS, KB, CCR (Klipfontein to Bonteberg). **(gce)**

pulchella Schltr. ex Hiern Annual, up to 300 mm tall. Leaves mostly lanceolate to linear, glabrous or with occasional glandular trichomes. Flowers in lax racemes, calyx lobes ovate, glandular-puberulent, corolla 17–21 mm long, upper lip white to pale yellow, lower lip yellow with basal palate bearing 2 orange bosses, spur conical, 3.9–5.9 mm long, deflexed, ± straight. Capsule ovate to oblong, 3.9–6.8 × 3.6–5.3 mm. Aug.–Sept. Sandy flats in shallow drainage lines, NH (Springbok to Rietkloof). **(ece)**

suaveolens K.E.Steiner Annual, up to 320 mm tall. Leaves lanceolate to ovate or elliptical. Flowers in lax, terminal racemes, calyx lobes lanceolate, acute, densely glandular pubescent, corolla 11.6–21 mm long, upper lip greyish white, with deep magenta base surrounding a bright yellow rectangular spot above corolla mouth, lower lip pale yellow with convex palate at base, palate with 2 raised oblong glabrous and cristate bosses, spur 3.5–4.8 mm long, ± equal to length of lower lip. Capsule ovate to oblong in outline, 4–10 × 3.5–6.5 mm. July–Sept. Sandy flats and dry streambeds, TS (Tanqua Karoo). **(ece)**

versicolor E.Mey. ex Benth. Annual, up to 300 mm tall. Leaves lanceolate, toothed to entire. Flowers in lax racemes, calyx lobes ovate, glandular-puberulent, corolla 16–20 mm long, upper lip yellow or pale blue-violet, with white or yellow patch and darker lines at base, lower lip with convex palate at base, palate 4.7–6.7 mm long, outwardly projecting, with 2 diverging bosses covered with yellow or orange clavate trichomes, spur ± 6–8 mm long, projecting back and curving downwards in distal third. Capsule wider than long, 5.8–6.2 × 6.3–7.7 mm. July–Sept. Sandy flats, G, NH (Spektakel Pass to Bitterfontein). **(ece)**

sp. B Annual, up to 250 mm tall. Leaves lanceolate to deltoid, serrate to serrulate. Flowers in lax racemes, calyx lobes oblong to obovate, glandular puberulent, corolla 11.5–18 mm, upper lip greyish magenta, with yellow rectangular spot and purple lines at base above mouth, lower lip greyish magenta with convex palate at base, base with smooth or cristate yellow boss, spur 4.2–6.7 mm long, projecting downward and curving forward, exceeding lower lip. Capsule oblong 6–7.2 × 3.9–4.6 mm. Aug.–Sept. Clay loam flats, WM (Laingsburg to Fraserburg).

sp. C Annual, ?up to 300 mm tall. Leaves lanceolate to ovate, coarsely serrate, glabrous. Flowers in lax racemes, calyx lobes oblanceolate to ovate, corolla 12–23 mm long, upper lip orange, white, or pale yellow, with yellow patch at base, lower lip orange or yellow, with strongly convex palate at base, palate orange or yellow, glabrous, with single, elongate, orange, pubescent ridge or boss, spur 5–10 mm long, projecting back and deflected downward in distal third (rarely recurved). Capsule ovate to obovate, 8.1–11.7 mm long. Aug.–Oct., especially after fire. Sandy flats and lower slopes between renosterveld and fynbos, TS, CCR (Matjiesfontein to Ladismith). **(gce)**

sp. D Annual, up to 280 mm tall. Leaves lanceolate to linear, entire or shallowly toothed. Flowers in lax, terminal racemes, calyx lobes lanceolate to ovate, acute, glandular-puberulent, corolla 11.7–15.4 mm long, pale yellow, lower lip with convex palate, with twin, yellow, glabrous bosses projecting outward and diverging, spur 5–6 mm long, projecting downwards and curving forward, tube with orange spot at spur mouth. Capsule ovate to oblong, 5.5–7.7 × 5.5–5.7 mm. May–Sept. In reddish brown sands, NH (Varsputs to Bushmanland).

sp. E Like **N. azurea** but flowers blue-violet and spur 3.2–6.2 mm long, usually exceeding the lower lip, projecting downward rather than backwards. Aug.–Sept. Granite hills in sand, KB (Kamiesberg Mountains). **(ece)**

[**Imperfectly known species** **N. glaucescens** Hiern, **N. platysepala** Diels and **N. viscosa** E.Mey. ex Benth. In addition, several undescribed species may still need to be recognised.]

OFTIA LAZY BUSH, SUKKELBOSSIE 3 spp., Namaqualand to Uitenhage **(gce)**

revoluta (E.Mey.) Bocq. Woody shrub, up to 1.5 m tall, branches ascending, with leaves. Leaves closely overlapping in 4 rows, broadly lanceolate, glandular-pubescent, margins revolute, with down-turned teeth, base running into ridges down stem. Flowers in axils of upper leaves, tubular with small rounded lobes, white. Fruit a round drupe. Frequently in renosterveld and fynbos, NH, KB (Okiep to Kamiesberg Mountains). **(ece)**

PELIOSTOMUM ± 7 spp., Africa

leucorrhizum E.Mey. ex Benth. Laxly branched shrublet, up to 250 mm tall, stems pale near base. Leaves linear to narrowly obovate, nearly glabrous. Flowers shortly pedicellate, corolla tube ± funnel-shaped, pale with dark longitudinal lines, lobes purplish with darker markings in throat, anthers long-haired. Sept.–Mar. Karroid flats, SN, G, NH, WM, TS, CCR (Namibia to Botswana to eastern Namaqualand to Little Karoo to S tropical Africa).

virgatum E.Mey. ex Benth. (including **P. viscosum** E.Mey. ex Benth.) Laxly branched shrublet, up to 300 mm tall. Leaves sessile, narrowly ovate, glandular-hairy. Flowers sparse, shortly pedicellate, corolla tube narrowly funnel-shaped, pale and striped, lobes violet, anthers shortly hairy. Aug.–Nov. Stony slopes and flats, G, NS, NH, KV, WM, CCR (southern Namibia, Richtersveld, Bushmanland, Namaqualand and western Karoo to Clanwilliam).

PHYLLOPODIUM CAPEWORT, OPSLAG 26 spp., Namibia and South Africa, mostly W Cape

A. Flowers with only 2 stamens

anomalum Hilliard Minutely glandular-hairy annual, up to 250 mm tall, hairs on stems eglandular, spreading. Leaves petiolate, ovate-elliptic, slightly toothed, grading into floral bracts. Flowers in leafy racemes, white, stamens only 2, bracts glandular-puberulous on backs, seeds ± mauve-grey outside, amber-coloured inside. July–Sept. Sandy, clay and gravelly soils, NH, WM, CCR (northern Namaqualand to Hantam to Roggeveld Escarpment to Montagu). **(gce)**

A.' Flowers with 4 stamens
B. Flowers in compact round heads terminating innumerable twiglets corymbosely or divaricately arranged

cephalophorum (Thunb.) Hilliard Hairy annual, up to 300 mm tall, stems corymbosely branched above, hairs on stems eglandular, retrorse. Leaves petiolate, oblanceolate, slightly toothed. Flowers many in crowded heads, mauve, pink or white, stamens 4, outer bracts shaggy in lower half, seeds smooth, dark blue-grey. Sept.–Oct. Sandy flats, below 300 m, NS, KV, CCR (just N of Vredendal to near Klawer to Cape Peninsula). **(gce)**

hispidulum (Thell.) Hilliard Annual, ± 35–80 mm tall, stems divaricately branched from base, hairs on stems mostly eglandular. Leaves elliptic to ovate-elliptic, smaller upwards, entire or few-toothed, hispid. Flowers few in crowded, capitate heads, all lobes mauve, stamens 4, seeds smooth, dark blue-grey. Sept.–Oct. On slopes, SN, G (Klinghardt Mountains and lower Gariep Valley). **(ece)**

phyllopodioides (Schltr.) Hilliard Hairy annual, up to 250 mm tall, stems corymbosely branched above, hairs on stem eglandular, retrorse. Leaves petiolate, oblanceolate, slightly toothed. Flowers few to several in crowded heads, mauve, lilac or rarely white, stamens 4, outer bracts with long hairs only on margins, seeds smooth, dark blue-grey. July–Sept. Sandy flats, below 300 m, KV, CCR (just N of Vanrhynsdorp to Saldanha Bay). **(gce)**

pumilum Benth. Single-stemmed to divaricately branched annual or perennial herb, ± 40–190 mm tall, hairs on stem eglandular, often minutely glandular on upper parts. Leaves petiolate, ovate to elliptic, becoming smaller upwards, entire or toothed, softly pubescent. Flowers few to several in crowded capitate heads, all lobes white to cream-coloured to lilac-mauve, stamens 4, seeds smooth, dark blue-grey. July–Oct. Sand dunes and inland sandy and gravelly paces, G, NS, NH (lower Gariep Valley to near Garies and Hondeklipbaai to Brand-se-Baai). **(ece)**

B.' Flowers in compact round heads terminating nude or sparsely bracteate peduncles

collinum (Hiern) Hilliard Mostly eglandular-hairy annual, 30–300 mm tall, stems leafy, tending to develop dwarf axillary shoots. Leaves linear-oblong to narrowly elliptic, entire or toothed, hairy. Flowers few to many in rounded heads, upper lobes orange-yellow, lower lip cream-coloured, stamens 4, bracts mostly eglandular on backs, seeds wrinkled, pale. July–Sept. Sandy or gravelly flats or slopes, NH (Okiep to near Bitterfontein). **(ece)**

heterophyllum (L.f.) Benth. Annual, up to 300 mm tall, hairs on stems mostly eglandular, retrorse. Leaves petiolate, elliptic, toothed. Flowers in small heads elongating into racemes, cream-coloured to pale yellow with patches of orange at base of lower lip and inside corolla tube, stamens 4, bracts ± glabrous on backs, seeds ± mauve to copper-coloured. Aug.–Sept. Sandy flats and slopes, KV, CCR (just N of Vanrhynsdorp to Port Beaufort). **(gce)**

lupuliforme (Thell.) Hilliard Annual, ± 65–150 mm tall, stem simple or branched from base, with glandular-pubescent hairs on upper parts. Leaves elliptic to rhomboid in lower 2 or 3 lower pairs, upper ones smaller and sessile, entire or ± serrate, thick, hairy. Flowers in crowded rounded heads, ?colour, stamens 4, bracts glabrous on backs, seeds dark blue-grey. Aug. On hills, NH (northern Namaqualand). **(ece)**

maxii (Hiern) Hilliard Glandular-hairy annual, 40–300 mm tall, tending to develop dwarf axillary shoots. Leaves narrowly elliptic, entire or toothed, becoming smaller upwards. Flowers few to many in rounded heads, upper lobes orange-yellow, lower lip ?white, stamens 4, bracts mostly glandular on backs, seeds pale outside, amber-coloured inside. July–Sept. Sandy or gravelly flats or slopes, NH (near Aus to Bushmanland to eastern Namaqualand).

namaense (Thell.) Hilliard Twiggy, rounded annual, ± 20–150 mm tall, with several stems from base, sparsely to densely pubescent. Leaves broadly elliptic in 2 basal pairs, upper ones narrower and shorter. Flowers in crowded rounded heads, upper lobes orange, lower lip white or mauve, stamens 4, seeds wrinkled, pale. July–Oct. In sandy places, SN, G (Lüderitz to lower Gariep Valley). **(ece)**

POLYCARENA CAPE-PHLOX 17 spp., N and W Cape **(gce)**

*A. Flowers crowded into ± rounded or spreading terminal heads (see also **P. rariflora**)*

aurea Benth. Shortly glandular-hairy annual, up to 200 mm tall. Leaves narrow and sparsely toothed. Flowers in small, rounded, terminal heads, corolla tube 3–3.5 mm long, glabrous, entirely yellow or white with upper lip tipped with yellow. Sept. Sandy or clay flats and slopes, WM, TS, CCR (Kubiskouberg to Bokkeveld Plateau to Ceres to Karoopoort to Roggeveld). **(gce)**

batteniana Hilliard Glandular-hairy annual, up to 180 mm tall. Leaves obscurely toothed. Flowers in terminal heads, corolla tube 10–17 mm long, mostly glabrous, cream-coloured to white with yellow patch at base of upper lip. Sept. Sandy slopes, NH, CCR (Garies to Wuppertal). **(gce)**

pubescens Benth. Glandular-hairy annual, up to 280 mm tall. Leaves narrow and obscurely toothed. Flowers in small, rounded, terminal heads, corolla tube 3.5–5 mm long, glabrous, white with yellow patch in throat and on tips of upper lobes. July–Sept. Moist rocky sites, NH, WM, TS, CCR (Okiep to Bokkeveld Mountains to Roggeveld to Montagu). **(gce)**

A.' Flowers in lax racemes or spikes

comptonii Hilliard Delicate annual, 20–100 mm tall, stem filiform, glandular-pubescent only at base. Leaves in a basal rosette of 4, ovate to elliptic, entire or toothed, only a few in upper parts. Flowers in loose racemes, corolla tube 1.5–2 mm long, glabrous, upper lobes orange, lower lobes white, stamens 2 or 4. Aug. S-facing slopes and elevated flats, WM, TS (Roggeveld Escarpment to near Matjiesfontein). **(ece)**

filiformis Diels Delicate, glandular-pubescent annual, 120–250 mm tall, stem usually well-branched from base. Leaves oblanceolate to linear, decreasing in size upwards, few-toothed to entire. Flowers in terminal racemes, corolla tube 2.6–3.6 mm long, glabrous, white, ?with a yellow patch at base of upper lip. Aug.–Sept. On slopes in shady places, WM (SW and N of Calvinia). **(ece)**

rariflora Benth. Glandular-hairy annual, up to 250 mm tall. Leaves elliptic to narrowly spathulate, upper ones ± linear, sparsely toothed. Flowers in lax spikes, often cleistogamous, corolla tube 3–5 mm long, glabrous, white or cream-coloured with orange at base of upper lobes and often on tips of upper lobes. July–Oct. Moist sandy patches, NH, KB, WM, TS, CCR (Okiep to Bokkeveld Mountains to Roggeveld to Hex River Mountains to Outeniqua Mountains). **(gce)**

tenella Hiern Delicate, glandular-puberulous annual, 30–190 mm tall, stems simple or branched. Leaves mostly oblanceolate, few-toothed. Flowers in lax terminal racemes, corolla tube 1–1.5 mm long, glabrous, lobes pointed at apex, entirely white. Aug.–Oct. Sheltered under rocks and

bushes, G, NH, WM, TS, CCR (Richtersveld to Cederberg Mountains to Roggeveld to Karoopoort and Whitehill Ridge). **(gce)**

SELAGO (= *WALAFRIDA*) AARBOSSIE, BITTER BUSH ± 190 spp., southern Africa

Group A

Dwarf shrublets or subshrubs; leaves tufted, ericoid; flowers in small spikes or racemes either solitary or in loose panicles, white or mauve; calyx obliquely 3- or 5-lobed, sometimes irregularly 3–5-lobed; anthers all exserted (as for Group 9 in Hilliard (1999))

sp. A (closely allied to **S. saxatilis** E.Mey.) Dwarf shrublet, ± 100–500 mm tall, stems many from a woody rootstock. Leaves tufted, oblong to oblong-lanceolate, thick, hairy on margins near base, glandular-punctate. Flowers in crowded spikes, mauve, calyx obliquely 2- or 3-lobed. Feb.–Apr. On dolerite ridges, WM (Roggeveld to Nuweveld Mountains). **(ece)**

Group B

Annual or perennial herbs; leaves tufted; flowers in panicles composed of small glomerules, white; calyx 3-lobed; anthers well exserted (as for Group 15 in Hilliard (1999))

dinteri Rolfe Perennial herb, 150–700 mm tall, stems tufted from a woody rootstock, puberulous with strongly recurved hairs or rarely glabrous. Leaves tufted, oblong-elliptic to lanceolate, margin mostly entire, thickened. Flowers in crowded racemes arranged in long narrow panicles, white, calyx obliquely 3-lobed. Year-round. Sandy places, often in dry riverbeds, G (Namibia and Botswana to Richtersveld).

Group C

Dwarf shrublets; leaves not tufted; flowers in spikes or racemes, either solitary or in loose panicles, white; calyx 5-fid halfway or more; anthers all well exserted or posterior in mouth (as for Group 1 in Hilliard (1999))

gloiodes Hilliard Closely leafy shrublet or perennial herb with a woody rootstock, up to 400 mm tall, old stems bare, young parts appearing varnished. Leaves not tufted, ± spreading, oblong-elliptic, thick, margins revolute. Flowers in crowded, spike-like racemes, white. Aug.–Oct. Stony slopes, TS, CCR (Hex River Mountains to Witteberg Mountains and Klein Roggeveld). **(gce)**

glutinosa E.Mey. Dwarf shrublet, ± 400 mm tall, young parts of stems with adpressed hairs, often appearing varnished. Leaves not tufted, spreading, crowded, linear to terete, thick, longitudinally grooved above. Flowers in dense, oblong, spike-like racemes, white, posterior stamens in mouth or included in tube, calyx coarsely hairy. Mostly Aug.–Nov. Sandy and stony slopes, NH, KB, WM, CCR (Steinkopf to Kamiesberg Mountains to Clanwilliam to Karoopoort to Montagu). **(gce)**

marlothii Hilliard Dwarf shrublet, ?height, young stems closely leafy, puberulous. Leaves not tufted, subterete, tip mucronate, recurved, base decurrent, upper surface glandular punctuate. Flowers in crowded racemes, white. Sept. ?Habitat, TS (Swanepoelspoortberg, ENE of Willowmore). **(ece)**

morrisii Rolfe Dwarf shrublet, ± 150–600 mm tall, branches virgate and lax, young parts often appearing varnished. Leaves not tufted, erect or spreading, linear-oblong, base decurrent, entire. Flowers in crowded spikes, white fading to cream-coloured, calyx densely hairy. Aug.–Sept. Rocky slopes, NH, KV, CCR (near Springbok to Bokkeveld Mountains). **(gce)**

scabribractea Hilliard Like **S. glutinosa** but stems with spreading, glandular hairs, bracts and calyx with broad-based, gland-tipped and acute hairs on outside. Sept.–Oct. Stony slopes, NH, WM, CCR (near Kamieskroon and Bokkeveld Plateau to Calvinia to Pakhuis Mountains and St. Helena Bay). **(gce)**

Group D

Dwarf shrublets; leaves in loose to tight tufts, primary leaves often fairly broad; flowers in congested or lax racemes, solitary or in panicles, white or shades of blue to violet or pink; calyx often lobed to about halfway, mostly 3-lobed or irregularly 3–5-lobed; anthers all well exserted (as for Group 4 in Hilliard (1999))

hermannioides E.Mey. Dwarf shrublet, 150–350 mm tall, young stems densely pubescent, closely leafy. Leaves weakly tufted, elliptic, entire, densely pubescent with short hairs, margin ± revolute, axillary ones similar. Flowers in ± pyramidal panicles, white, calyx pubescent all over. Aug.–Sept. Sandy soils, in moist depressions, NH, KB (near Kamieskroon to Garies to Kamiesberg Mountains). **(ece)**

namaquensis Schltr. Dwarf shrublet, ± 110–300 mm tall, stems tufted from a woody rootstock, young parts pubescent and closely leafy. Leaves tufted, elliptic to narrowly elliptic, entire, margins weakly revolute, ± roughly hairy. Flowers in short, pyramidal panicles, white, calyx obliquely 5-lobed. July–Sept. Sandy soils, G, NS, NH, KB (Lekkersing to Steinkopf to near Soebatsfontein to near Bitterfontein and ?near Loeriesfontein). **(ece)**

pinguicula E.Mey. Twiggy shrublet, 150–350 mm tall, with young branches pubescent. Leaves in loose tufts, narrowly elliptic, ± rough, margins entire, slightly revolute. Flowers in short, compact, rounded racemes, white, calyx inflated, including at least half the corolla tube, bracts pouched, wrinkled at base. July–Oct. Stony clay soils in renosterveld, NH, KB, WM, TS, CCR (Springbok, Kamiesberg Mountains and Bokkeveld Mountains and Hantamsberg to Roggeveld to ?Hex River Valley to near ?Fraserburg). **(gce)**

polygala S.Moore Compact, pungent-smelling, glabrescent shrublet, 150–350 mm tall, tufted from top of stout, woody rootstock, stems shortly hairy on young parts. Leaves ± tufted, broadly elliptic to oblong-elliptic, axillary ones smaller. Flowers in dense racemes, white, calyx with scattered, minute glands on outside. July–Sept. Stony karroid slopes, WM, TS, CCR (?Calvinia, Roggeveld Escarpment to Hex River Valley). **(gce)**

rigida Rolfe Twiggy, rounded, dwarf shrublet, ± 200–600 mm tall, young branches pubescent, closely leafy. Leaves tightly clustered, elliptic or triangular, thick, entire, often appearing varnished, sometimes hairy, axillary ones smaller. Flowers in congested spikes, white or pale mauve, calyx usually 3-lobed. July–Oct. Shaley slopes, WM (?Bokkeveld Plateau, Roggeveld Escarpment to Nuweveld Mountains). **(ece)**

subspinosa Hilliard Twiggy, white-hairy shrublet, ± 120–350 mm tall, flowering branches becoming spine-tipped. Leaves tufted, linear, thick, margins revolute. Flowers in small, mainly single clusters, mauve or pink, stamens well exserted, bracts and calyx with minute, stalked glands. Aug.–Sept. Stony flats, WM, TS (Calvinia to Roggeveld Escarpment to Klein Roggeveld to near Matjiesfontein). **(ece)**

Group E

Dwarf shrublets; leaves usually tufted; flowers in spikes or racemes either solitary or in loose panicles, white or mauve; calyx mostly obliquely 5-lobed in upper half, or irregularly 3–5-lobed; anthers all well to far exserted (as for Group 8 in Hilliard (1999))

acocksii Hilliard Densely leafy, minutely puberulous shrublet, ± 100–300 mm tall. Leaves tufted, oblong, minutely glandular throughout. Flowers in oblong spikes, white, bracts minutely glandular and with few to many acute hairs. Feb.–Oct. Dry stony slopes, TS, CCR (near Matjiesfontein to Swartberg Mountains to Great Karoo and Free State).

articulata Thunb. Finely leafy, dwarf shrublet, ± 150–250 mm tall. Leaves tufted, needle-like, spreading, ± thick, often appearing varnished. Flowers in short spikes, white to pale mauve, calyx deeply 2- or 3-lobed. (May–)Sept.–Oct. Stony flats and slopes, WM, CCR (Bokkeveld Mountains and Roggeveld Escarpment). **(gce)**

centralis Hilliard Dwarf shrublet, up to ± 450 mm tall, subspinescent from old bare inflorescence axes. Leaves tufted, linear to narrowly oblanceolate, somewhat thick, margins entire, revolute, minutely scabridulous. Flowers in spikes, violet to mauve or ?sometimes white, calyx mostly 5-lobed, rarely 3–7-lobed. (Sept.–)Jan.–May. Open sites in sandy and stony soils, WM (south-eastern Namibia to Calvinia to Roggeveld Escarpment to Great Karoo).

diabolica Hilliard Dwarf, well-branched, minutely glandular-puberulous shrublet, ?± 150 mm tall, stems with blackish bark. Leaves not or scarcely tufted, oblong to narrowly elliptic, margins

thickened, slightly revolute. Flowers in terminal racemes, white, calyx 5-lobed, obliquely campanulate. Oct. On slopes among rocks, G (Richtersveld: Helskloof). **(ece)**

distans E.Mey. Dwarf, twiggy shrublet, ± 150–450 mm tall, subspinescent from old bare inflorescence axes, young parts shortly hairy. Leaves tufted, oblong, margins entire, thickened, revolute, glabrous, often appearing varnished later. Flowers in crowded spikes, white, calyx mostly 5-lobed. June–Oct. Stony places, TS, CCR (Touwsrivier to Matjiesfontein to Anysberg to Groot Swartberg Mountains). **(gce)**

fourcadei Hilliard Densely leafy shrublet, up to 300 mm tall. Leaves in loose tufts, linear, minutely glandular-punctate, margins thickened. Flowers in short spikes, purple or whitish flushed mauve. Sept.–Nov. Stony slopes, TS, CCR (Witteberg and Swartberg Mountains to Willowmore and southern Karoo).

geniculata L.f. Grey-hairy, finely leafy shrublet, up to 600 mm tall. Leaves tufted, linear. Flowers in elongate, narrow spikes, violet, sometimes white, calyx 3–5-lobed, bracts with abruptly acute to shortly acuminate, recurved tips. Nov.–Apr. Stony slopes and flats, TS, CCR (Upper Karoo to Free State to Hex River Valley to E Cape).

Group F

Dwarf shrublets or subshrubs; leaves tufted, often ericoid; flowers in a long, narrow panicle of small, globular spikes or racemes, white or shades of violet; calyx mostly 5-lobed, rarely irregularly 3–5-lobed; anthers all well exserted (as for Group 10 in Hilliard (1999))

albida Choisy Finely pubescent to velvety shrublet, 150–600 mm tall. Leaves in tufts, linear. Flowers in racemes with long peduncles forming loose panicles, usually shades of violet, calyx 5-lobed, obliquely campanulate. Mainly May–Sept. Stony or rocky sites, WM, CCR (Hantamsberg to Roggeveld to Little Karoo and Great Karoo to Free State).

angustibractea Hilliard Dwarf shrublet, 70–600 mm tall, stems tufted from a woody rootstock, tips of old branches becoming subspinescent, young parts pubescent with recurved hairs. Leaves ± tufted, obovate to oblanceolate. Flowers in small racemes, white, calyx 5-lobed, obliquely campanulate. May–Oct. On stony or rocky slopes and flats, SN, G, NS, NH (central Namibia to near Hondeklipbaai).

beaniana Hilliard Dense, rounded shrublet, ± 0.4–1.5 m tall, pubescent on young parts with minutely stellate or branched hairs. Leaves tufted, elliptic to narrowly spathulate, thick, velvety. Flowers in narrow, loose panicles, mauve, calyx 5-lobed, velvety outside. Aug.–Sept. Rocky and stony places, G, NH (Richtersveld uplands and Langberg). **(ece)**

divaricata L.f. Twiggy, divaricately branched, sometimes lax, minutely puberulous shrublet, up to 0.8–1 m tall, with pale bark. Leaves tufted, linear-oblong, sometimes glabrescent, primary leaf strongly reflexed. Flowers in small, rounded clusters, axes of inflorescences becoming spine-tipped, white to violet, calyx 3–5(6)-lobed. Mostly Sept.–Dec. Stony slopes and flats, WM, TS, CCR (Namibia to Hantam, Roggeveld, Little Karoo and Great Karoo).

farrago Hilliard Dwarf, ± sprawling shrublet, 0.6–1 m tall, puberulous on young parts, closely leafy. Leaves distinctly tufted, linear, thick, glandular-punctate. Flowers in broad terminal panicles, mauve, calyx 4- or 5-lobed. Sept. On rocky granite slopes, KB (Kamiesberg Mountains). **(ece)**

florifera Hilliard Dwarf shrublet, ?height, with pubescent leafy branches. Leaves tufted, ovate or broadly elliptic, margins thickened, sometimes revolute. Flowers in congested spikes, white, calyx 3- or rarely 5-lobed. Sept. ?Habitat, WM (Roggeveld Escarpment). **(ece)**

glabrata Choisy Densely leafy, virgate shrublet, ± 100–600 mm tall. Leaves tufted, linear. Flowers in dense spikes arranged in narrow, lax panicles, white (in Namaqualand) to mauve, calyx 5-lobed. Sept.–Oct. Stony slopes in renosterveld and karroid scrub, G, NH, KB, KV, WM, CCR (Richtersveld to Bokkeveld Mountains to Calvinia to Worcester and Little Karoo). **(gce)**

inaequifolia Hilliard Like **S. multiflora** but virgately branching, hairs on stem spreading, and primary leaves of leaf cluster 8–20 mm long, much longer than secondary leaves. Aug.–Oct. Sandy flats, KV (E of Klawer). **(ece)**

multiflora Hilliard Like **S. divaricata** but bark dark, leaves markedly pilose and glandular-punctate, primary leaves 2.5–8 mm long, flowers copious, bracts larger (2.2–3.2 vs. 1.4–2.4 mm long) and corolla tube longer (2.3–3.8 vs. 1.3–2.4 mm). Sept.–Nov. Rocky slopes, NH, CCR (near Springbok to Hex River Valley and Bonteberg). **(gce)**

spectabilis Hilliard Dwarf, rounded shrublet, ± 150–500 mm tall, young parts pubescent with short recurved hairs. Leaves tufted, elliptic to oblanceolate, thick, glandular-punctate. Flowers in narrow panicles that become subspinescent when old, white, cream-coloured or mauve, showy, sweetly scented, calyx 5-lobed, obliquely campanulate. July–Sept. Among rocks and in sandy gravel, WM (Hantamsberg and around Calvinia). **(ece)**

stenostachya Hilliard Dwarf, spreading shrublet, up to 300 mm tall, branches with retrorse hairs, bark grey to blackish. Leaves tufted, narrowly elliptic, margins thickened, revolute, glandular-punctate, sparsely hairy. Flowers in narrow panicles, white to violet, calyx 5-lobed, obliquely campanulate. Aug.–Sept. Stony slopes and sandy flats, NH, KV, CCR (near Bitterfontein and Bokkeveld Mountains to Klawer). **(gce)**

verna Hilliard Dwarf, twiggy shrublet, ± 200–750 mm tall, bark greyish to blackish, old inflorescence axes subspinescent, indumentum ± velvety. Leaves conspicuously tufted, elliptic to oblong-elliptic, margins thickened, revolute. Flowers in narrow, showy panicles, mauve to white, calyx 5-lobed, obliquely campanulate. Sept.–Oct. Rocky sandy slopes and flats, NH, KB (near Springbok to near Garies). **(ece)**

SUTERA (see also **CHAENOSTOMA**) SKUNK BUSH, STINKBOSSIE 3 spp., South Africa

foetida Roth Minutely glandular annual, ± 150–600 mm tall, foetid, leafy throughout. Leaves coarsely serrate. Flowers in racemose or paniculate cymules, corolla tube 10–11.5 mm long, narrowly funnel-shaped, white, pink or violet with orange in throat. July–Dec. Damp, sheltered spots, often below rocks, NH, KB, TS, CCR (Kamiesberg Mountains to near Soebatsfontein to Malmesbury to Kouga Mountains). **(gce)**

TEEDIA BERGSUKKELBOS, FELL LAZY BUSH 2 spp., Namaqualand to E Cape

lucida (Sol.) Rudolphi Sprawling shrublet, up to 1.2 m tall. Leaves opposite, with winged petioles ± half-clasping stem, ovate-lanceolate, finely toothed, shiny. Flowers in axillary or terminal cymes, corolla ± tubular, lobes outspread, mauve to pink. Fruit globose, purplish black. Sept.–Jan. Rocky outcrops at middle to upper elevations, NH, KB, CCR (near Steinkopf to SW Cape to Zimbabwe).

TRIEENEA 10 spp., W Cape, mostly Cederberg Mountains, and E Cape

glutinosa (Schltr.) Hilliard Glandular-hairy annual or short-lived perennial. Leaves opposite becoming alternate above and passing into bracts. Flowers in heads elongating into racemes, corolla tube glandular-hairy, white to pale mauve, with 2 orange patches at base of upper lobes. Mainly Sept.–Dec. Sheltered upper sandy peaty slopes, 1 500–2 100 m, WM, CCR (Gifberg to between Sutherland and Fraserburg to Great Winterhoek Mountains to Sneeuberg).

ZALUZIANSKYA (including **REYEMIA**) DRUMSTICKS, VERFBLOMMETJIE 57 spp., southern Africa, annuals mainly W Cape, perennials mainly eastern southern Africa

A. Petals entire

benthamiana Walp. Annual, 20–330 mm tall, stems with spreading hairs. Leaves glandular-hairy. Flowers in a crowded spike, corolla tube 10–20 mm long, glandular-hairy, lobes rounded, white to yellow above with star-shaped orange centre, maroon beneath, stamens 2. June–Aug. Sandy or gravelly flats and slopes, SN, G, NS, NH, WM, TS, CCR (southern Namibia, Bushmanland, Namaqualand to Roggeveld to Tanqua Karoo to Oudtshoorn).

cohabitans Hilliard Annual, 5–100 mm tall, stems with retrorse hairs. Leaves crowded at base, partially hairy. Flowers crowded in a head, corolla tube 6–8.5 mm long, minutely glandular-puberulous, lobes usually entire, rarely 1 or 2 notched, rose-pink, yellow in throat, stamens 2. Aug.–Sept. Sandy, clay or shaley soils, WM (foot of Hantamsberg to Roggeveld). **(ece)**

collina Hiern Annual, 30–250 mm tall, stems decumbent or ascending, glabrous to sparsely pubescent. Leaves ovate at base, linear in upper parts. Flowers in capitate spikes, corolla tube 17–20

mm long, lobes elliptic, entire, bright yellow, barred with orange above, mouth thickly bearded, stamens 4. Aug.–Sept. Seasonally damp sandy or gravelly places, NH, KB (Kamieskroon and Kamiesberg Mountains to Garies to Spoegrivier). **(ece)**

kareebergensis Hilliard Erect annual, 60–150 mm tall, stem with retrorse hairs, often with axillary leaf tufts. Leaves ovate to oblong-elliptic, thinly hairy. Flowers in compact heads, corolla tube ± 7.5–9 mm long, minutely glandular-hairy, lobes ± broadened at tips, entire, ?white or yellow, stamens 4. Aug. ?Habitat, KV (SE of Bitterfontein). **(ece)**

lanigera Hilliard Annual, ± 18–35 mm tall, stems pubescent with retrorse appressed hairs. Leaves few, 1 pair basal, with 1 or 2 pairs subtending inflorescence, ± elliptic, shortly hairy. Flowers in a tight head, corolla tube ± 11–12 mm long, glabrous, lobes elliptic, entire, orange-yellow, barred with deeper orange above, stamens 4, calyx and bracts white-woolly. Sept. Sandy flats, TS, CCR (northern Swartruggens to E of Doringrivier near Karoopoort). **(gce)**

marlothii Hilliard Annual, ± 20–50 mm tall, stem with spreading, acute hairs. Leaves few, glandular-pubescent. Flowers in a dense spike, corolla tube ± 13–15 mm long, mouth ringed by acute hairs, corolla lobes spathulate, entire, mauve, with a crimson star around mouth, radiating well up shaft of lobes, stamens 4. Oct. At high altitudes, 1 500–1 700 m, WM (Roggeveld: Uitkyk). **(ece)**

nemesioides Diels (= *Reyemia nemesioides* (Diels) Hilliard) Erect annual, 20–300 mm tall, stem glandular-puberulous. Leaves in a basal tuft, elliptic, tapering below, distantly leafy above, glandular-hairy on upper surface. Flowers loosely panicled, corolla tube ± 7–8.5 mm long, minutely glandular, 2-lipped, upper lip white, rarely pale yellow, lower lip yellow with orange palate, stamens 2. July–Oct. Dolerite hills, WM (Hantamsberg to Roggeveld to Nuweveld Mountains). **(ece)**

peduncularis (Benth.) Walp. Annual, 13–250 mm tall, stems with retrorse hairs. Leaves thinly hairy. Flowers in a terminal head, corolla tube 17–25 mm long, glandular-hairy, lobes rounded, entire, cream-coloured to lemon-yellow above with a yellow or red centre, maroon beneath, opening at dusk, stamens 4. June–Sept. Sandy or stony places, 100–1 900 m, SN, NH, KB, WM, TS, CCR (southern Namibia to Free State and Lesotho to Matroosberg).

pusilla (Benth.) Walp. Annual, ± 20–155 mm tall, stems often with retrorse hairs. Leaves mostly basal, thinly hairy. Flowers initially in a crowded spike, corolla tube 6–17 mm long, sometimes sparsely glandular-hairy, lobes rounded, entire, white or cream-coloured with orange bar above, centre with star-shaped orange patch, maroon beneath, stamens 4. July–Oct. Rocky or sandy slopes and flats, 150–950 m, NH, KB, KV, TS, CCR (Kamiesberg Mountains to Laingsburg to Swellendam). **(gce)**

sp. A Well-branched annual, ± 50 mm tall, stems glabrous throughout, glandular above, with leaf tufts. Leaves elliptic, glabrous. Flowers 1 at tip of each branchlet, corolla tube ± 17 mm long, glabrous, lobes elliptic, ?colour, mouth bearded, stamens 4. Dec. Damp rock crevices, KB (Kamiesberg Mountains: Sneeuwkop). **(ece)**

*A.' Petals bifid or notched (see also **Z. cohabitans**)*
B. Flowers nocturnal, white with maroon reverse

capensis (L.) Walp. Annual or short-lived perennial, 100–400 mm tall, stems with retrorse hairs. Leaves usually hairy. Flowers in a spike, corolla tube 25–40 mm long, lobes deeply notched, white inside and red outside, opening at dusk and then scented, stamens 4. Mainly July–Oct. Sandy places, KB, WM, CCR (Kamiesberg Mountains and Kubiskouberg to Roggeveld Escarpment to SW Cape to near Grahamstown).

glareosa Hilliard & B.L.Burtt Perennial herb, up to ± 450 mm tall, stems simple of branching from a woody rootstock, decumbent or ascending, hairs retrorse or spreading, white. Leaves usually > twice as long as broad, thinly hairy. Flowers in a condensed spike, corolla tube 27–50 mm long, lobes deeply notched, white inside, crimson outside, opening at dusk and then scented, stamens 4. (Oct.–)Dec.–Apr. In rock crevices or among rocks, WM (Hantamsberg along Great Escarpment to KwaZulu-Natal Drakensberg Mountains).

ovata (Benth.) Walp. Strongly aromatic, twiggy shrublet, up to ± 450 mm tall, usually coarsely hairy. Leaves usually twice as long as broad, shaggy. Flowers few in spikes, corolla tube 30–60 mm long, lobes deeply notched, white inside (sometimes orange in centre) and red outside, opening at dusk, stamens 4. Nov.–Dec. Partly shaded cliffs or bare gravelly patches, WM, CCR (Hantamsberg to Tulbagh, Little Karoo to KwaZulu-Natal).

B.' Flowers diurnal, white to mauve to pink with a yellow centre
*C. Stamens 2 (see also **Z. violacea**)*

affinis Hilliard Annual, 20–300 mm tall, stem simple, soon branching from base, usually hairy. Leaves lanceolate, acute, mostly entire, sparsely hairy. Flowers in crowded, eventually elongated spikes, corolla tube 9–30 mm long, minutely glandular-puberulous, lobes broadly Y-shaped, white to mauve or yellow above, with a yellow to orange or red star around mouth. June–Nov. Sandy flats and slopes, up to 900 m, G, NS, NH, KB, KV, WM, CCR (Richtersveld to Vredenburg). **(gce)**

pilosissima Hilliard Annual, 10–140 mm tall, erect to prostrate, stems hairy. Leaves mostly basal, few, spathulate, glandular-pubescent. Flowers in crowded spikes, corolla tube 12.5–19 mm long, pubescent, lobes broadly Y-shaped, pink to mauve with a yellow to orange patch around mouth. Aug.–Sept. Dry stream beds and sandy places, 1 100–1 500 m, WM (Bushmanland to Upper Karoo to Roggeveld).

sanorum Hilliard Annual, 10–140 mm tall, stems erect to prostrate, usually glabrous. Leaves mostly basal, few, spathulate. Flowers in crowded, eventually elongated spikes, corolla tube 14–24 mm long, pubescent with glandular and eglandular hairs, limb red-violet with a bright yellow to orange central eye. May–Oct. Gravel slopes and in red sand, G, NH (Bushmanland to near Steinkopf to near Kamieskroon).

C.' Stamens 4
D. Corolla tube with a ring of tiny glands around mouth

acutiloba Hilliard Like **Z. mirabilis** in the soft spreading indumentum and inflated calyx but corolla lobes deeply divided into 2 very acute segments with revolute margins, and flowers yellowish brown without a contrasting central patch. Aug.–Sept. Gravelly or stony ground or on shale screes, WM (Hantamsberg to Roggeveld and between Sutherland and Fraserburg). **(ece)**

mirabilis Hilliard Annual, 10–80 mm tall, stem with spreading hairs. Leaves few, glandular-pubescent. Flowers crowded, later in dense spikes, corolla tube ± 20–38 mm long, lobes twice lobed, pinkish mauve above, reddish below, sometimes with an orange star around mouth, margins plane, stamens 4. Aug.–Sept. Gravelly ground near dry watercourses, WM, TS (southern Roggeveld Escarpment and near Matjiesfontein). **(ece)**

D.' Corolla tube with a ring of clavate or acute hairs around mouth

bella Hilliard Annual, 15–150 mm tall, stems ascending or decumbent, pubescent with spreading hairs. Leaves few, hairy, eglandular. Flowers in a crowded head, eventually elongating into a spike, corolla tube 11–15 mm long, minutely glandular-puberulous, mouth ringed by long, erect, acute hairs, lobes Y-shaped, pale to deep mauve above, deep red beneath, with a yellow patch around mouth and encircled by long hairs. July–Sept. Sandy or gravelly places, WM, TS (Klein Roggeveld and Tanqua Karoo). **(ece)**

inflata Diels Annual, 30–250 mm tall. Leaves few, thinly covered with acute hairs. Flowers in a lax or crowded spike, corolla tube 29–35 mm long, mouth ringed by obtuse hairs, lobes deeply Y-shaped, deep purple, with a reddish patch at base, stamens 4. July–Sept. On dolerite outcrops, WM (Bokkeveld Plateau and lower slopes of Hantamsberg). **(ece)**

minima (Hiern) Hilliard Annual, 10–100 mm tall, stems with spreading hairs. Leaves few, hairy. Flowers crowded in a head, corolla tube 4–8.5 mm long, minutely glandular-hairy, mouth partially ringed by long, erect, acute hairs, lobes shortly bifid, bright mauve to pink above with star-shaped orange centre, sometimes with a crimson fleck at base, orange beneath, stamens 4. June–Sept. Stony or gravelly flats, 800–1 500 m, WM, CCR (Hantamsberg to Roggeveld to Nuweveld to Swartruggens to Little Karoo). **(gce)**

pumila (Benth.) Walp. Annual, 20–230 mm tall, stem with retrorse hairs. Leaves few, thinly hairy, upper leaves and bracts deeply lobed or toothed. Flowers crowded in a head, corolla tube (17–)21–32 mm long, sparsely glandular, mouth ringed by obtuse hairs, lobes deeply Y-shaped, occasionally twice bifid, white to mauve above, mauve to pink beneath, with a raised yellow to orange or bright scarlet star around mouth, stamens 4. July–Sept. Gravelly, sandy or shaley flats and slopes, KV, WM, TS (Knersvlakte to near Calvinia to Roggeveld to southern Tanqua Karoo). **(ece)**

regalis J.C.Manning & Goldblatt Erect annual, 70–100 mm tall, basal branches often decumbent, stems pubescent with retrorse hairs. Leaves well-spaced, pubescent with eglandular hairs and minute gland-tipped hairs. Flowers in crowded heads eventually elongating, corolla tube 35–40 mm long,

densely pubescent, mouth ringed by long, erect, acute hairs, lobes Y-shaped, deep pink to magenta with yellow star around mouth, bases with dark red, diamond-shaped blotches, stamens 4. Aug.–Sept. Seasonally wet flats on dolerite outcrops, WM (between Nieuwoudtville and Calvinia). **(ece)**

sutherlandica Hilliard Like **Z. pumila** but without a thick-textured orange star around corolla mouth, also like **Z. inflata** but with a smaller calyx, ± 7–8 mm long, shorter corolla tube, ± 22 mm long, and longer anthers (1.25 and 2.5 vs. 0.4–0.8 and 1.5–1.8 mm long). Sept. ?Habitat, WM (Roggeveld near Sutherland area). **(ece)**

venusta Hilliard Annual, 10–150 mm tall, stems with spreading hairs. Leaves glandular-hairy. Flowers crowded in a head, eventually elongating into a spike, corolla tube 15–26 mm long, glandular-hairy, mouth ringed by long, erect, acute hairs, lobes broadly Y-shaped, mauve to pink inside with star-shaped orange centre, orange beneath, stamens 4. June–Nov. Sandy or gravelly soils, 350–1 500 m, TS, CCR (Upper Karoo to Free State to Tanqua Karoo to Little Karoo).

violacea Schltr. Erect or decumbent annual, 20–150 mm tall, stems with retrorse ± appressed hairs. Leaves well-spaced, sometimes few, glandular-pubescent. Flowers in a crowded head, eventually elongating into a spike, corolla tube 10–23 mm long, usually finely pubescent, mouth usually ringed by long, erect, acute hairs, lobes Y-shaped, violet to mauve to rosy mauve, rarely pale yellow, with a deep yellow star around mouth, often with a small crimson blotch at base, stamens 4 or rarely 2. July–Sept. KV, WM, ?TS (Knersvlakte to near Loeriesfontein to Hantamsberg to Roggeveld Escarpment). **(ece)**

SOLANACEAE

Lycium by A.M. Venter, **Nicotiana** and **Solanum** by W.G. Welman

1. Fruit a capsule. . . . . **Nicotiana**
1.' Fruit a berry:
2. Stamens inserted in mouth or throat of corolla; anthers dehiscing by pores . . . . . **Solanum**
2.' Stamens inserted near base of corolla tube; anthers dehiscing by longitudinal slits . . . . . **Lycium**

LYCIUM BOX THORN, KRIE BUSH, KRIEDORING ± 95 spp., cosmopolitan in arid, warm and temperate regions

A. Flowers with corolla tube ≥ 10 mm long
B. Stamens and/or style included in corolla tube or just visible in mouth of corolla tube

hirsutum Dunal (= *L. glandulosissimum* Schinz *pro parte*) RIVIERKAREEDORING, WOLHAARBOS Thorny shrub, up to 3 m tall, with rigidly erect to curved stems, bark creamy white, young stems, leaves and calyx densely hirsute. Leaves herbaceous, solitary or in clusters, elliptic to obovate, 10–30 mm long. Flowers bisexual, tubular, 14–20 mm long, creamy white, lobes spreading. Berries red, almost spherical, ± 5 mm diam. Apr.–Aug. In alluvial silt and sands along streams or rivers and dry streambeds, TS (Namibia through to Karoopoort and E to Touwsrivier and Karoo).

oxycarpum Dunal KAREEDORING, KARRIEDORING, WOLWEDORING Much-branched, thorny shrub or small tree, up to 3 m tall, branches curved. Leaves herbaceous to semi-succulent, solitary or in loose clusters, obovate to oblong-elliptic, 20–30(–50) mm long. Flowers bisexual, narrowly tubular, 20–24 mm long, creamy white with violet veins, lobes violet, spreading, calyx small. Berries red, ellipsoidal, 5–7 mm long. May–Oct. River and streambanks, ravines and depressions in deep sandy or alluvial, well-drained soil, WM, TS, CCR (Roggeveld Escarpment and Laingsburg to Little Karoo and Karoo).

strandveldense A.M.Venter STRANDVELDSE KRIEDORING Dioecious, rigid, erect, thorny shrub, up to 1.5 m tall. Leaves succulent, in dense clusters, narrowly obovate to ovate, 9–13 mm long. Flowers functionally unisexual, tubular, 9–13 mm long, mauvish purple, lobes spreading, calyx up to 4 mm long, reaching one third up corolla tube, male flowers with minute style, female flowers with infertile anthers, style 10–12 mm long. Berries red, ellipsoidal, ± 5 mm long. Sept.–Dec. Coastal sands, NS, CCR (Port Nolloth to lower Berg River). **(gce)**

villosum Schinz HARIGE SANDKRIEDORING Dioecious, rigid, erect, thorny shrub, up to 3 m tall, young stems, leaves and calyx densely hirsute with glandular hairs. Leaves herbaceous or rarely semi-succulent, solitary or in clusters, elliptic to obovate, 16–28 mm long. Flowers functionally

unisexual, 8–12 mm long, cream-coloured to dirty white, lobes spreading, male flowers narrowly trumpet-shaped with minute style, female flowers tubular with infertile anthers, style 7–10 mm long. Berries nearly spherical, ± 4 mm diam. Mainly Apr.–July. On sandy plains, dunes or dry riverbeds, G (Namibia, lower Gariep Valley to Kgalagadi and Upper Karoo).

B.' Stamens and style conspicuously exserted from corolla tube

amoenum Dammer (= *L. rigidum* Thunb. in part) SLANGBESSIE Rigid, thorny shrub, up to 2.5 m tall. Leaves in dense clusters, obovate to oblong, 12–24 mm long, semi-succulent. Flowers bisexual, large, bell- to broadly funnel-shaped, 10–14 mm long, off-white with purple veins, lobes purple, reflexed. Berries red, broadly ovoidal to spherical, 8–10 mm diam. June–Sept. Sands along watercourses and dry, rocky hillsides, SN, G, NS, NH, KB, KV, WM, CCR (Schakalsberg to Nieuwoudtville and Calvinia to SW Cape). **(gce)**

bosciifolium Schinz (= *L. aciculare* Dammer, *L. glossophyllum* Dammer, *L. rangei* Dammer) BOESMANLANDSE KRIEDORING Erect, tangled shrub, up to 3 m tall, stems arched. Leaves semi-succulent to succulent, solitary or in dense clusters, oblong-elliptic, 10–35 mm long. Flowers bisexual, tubular to narrowly funnel-shaped, 10–16 mm long, dirty white to greenish cream, lobes dark violet, spreading, calyx small. Berries red, narrowly ellipsoidal, 5–6 mm long. Jan.–Aug. In deep sand along rivers and streams and flood plains, sometimes on limestone outcrops, SN, G, NH, KV, WM, TS (Angola, Namibia and Botswana, along Gariep Valley, Namaqualand, Loeriesfontein, Nieuwoudtville, western Tanqua Karoo and Upper Karoo).

grandicalyx Joubert & A.M.Venter BLAASKELKKRIEDORING Thorny shrub, up to 1 m tall, branches erect to spreading. Leaves succulent, solitary or in clusters, obovate to elliptic, 20–40 mm long. Flowers bisexual, trumpet-shaped, 10–13 mm long, creamy white, lobes lilac, reflexed, calyx large, inflated, sparsely covered with glandular hairs. Berries red, ovoidal to spherical, ± 8 mm diam., enclosed by inflated calyx. May–Aug. On blue-grey, dolomitic limestone terraces, G (Witpütz to Fish River Canyon).

hantamense A.M.Venter Like **L. pilifolium** in the densely glandular-hirsute leaves, flowers with conspicuously exserted style and stamens, and berries yellow, ± spherical, but flowers functionally unisexual with corolla tube cylindrical, 11–15 mm long (in males) and 11–12 mm long (in females), greenish white, with deep purple lobes, and berries 7–8 mm diam. Aug. In heavy soils on dolerite or tillite, WM (Bokkeveld Plateau from Nieuwoudtville to Calvinia and near Lokenberg). **(ece)**

*A.' Flowers with corolla tube < 10 mm long (see also **L. villosum**)*
C. Stamens and/or style included in corolla tube
or just visible in corolla mouth

gariepense A.M.Venter GARIEP BOX THORN, GARIEPKRIEDORING Dioecious, intricately branched, thorny shrub, up to 1.2 m tall. Leaves succulent, in clusters, obovate to narrowly obovate, 10–15 mm long. Flowers functionally unisexual, 7–9 mm long, creamy white, veins purple, lobes pale lilac, spreading, calyx small, male flowers narrowly funnel-shaped with minute style, female flowers tubular with infertile anthers, style 6–8 mm long. Berries red, ovoidal, 5–6 mm long. After summer showers. Dry ridges and cliffs of igneous rock, SN, G (Witpütz to lower Gariep Valley). **(ece)**

horridum Thunb. (= *L. apiculatum* Dunal, *L. eleutherosiphon* C.H.Wright, *L. oxycarpum* var. *parviflorum* Dunal, *L. schoenlandii* Dammer, *L. undulatum* Dammer) KRIEDORING, SLANGBESSIE(BOS) Dioecious, rigid, erect, densely branched shrub, up to 1.8 m tall. Leaves succulent, in small clusters, linear to narrowly obovate, flattened, 7–12 mm long. Flowers functionally unisexual, tubular to narrowly funnel-shaped, 6–9 mm long, white, lobes lilac with dark purple bases, spreading, calyx small, male flowers with minute style, female flowers with infertile anthers, style 6–9 mm long. Berries red, ovoidal, 4–6 mm long. Aug.–Apr. Dry sandy plains or disturbed areas, SN, G, NS, NH, KV, WM, TS, CCR (widespread in southern African interior).

tetrandrum Thunb. (= *L. microphyllum* Loisel) BOKDORING, CAPE BOX THORN, KRAALDORING, MUISBOS Dioecious, rigid, densely branched, thorny shrub, up to 3 m tall, often decumbent in dense clumps. Leaves succulent and glossy, in small clusters, obovate to elliptic, terete, 10–15 mm long. Flowers functionally unisexual, 5–6 mm long, creamy white, lobes spreading, calyx small, male flowers narrowly trumpet-shaped without a style, female flowers tubular with sterile anthers, style 4–5 mm long. Berries red, spherical, 3 mm diam. Aug.–Oct. (South Africa), June–Sept. (Namibia). Deep sands along rivers, flood plains or dunes, SN, G, NS, CCR (coastal belt from Namibia to Agulhas Plain).

C.' Stamens and style conspicuously exserted from corolla tube

cinereum Thunb. (= *L. engleri* Dammer, *L. seineri* Dammer) BRUINSTAMKAREEDORING, KAREEDORING Rigid, erect, much-branched, very thorny shrub, up to 2 m tall. Leaves succulent, in tight clusters, narrowly oblong, 7–17 mm long. Flowers bisexual, tubular, 5–7 mm long, creamy white, lobes purple, reflexed, calyx small. Berries red, ovoidal to spherical, 3–4 mm diam. Aug.–June. Dry valleys, alluvial floodplains or rocky ridges in sand or gravel, often in disturbed soil, SN, G, NS, NH, WM, TS, CCR (Namibia to lower Gariep Valley, Steinkopf, Calvinia, Roggeveld Escarpment, Worcester and E to Zimbabwe).

pilifolium C.H.Wright DOUVATKRIEDORING Rigid, erect, densely thorny, dwarf shrub, up to 0.7 m tall, young stems, new leaves and calyx pilose with glandular hairs. Leaves semi-succulent, densely clustered, obovate to narrowly obovate, 3–12 mm long. Flowers bisexual, narrowly trumpet-shaped, 7–9 mm long, creamy white with lilac veins, lobes lilac, reflexed, calyx ± as long as corolla tube. Berries yellow, spherical, 6–10 mm diam. Sept.–Dec. In depressions and dry riverbeds, in sandy calcareous soils and weathered granite or dolerite, SN, G, NH, WM, TS (Lüderitz to Steinkopf and Nieuwoudtville to Roggeveld Escarpment, western Tanqua Karoo and Karoo).

pumilum Dammer (= *L. engleri* Dammer, *L. roseum* L.Bolus) SOETKRIEDORING, SWEET BOX THORN Rigid, erect, thorny shrub, up to 1.2 m tall, stems zigzagged, bark glossy, dark purplish brown. Leaves succulent, in small clusters, narrowly elliptic to obovate, 10–15 mm long, greyish blue-green. Flowers bisexual, broadly trumpet-shaped, 4–5 mm long, white with purple veins, sweet-smelling, lobes pale lilac, reflexed, as long as tube, calyx ± as long as corolla tube. Berries red, spherical, 4 mm diam. Sept.–Oct. and Jan.–Apr. Sandy streambeds, plains and dry slopes, often in limestone or brackish soil, G, WM, TS, CCR (Namibia to lower Gariep Valley, Roggeveld Escarpment, Little Karoo and Karoo).

schizocalyx C.H.Wright Rigid, erect, profusely branched shrub, up to 1.7 m tall. Leaves semi-succulent, in clusters, oblong-obovate to narrowly obovate, 9–15 mm long. Flowers bisexual, trumpet-shaped, 6–8 mm long, creamy white with purple veins, lobes purple, reflexed, calyx ± as long as corolla tube. Berries red, spherical, ± 7 mm diam. Sept.–Apr. Dry sandy, gravelly, calcareous or brackish soils in depressions, pans and drainage lines, G, TS (Namibia to Richtersveld National Park, Laingsburg to Prince Albert, Karoo to Zimbabwe).

tenue Willd. Rigid, thorny shrub, up to 2 m tall. Leaves semi-succulent, fascicled on stems and thorns, narrowly obovate, 10–15 mm long. Flowers bisexual, narrowly trumpet-shaped, 6–7 mm long, creamy white, lobes lilac, reflexed, calyx tubular, 5–6 mm long. Berries red, ellipsoidal, 5–7 mm long. Sept.–Jan. Sandy limestone soil along dry river and stream beds or on gravelly mountain slopes, TS, CCR (southern Tanqua Karoo to E of Laingsburg and Agulhas Plain). **(gce)**

*NICOTIANA ± 70 spp., Americas, Australasia, 1 sp. in Namibia

***glauca** Graham WILD TOBACCO, WILDE TABAK Slender, poisonous shrub or small tree, up to 5 m tall, glabrous. Leaves petiolate, ± ovate, glaucous, up to 200 mm long. Flowers in racemes, yellow, calyx up to 10 mm long, corolla tubular, 35–40 mm long. Capsule ± 15 mm long, in ± enlarged calyces. Jan.–Dec. Mainly roadsides, waste places and riverbanks, declared weed, SN, G, NS, NH, KV, TS, CCR (widespread in southern Africa, introduced from S America, now almost cosmopolitan).

***longiflora** Cav. Short-lived perennial or annual, up to 1.4 m tall, sparsely hairy, sometimes sticky. Leaves up to 300 mm long, lower elliptic-ovate with winged petioles, upper linear to lanceolate, sessile and auricled. Flowers in racemes, calyx up to 20 mm long, 10-ribbed, corolla narrowly tubular, 40–120 mm long, pale yellow, grey, purplish or greenish brown outside, with cream to lavender limb. Capsule ovoid, up to 16 mm long. Sept.–Feb. Mainly sandy soil along watercourses, weedy, G (western and central parts of southern Africa, introduced from S America).

SOLANUM ± 1 400 spp., ± cosmopolitan, mainly Americas

A. Plants armed or with a dense covering of stellate hairs

burchellii Dunal SLANGAPPELBOS Small shrub, up to 1 m tall, with dense, stellate, green-yellow or brownish hairs; stem prickles reddish, slender, straight, up to 6 mm long or absent. Leaves

petiolate, elliptic, up to 60 mm long, margin undulate, midvein prominent. Flowers solitary to few in clusters, 15–20 mm diam., mauve to violet inside. Ripe berries orange, drying black, shiny, 10 mm diam. Jan.–Dec. Sandy, clay, loam, stony soils, rocky hillsides, SN, G, NH, WM (N of Windhoek through to northern Namaqualand to E of Sutherland to Kimberley).

*__elaeagnifolium__ Cav. SATANSBOS, SILVER-LEAF BITTER APPLE Poisonous shrublet, with deep, spreading rootstock and annual stems, up to 0.6 m tall, bearing dense, silvery-green, stellate hairs, and often with straight, slender, reddish prickles, up to 5 mm long. Leaves petiolate, linear to lanceolate, up to 110 mm long, folded upwards, margins wavy. Flowers in terminal racemes, up to 20 mm long, white, mauve or blue. Berries mottled green, turning yellow, shiny, 12 mm diam. Oct.–June. Invasive, mainly in dry areas, a declared weed, KV (native to dry parts of the Americas, widespread in southern Africa and Australia).

__giftbergense__ Dunal Shrub or shrublet, up to 1 m tall, stellately hairy, prickles yellow to reddish brown, straight, up to 12 mm long. Leaves petiolate, ovate to elliptic, up to 40 mm long, margins slightly uneven. Flowers 2–4 in clusters, up to 12 mm long, blue, lilac or violet. Berries mottled green, turning orange, red or black, up to 12 mm diam. Mar.–Nov. Stony, sandy soil in dry watercourses and on rocky hillsides, SN, G, NS, NH, KB, KV, CCR (southern and SE Namibia through to Namaqualand and Clanwilliam).

__tomentosum__ L. SLANGAPPELBOS Shrub, up to 1.5 m tall, very densely covered with yellow-brown, stellate hairs, and bearing slender, straight prickles, up to 10 mm long. Leaves petiolate, elliptic, up to 80 mm long, margins sinuate, midvein prominent, rarely spiny. Flowers few in clusters, up to 20 mm diam., violet inside. Ripe berries orange to red, shiny, 10–20 mm diam. July–Oct. Stony sand, sandy loam, rocky slopes and flats, G, NH, KV, WM, CCR (Richtersveld through to SW Cape, E Cape, Free State and Lesotho).

A'. Plants unarmed, without a dense covering of stellate hairs

__guineense__ L. Unarmed, ± glabrous, erect or sprawling shrub or shrublet, up to 2 m tall. Leaves petiolate, ovate to elliptic, entire, up to 70 mm long, softly leathery. Flowers 1–many in axils, up to 25 mm long, blue or purple. Ripe berries yellow, orange to red, up to 15 mm diam. Jan.–Dec. Sandy, loam or clay soils on coastal dunes, rocky slopes and stream banks, NS, NH, KV, CCR (Hondeklipbaai to Uitenhage, Graaff-Reinet and Despatch).

*__nigrum__ L. BLACK NIGHTSHADE, NASTERGAL, UMSOBO Erect, branched annual, up to 0.85 m tall. Leaves petiolate, lanceolate to elliptical, up to 120 mm long, entire to serrate, ± glabrous to hairy. Flowers few, in ± drooping umbels, 10–14 mm diam., white, sepals deflexed or adhering to base of mature berry. Ripe berries dull purple to blackish, broadly ovoid, 6–10 mm in diam., held in drooping clusters from outspread peduncles, edible (as jam). Jan.–Dec. Sandy, clay or loam soil in cool, shady, places, also weedy, SN, WM, CCR (widespread and common in southern and tropical Africa, indigenous to Eurasia, possibly also to Africa).

__retroflexum__ Dunal BLACK NIGHTSHADE, NASTERGAL, UMSOBO Erect, branched, ± pubescent annual, up to 0.9 m tall. Leaves lanceolate to elliptical, up to 100 mm long, with winged petiole and truncate base, margins prominently uneven to serrate. Flowers few, umbellate, ± drooping, 9–12 mm diam., cream or white, each petal with a purple central stripe outside, sepals reflexed in fruit. Ripe berries dull, dark purple, globose, 9 mm diam., held in drooping clusters from outspread peduncles, edible (as jam). Jan.–Dec. Sandy, clay or loamy soil in cool, shady, places, also weedy, G, WM, CCR (widespread and common in southern Africa, indigenous to Africa).

?STILBACEAE

by D.A. Snijman

?THESMOPHORA 1 sp., ?Namaqualand, W Cape

[__Uncertain record__ __T. scopulosa__ Rourke. See notes on the collections of T.P. Stokoe from the Kamiesberg Mountains (p. 491).]

TAMARICACEAE

by D.A. Snijman

TAMARIX 54 spp., mainly Europe and Asia

*__ramosissima__ Ledeb. Like **T. usneoides** but bark reddish brown, ± longitudinally wrinkled, leaves green and not stem-clasping and petals various shades of pink. Nov. Sandy riverbeds and riverbanks, TS, CCR (near Laingsburg, Little Karoo and Mossel Bay, native to E Europe and E Asia).

usneoides E.Mey. ex Bunge Willowy, usually dioecious, evergreen tree, up to 9 m tall, with brownish grey bark, rough with transverse scars, often with pink to reddish galls. Leaves overlapping, scale-like, pale grey. Flowers in massed panicles, minute, scented, petals whitish to grey, anthers pink. Mainly Mar.–June. Streambanks or dry river courses, SN, G, NH, WM, TS, CCR (Namibia, Gariep Valley, Gordonia, to central Karoo and Little Karoo).

THEOPHRASTACEAE

by D.A. Snijman

SAMOLUS WATER-PIMPERNEL ± 16 spp., almost cosmopolitan, mainly S hemisphere

*__valerandi__ L. BROOK WEED Tufted perennial or biennial or annual, up to 0.6 m tall. Leaves in a basal rosette and cauline, spathulate to obovate, (15–)20–45(–100) × 0.8–2.5 mm. Flowers in racemes or panicles, with bracteoles in middle of bent pedicel, minute, white. Nov.–Jan. In water and moist, often brackish, places, SN, NH, WM, CCR (scattered cosmopolitan weed).

THYMELAEACEAE

by C.L. Bredenkamp

1. Flowers without petaloid scales; stamens 8, well exserted flaps ..... **Passerina**
1.' Flowers usually with petaloid scales, rarely lacking but then stamens included or shortly exserted:
2. Stamens 4 in a single whorl; flowers solitary in axils in elongate racemes..... **Struthiola**
2.' Stamens 8 in 2 whorls, rarely upper whorl lacking; flowers usually terminal in clusters, rarely solitary in upper axils:
3. Flowers 4-merous, white to pale yellow..... **Gnidia**
3.' Flowers 5-merous, bright yellow..... **Lasiosiphon**

GNIDIA SAFFRAAN, SAFFRON BUSH ± 120 spp., mainly Africa, also India

A. Floral scales 4, sometimes divided or fringed
B. Floral scales membranous

cyanea Burch. Many stemmed shrub, up to 0.3 m tall. Leaves opposite, elliptic, upper surface glabrous, lower surface sparsely hairy, involucral leaves similar. Flowers mostly in pairs at branch tips, blue, sweetly scented, hypanthium sparsely hairy, petaloid flower scales 4, membranous, deeply notched. Sept.–Oct. Shaley slopes and plateaux, WM (Roggeveld Escarpment). **(ece)**

B.' Floral scales fleshy

geminiflora E.Mey. ex Meisn. Shrub, up to 0.6 m tall. Leaves opposite, linear-lanceolate, glabrous or silky hairy above, involucral leaves similar. Flowers paired at branch tips, cream-yellow, hypanthium silky hairy, petaloid floral scales 4, fleshy, bifid. June–Dec. Sandy flats and slopes, NS, KV, CCR (Hondeklipbaai, Vanrhynsdorp, Nieuwoudtville to Langebaan). **(gce)**

pedunculata Beyers Dwarf shrub, up to 0.25 m tall. Leaves alternate, oblanceolate, somewhat fleshy, glabrous, densely overlapping below, absent above, involucral leaves broad, elliptic, leath-

ery. Flowers up to 14, clustered at branch tips, yellow, hypanthium base with long, spreading, silky hairs, tube shortly hairy, petaloid floral scales small, yellow, succulent. Aug. In sandy soil, KV (N of Vredendal). **(ece)**

suavissima Dinter Twiggy shrub, up to 0.45 m tall, with grey branches. Leaves alternate on young branchlets, elliptic to oblong, glabrous, involucral leaves 5, ovate to obovate, glabrous. Flowers 7, terminal, hypanthium base with long, spreading, silky hairs, persisting in fruit, tube shortly hairy, petaloid floral scales small, yellow, succulent. Aug.–Oct. Sandveld, in deep sand, often grazed, SN, NS (Sperrgebiet, E of Buchuberg to Port Nolloth). **(ece)**

A.' Floral scales 8

clavata Schinz Lax shrub, 0.4–1 m tall. Leaves opposite, lanceolate, hispidulous, involucral bracts 2, leaf-like. Flowers 2, terminal, cream-yellow, hypanthium tomentose, purple-striped lengthwise, floral scales 8, petaloid, deltoid, yellow, fleshy. July–Oct. Sandy stony soil, N-facing slopes, kloofs, NS, KB, WM, CCR (Kamieskroon, Hondeklipbaai, Hantam to Olifants River Mountains). **(gce)**

imbricata L.f. Silver-hairy shrublet, up to 0.3 m tall. Leaves opposite to subopposite, elliptic-lanceolate, densely silky hairy, involucral leaves similar. Flowers 2–4 at branch tips, cream-coloured, hypanthium densely silky hairy, petaloid floral scales 8, anther-like. June–Jan. Lower and middle slopes, NH, WM, CCR (Garies, Calvinia, Nardousberg to Cape Peninsula). **(gce)**

meyeri Meisn. Spreading, slender shrublet, up to 0.8 m tall. Leaves alternate, linear-lanceolate, involucral leaves similar. Flowers few–8 at branch tips, pale yellow to yellow-green, hypanthium minutely hairy, petaloid floral scales 8, membranous. Aug.–Oct. Dry slopes, KB, WM, CCR (Kamiesberg Mountains, Roggeveld Escarpment to Malmesbury). **(gce)**

nitida Bolus Small shrub, 0.5–1.5 m tall. Leaves opposite, crowded towards branch tips, elliptic-subacute, smoothly silky, becoming glabrous. Flowers paired at branch tips, cream-coloured to yellow, hypanthium densely silky hairy, petaloid floral scales 8, anther-like. Mar.–Oct. Rocky granite and sandstone slopes, NH, KB, CCR (Okiep, Kamiesberg Mountains, Little Karoo to Ladismith). **(gce)**

scabra Thunb. Dense shrub, up to 1 m tall, with slender branches. Leaves alternate or subopposite, oblong-lanceolate to linear-lanceolate. Flowers up to 3 at branch tips, cream-yellow, hypanthium puberulous, petaloid floral scales 8. Sept.–Apr. Lower slopes, along watercourses, WM, TS, CCR (Cold Bokkeveld, Roggeveld, Karoopoort, Klein Roggeveld and Little Karoo). **(gce)**

LASIOSIPHON (= *ARTHROSOLEN*) KERRIEBLOM, YELLOW-HEAD ± 30 spp., tropical and southern Africa, Madagascar

deserticola (Gilg.) C.H.Wright SAFFRAAN Twiggy shrub, up to 0.3 m tall. Leaves clustered at branch tips, alternate to subopposite, oblong-ovate, hispidulous, involucral leaves velvety, with swollen bases. Flowers 5–7 at branch tips, ochre-yellow, hypanthium densely, silky hairy, base with long, spreading hairs, persisting in fruit, petaloid floral scales 5, small, membranous. Jan.–Dec. Dry flats and lower slopes, WM, TS, CCR (Hantam through Karoopoort to Worcester, Little Karoo and Great Karoo).

microphyllus (Meisn.) C.H.Wright Branched, erect, rigid shrub, up to ± 0.3 m tall. Leaves alternate, linear oblong, glabrous, ± widely spaced, involucral leaves broadly ovate, shortly hairy. Flowers 6–10, in clusters at branch tips, yellow, hypanthium base covered with long, spreading, silky hairs, tube shortly hairy to smooth, petaloid floral scales 5. Apr.–July. On lower slopes and flats, G, TS (lower Gariep Valley, Tanqua Karoo and Doringrivier through to Great and Upper Karoo).

PASSERINA GANNABUSH ± 20 spp., southern Africa

A. Inflorescence a terminal subcapitulate spike

truncata (Meisn.) Bredenk. & A.E.van Wyk Shrub or shrublet, 0.3–1.5 m tall. Leaves oblong, apex truncate or hump-backed, hairy beneath, 2–4 mm long, bracts obovate, ribbed, larger than leaves. Flowers few in dense spikes, cream-coloured, yellow or reddish-brown, hypanthium ± 6 mm long, neck very short. Fruits dry. Oct.–Nov. Sandy and stony flats, NS, NH, KB, WM, CCR (Steinkopf, Komaggas to Malmesbury and to Seweweekspoort Mountains). **(gce)**

A.' Inflorescence an extended spike

comosa (Meisn.) C.H.Wright Shrublet, 0.8–1.8 m tall. Leaves linear to narrowly lanceolate, villous beneath, upper surface tomentose, with an apical tuft, 3 mm long, bracts broadly ovate, villous beneath, tomentose above, larger than leaves. Flowers in spikes, yellow to reddish-brown, hypanthium 7 mm long, neck 1 mm long. Fruits dry. Oct.–Jan. Granite and sandstone slopes, KB, WM, CCR (Kamiesberg Mountains, Roggeveld Escarpment, Witteberg and Swartberg Mountains). **(gce)**

nivicola Bredenk. & A.E.van Wyk Shrub, up to 0.5 m tall. Leaves subterete, with a hairy groove beneath and tufted at apex when young, 2.5–4.5 mm long, bracts winged and dilated on each side. Flowers in spikes, yellow, hypanthium ± 5 mm long, neck ± 1.2 mm long, hairy. Fruits dry. Oct.–Nov. Slopes of high mountains, WM, CCR (Roggeveld Escarpment to mountains at Ceres and Worcester). **(gce)**

obtusifolia Thoday KAROO GONNA Shrub, up to 1–1.5 m tall. Leaves linear, hairy beneath, 4–8 mm long, bracts dilated and ribbed below. Flowers in dense spikes, yellow, pale pink to mauve-red, hypanthium ± 6.8 mm long, neck ± 1.8 mm long, bent outwards. Fruits dry. Oct.–Nov. N-facing rocky slopes and flats, WM, CCR (Vanrhyns Pass and Hantamsberg, Nuweveld Mountains, Worcester to E Cape).

STRUTHIOLA FEATHERHEAD, KATSTERTJIE, ROEMENAGGIE, VEERTJIE ± 40 spp., tropical and southern Africa, mainly W Cape

ciliata (L.) Lam. (including **S. angustifolia** Lam., **S. flavescens** Gilg, **S. longiflora** Lam., **S. lucens** Lam., **S. pillansii** Hutch., **S. rustiana** Gilg, **S. schlechteri** Gilg, **S. virgata** L.) Shrub, up to 1.5 m tall, with adpressed-hairy to white-woolly, tetragonal branches. Leaves opposite, linear-lanceolate to narrowly elliptic, faintly ribbed beneath, ciliate. Flowers axillary, cream-coloured, pink or reddish, hypanthium sometimes glabrescent, scales oblong, shorter to longer than perigonal hairs. Jan.–Dec. Flats and slopes, NH, KB, CCR (Springbok, Kamiesberg Mountains, Nieuwoudtville to Albertinia and Little Karoo). **(gce)**

leptantha Bolus Shrub, up to 2 m tall, with densely to sparsely hairy, slightly tetragonal branches. Leaves opposite, narrowly elliptic to narrowly obovate, obtuse to subacute, at first hairy below, later glabrous and pustulate. Flowers axillary, cream-coloured or yellow, sometimes reddish, scales oblong, as long as or shorter than perigonal hairs. June–Oct. Sandy flats and mountain slopes, NS, NH, KB, KV, CCR (Steinkopf to Kamiesberg Mountains, Klawer, Nieuwoudtville to Saldanha and Little Karoo). **(gce)**

URTICACEAE

by D.A. Snijman

1. Plants with stinging hairs, at least on inflorescences and petioles; inflorescence a panicle with flowers in minute cymose clusters along a lax axis. . . . . **Urtica**
1.' Plant without stinging hairs; inflorescence a ± sessile axillary cluster:
2. Bracts below inflorescence small and insignificant . . . . . **Didymodoxa**
2.' Bracts below inflorescence prominent, forming a ± fused campanulate involucre . . . . . **Forsskaolea**

DIDYMODOXA 2 spp., southern Africa to Ethiopia

capensis (L.f.) Friis & Wilmot-Dear Monoecious, sprawling to upright, glabrescent or hairy annual, up to 0.3 m tall. Leaves on slender petioles, soft, ovate, entire or crenate to bluntly toothed. Flowers in small axillary clusters, green, surrounded by ovate to broadly obovate involucral bracts. July–Nov. Sheltered shady sites, G, NH, WM, CCR (southern Namibia, Namaqualand, Bokkeveld Plateau to Knysna). **(gce)**

FORSSKAOLEA 6 spp., southern Africa to Indonesia

candida L.f. Monoecious, softly woody, roughly hairy shrublet, up to 0.8 m tall, often with red stems. Leaves ovate, discolorous, usually grey-felted beneath, margins revolute, with 3–7 pairs

of teeth. Flowers in axillary clusters, greenish, lobes of surrounding involucre ovate to broadly obovate, enlarging in fruit. Mainly Aug.–Oct. Dry rocky slopes, flats and riverbeds, SN, G, NS, NH, WM, TS, CCR (Namibia to Little Karoo and central Karoo).

hereroensis Schinz Shrub or dwarf shrub, up to ± 1 m tall, with short, coarse, upcurved hairs on lower stems. Leaves lanceolate to ovate, discolorous, densely white woolly beneath, margin with up to 4 pairs of teeth. Flowers in axillary clusters, greenish, lobes of surrounding involucre lanceolate, acuminate. Aug.–Sept. Rocky hillsides and seasonally dry water courses, SN, G (central Namibia to lower Gariep Valley).

URTICA NETTLES ± 80 spp., subcosmopolitan in temperate regions

***dioica** L. STINGING NETTLE Dioecious perennial herb, up to 1 m tall, with a ± woody rhizome, usually with dense stinging hairs on stems and leaves. Leaves petiolate, lanceolate, truncate to ± cordate at base, margin toothed. Flowers in lax, slender, drooping, cymose clusters, small, whitish, tepals of females hairy on backs. Achenes ovoid, pale ochre. Feb. In shade near water, WM (Roggeveld Escarpment to E Cape, native to Europe).

lobulata Blume Erect, monoecious, short-lived perennial herb, up to 0.8 m tall, with stinging hairs on stems and leaves. Leaves petiolate, broadly ovate, margin toothed or lobed and these sometimes trilobed. Flowers in erect to drooping, cylindrical panicles of cymose clusters, small white, with bristly hairs on females. Achenes pale ochre to brownish. Sept.–Feb. Moist places in shade, KB, WM, CCR (Kamiesberg Mountains to southern Cape to eastern Free State).

VAHLIACEAE

by D.A. Snijman

VAHLIA VERKLEURMANNETJIEKRUID 5 spp., Africa, Madagascar and India

capensis (L.f.) Thunb. Sprawling, shortly hairy shrublet from a woody caudex, mostly up to 300 mm tall. Leaves opposite, linear-oblanceolate. Flowers paired, axillary, yellow fading maroon or brown. Mainly Sept.–Nov. Sandstone and granite slopes and sandy flats, SN, G, NS, NH, KV, CCR (Namibia to Mamre, widespread in the drier parts of southern Africa).

VERBENACEAE

by D.A. Snijman

CHASCANUM ± 25 spp., Africa

garipense E.Mey. Shrub or dwarf shrub, 0.2–0.9 m tall. Leaves ± opposite, 2-ranked, petiolate, oblong or elliptic, bright green, glabrous, margin deeply dentate, often with new shoots and leaves in axils. Flowers in long, terminal spikes, slender-tubed with a flat, 5-parted limb, white, bluish or pale violet, fragrant. Mar.–Jan. Among rocks and on sandy flats, SN, G (Namibia, Richtersveld and Gordonia).

namaquanum (Bolus ex H.Pearson) Moldenke Shrub or dwarf shrub, 0.15–0.3 m tall. Leaves oblong-cuneate, spatulate or obovate-cuneiform, broad apically, grey-green, densely covered with sharp-pointed, appressed hairs, margin irregularly toothed towards apex, otherwise entire. Flowers in short, terminal spikes, slender-tubed with a flat limb, reddish yellow. Sept.–Oct. In stony soil, G, NH (southern Namibia to northern Namaqualand). (ske)

pumilum E.Mey. Shrub or dwarf shrub, up to 0.3 m tall. Leaves opposite, 2-ranked, elliptic-ovate or ovate-oblong, narrowed apically, densely covered with sharp-pointed, appressed hairs, margin coarsely toothed, mostly with new shoots and leaves in axils. Flowers in short, terminal spikes, slender-tubed with a flat, 5-parted limb, white to yellow. Jan.–Apr.(–Oct.). Dry riverbeds and hills, SN, G, NH, TS (dry interior of southern Africa).

ZYGOPHYLLACEAE

by D.A. Snijman

1. Ovary smooth:
 2. Sepals not persistent on mature fruit . . . . . **Tetraena**
 2.' Sepals persistent on mature fruit:
  3. Gynoecium of 4 or 5 carpels; disc not cup-shaped, regularly 8–10-angled, papillate. . . . . **Roepera**
  3.' Gynoecium of 10 carpels; disc cup-shaped with 10 distinct ± lanceolate lobes, not papillate **Augea**
1.' Ovary villous or bristly (for species in study area):
 4. Leaves mostly 2- or 3-foliolate . . . . . **Fagonia**
 4.' Leaves pinnate, at least when young:
  5. Erect shrub; leaves pinnate but leaflets soon deciduous then appearing simple . . . . . **Sisyndite**
  5.' Annual or perennial herbs, rarely subshrubs; leaves pinnate with leaflets persistent . . . . . **Tribulus**

AUGEA 1 sp., southern Africa in western parts

capensis Thunb. Brittle, succulent annual or short-lived perennial, up to 450 mm tall. Leaves opposite, thickly clavate, pale green, smooth. Flowers few at nodes, succulent, whitish inside, petals 3-toothed. Fruit large, ellipsoid, fleshy when fresh, becoming papery and splitting irregularly when dry, seeds woolly. Aug.–Oct. Dry sandy flats, SN, NH, KV, TS, CCR (southern Namibia to Bushmanland to Knersvlakte, Tanqua and Little Karoo to near Steytlerville).

FAGONIA 34 spp., Old and New World

rangei Loes. ex Engl. Spiny, ± densely branched, shrub or shrublet, 0.2–0.6(–1) m tall, stems glandular or ± glabrous, with longitudinal ridges above. Leaves opposite, 3-foliolate, with a petiole shorter or longer than spinescent stipules. Flowers in terminal monochasia, each lasting 1 day, petals pink to violet. Rain-dependent, SN, G (central Namibia to Richtersveld).

ROEPERA (= *ZYGOPHYLLUM* in part) ± 60 spp., southern Africa and Australia

A. Flowers 4-merous with 4 sepals and petals and 8 stamens

morgsana (L.) Beier & Thulin SLAAIBOS Erect shrub or shrublet, up to 1.5 m tall. Leaves petiolate, bifoliolate, leaflets asymmetric, ± obovate. Flowers usually 2 per axil, pale yellow, with red or brown markings. Fruit drooping, large, 4-angled and 4-winged, wings 15 mm wide. May–Oct. Sandy and stony slopes and flats, mostly coastal, SN, G, NS, NH, KV, CCR (southern Namibia to near Port Elizabeth). **(gce)**

A.' Flowers 5-merous with 5 sepals and petals and 10 stamens
B. Leaves petiolate, bifoliolate

foetida (Schrad. & J.C.Wendl.) Beier & Thulin SLYMBOS Foetid, sprawling and climbing shrub, up to 2 m or more tall. Leaves petiolate, bifoliolate, leaflets asymmetric, obovate. Flowers 1 or 2, axillary, deep yellow with red or brown markings. Fruit drooping, roundish when fresh, 5-lobed with prominent bony ribs when dry. July–Oct.(–Dec.). Slopes, flats and stream banks, SN, G, NH, KV, WM, CCR (southern Namibia to near Grahamstown).

leptopetala (E.Mey. ex Sond.) Beier & Thulin Rounded shrub, up to 1(–2) m tall, young stems ± square in cross section, often striate, sometimes hairy. Leaves petiolate, bifoliolate, leaflets asymmetrical obovate, midrib ± visible. Flowers 1 or 2 per axil, white with reddish maroon veins, with or without maroon or brown blotches. Fruit drooping, ± roundish when fresh, 5-lobed and 5-ridged when dry. May–Sept. Rocky slopes, SN, G, NH, KV (Witpütz to near Vanrhynsdorp). **(ece)**

lichtensteiniana (Cham. & Schltdl.) Beier & Thulin (= *Zygophyllum gilfillanii* N.E.Br.) VAALSPEKBOS Erect shrublet, up to 0.8 m tall. Leaves bifoliolate, petioles short, flat, leaflets asymmetrical, obovate, glaucous and waxy. Flowers lime-yellow. Fruit oblong, 5-angled with 5 wings, wings 2 mm wide. Mainly Sept. Shale flats, NH, WM, TS, CCR (eastern Namaqualand to Bushmanland, western and Little Karoo to central Karoo).

macrocarpon (Retief) Beier & Thulin Erect or sprawling shrub, up to 1 m tall, resprouting from base, young stems rarely shortly hairy. Leaves petiolate, bifoliolate, leaflets asymmetrical, obovate, thin-textured. Flowers up to 9 per axil, deep yellow with reddish brown markings. Fruit drooping, large, longitudinally angled and 5-winged, wings 5 mm wide. July–Sept. In shade of cliffs and rock outcrops, SN, G (Aurus Mountains to Richtersveld). **(ece)**

maculata (Aiton) Beier & Thulin LANTERNBOS Erect shrublet, up to 0.8 m tall, stems striate, usually with dense short hairs in grooves. Leaves petiolate, bifoliolate, leaflets linear, usually shortly hairy. Flowers 1 per leaf axil, bright yellow with red markings. Fruit ± oblong, 5-lobed with ribs. May–Oct. Shale flats and rocky ridges, TS, CCR (southern Tanqua Karoo to Koedoesberg Mountains to near Laingsburg). **(gce)**

schreiberiana (Merxm. & Giess) Beier & Thulin Erect, rounded shrub, up to 0.8 m tall, young stems densely short-haired, ± striate when dry. Leaves petiolate, trifoliolate, leaflets terete, densely short-haired when young. Flowers 1 or 2 in axils, yellow marked with red. Fruit drooping, subspheroid, 5-lobed with 5 ridges, black when dry. June–Aug. S-facing rocky slopes, SN, G (near Rosh Pinah to Richtersveld: Cornellskop). **(ece)**

B.' Leaves sessile, simple or bifoliolate

botulifolia (Van Zyl) Beier & Thulin Like **R. teretifolia** but an erect, woody shrub, up to 0.6 m tall, resprouting from below, leaves glabrous, sometimes brown-tinted. Flowers 1 per leaf axil, sulphur or golden yellow, marked with red, brown or khaki. July–Aug. On stony plains, TS (southern Tanqua Karoo). **(ece)**

cordifolia (L.f.) Beier & Thulin GELDJIEBOS Erect or sprawling shrublet, up to 0.4(–1) m tall. Leaves sessile, simple, obovate to suborbicular, glaucous, succulent, cordate to cuneate at base. Flowers 1 or 2, axillary, lime-yellow, with red or brown markings. Fruit drooping, oblong, 5-angled and 5-winged. Apr.–Oct. Sandy coastal dunes and rocky slopes, SN, G, NS, NH, KV, WM, CCR (Lüderitz to Saldanha). **(gce)**

cuneifolia (Eckl. & Zeyh.) Beier & Thulin Spreading or erect shrublet, up to 0.6 m tall, with ± swollen nodes. Leaves sessile, bifoliolate, leaflets wedge-shaped, succulent. Flowers 1(2), axillary, yellow with khaki or reddish brown markings or unmarked. Fruit drooping, ovoid, 5-lobed and 5-ribbed. June–Sept. Red sands and shale slopes, NS, KV, CCR (near Hondeklipbaai to Klawer). **(gce)**

hirticaulis (Van Zyl) Beier & Thulin Decumbent, compact shrublet, up to 0.3 m tall, with swollen nodes and hirsute young stems. Leaves sessile, bifoliolate, leaflets asymmetrical, obovate, leathery, glaucous. Flowers 1 or 2, axillary, bright yellow, unmarked. Fruit drooping, oblong, 5-winged, tomentose, with glabrescent wings, reddish-brown. May–Aug. Rocky flats, SN (Rosh Pinah area). **(ece)**

pygmaea (Eckl. & Zeyh.) Beier & Thulin Like **R. spinosa** but leaflets 7–14 vs. 10–22 mm long, and fruits ± acute at apex and never succulent. June–Sept. Sandstone and shale slopes, WM, CCR (Bokkeveld Plateau to Roggeveld Escarpment to Worcester to Uniondale). **(gce)**

spinosa (L.) Beier & Thulin Erect or decumbent shrublet, up to 1 m tall. Leaves sessile, bifoliolate, leaflets narrowly cylindrical, grooved beneath. Flowers 1(2) per leaf axil, cream, pale or deep yellow with or without red markings. Fruit drooping, round, acute and succulent when fresh, 5-angled and slightly ribbed when dry. June–Sept. Sandy soils, NS, CCR (Kleinsee near Hondeklipbaai to Cape Peninsula). **(gce)**

teretifolia (Schltr.) Beier & Thulin Decumbent, dwarf shrublet or shrub, up to 0.3(–1.3) m tall, with swollen nodes. Leaves sessile, bifoliolate, leaflets terete, succulent, glabrous or hirsute, often tinted brownish maroon. Flowers 1 or 2, axillary, pale yellow, plain or with red or brown markings. Fruit drooping, oblong, 5-lobed, each lobe ridged. June–July. In sand, granite outcrops and quartz pebble patches, NS, KV (Namaqualand coast and Knersvlakte). **(ece)**

sp. A Like **R. cordifolia** but a decumbent shrublet, up to 0.3 m tall, leaves obtuse or wedge-shaped at base, fruit spindle-shaped, succulent when fresh, ellipsoid and 5-angled when dry. May–Aug. Sandy flats and S-facing slopes, G, NS (Richtersveld to N of Port Nolloth). **(ece)**

sp. B Erect or spreading woody shrub, up to 0.6 m tall. Leaves sessile, bifoliolate, leaflets small, obovate, sometimes succulent, margins sometimes scabrous. Flowers 1 per leaf axil, yellow, with red to brown markings. Fruit drooping, ± round to ovoid, 5-lobed, thinly 5-ridged, acute at apex. July–Sept. Rocky slopes and flats, G, NH, KB (Richtersveld to Kamiesberg Mountains). **(ece)**

SISYNDITE 1 sp., southern Africa in dry west

spartea E.Mey. ex Sond. BESEMBOS Many stemmed, pale green to glaucous shrub, up to ± 2 m tall. Leaves pinnate, rachis thick and resembling a slender, green branch, leaflets widely spaced, obovate, soon deciduous. Flowers usually solitary in branch axils, yellow. Fruit a large silky capsule, hairs cream-yellow. Sept.–Apr. In sandy washes, SN, G, NH (Swakopmund to northern Namaqualand and Gordonia).

TETRAENA (= *Zygophyllum* in part) ± 40 spp., Africa and Asia

A. Leaves sessile, simple

prismatocarpa (E.Mey. ex Sond.) Beier & Thulin Erect, sparsely branched shrub, up to 1.5 m tall, woody basally, young stems longitudinally 1-winged. Leaves sessile, simple, ± obovate, succulent, glaucous. Flowers in dense, contracted, terminal cymes, white. Fruit erect or drooping, fleshy and ± obovoid when fresh, longitudinally angled when dry. July–Oct. On hills, ridges and in dry riverbeds, SN, G, NS (Lüderitz to near Kleinsee). **(ece)**

pterocaulis (Van Zyl) Beier & Thulin Decumbent shrublet, up to 0.15 m tall, with swollen nodes on old stems, young stems longitudinally 2-winged. Leaves sessile, simple, suborbicular, succulent, glaucous. Flowers in short, terminal cymes, white, petals sometimes undulate on margins. Fruit drooping, fleshy and ± obovoid when fresh, longitudinally angled when dry. Stony slopes, SN, G (Schakalsberg to Boomrivier to Cornellskop). **(ece)**

simplex (L.) Beier & Thulin VOLSTRUISKOS Succulent, densely mat-forming annual or biennial, up to 1 m across. Leaves sessile, simple, small, broadly obovoid or globose, bright green or yellowish, Flowers small, yellow. Fruit succulent when fresh, obovoid to obcordate, thin-walled and 5-ridged with dark tubercles when dry. Year-round. Usually in disturbed areas, SN, G, NH (Namibia and Botswana to central Karoo).

sp. A (= *Zygophyllum prismatocarpum* Sond. var. β *diffusum* Sond.) Like **T. pterocaulis** but a spreading shrublet, up to 0.4 m tall and young stems longitudinally 1-winged. Aug.–Sept. Base of hills and ridges and in dry riverbeds, SN, G (Klinghardt Mountains to southeastern Namibia and lower Gariep Valley).

A.' Leaves petiolate, bifoliolate

applanata (Van Zyl) Beier & Thulin Prostrate to semi-prostrate shrublet, up to 0.1 m tall, old stems white. Leaves petiolate, bifoliolate, leaflets ± subrotund, succulent. Flowers 1 or 2 axillary, petals 5, white. Fruit drooping, succulent when fresh, cylindrical and 5-lobed when dry. Aug.–Dec. Arid flats, SN (Lüderitz to Aus to Rosh Pinah). **(ece)**

chrysopteron (Retief) Beier & Thulin KLEINSKILPADBOS Like **T. retrofracta** but fruit golden-yellow, ± spherical, 5-winged, wings usually thin and reticulate-veined, veins sometimes rib-like. Sept.–Dec. Shale flats or slopes, KV, WM, TS, CCR (widespread in interior of southern Africa).

clavata (Schltr. & Diels) Beier & Thulin Erect to hummock-forming, densely branched, woody shrublet, up to 0.5 m tall. Leaves petiolate, bifoliolate, leaflets asymmetrical, obovate to clavate, succulent. Flowers 1–3, axillary, white. Fruit erect, 5-parted, depressed ovoid. Year-round. Coastal dunes and at base of rock outcrops, SN, G, NS (northern Namib to Port Nolloth).

longicapsularis (Schinz) Beier & Thulin VOLSTRUISBOS Many-stemmed, woody based shrub, up to 0.4(0.7) m tall, young stems with minute, dense, white, 2-armed hairs and a brown longitudinal band. Leaves petiolate, bifoliolate, leaflets orbicular or obovate, succulent. Flowers 1(2), axillary, white or rarely cream-coloured. Fruit pendulous, cylindrical or spherical, succulent when fresh, 5-angled or 5-lobed when dry. July–Sept. Rocky slopes and sandy flats, SN, G (central Namib to Richtersveld).

microcarpa (Licht. ex Cham.) Beier & Thulin ARMOEDSBOS, GANNABOS Erect or spreading shrub, up to 1.5 m tall, with minute, white, 2-armed hairs on young parts, nodes of old stems ± swollen. Leaves petiolate, bifoliolate, leaflets narrowly obovate. Flowers 1 in leaf axils, white or pale yellow. Fruit ± erect, broadly 5-winged, wings undulate and twisted, yellow or reddish orange. Mostly July–Aug. Along drainage lines, SN, G, TS (southern Namibia through central Karoo to near Oudtshoorn).

retrofracta (Thunb.) Beier & Thulin JAKKALSBOS, VAALKAREEDORING Rounded shrub or shrublet, up to 1.5 m tall. Leaves bifoliolate, petiolate, leaflets ± obovate, small, succulent. Flowers 1(2),

axillary, small, white. Fruit erect, small, ± spheroid and usually succulent when fresh, ellipsoid, 5-angled or 5-ribbed when dry. July–Dec. Sandy and shale flats and rock outcrops, SN, G, NS, NH, KV, WM, TS (Helmeringhausen to Gordonia to near Merweville).

sp. B Rounded, woody shrub, up to 0.6 m tall, stems conspicuously segmented. Leaves petiolate, bifoliolate, leaflets cylindrical, usually folded lengthwise, succulent. Flowers 1–3, axillary, petals 5, white. Fruit drooping, obovoid, succulent when fresh, 5-lobed when dry. Nov. Along dry water courses, G (near Rosh Pinah to lower Gariep Valley). **(ece)**

sp. C Like **T. retrofracta** but stipules white (not brown) and fruit turbinate, 5-winged, with pink tints. Sept.–Nov. Valleys and low hills, in shale, dolerite or loam, TS (southern Tanqua Karoo to near Beaufort West and Prince Albert).

TRIBULUS DUBBELTJIEDORING ± 20 spp., cosmopolitan in dry parts

cristatus C.Presl Like **T. terrestris** but occasionally a short-lived perennial, pedicel usually 2–3 times as long as subtending leaf, intrastaminal glands united into a shallow cup at base of ovary, and fruit large, up to 30 mm across, dorsally ridged with 5 rounded wings, wing edges with sharp spines. Nov.–Apr. Sandy areas, SN, G (southern Namibia, Richtersveld to Bushmanland).

pterophorus C.Presl Like **T. terrestris** but pedicel usually 1–3 times as long as subtending leaf, intrastaminal glands united into a shallow cup at base of ovary, and fruit up to 10 mm across, 5-winged, wings unarmed. Sept.–May. In disturbed places, often in sand, SN, G (southern Namibia to lower Gariep Valley to Bushmanland and Gordonia).

terrestris L. Glabrescent or hairy, prostrate annual, with stems radiating from a crown, up to 2 m long. Leaves opposite, unequal, pinnate, leaflets oblong, silky. Flowers solitary in axils, intrastaminal glands free, yellow. Fruit fragmenting into 5 segments, each with several sharp conical spines. Oct.–Apr. Sandy flats and roadsides, SN, G, NH, KV, WM, TS, CCR (throughout southern Africa).

zeyheri Sond. Like **T. terrestris** but a perennial, pedicel usually 1.5–2 times as long as subtending leaf, petals up to 25 mm long, intrastaminal glands united into a shallow cup at base of ovary, and fruit breaking into 5 segments, each armed with 4(–6) well-developed spines or spines wart-like in appearance. Jan.–May. On gravelly flats, SN, NH, TS (widespread in arid interior of southern Africa).

Notes on the collections of T.P. Stokoe from the Kamiesberg Mountains

According to the holdings of the National Herbarium, Pretoria (PRE) and the data in PRECIS, the South African National Biodiversity Institute's Computerised Information System, several of the plant collections made by T.P. Stokoe in the summer of 1929 bear the location 'Kamiesberg Mountains, Namaqualand'. Many of these are typical Core Cape plants and several specialists in the Greater Cape flora have expressed doubt as to the authenticity of the Kamiesberg as being the correct locality (N.A. Helme, E.G.H. Oliver, J.P. Rourke pers. comm.). Nick Helme in particular has surveyed the Kamiesberg Mountains on several occasions (Helme 2009), but so far has never been able to relocate any of the species in question. Stokoe's doubtful collections are given below.

ASTERACEAE

Edmondia sesamoides (L.) Hilliard	*Stokoe 2064* (PRE)
Helichrysum felinum Less.	*Stokoe 2070* (PRE)
Heterolepis aliena (L.f.) Druce	*Stokoe 2051* (PRE)
Metalasia muraltiifolia DC.	*Stokoe 2071* (PRE)
Phaneroglossa bolusii (Oliv.) B.Nord.	*Stokoe 2065* (PRE)
Syncarpha staehelina (L.) B.Nord.	*Stokoe 2063* (PRE)
Ursinia sericea (Thunb.) N.E.Br.	*Stokoe 2058* (PRE)

BRUNIACEAE

Audouinia laxa (Thunb.) A.V.Hall (= *Tittmannia laxa* (Thunb.) C.Presl)	*Stokoe 2039* (PRE)
Brunia fragarioides Willd. (= *Nebelia fragarioides* (Willd.) Kuntze)	*Stokoe 2069* (PRE)

CYPERACEAE

Chrysitrix capensis L.	*Stokoe 2068* (PRE)

ERICACEAE

Erica longistyla L.Bolus	*Stokoe 2041* (PRE)
Erica subulata J.C.Wendl.	*Stokoe 2053* (PRE)

GERANIACEAE

Pelargonium capillare (Cav.) Willd.	*Stokoe 2047* (PRE)

PROTEACEAE

Sorocephalus lanatus (Thunb.) R.Br.	*Stokoe 2038* (PRE)

RHAMNACEAE

Phylica insignis Pillans	*Stokoe 2052* (PRE)

SANTALACEAE

Thesium juncifolium DC. *Stokoe 2056* (PRE)

STILBACEAE

Thesmophora scopulosa Rourke *Stokoe 2050* (PRE)

Evidence that the above specimens may indeed be incorrectly labelled emerged from a study of the collections in the Bolus Herbarium (BOL). Although duplicates of only three of the doubtful Stokoe collections could be found in BOL, none of these gave the locality as the Kamiesberg. Instead, the Bolus Herbarium collections of *Thesmophora scopulosa* (*Stokoe 2050*), *Phylica insignis* (*Stokoe 2052*) and *Edmondia sesamoides* (*Stokoe 2064*) give the locality as 'Castle Rock, Mitchells Pass, Ceres', which fits the known distributions of these species (Pillans 1942, Hilliard 1983, Rourke 1993). Apparently Hilliard did not see Stokoe's duplicate collection of *Edmondia sesamoides* in BOL, hence she did not doubt the data given on the specimen in PRE and consequently described *Edmondia sesamoides* as having a disjunct distribution between the Kamiesberg Mountains in Namaqualand and the Cape Fold Mountains in the Western Cape. This distribution, however, seems very unlikely.

In addition, three of the above specimens in PRE have been annotated by specialists in various plant families as having doubtful localities: *Brunia fragarioides* (*Stokoe 2069*) by N.S. Pillans, *Pelargonium capillare* (*Stokoe 2047*) by L. Hugo, and *Sorocephalus lanatus* (*Stokoe 2038*) by J.P. Rourke.

With the exception of the above collections, Stokoe's other collections from Namaqualand, mostly labelled 'Bowesdorp' are not in doubt. In PRE, these either lack collecting numbers or have five-digit numbers, as opposed to the four-digit numbers given above.

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Appendix.—Statistics for families of the Extra Cape flora.

Abbreviations: ECR = Extra Cape Subregion, (ece) = Extra Cape endemic genera, ece = Extra Cape endemic spp., (gce) = Greater CFR endemic genera, gce = Greater CFR endemic spp., SNe = Southern Namib endemic spp., Ge = Gariep endemic spp., NSe = Namaqualand Sandveld endemic spp., NHe = Namqualand Hardeveld endemic spp., KBe = Kamiesberg Mountains endemic spp., KVe = Knersvlakte endemic spp., WMe = Western Mountain Karoo endemic spp., TSe = Tanqua-southern Greater Karoo endemic spp.

Lycopods & monilophytes	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
ANEMIACEAE	Mohria	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
ASPLENIACEAE	Asplenium	2	0	0	1	0	1	0	0	0	1	0	1	0	0	0	2	0	1	0
BLECHNACEAE	Blechnum	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
DRYOPTERIDACEAE	Polystichum	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
EQUISETACEAE	Equisetum	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ISOËTACEAE	Isoëtes	3	2	1	0	0	0	0	0	0	0	0	2	1	0	0	1	1	0	0
MARSILEACEAE	Marsilea	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0
OPHIOGLOSSACEAE	Ophioglossum	3	0	2	1	0	1	0	1	0	2	0	2	0	0	0	2	0	1	0
OSMUNDACEAE	Todea	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
PTERIDACEAE	Adiantum	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
PTERIDACEAE	Cheilanthes	14	2	5	8	0	8	0	2	0	9	0	4	0	1	0	6	0	9	0
PTERIDACEAE	Pellaea	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
TOTAL		31	4	10	11	0	12	0	3	0	13	0	13	1	1	0	14	1	13	0

Palaeodicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
HYDNORACEAE	Hydnora	2	1	0	1	0	2	0	2	0	0	0	0	0	1	0	0	0	1	0
TOTAL		2	1	0	1	0	2	0	2	0	0	0	0	0	1	0	0	0	1	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Monocots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
AGAVACEAE	Chlorophytum	8	4	4	3	0	4	0	5	0	4	1	1	0	2	0	1	0	2	1
ALLIACEAE	Allium	1	0	0	0	0	1	0	0	0	1	0	1	0	1	0	1	0	1	0
ALLIACEAE	Tulbaghia	2	0	2	0	0	1	0	0	0	1	0	1	0	2	0	0	0	0	0
AMARYLLIDACEAE	Amaryllis (gce)	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
AMARYLLIDACEAE	Ammocharis	1	0	1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0
AMARYLLIDACEAE	Boophone	2	0	1	0	0	2	0	1	0	0	0	0	0	0	0	1	0	0	0
AMARYLLIDACEAE	Brunsvigia	8	2	3	1	0	3	0	3	0	5	0	1	0	3	0	3	0	3	0
AMARYLLIDACEAE	Crinum	1	0	1	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0
AMARYLLIDACEAE	Crossyne (gce)	1	0	1	0	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0
AMARYLLIDACEAE	Cyrtanthus	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
AMARYLLIDACEAE	Gethyllis	24	13	8	1	0	6	1	7	1	8	1	3	0	8	0	11	1	7	2
AMARYLLIDACEAE	Haemanthus	11	7	3	3	0	3	0	3	0	7	1	3	0	4	0	4	0	3	1
AMARYLLIDACEAE	Hessea	8	6	2	0	0	2	0	2	0	4	2	2	2	3	0	3	0	1	0
AMARYLLIDACEAE	Namaquanula	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
AMARYLLIDACEAE	Nerine	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
AMARYLLIDACEAE	Strumaria	22	18	3	2	1	8	4	1	0	8	4	0	0	3	0	8	2	3	1
APONOGETONACEAE	Aponogeton	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
ARACEAE	Zantedeschia	2	1	1	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0	0
ASPARAGACEAE	Asparagus	23	4	8	11	1	8	0	9	0	12	1	2	0	6	0	12	0	11	0
ASPHODELACEAE	Aloe	25	10	6	9	0	16	3	3	0	9	1	1	0	5	0	11	1	8	0
ASPHODELACEAE	Astroloba	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
ASPHODELACEAE	Bulbine	37	23	10	9	2	11	2	9	0	18	3	3	0	15	5	5	0	10	1
ASPHODELACEAE	Bulbinella	10	3	7	0	0	2	0	2	0	7	1	3	0	3	0	6	0	3	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Monocots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
ASPHODELACEAE	Chortolirion	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ASPHODELACEAE	Gasteria	1	0	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0
ASPHODELACEAE	Haworthia	6	0	2	0	0	2	0	1	0	3	0	0	0	1	0	3	0	6	0
ASPHODELACEAE	Kniphofia	2	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0
ASPHODELACEAE	Trachyandra	26	10	10	7	1	14	1	10	0	11	0	2	1	12	0	6	2	6	1
COLCHICACEAE	Colchicum	25	16	5	3	1	7	3	1	0	10	3	5	0	4	2	10	2	7	0
COLCHICACEAE	Hexacyrtis (ece)	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
COLCHICACEAE	Ornithoglossum	6	2	1	5	1	4	0	2	0	4	0	1	0	1	0	3	0	3	0
COLCHICACEAE	Wurmbea	2	0	2	0	0	0	0	0	0	0	0	2	0	1	0	1	0	1	0
CYPERACEAE	Bolboschoenus	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
CYPERACEAE	Carex	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
CYPERACEAE	Cyperus	7	0	0	3	0	3	0	2	0	2	0	2	0	4	0	6	0	3	0
CYPERACEAE	Eleocharis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
CYPERACEAE	Ficinia	12	1	6	0	0	3	0	4	0	5	0	4	0	4	1	6	1	4	0
CYPERACEAE	Fimbristylis	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
CYPERACEAE	Isolepis	17	1	5	0	0	3	0	2	0	10	0	8	0	6	0	11	0	3	0
CYPERACEAE	Pseudoschoenus	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	1	0
CYPERACEAE	Schoenoplectus	2	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
CYPERACEAE	Scirpoides	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0
CYPERACEAE	Tetraria	3	1	2	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0
DIOSCOREACEAE	Dioscorea	2	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	1	0
HAEMODORACEAE	Wachendorfia (gce)	2	0	2	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0
HEMEROCALLIDACEAE	Caesia	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Monocots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
HYACINTHACEAE	Albuca	42	14	17	19	1	26	2	10	0	30	0	2	0	21	0	20	0	17	0
HYACINTHACEAE	Bowiea	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
HYACINTHACEAE	Daubenya	6	4	2	0	0	0	0	0	0	1	1	0	0	1	0	5	2	0	0
HYACINTHACEAE	Dipcadi	3	0	0	3	0	2	0	0	0	1	0	0	0	2	0	1	0	0	0
HYACINTHACEAE	Drimia	25	7	10	5	2	7	1	3	0	11	0	4	0	8	1	12	0	12	0
HYACINTHACEAE	Eucomis	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0
HYACINTHACEAE	Lachenalia	59	37	18	5	1	13	1	13	2	26	3	8	0	15	1	29	8	12	1
HYACINTHACEAE	Ledebouria	2	0	0	0	0	1	0	0	0	2	0	0	0	0	0	3	0	3	0
HYACINTHACEAE	Massonia	6	2	2	3	0	4	0	0	0	3	0	2	0	2	0	2	0	0	0
HYACINTHACEAE	Namophila	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
HYACINTHACEAE	Ornithogalum	29	16	8	7	1	13	1	1	0	17	2	6	0	9	1	14	2	6	0
HYACINTHACEAE	Pseudogaltonia	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
HYACINTHACEAE	Veltheimia	1	0	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0
HYPOXIDACEAE	Empodium	3	0	3	0	0	0	0	1	0	3	0	2	0	2	0	2	0	1	0
HYPOXIDACEAE	Spiloxene	10	5	5	0	0	2	1	0	0	4	0	4	1	1	0	6	2	1	0
IRIDACEAE	Afrocrocus	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
IRIDACEAE	Aristea	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
IRIDACEAE	Babiana	45	31	13	3	0	9	1	12	4	18	3	7	1	7	2	11	3	5	1
IRIDACEAE	Chasmanthe	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
IRIDACEAE	Crocosmia	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
IRIDACEAE	Devia (ece)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
IRIDACEAE	Ferraria	10	5	4	1	0	2	0	8	1	5	2	3	0	2	0	2	0	1	0
IRIDACEAE	Freesia	2	0	2	1	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Monocots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
IRIDACEAE	Geissorhiza	10	6	4	0	0	0	0	1	0	1	0	3	1	0	0	6	3	2	0
IRIDACEAE	Gladiolus	24	8	12	2	0	5	1	6	0	9	1	8	1	4	0	10	3	7	0
IRIDACEAE	Hesperantha	28	15	10	0	0	2	1	0	0	7	1	7	2	3	0	20	8	6	0
IRIDACEAE	Ixia	22	13	8	0	0	1	0	1	0	3	0	2	0	1	1	16	11	6	1
IRIDACEAE	Lapeirousia	19	12	5	2	0	6	1	6	0	9	1	4	1	7	0	3	0	2	0
IRIDACEAE	Melasphaerula (gce)	1	0	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0
IRIDACEAE	Moraea	68	35	22	1	1	19	6	3	0	27	3	24	5	15	2	26	4	16	2
IRIDACEAE	Romulea	37	22	11	0	0	2	0	2	1	7	1	11	2	2	1	21	12	3	0
IRIDACEAE	Sparaxis (gce)	2	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0
IRIDACEAE	Syringodea	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0
IRIDACEAE	Tritonia	7	3	1	0	0	2	2	0	0	1	0	1	1	0	0	1	0	3	0
IRIDACEAE	Watsonia	2	1	1	0	0	0	0	0	0	1	0	2	1	0	0	0	0	0	0
IRIDACEAE	Xenoscapa	3	2	1	0	0	2	1	0	0	1	0	2	1	1	0	1	0	1	0
JUNCACEAE	Juncus	7	0	2	1	0	4	0	1	0	2	0	2	0	2	0	1	0	3	0
JUNCAGINACEAE	Triglochin	4	0	2	1	0	1	0	3	0	0	0	0	0	1	0	0	0	0	0
ORCHIDACEAE	Bartholina	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
ORCHIDACEAE	Disa	4	2	2	0	0	0	0	0	0	2	0	3	1	0	0	1	0	0	0
ORCHIDACEAE	Disperis	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0
ORCHIDACEAE	Holothrix	6	1	5	1	0	3	0	1	0	6	0	2	0	1	0	3	0	4	0
ORCHIDACEAE	Pterygodium	5	0	5	0	0	3	0	0	0	2	0	2	0	1	0	5	0	2	0
ORCHIDACEAE	Satyrium	5	1	3	0	0	0	0	0	0	1	0	4	0	1	1	3	0	0	0
POACEAE	Agrostis	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
POACEAE	Aristida	7	1	0	3	0	5	0	1	0	5	0	1	0	3	0	3	0	4	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Monocots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
POACEAE	Brachypodium	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
POACEAE	Cenchrus	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
POACEAE	Centropodia	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
POACEAE	Chaetobromus	1	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0
POACEAE	Cladoraphis	2	0	0	1	0	2	0	2	0	1	0	0	0	1	0	1	0	0	0
POACEAE	Cymbopogon	3	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0
POACEAE	Cynodon	1	0	0	1	0	1	0	1	0	1	0	1	0	0	0	1	0	1	0
POACEAE	Diandrochloa	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
POACEAE	Dichanthium	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
POACEAE	Digitaria	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
POACEAE	Dregeochloa	2	1	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0
POACEAE	Ehrharta	12	2	8	5	0	7	0	8	0	8	0	7	0	6	0	6	0	6	0
POACEAE	Eleusine	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
POACEAE	Enneapogon	3	0	0	2	0	2	0	0	0	2	0	1	0	1	0	2	0	3	0
POACEAE	Eragrostis	9	0	0	2	0	3	0	1	0	1	0	1	0	2	0	4	0	3	0
POACEAE	Festuca	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0
POACEAE	Fingerhuthia	1	0	0	1	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0
POACEAE	Helictotrichon	3	3	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0
POACEAE	Hemarthria	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POACEAE	Holcus	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
POACEAE	Hordeum	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0
POACEAE	Hyparrhenia	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
POACEAE	Koeleria	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Monocots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
POACEAE	Leptochloa	1	0	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0
POACEAE	Leucophrys	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
POACEAE	Melica	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
POACEAE	Merxmuellera	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POACEAE	Odyssea	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0
POACEAE	Panicum	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
POACEAE	Pentameris	11	2	6	1	0	2	0	5	0	6	0	8	1	2	0	7	1	1	0
POACEAE	Phragmites	1	0	0	1	0	1	0	1	0	1	0	1	0	0	0	1	0	1	0
POACEAE	Puccinellia	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
POACEAE	Schismus	4	0	1	2	0	2	0	2	0	4	0	4	0	4	0	3	0	2	0
POACEAE	Schmidtia	1	0	0	1	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0
POACEAE	Secale	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
POACEAE	Setaria	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
POACEAE	Sorghum	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
POACEAE	Sporobolus	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0
POACEAE	Stipa	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0
POACEAE	Stipagrostis	15	2	0	14	0	10	0	5	0	5	0	1	0	5	0	3	0	4	0
POACEAE	Tenaxia	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0
POACEAE	Tribolium	7	1	4	0	0	1	0	2	0	6	0	2	0	5	0	5	0	3	0
POACEAE	Tricholaena	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
POACEAE	Triraphis	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POTAMOGETONACEAE	Althenia	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
POTAMOGETONACEAE	Potamogeton	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Monocots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
POTAMOGETONACEAE	Zannichellia	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
RESTIONACEAE	Hypodiscus	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
RESTIONACEAE	Restio	11	1	8	0	0	2	0	3	0	2	0	8	1	0	0	3	0	0	0
RESTIONACEAE	Thamnochortus	1	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0
RESTIONACEAE	Willdenowia (gce)	2	0	2	0	0	1	0	2	0	1	0	1	0	0	0	0	0	0	0
RUPPIACEAE	Ruppia	2	0	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0
RUSCACEAE	Eriospermum	51	30	17	2	1	9	1	3	0	26	10	7	0	21	4	12	2	14	1
TECOPHILAEACEAE	Cyanella	9	4	4	1	0	3	1	2	0	4	0	1	0	2	0	4	1	3	0
TECOPHILAEACEAE	Walleria	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		1024	423	345	171	15	324	38	200	9	429	47	225	24	264	22	434	76	266	13

Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
AIZOACEAE	Aizoon	4	1	2	0	0	0	0	2	0	2	0	0	0	0	0	0	0	1	0
AIZOACEAE	Aloinopsis	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	1
AIZOACEAE	Amphibolia (gce)	3	3	0	2	1	2	1	2	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Antimima	62	51	9	6	5	11	5	9	5	14	8	0	0	12	8	10	6	7	3
AIZOACEAE	Arenifera (gce)	4	3	1	0	0	3	1	0	0	2	0	0	0	2	0	1	0	0	0
AIZOACEAE	Argyroderma (ece)	11	11	0	0	0	0	0	0	0	0	0	0	0	11	11	0	0	0	0
AIZOACEAE	Astridia (ece)	8	8	0	5	0	8	3	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Bijlia (ece)	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
AIZOACEAE	Braunsia (ece)	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
AIZOACEAE	Carpobrotus	2	0	1	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
AIZOACEAE	Cephalophyllum	24	21	3	4	2	5	1	6	2	6	0	0	0	9	6	3	1	4	1

Appendix.—Statistics for families of the Extra Cape flora (continued).

Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
AIZOACEAE	Chasmatophyllum	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
AIZOACEAE	Cheiridopsis	30	26	1	4	1	18	8	1	1	16	5	2	1	1	0	1	0	1	0
AIZOACEAE	Cleretum	2	0	0	0	0	1	0	1	0	1	0	1	0	1	0	1	0	2	0
AIZOACEAE	Conicosia	2	0	1	0	0	2	0	2	0	1	0	1	0	0	0	0	0	0	0
AIZOACEAE	Conophytum	81	68	3	7	2	32	15	9	1	52	24	5	1	9	4	3	0	1	0
AIZOACEAE	Cylindrophyllum	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0
AIZOACEAE	Deilanthe	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	1
AIZOACEAE	Delosperma	5	3	1	1	0	1	0	0	0	1	0	0	0	1	0	2	2	1	0
AIZOACEAE	Dicrocaulon (gce)	7	6	1	0	0	0	0	2	2	1	0	0	0	5	3	0	0	1	0
AIZOACEAE	Didymaotus (ece)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
AIZOACEAE	Diplosoma (gce)	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
AIZOACEAE	Dorotheanthus (gce)	4	3	1	0	0	0	0	1	0	2	0	1	0	1	0	2	2	0	0
AIZOACEAE	Dracophilus (ece)	2	2	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Drosanthemum	29	20	5	3	0	4	1	4	0	8	3	0	0	9	5	4	2	9	3
AIZOACEAE	Eberlanzia (ece)	8	8	0	4	1	5	1	2	1	2	1	0	0	0	0	0	0	0	0
AIZOACEAE	Ebracteola	2	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Enarganthe (ece)	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Fenestraria (ece)	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Galenia	22	2	3	10	0	11	0	8	0	12	0	2	0	8	0	10	0	11	0
AIZOACEAE	Gibbaeum (gce)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
AIZOACEAE	Glottiphyllum	5	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1
AIZOACEAE	Hallianthus (ece)	2	2	0	0	0	1	0	1	0	2	1	0	0	1	0	0	0	0	0
AIZOACEAE	Hammeria (gce)	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
AIZOACEAE	Hartmanthus (ece)	2	2	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
AIZOACEAE	Hereroa	8	5	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	7	5
AIZOACEAE	Hymenogyne (gce)	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
AIZOACEAE	Ihlenfeldtia	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
AIZOACEAE	Jacobsenia (ece)	3	3	0	0	0	0	0	0	0	2	1	0	0	2	1	0	0	0	0
AIZOACEAE	Jensenobotrya (ece)	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Jordaaniella (gce)	4	4	0	1	0	3	0	4	1	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Juttadinteria (ece)	5	5	0	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Lampranthus	13	6	4	3	0	4	0	6	1	6	0	3	0	3	1	4	0	4	0
AIZOACEAE	Leipoldtia (gce)	12	11	1	2	0	6	2	5	2	5	1	0	0	2	1	2	1	1	0
AIZOACEAE	Lithops	17	11	0	5	3	4	3	0	0	5	2	0	0	1	0	3	1	2	0
AIZOACEAE	Malephora	5	4	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	4	3
AIZOACEAE	Mesembryanthemum	77	41	11	26	1	36	4	27	0	39	3	4	0	28	8	20	1	22	2
AIZOACEAE	Meyerophytum (ece)	2	2	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0
AIZOACEAE	Mitrophyllum (ece)	6	6	0	0	0	5	4	0	0	2	1	0	0	0	0	0	0	0	0
AIZOACEAE	Monilaria (gce)	5	3	2	0	0	1	0	1	0	2	1	0	0	3	1	0	0	0	0
AIZOACEAE	Namaquanthus (ece)	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Namibia (ece)	3	3	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Nelia (ece)	2	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Octopoma (gce)	5	4	1	0	0	1	0	1	1	2	1	0	0	2	1	0	0	1	0
AIZOACEAE	Odontophorus (ece)	4	4	0	0	0	3	2	0	0	2	1	0	0	0	0	0	0	0	0
AIZOACEAE	Oophytum (ece)	2	2	0	0	0	0	0	0	0	0	0	0	2	2	2	0	0	0	0
AIZOACEAE	Ottosonderia (ece)	1	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
AIZOACEAE	Peersia	3	2	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	3	1
AIZOACEAE	Phiambolia (gce)	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
AIZOACEAE	Pleiospilos	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
AIZOACEAE	Polymita (ece)	2	2	0	0	0	1	0	0	0	2	1	0	0	0	0	0	0	0	0
AIZOACEAE	Psammophora (ece)	4	4	0	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Rhinephyllum	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2
AIZOACEAE	Ruschia	69	50	3	8	1	22	2	14	3	31	4	2	1	19	9	7	1	16	3
AIZOACEAE	Ruschianthus (ece)	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Ruschiella	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
AIZOACEAE	Schlechteranthus (ece)	2	2	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Schwantesia	4	3	0	1	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Scopelogena (gce)	1	0	1	0	0	0	0	0	0	1	O	0	0	1	0	0	0	1	0
AIZOACEAE	Sesuvium	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AIZOACEAE	Stoeberia	6	4	1	5	0	4	0	3	0	3	0	1	0	2	0	0	0	0	0
AIZOACEAE	Stomatium	8	4	1	0	0	0	0	0	0	3	1	0	0	0	0	3	1	3	1
AIZOACEAE	Tanquana (gce)	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
AIZOACEAE	Tetragonia	15	1	4	5	0	5	0	6	1	9	0	0	0	9	0	5	0	7	0
AIZOACEAE	Titanopsis	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
AIZOACEAE	Trianthema	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	3	0
AIZOACEAE	Trichodiadema	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
AIZOACEAE	Vanheerdia (ece)	2	2	0	0	0	0	0	0	0	2	1	0	0	0	0	1	0	0	0
AIZOACEAE	Vanzijlia (gce)	1	0	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0
AIZOACEAE	Wooleya (ece)	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
TOTAL		658	455	75	123	29	219	61	126	24	248	61	22	5	148	62	94	23	143	33

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
ACANTHACEAE	Acanthopsis	5	4	0	1	0	4	0	1	0	4	1	2	0	0	0	1	0	0	0
ACANTHACEAE	Barleria	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
ACANTHACEAE	Blepharis	6	1	0	4	1	2	0	0	0	2	0	0	0	1	0	0	0	2	0
ACANTHACEAE	Justicia	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0
ACANTHACEAE	Monechma	5	1	0	3	0	4	0	2	0	3	0	0	0	2	0	1	0	1	0
ACANTHACEAE	Petalidium	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
ACHARIACEAE	Kiggelaria	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
AMARANTHACEAE	Amaranthus	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0
AMARANTHACEAE	Atriplex	4	0	0	3	0	3	0	3	0	2	0	0	0	2	0	2	0	1	0
AMARANTHACEAE	Bassia	3	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
AMARANTHACEAE	Calicorema	2	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
AMARANTHACEAE	Caroxylon	22	19	0	9	6	5	2	3	1	6	5	0	0	6	3	2	0	2	1
AMARANTHACEAE	Chenopodium	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
AMARANTHACEAE	Exomis	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
AMARANTHACEAE	Halopeplis	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
AMARANTHACEAE	Hermbstaedtia	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
AMARANTHACEAE	Kali	1	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	1	0
AMARANTHACEAE	Manochlamys	1	0	0	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
AMARANTHACEAE	Salicornia	2	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
AMARANTHACEAE	Sarcocornia	7	3	1	4	1	2	0	4	1	2	0	0	0	4	1	0	0	1	0
AMARANTHACEAE	Sericocoma	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0
AMARANTHACEAE	Suaeda	2	0	1	2	0	1	0	0	0	1	0	1	0	1	0	1	0	1	0
ANACAMPSEROTACEAE	Anacampseros	23	10	3	2	0	14	6	4	1	8	2	0	0	2	0	1	0	6	0
ANACARDIACEAE	Ozoroa	3	1	0	3	0	3	0	0	0	1	0	1	0	0	0	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
ANACARDIACEAE	Searsia	10	1	1	3	0	4	0	4	0	4	0	2	0	2	0	5	0	5	0
APIACEAE	Anginon	4	2	1	1	0	3	0	0	0	3	0	3	0	0	0	3	0	1	0
APIACEAE	Annesorhiza	3	1	2	0	0	1	0	0	0	2	0	1	0	2	0	3	0	2	0
APIACEAE	Apium	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
APIACEAE	Arctopus	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
APIACEAE	Berula	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
APIACEAE	Bupleurum	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
APIACEAE	Capnophyllum (gce)	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
APIACEAE	Centella	4	0	4	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0
APIACEAE	Chamarea	3	2	0	0	0	0	0	0	0	0	0	1	0	1	0	2	1	0	0
APIACEAE	Conium	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0
APIACEAE	Cynorhiza	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
APIACEAE	Dasispermum	3	0	2	0	0	1	0	3	0	1	0	0	0	1	0	0	0	0	0
APIACEAE	Deverra	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	1	0
APIACEAE	Heteromorpha	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
APIACEAE	Marlothiella (ece)	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APIACEAE	Notobubon	2	1	1	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0
APIACEAE	Polemanniopsis (gce)	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
APIACEAE	Scaraboides (ece)	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
APIACEAE	Torilis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
APOCYNACEAE	Astephanus	1	0	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0
APOCYNACEAE	Brachystelma	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
APOCYNACEAE	Carissa	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
APOCYNACEAE	Ceropegia	5	2	0	1	0	1	1	1	0	0	0	0	0	0	0	1	0	2	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
APOCYNACEAE	Cynanchum	3	1	1	1	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0
APOCYNACEAE	Duvalia	2	0	0	0	0	1	0	1	0	1	0	0	0	1	0	2	0	1	0
APOCYNACEAE	Ectadium	2	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
APOCYNACEAE	Eustegia (gce)	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
APOCYNACEAE	Fockea	2	0	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	2	0
APOCYNACEAE	Gomphocarpus	3	0	0	2	0	3	0	1	0	3	0	1	0	2	1	2	0	2	0
APOCYNACEAE	Hoodia	6	0	0	3	0	2	0	0	0	1	0	0	0	1	0	2	0	4	0
APOCYNACEAE	Huernia	5	1	0	0	0	1	0	0	0	2	0	0	0	1	0	2	0	2	0
APOCYNACEAE	Larryleachia	4	0	0	2	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0
APOCYNACEAE	Microloma	8	3	1	2	1	5	0	2	0	7	1	1	0	2	0	1	0	1	0
APOCYNACEAE	Notechidnopsis (ece)	1	1	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0
APOCYNACEAE	Orbea	3	0	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	2	0
APOCYNACEAE	Pachypodium	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
APOCYNACEAE	Pectinaria (gce)	3	2	1	0	0	1	0	0	0	1	0	0	0	0	0	3	2	1	0
APOCYNACEAE	Pergularia	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
APOCYNACEAE	Piaranthus	5	0	2	0	0	1	0	1	0	2	0	0	0	1	0	3	0	4	0
APOCYNACEAE	Quaqua	17	11	3	3	0	4	0	5	0	11	3	0	0	8	2	8	0	8	0
APOCYNACEAE	Rhyssolobium (ece)	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
APOCYNACEAE	Richtersveldia (ece)	1	1	0	0	0	1	1	0	0	0	0	0	1	0	1	0	1	0	0
APOCYNACEAE	Sarcostemma	1	0	0	1	0	1	0	0	0	1	0	0	0	1	0	1	0	1	0
APOCYNACEAE	Stapelia	12	4	4	1	0	4	1	0	0	3	0	0	0	2	0	4	1	6	1
APOCYNACEAE	Stapeliopsis	5	2	2	0	0	2	1	0	0	1	1	0	0	0	0	2	0	2	0
APOCYNACEAE	Tridentea	5	2	1	1	0	1	0	1	0	1	0	0	0	1	1	3	0	2	0
APOCYNACEAE	Tromotriche	7	3	1	3	1	4	0	2	0	3	0	0	0	2	0	3	0	3	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
APOCYNACEAE	Xysmalobium	2	2	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
ASTERACEAE	Adenoglossa (ece)	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Alatoseta (ece)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
ASTERACEAE	Amellus	8	3	3	2	0	4	0	4	0	4	1	1	0	2	0	2	0	2	0
ASTERACEAE	Amphiglossa	6	3	0	1	1	1	0	1	1	1	0	1	0	1	1	3	0	1	0
ASTERACEAE	Antithrixia (ece)	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
ASTERACEAE	Arctotheca	3	0	0	0	0	0	0	2	0	1	0	1	0	1	0	2	0	1	0
ASTERACEAE	Arctotis	25	13	7	2	1	4	0	6	2	11	3	5	0	3	0	12	1	4	0
ASTERACEAE	Asaemia	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0
ASTERACEAE	Athanasia	3	0	2	0	0	0	0	0	0	3	0	2	0	0	0	2	0	2	0
ASTERACEAE	Berkheya	15	2	3	6	1	4	0	1	0	5	0	2	0	1	0	8	1	6	0
ASTERACEAE	Bolandia	3	1	1	0	0	0	0	0	0	1	0	2	0	0	0	2	0	0	0
ASTERACEAE	Chrysanthemoides	2	0	1	2	0	1	0	2	0	1	0	1	0	1	0	1	0	1	0
ASTERACEAE	Chrysocoma	12	3	5	2	0	4	1	2	0	8	0	5	0	3	0	5	1	4	0
ASTERACEAE	Cineraria	5	0	1	0	0	1	0	0	0	2	0	2	0	1	0	2	0	1	0
ASTERACEAE	Cotula	12	3	7	2	0	4	0	3	0	7	0	6	0	3	0	6	1	3	0
ASTERACEAE	Cullumia (gce)	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
ASTERACEAE	Cuspidia	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
ASTERACEAE	Dauresia	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Dicoma	4	2	0	2	2	1	0	0	0	1	0	0	0	0	0	1	0	2	0
ASTERACEAE	Didelta	2	0	1	2	0	2	0	2	0	2	0	0	0	2	0	2	0	1	0
ASTERACEAE	Dimorphotheca	7	1	1	3	0	5	0	5	0	5	0	3	0	4	0	6	0	2	0
ASTERACEAE	Elytropappus	2	0	1	0	0	1	0	1	0	1	0	2	0	0	0	1	0	0	0
ASTERACEAE	Emilia	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
ASTERACEAE	Eremothamnus (ece)	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Eriocephalus	19	7	5	4	2	5	0	1	0	9	0	2	0	3	0	12	0	6	0
ASTERACEAE	Euryops	24	13	6	5	1	6	0	1	0	7	2	3	0	2	1	16	6	7	0
ASTERACEAE	Felicia	27	5	13	5	0	8	0	6	0	14	0	11	0	5	0	13	0	13	2
ASTERACEAE	Foveolina	3	0	1	1	0	1	0	2	0	1	0	0	0	1	0	3	0	1	0
ASTERACEAE	Galeomma	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
ASTERACEAE	Garuleum	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
ASTERACEAE	Gazania	10	3	3	4	0	3	0	6	1	6	1	3	0	5	0	6	0	5	0
ASTERACEAE	Geigeria	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0
ASTERACEAE	Gnaphalium	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Gorteria	2	0	1	2	0	2	0	1	0	1	0	1	0	1	0	1	0	1	0
ASTERACEAE	Gymnodiscus	2	0	1	0	0	1	0	0	0	2	0	1	0	1	0	0	0	1	0
ASTERACEAE	Helichrysum	34	6	14	7	1	16	1	11	0	17	1	11	0	8	0	11	0	14	1
ASTERACEAE	Hertia	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0
ASTERACEAE	Hirpicium	2	0	0	1	0	2	0	1	0	2	0	1	0	1	0	2	0	1	0
ASTERACEAE	Hoplophyllum	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0
ASTERACEAE	Hymenolepis	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
ASTERACEAE	Ifloga	3	0	2	1	0	1	0	1	0	1	0	0	0	0	0	1	0	3	0
ASTERACEAE	Kleinia	2	0	0	1	0	2	0	0	0	1	0	0	0	0	0	0	0	1	0
ASTERACEAE	Lachnospermum (gce)	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Laggera	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
ASTERACEAE	Lasiopogon	8	3	2	3	0	3	0	2	1	2	0	1	0	2	0	1	0	3	0
ASTERACEAE	Lasiospermum	4	0	1	1	0	1	0	1	0	2	0	1	0	2	0	2	0	0	0
ASTERACEAE	Leucoptera (gce)	3	2	1	0	0	0	0	2	0	1	0	0	0	3	1	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
ASTERACEAE	Leysera	2	0	0	1	0	1	0	2	0	2	0	2	0	2	0	2	0	2	0
ASTERACEAE	Litogyne	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Lopholaena	1	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0
ASTERACEAE	Macledium	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
ASTERACEAE	Mesogramma	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Metalasia	3	1	1	0	0	0	0	2	0	1	0	2	1	0	0	0	0	0	0
ASTERACEAE	Myxopappus	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Nestlera (gce)	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
ASTERACEAE	Nidorella	2	0	0	2	0	2	0	0	0	0	0	0	0	0	0	1	0	1	0
ASTERACEAE	Nolletia	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Oedera	4	2	1	0	0	1	1	0	0	2	0	3	1	0	0	1	0	2	0
ASTERACEAE	Oncosiphon	4	0	2	2	0	2	0	4	0	3	0	1	0	2	0	3	0	3	0
ASTERACEAE	Orbivestus	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Osteospermum	9	0	3	1	0	4	0	0	0	4	0	1	0	1	0	4	0	6	0
ASTERACEAE	Othonna	41	24	7	9	0	18	3	8	0	21	4	4	0	15	4	8	0	8	1
ASTERACEAE	Pegolettia	4	1	0	1	0	4	1	1	0	1	0	1	0	0	0	0	0	1	0
ASTERACEAE	Pentatrichia	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Pentzia	8	1	0	0	0	3	0	0	0	3	0	1	0	1	0	5	0	3	0
ASTERACEAE	Perdicium (gce)	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
ASTERACEAE	Phymaspermum	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
ASTERACEAE	Pseudognaphalium	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
ASTERACEAE	Pteronia	41	11	13	8	0	12	2	6	0	12	1	8	1	9	1	16	0	21	1
ASTERACEAE	Pulicaria	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ASTERACEAE	Rhynchopsidium (gce)	2	0	2	0	0	1	0	1	0	1	0	1	0	1	0	2	0	1	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
ASTERACEAE	Rosenia	4	0	0	0	0	1	0	0	0	1	0	0	0	0	0	3	0	3	0
ASTERACEAE	Senecio	42	9	14	16	1	15	0	8	0	21	1	12	1	7	1	18	0	18	0
ASTERACEAE	Steirodiscus (gce)	2	0	2	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0
ASTERACEAE	Stilpnogyne (gce)	1	0	1	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0
ASTERACEAE	Stoebe	2	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
ASTERACEAE	Syncarpha	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
ASTERACEAE	Trichogyne	7	3	3	6	0	1	0	3	0	4	0	0	0	1	0	3	0	2	0
ASTERACEAE	Tripteris	11	3	3	0	0	10	0	7	0	7	0	1	0	5	0	6	0	4	0
ASTERACEAE	Troglophyton	5	1	2	2	0	2	0	0	0	3	0	2	0	0	0	3	1	1	0
ASTERACEAE	Ursinia	10	4	4	3	1	5	0	3	0	7	1	6	0	5	0	3	0	3	0
ASTERACEAE	Vellereophyton	3	1	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0
BIGNONIACEAE	Rhigozum	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
BORAGINACEAE	Anchusa	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0
BORAGINACEAE	Codon	2	0	0	2	0	2	0	0	0	1	0	0	0	1	0	1	0	1	0
BORAGINACEAE	Cynoglossum	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
BORAGINACEAE	Heliotropium	2	0	0	1	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0
BORAGINACEAE	Lappula	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
BORAGINACEAE	Lithospermum	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
BORAGINACEAE	Lobostemon	5	0	3	0	0	2	0	2	0	3	0	4	0	0	0	2	0	0	0
BORAGINACEAE	Trichodesma	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0
BORAGINACEAE	Wellstedia	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
BRASSICACEAE	Heliophila	30	10	12	7	1	9	2	3	0	17	2	10	0	8	1	12	1	7	0
BRASSICACEAE	Lepidium	4	0	0	2	0	3	0	0	0	2	0	0	0	3	0	3	0	2	0
BRASSICACEAE	Matthiola	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
BRASSICACEAE	Sisymbrium	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0
BURSERACEAE	Commiphora	2	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMPANULACEAE	Prismatocarpus	3	1	1	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0
CAMPANULACEAE	Roella	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
CAMPANULACEAE	Wahlenbergia	26	17	3	6	1	8	0	3	0	17	8	6	1	6	1	4	1	2	0
CAPPARACEAE	Boscia	2	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
CAPPARACEAE	Cadaba	1	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0
CAPPARACEAE	Capparis	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
CAPPARACEAE	Maerua	2	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
CARYOPHYLLACEAE	Cerastium	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
CARYOPHYLLACEAE	Corrigiola	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
CARYOPHYLLACEAE	Dianthus	4	2	0	0	0	1	0	1	0	3	0	2	0	1	0	2	0	2	0
CARYOPHYLLACEAE	Pollichia	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
CARYOPHYLLACEAE	Silene	3	0	1	0	0	3	0	2	0	3	0	2	0	1	0	3	0	0	0
CELASTRACEAE	Gloveria (gce)	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
CELASTRACEAE	Gymnosporia	3	1	0	1	0	3	1	1	0	1	0	1	0	0	0	0	0	1	0
CELASTRACEAE	Maytenus	1	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0
CLEOMACEAE	Cleome	3	0	0	3	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0
CONVOLVULACEAE	Convolvulus	2	0	1	0	0	0	0	0	0	2	0	1	0	1	0	2	0	0	0
CRASSULACEAE	Adromischus	14	3	4	5	0	6	0	3	0	4	0	2	0	2	0	5	1	9	0
CRASSULACEAE	Cotyledon	3	0	0	1	0	3	0	1	0	3	0	1	0	2	0	3	0	3	0
CRASSULACEAE	Crassula	81	17	26	19	0	41	1	33	1	46	0	25	0	23	0	29	2	39	0
CRASSULACEAE	Tylecodon	36	27	2	10	2	19	6	8	2	13	5	2	0	8	4	4	0	6	1
CUCURBITACEAE	Acanthosicyos	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
CUCURBITACEAE	Citrullus	2	0	0	2	0	2	0	0	0	1	0	0	0	0	0	1	0	0	0
CUCURBITACEAE	Corallocarpus	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
CUCURBITACEAE	Cucumis	4	0	0	2	0	4	0	0	0	1	0	0	0	0	0	2	0	2	0
CUCURBITACEAE	Kedrostis	2	0	1	1	0	1	0	1	0	2	0	0	0	1	0	0	0	1	0
CUCURBITACEAE	Momordica	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
CYTINACEAE	Cytinus	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
DIDIEREACEAE	Ceraria	2	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
DIDIEREACEAE	Portulacaria	2	2	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
DIPSACACEAE	Scabiosa	1	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	1	0
DROSERACEAE	Drosera	2	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
EBENACEAE	Diospyros	4	0	0	1	0	2	0	2	0	3	0	1	0	0	0	1	0	2	0
EBENACEAE	Euclea	5	0	2	2	0	2	0	2	0	2	0	2	0	2	0	1	0	1	0
ELATINACEAE	Bergia	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
ERICACEAE	Erica	8	0	8	0	0	0	0	0	0	1	0	8	0	0	0	0	0	0	0
EUPHORBIACEAE	Clutia	4	1	2	0	0	1	0	0	0	1	0	4	1	0	0	0	0	0	0
EUPHORBIACEAE	Euphorbia	58	19	10	21	0	29	3	13	0	18	2	4	0	15	2	15	1	18	0
EUPHORBIACEAE	Jatropha	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
FABACEAE	Acacia	2	0	0	2	0	2	0	2	0	1	0	1	0	1	0	1	0	1	0
FABACEAE	Adenolobus	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
FABACEAE	Amphithalea	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
FABACEAE	Argyrolobium	2	1	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0
FABACEAE	Aspalathus	10	0	8	0	0	0	0	6	0	4	0	5	0	3	0	1	0	0	0
FABACEAE	Calliandra	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
FABACEAE	Calobota	10	3	4	7	1	6	0	5	0	4	0	1	0	2	0	0	0	1	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
FABACEAE	Crotalaria	5	2	2	2	0	4	1	2	0	2	0	1	0	2	0	0	0	0	0
FABACEAE	Cullen	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
FABACEAE	Euchlora (gce)	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
FABACEAE	Indigastrum	4	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0
FABACEAE	Indigofera	19	14	3	6	0	10	3	2	0	5	0	4	2	4	1	3	2	2	0
FABACEAE	Lebeckia (gce)	2	0	2	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
FABACEAE	Leobordea	9	8	1	0	0	2	0	0	0	7	3	4	2	1	0	0	0	0	0
FABACEAE	Lessertia	19	11	3	7	3	5	0	4	0	9	0	3	0	4	0	7	2	4	0
FABACEAE	Lotononis	23	8	7	9	2	6	0	2	0	8	1	7	1	7	0	7	1	9	0
FABACEAE	Melolobium	6	0	3	2	0	3	0	2	0	4	0	1	0	3	0	2	0	5	0
FABACEAE	Otholobium	7	2	5	0	0	0	0	1	0	3	1	4	1	0	0	2	0	0	0
FABACEAE	Parkinsonia	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
FABACEAE	Polhillia (gce)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
FABACEAE	Psoralea	2	0	2	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
FABACEAE	Rhynchosia	3	2	1	0	0	2	0	0	0	2	0	1	0	0	0	0	0	0	0
FABACEAE	Schotia	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
FABACEAE	Sesbania	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FABACEAE	Tephrosia	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
FABACEAE	Wiborgia (gce)	6	1	5	0	0	0	0	4	0	5	0	4	0	5	0	2	0	0	0
FABACEAE	Wiborgiella	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
FRANKENIACEAE	Frankenia	3	1	0	2	1	0	0	2	0	2	0	1	0	1	0	1	0	0	0
FUMARIACEAE	Cysticapnos	2	0	2	0	0	1	0	0	0	1	0	2	0	0	0	1	0	1	0
FUMARIACEAE	Trigonocapnos (gce)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
GENTIANACEAE	Chironia	2	0	1	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
GENTIANACEAE	Sebaea	2	0	1	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0
GERANIACEAE	Monsonia	15	8	1	9	2	10	1	3	0	4	0	0	0	2	0	0	0	3	0
GERANIACEAE	Pelargonium	77	28	34	14	0	31	2	15	1	38	1	20	1	22	1	21	3	22	0
GISEKIACEAE	Gisekia	2	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
LAMIACEAE	Acrotome	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
LAMIACEAE	Ballota	1	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
LAMIACEAE	Mentha	1	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0
LAMIACEAE	Salvia	8	0	3	1	0	2	0	3	0	5	0	2	0	3	0	3	0	3	0
LAMIACEAE	Stachys	7	0	2	1	0	3	0	0	0	3	0	2	0	2	0	6	0	3	0
LIMEACEAE	Limeum	4	0	1	3	0	3	0	3	0	2	0	1	0	1	0	0	0	1	0
LOASACEAE	Kissenia	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
LOBELIACEAE	Cyphia	7	3	4	0	0	1	0	0	0	3	0	3	0	4	1	1	0	2	1
LOBELIACEAE	Lobelia	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0
LOBELIACEAE	Monopsis	2	0	2	0	0	0	0	1	0	1	0	2	0	1	0	0	0	0	0
LOPHIOCARPACEAE	Lophiocarpus	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
LORANTHACEAE	Moquiniella	1	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0
LORANTHACEAE	Plicosepalus	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
LORANTHACEAE	Septulina	2	0	0	0	0	2	0	1	0	0	0	0	0	1	0	1	0	1	0
LORANTHACEAE	Tapinanthus	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
MALVACEAE	Abutilon	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
MALVACEAE	Anisodontea	5	1	4	0	0	2	0	0	0	2	0	2	0	0	0	4	1	2	0
MALVACEAE	Grewia	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
MALVACEAE	Hermannia	40	8	9	12	0	14	0	9	1	13	1	8	0	8	1	12	0	14	0
MALVACEAE	Radyera	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
MELIACEAE	Nymania	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
MELIANTHACEAE	Melianthus	5	0	1	0	0	4	0	1	0	1	0	1	0	1	0	2	0	1	0
MENISPERMACEAE	Antizoma	1	0	1	0	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0
MENISPERMACEAE	Cissampelos	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0
MOLLUGINACEAE	Adenogramma (gce)	4	0	4	1	0	0	0	1	0	2	0	1	0	2	0	0	0	0	0
MOLLUGINACEAE	Coelanthum (gce)	2	0	2	1	0	1	0	1	0	1	0	0	0	2	0	0	0	0	0
MOLLUGINACEAE	Glinus	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
MOLLUGINACEAE	Hypertelis	3	0	0	5	0	2	0	2	0	1	0	0	0	1	0	1	0	1	0
MOLLUGINACEAE	Mollugo	3	0	2	0	0	2	0	0	0	3	0	4	0	0	0	1	0	1	0
MOLLUGINACEAE	Pharnaceum	11	0	7	0	0	3	0	6	0	8	0	0	0	4	0	4	0	0	0
MOLLUGINACEAE	Polpoda (gce)	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
MOLLUGINACEAE	Psammotropha	2	0	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
MOLLUGINACEAE	Suessenguthiella	2	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
MONTINIACEAE	Montinia	1	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
MORACEAE	Ficus	2	0	0	1	0	2	0	1	0	2	0	0	0	1	1	1	0	0	0
MYRICACEAE	Morella	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
NEURADACEAE	Grielum	4	1	2	2	0	4	1	2	0	2	0	0	0	2	0	1	0	1	0
NYCTAGINACEAE	Phaeoptilum	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
OLEACEAE	Menodora	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
OLEACEAE	Olea	1	0	0	0	0	1	0	0	0	1	0	1	0	1	0	1	0	0	0
OROBANCHACEAE	Harveya	4	0	2	0	0	0	0	1	0	0	0	2	0	2	0	0	0	0	0
OROBANCHACEAE	Hyobanche	4	2	1	1	0	2	0	1	0	2	0	2	1	1	0	1	0	0	0
OXALIDACEAE	Oxalis	87	53	26	7	3	8	1	7	0	40	10	15	1	30	10	28	8	19	1
PEDALIACEAE	Rogeria	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
PEDALIACEAE	Sesamum	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0
PLANTAGINACEAE	Plantago	2	0	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	2	0
PLANTAGINACEAE	Veronica	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
PLUMBAGINACEAE	Dyerophytum	1	0	0	2	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
PLUMBAGINACEAE	Limonium	9	5	3	0	0	2	0	5	2	1	1	0	0	2	1	1	0	1	0
PLUMBAGINACEAE	Plumbago	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
POLYGALACEAE	Muraltia	7	2	2	0	0	1	0	2	0	2	1	2	1	2	0	3	0	1	0
POLYGALACEAE	Polygala	10	1	2	2	0	4	0	1	0	4	0	3	0	3	0	5	0	5	0
POLYGONACEAE	Emex	1	0	0	0	0	1	0	1	0	1	1	0	0	1	0	0	0	1	0
POLYGONACEAE	Persicaria	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
POLYGONACEAE	Polygonum	2	1	1	1	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0
POLYGONACEAE	Rumex	3	0	0	0	0	0	0	1	0	2	0	0	0	0	0	1	0	1	0
PROTEACEAE	Leucadendron	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
PROTEACEAE	Leucospermum	2	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
PROTEACEAE	Protea	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
PROTEACEAE	Vexatorella (gce)	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
RANUNCULACEAE	Ranunculus	2	0	0	1	0	1	0	0	0	0	0	1	0	0	0	2	0	0	0
RESEDACEAE	Oligomeris	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
RHAMNACEAE	Phylica	7	3	4	0	0	0	0	1	0	4	0	5	1	0	0	0	0	0	0
RHAMNACEAE	Trichocephalus (gce)	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
RHAMNACEAE	Ziziphus	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ROSACEAE	Acaena	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
ROSACEAE	Cliffortia	7	1	5	0	0	1	0	1	0	3	0	3	0	0	0	3	1	0	0
ROSACEAE	Potentilla	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
RUBIACEAE	Anthospermum	3	0	0	1	0	1	0	1	0	2	0	2	0	2	0	2	0	0	0
RUBIACEAE	Gaillonia	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
RUBIACEAE	Galium	3	0	0	0	0	1	0	1	0	1	0	1	0	0	0	3	0	2	0
RUBIACEAE	Kohautia	3	0	0	3	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0
RUBIACEAE	Nenax	4	2	1	1	0	0	0	1	0	2	0	1	0	0	0	2	0	2	1
RUTACEAE	Agathosma	3	2	1	0	0	0	0	1	0	1	0	1	0	0	0	1	1	0	0
RUTACEAE	Diosma (gce)	2	0	2	0	0	0	0	1	0	2	0	1	0	0	0	0	0	0	0
RUTACEAE	Euchaetis (gce)	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
SALICACEAE	Salix	1	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0
SANTALACEAE	Thesidium	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
SANTALACEAE	Thesium	19	7	10	0	0	4	0	5	0	7	1	4	0	3	0	7	3	3	1
SANTALACEAE	Viscum	6	0	0	2	0	4	0	1	0	1	0	0	0	0	0	1	0	4	0
SAPINDACEAE	Dodonaea	1	0	0	0	0	1	0	0	0	1	0	1	0	2	0	1	0	1	0
SAPINDACEAE	Erythrophysa	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
SAPINDACEAE	Pappea	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
SCROPHULARIACEAE	Alonsoa	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
SCROPHULARIACEAE	Antherothamnus	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
SCROPHULARIACEAE	Anticharis	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
SCROPHULARIACEAE	Aptosimum	5	0	0	3	0	3	0	0	0	3	0	1	0	0	0	3	0	3	0
SCROPHULARIACEAE	Buddleja	2	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0
SCROPHULARIACEAE	Chaenostoma	8	0	6	0	0	0	0	1	0	0	0	1	0	1	0	5	0	2	0
SCROPHULARIACEAE	Colpias (gce)	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
SCROPHULARIACEAE	Cromidon	9	2	3	0	0	0	0	0	0	2	1	2	1	0	0	6	0	2	0
SCROPHULARIACEAE	Diascia	22	12	9	2	0	4	1	2	1	7	0	7	0	5	0	13	1	10	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
SCROPHULARIACEAE	Diclis	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
SCROPHULARIACEAE	Dischisma (gce)	5	1	4	1	0	2	0	3	0	2	0	1	0	2	0	0	0	0	0
SCROPHULARIACEAE	Freylinia	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
SCROPHULARIACEAE	Gomphostigma	2	0	0	1	0	1	0	0	0	0	0	0	0	1	0	2	0	1	0
SCROPHULARIACEAE	Hebenstretia	12	5	2	3	0	5	0	7	0	6	1	3	2	4	0	4	1	2	0
SCROPHULARIACEAE	Hemimeris (gce)	5	1	4	0	0	1	0	2	0	1	0	1	0	3	0	4	0	3	0
SCROPHULARIACEAE	Jamesbrittenia	18	5	0	3	1	9	0	3	0	6	0	4	0	4	0	3	0	1	0
SCROPHULARIACEAE	Limosella	1	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0
SCROPHULARIACEAE	Lyperia	3	0	2	1	0	1	0	1	0	2	0	0	0	1	0	1	0	2	0
SCROPHULARIACEAE	Manulea	23	11	7	5	1	6	1	6	1	11	1	2	0	5	1	5	2	4	0
SCROPHULARIACEAE	Microdon (gce)	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
SCROPHULARIACEAE	Nemesia	27	12	8	3	0	7	0	5	1	10	2	5	1	2	0	7	1	6	2
SCROPHULARIACEAE	Oftia (gce)	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
SCROPHULARIACEAE	Peliostomum	2	0	0	1	0	2	0	1	0	2	0	0	0	1	0	2	0	1	0
SCROPHULARIACEAE	Phyllopodium	10	5	4	2	0	3	0	2	0	5	2	0	0	3	0	1	0	0	0
SCROPHULARIACEAE	Polycarena	7	2	5	0	0	1	0	0	0	4	0	1	0	0	0	6	1	5	0
SCROPHULARIACEAE	Selago	32	13	11	1	0	6	1	2	0	12	0	7	1	4	1	14	4	10	1
SCROPHULARIACEAE	Sutera	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0
SCROPHULARIACEAE	Teedia	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
SCROPHULARIACEAE	Trieenea	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
SCROPHULARIACEAE	Zaluzianskya	26	14	4	2	0	3	0	2	0	6	0	7	1	5	1	19	7	8	0
SOLANACEAE	Lycium	16	2	3	7	0	11	0	5	0	5	0	1	0	3	0	8	1	9	0
SOLANACEAE	Solanum	6	0	0	3	0	4	0	2	0	4	0	1	0	3	0	4	0	0	0
TAMARICACEAE	Tamarix	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0

Appendix.—Statistics for families of the Extra Cape flora (continued).

non-Aizoaceous Eudicots	Genera	ECR spp.	ece	gce	SN spp.	SNe	G spp.	Ge	NS spp.	NSe	NH spp.	NHe	KB spp.	KBe	KV spp.	KVe	WM spp.	WMe	TS spp.	TSe
THYMELAEACEAE	Gnidia	9	3	6	1	0	0	0	3	0	2	0	3	0	2	1	5	1	1	0
THYMELAEACEAE	Lasiosiphon	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	0
THYMELAEACEAE	Passerina	4	0	3	0	0	0	0	1	0	1	0	2	0	0	0	4	0	0	0
THYMELAEACEAE	Struthiola	2	0	2	0	0	0	0	1	0	2	0	2	0	1	0	0	0	0	0
URTICACEAE	Didymodoxa	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0
URTICACEAE	Forsskaolea	2	0	0	2	0	2	0	1	0	1	0	0	0	0	0	1	0	1	0
URTICACEAE	Urtica	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
VAHLIACEAE	Vahlia	1	0	0	1	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0
VERBENACEAE	Chascanum	3	1	0	2	0	3	0	0	0	2	0	0	0	0	0	0	0	1	0
ZYGOPHYLLACEAE	Augea	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0
ZYGOPHYLLACEAE	Fagonia	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
ZYGOPHYLLACEAE	Roepera	16	8	6	7	1	8	0	6	0	6	0	1	0	6	0	4	0	3	0
ZYGOPHYLLACEAE	Sisyndite	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
ZYGOPHYLLACEAE	Tetraena	12	4	0	9	1	9	1	3	0	2	0	0	0	2	0	2	0	4	0
ZYGOPHYLLACEAE	Tribulus	4	0	0	4	0	3	0	0	0	2	0	0	0	1	0	1	0	2	0
TOTAL		2000	617	570	491	45	747	49	436	20	824	73	433	29	449	47	695	70	580	18

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The Greater Cape Floristic Region of southern Africa, with an estimated 11 423 native vascular plant species, has one of the richest temperate floras in the world. The newly named Extra Cape Subregion comprises the northern, semi-arid part of the Region.

Covering 98 900 km^2 and incorporating 92% of the Succulent Karoo Biome, the Extra Cape Subregion has an estimated 3 715 native vascular plant species—ferns, other spore-bearing vascular plants and flowering plants—of which 40% are endemic. Extraordinary are the dominance of succulent plants and the rich representation of geophytes.

The contributions of a large number of specialists have made this the first rigorously compiled floristic account of the semi-arid Subregion. Based on the most recent system of classification, it provides concise taxonomic descriptions of all the known vascular plants in the region and includes comparative data with the Core Cape Subregion in the south.







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