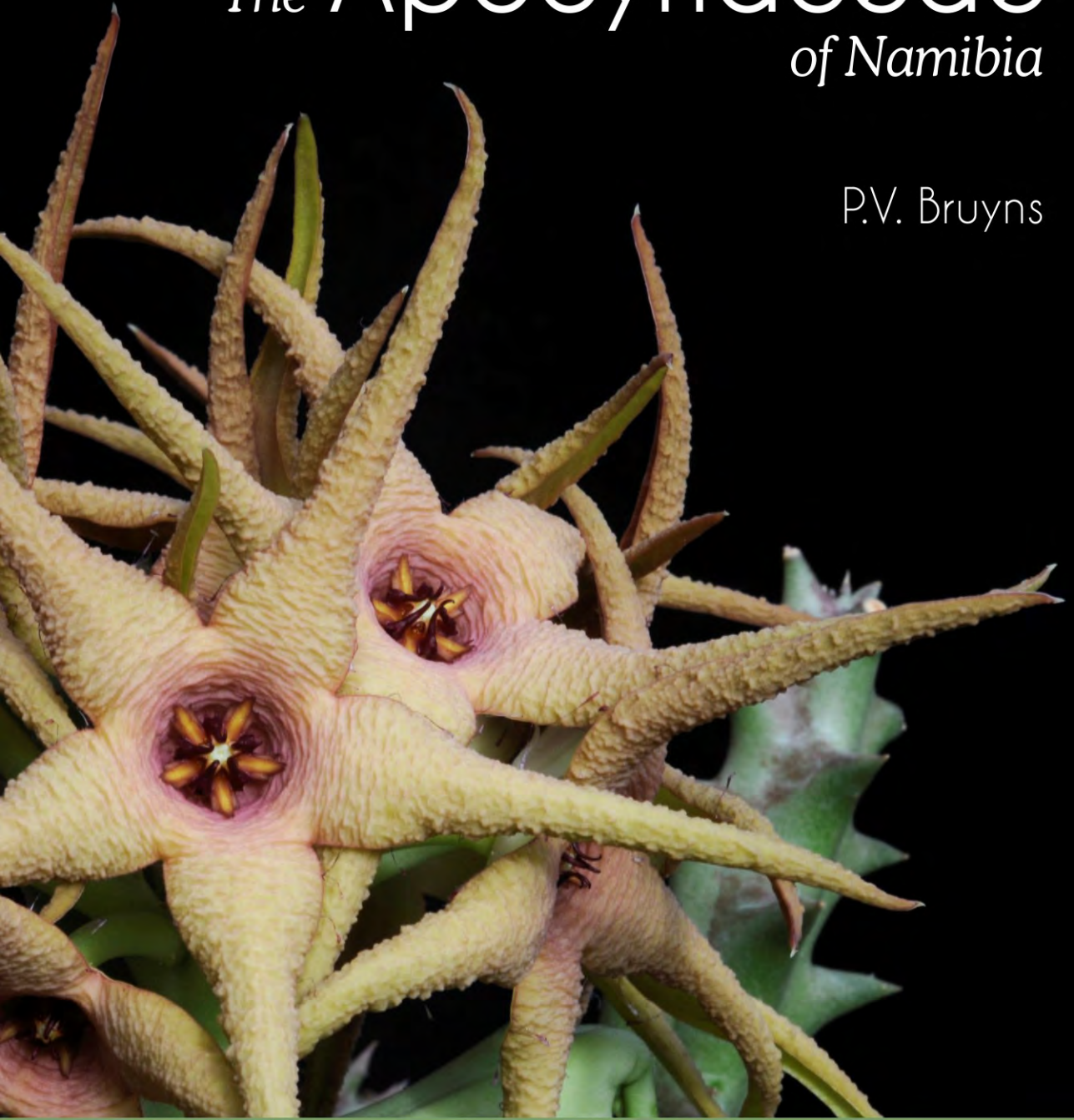
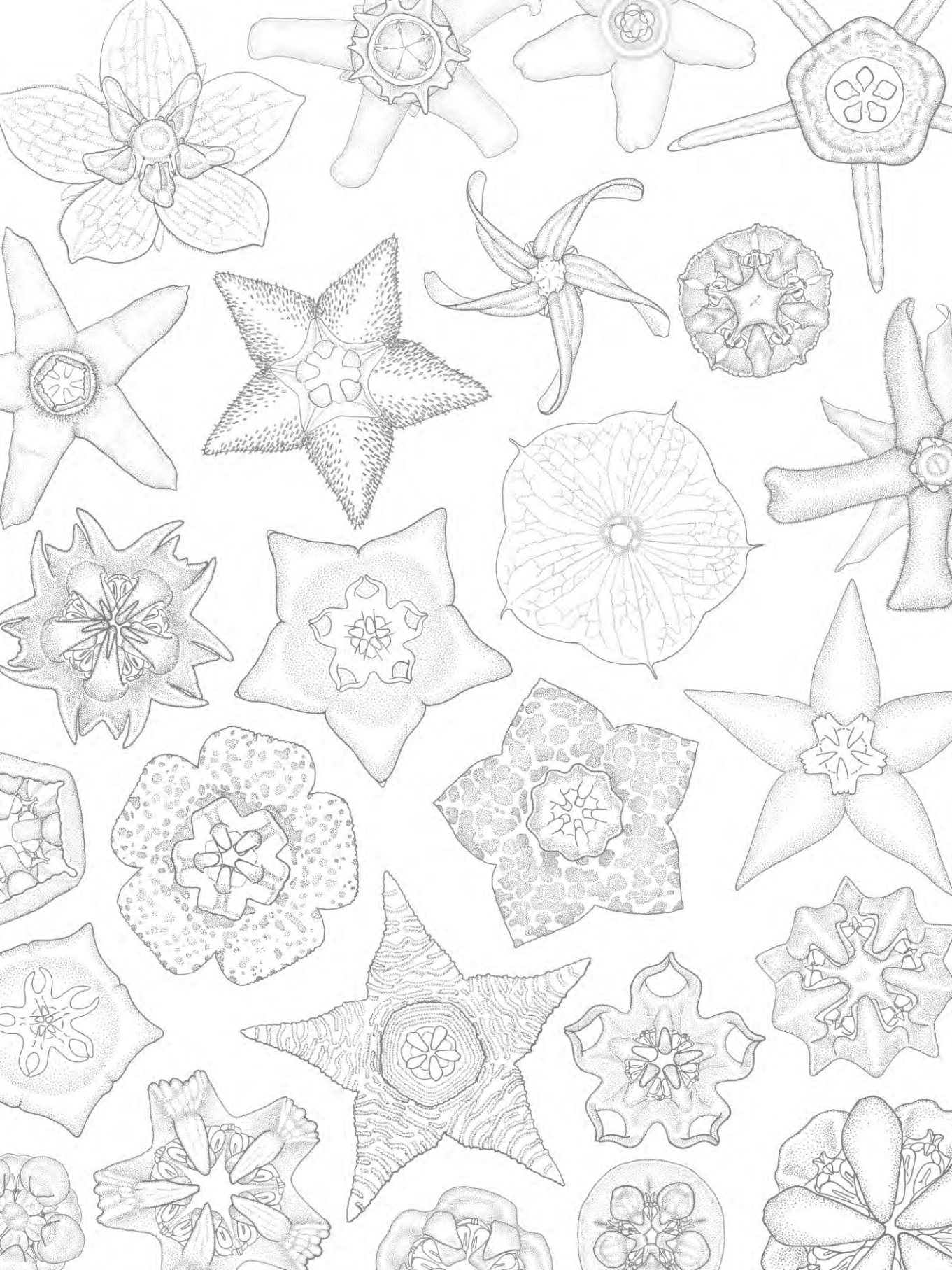
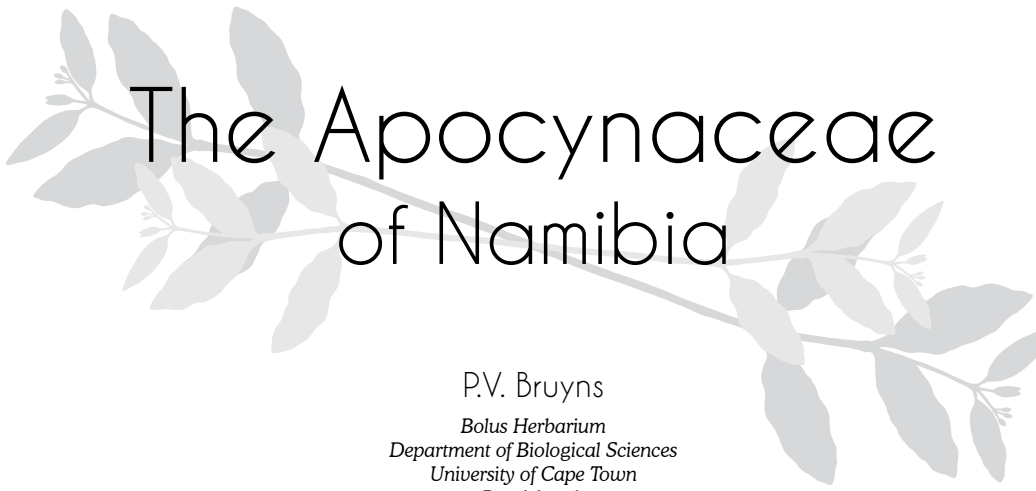


The Apocynaceae *of Namibia*

P.V. Bruyns







The Apocynaceae of Namibia

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SANBI 
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South African National Biodiversity Institute

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TRELITZIA

This series has replaced *Memoirs of the Botanical Survey of South Africa* and *Annals of the Kirstenbosch Botanic Gardens*, which the South African National Biodiversity Institute (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 SANBI 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 SANBI to champion the exploration, conservation, sustainable use, appreciation and enjoyment of South Africa's exceptionally rich biodiversity for all people.

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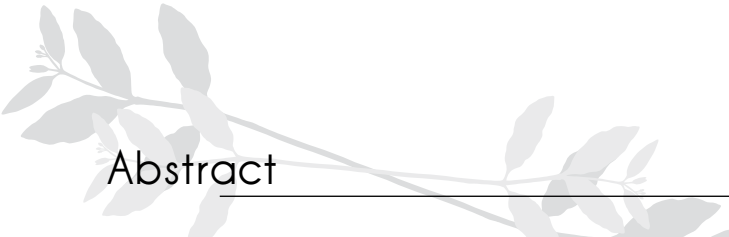
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Contents

Abstract	1
Introduction	2
Materials and methods	4
Results	5
Taxonomic account.	8
Apocynaceae Juss.	9
RAUVOLFIOIDEAE Kostel.	10
CARISSEAE Dumort.	10
<i>Carissa</i> L.	10
MELODINEAE G.Don	12
<i>Diplorhynchus</i> Welw. ex Ficalho & Hiern	12
APOCYNIOIDEAE Burnett	13
BAISSEAE M.E.Endress	13
<i>Baissea</i> A.DC.	13
NERIEAE Baill.	14
<i>Adenium</i> Roem. & Schult.	14
<i>Strophanthus</i> DC.	16
MALOUETIEAE Müll.Arg.	18
<i>Pachypodium</i> Lindl.	18
PERIPLOCOIDEAE R.Br. ex Endl.	20
<i>Cryptolepis</i> R.Br. (incl. <i>Curroria</i> Planch. ex Benth.)	20
<i>Ectadium</i> E.Mey.	22
<i>Raphionacme</i> Harv.	23
<i>Tacazzea</i> Decne.	28
SECAMONOIDEAE Endl.	29
<i>Secamone</i> R.Br.	29
ASCLEPIADOIDEAE R.Br. ex Burnett.	29
FOCKEEAE H.Kunze, Meve & Liede.	30
<i>Fockea</i> Endl.	30
MARSDENIEAE Benth.	34
<i>Gymnema</i> R.Br.	34
<i>Marsdenia</i> R.Br.	35
<i>Rhyssolobium</i> E.Mey.	35
<i>Stigmatorhynchus</i> Schltr.	37
ASCLEPIADEAE (R.Br.) Duby	39
<i>Asclepias</i> L.	40
<i>Cynanchum</i> L. (incl. <i>Sarcostemma</i> R.Br.)	42
<i>Gomphocarpus</i> R.Br.	48
<i>Microlooma</i> R.Br.	51

<i>Pachycarpus</i> E.Mey.	57
<i>Pentarrhinum</i> E.Mey.	58
<i>Pergularia</i> L.	60
<i>Periglossum</i> Decne.	60
<i>Schizoglossum</i> E.Mey.	61
<i>Schizostephanus</i> Hochst.	65
<i>Sphaerocodon</i> Benth.	66
<i>Tylophora</i> R.Br.	67
<i>Xysmalobium</i> R.Br.	69
CEROPEGIEAE Decne. ex Orb.	69
<i>Australluma</i> Plowes	71
<i>Baynesia</i> Bruyns.	72
<i>Brachystelma</i> R.Br. ex Sims	73
<i>Ceropegia</i> L.	82
<i>Duvalia</i> Haw.	94
<i>Hoodia</i> Sweet ex Decne.	96
<i>Huernia</i> R.Br.	104
<i>Larryleachia</i> Plowes.	110
<i>Laurania</i> Plowes.	113
<i>Orbea</i> Haw.	115
<i>Orthanthera</i> Wight.	122
<i>Piaranthus</i> R.Br.	125
<i>Quaqua</i> N.E.Br.	127
<i>Stapelia</i> L.	130
<i>Stapeliopsis</i> Pillans	136
<i>Tavaresia</i> Welw.	138
<i>Tridentea</i> Haw.	140
<i>Tromotriche</i> Haw.	144
Acknowledgements	148
References.	149
Index	151

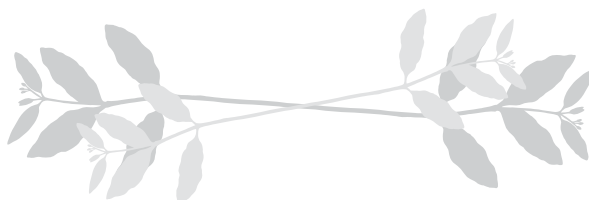


Abstract

The Flora of Namibia is dominated by the families Poaceae, Asteraceae and Fabaceae. Here, an account of the Apocynaceae, the sixth largest family in Namibia, is presented. A total of 153 species belonging to 46 genera are recorded as occurring naturally for the country and 19 of these species are endemic to Namibia, with two endemic genera. More than half of these 153 species belong to the tribe Ceropegieae, with the highly succulent group, the stapeliads, represented by 58 species. It is shown that the family is

most diverse in the extreme south of the country, in the Rosh Pinah and in the Karasburg districts. The distribution of each species is mapped and, for many genera, one species is illustrated with line drawings. Lectotypes are selected for several species.

Keywords: Apocynaceae, Apocynoideae, Asclepiadoideae, endemics, largest families, Namibian Flora, Periplocoideae, Rauvolfioideae, Secamonoideae.



Introduction

The only account of the Flora of Namibia remains the *Prodromus einer Flora von Südwest-Afrika* (Merxmüller 1966–1972). Much new information has become available since the completion of this work and revision of the 'Prodromus' is becoming ever more necessary. In an attempt to initiate a Flora of Namibia, an account of the family Apocynaceae for Namibia is presented here.

The Apocynaceae is a medium-sized, cosmopolitan family of some 5 000 species with a preponderance of species in the tropics (Endress & Bruyns 2000). The family is well represented in southern Africa generally, where over 650 species are known (Germishuizen & Meyer 2003).

In Huber (1967) the three families Apocynaceae (6 genera, 10 species), Asclepiadaceae (32 genera, 101 species) and Periplocaceae (5 genera, 9 species) were listed for Namibia (i.e. a total of 43 genera with 120 species in the greater Apocynaceae). With the arrangement of Endress

& Bruyns (2000) and APG III (2009) these now fall into a single family, which is the sixth largest in Namibia (Table 1).

Namibia is bounded on the west alongside the Atlantic Ocean by the Namib Desert, one of the most arid regions on Earth, and on the east by the semi-arid Kalahari 'Desert' (Simmons *et al.* 1998). Consequently the country is mostly arid to semi-arid. Over its surface area of 824 292 km², a total of 3 729 angiosperms have been recorded. This is made up of 938 monocotyledons and 2 791 dicotyledons (Craven 1999), corresponding to the widely known ratio of three dicotyledonous species to one monocotyledonous species (Goldblatt & Manning 2000). In contrast to the Cape Flora where petaloid monocotyledons dominate (Goldblatt & Manning 2000), in Namibia the 938 monocotyledons are mainly non-petaloid, with 551 species in the Cyperaceae and Poaceae alone and with the petaloid families Amaryllidaceae (43), Asphodelaceae (50), Hyacinthaceae (88), Iridaceae (36) and Orchidaceae (20) contributing only 237 species (25% of the total number of monocots). Since Namibia is generally dry, it is not surprising that the flora is dominated by the three families Asteraceae, Fabaceae and Poaceae (Table 1). Also, the largest genera are mainly drought-tolerant plants, with *Crassula* and *Euphorbia* providing the largest numbers of succulents (Table 2).

Of the 3 729 species recorded, 589 (16%) are endemic to Namibia. In comparison to the island-like level of endemism of nearly 78% for the 11 423 species found in the 189 629 km² of the Greater Cape Floristic Region (Snijman 2013), the level of endemism in the flora of Namibia is low. This is clearly a consequence of the flora of Namibia consisting primarily of extensions of other, more widely distributed floras. For example, the Succulent Karoo of the western side of South Africa extends northwards into the winter-

TABLE 1.—The ten largest families of Angiosperms in Namibia (data from Craven 1999)

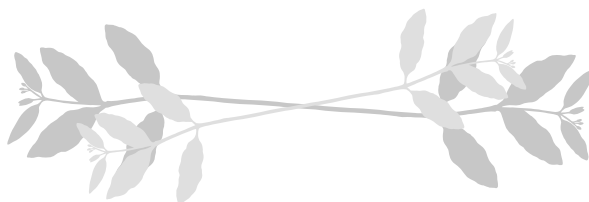
	Family	Number of species	Number of endemics (%)
1.	Poaceae	401	27 (7)
2.	Asteraceae	360	61 (17)
3.	Fabaceae	312	34 (11)
4.	Aizoaceae	226	70 (31)
5.	Scrophulariaceae	156	32 (21)
6.	Apocynaceae	153	19 (12)
7.	Cyperaceae	151	2 (1)
8.	Acanthaceae	139	38 (27)
9.	Euphorbiaceae	91	16 (18)
10.	Chenopodiaceae	91	39 (43)

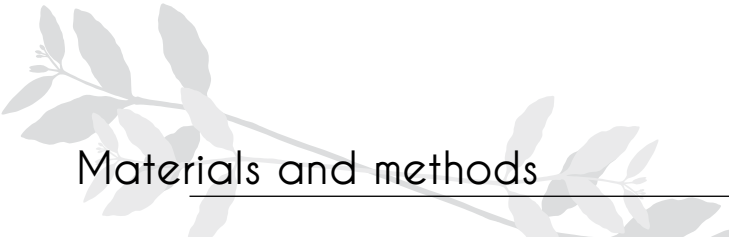
TABLE 2.—The ten largest genera of Angiosperms in Namibia (data from Craven 1999)

	Genus	Family	Number of species	Number of endemics (%)
1.	<i>Salsola</i> L.	Chenopodiaceae	61	36 (59)
2.	<i>Eragrostis</i> Wolf	Poaceae	56	8 (14)
3.	<i>Euphorbia</i> L.	Euphorbiaceae	51	12 (24)
4.	<i>Hermannia</i> L.	Sterculiaceae	48	9 (19)
5.	<i>Indigofera</i> L.	Fabaceae	48	7 (15)
6.	<i>Crassula</i> L.	Crassulaceae	41	3 (7)
7.	<i>Cyperus</i> L.	Cyperaceae	35	1 (3)
8.	<i>Jamesbrittenia</i> Kuntze	Scrophulariaceae	34	15 (44)
9.	<i>Ipomoea</i> L.	Convolvulaceae	33	0 (0)
10.	<i>Crotalaria</i> L.	Fabaceae	28	4 (14)

rainfall region of the extreme south of Namibia, the Nama-Karoo extends from central South Africa into the southeast of Namibia, the flora of the Kalahari 'Desert' continues from Botswana

westwards into the eastern flank of Namibia, and many elements of the Angolan flora extend southwards into the Kaokoveld and Ovambo-land in the north of Namibia.

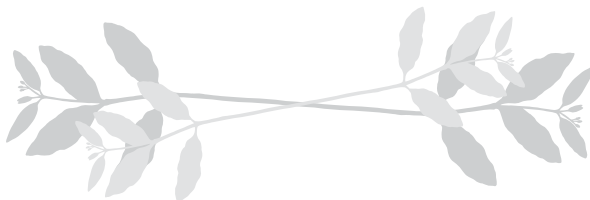




Materials and methods

Specimens of Apocynaceae in the herbaria BOL, M, NBG, PRE, SAM and WIND were examined and determined, from which a database of specimens was built up (herbarium acronyms according to Holmgren *et al.* 1990). These were used to draw up the descriptions, to determine flowering times, and they also provided the raw data for the maps. Where types are from Namibia, they are cited in full; when from other countries, only the country is given. Holotypes and isotypes have been located as far as possible and were either seen or were viewed on the JSTOR Plant Science website (<http://plants.jstor.org/>). A specimen is taken as the holotype if it was indicated as such by the author or if it is clear from where it is located relative to where the author worked that it must be the holotype. In some cases it is impossible to be sure which specimen is the holotype and then a lectotype is selected from among the duplicates of the 'type number' given in the protologue or from

among the 'syntypes' listed by the author in the protologue. For the line drawings, all vouchers are at BOL unless otherwise indicated. All photographs are from the author's collection unless otherwise indicated in the captions. Collections where the collector did not give a number are left without number. Certain species such as *Catharanthus roseus* (L.) G.Don and *Cryptostegia grandiflora* R.Br. are common in cultivation and have even occasionally spread as weeds but do not occur naturally in Namibia. Craven (1999) also recorded *Acokanthera oblongifolia* (Hochst.) Codd [*De Winter 6044* (PRE)] and *Periploca graeca* L. [*Range 1196* (SAM)] for Namibia. However, the first specimen was made from a plant in cultivation in Windhoek, and the second (of very doubtful identity, but too fragmentary for clear identification) came from a garden at Kuibis and so neither occurs naturally in Namibia. All four species are not considered further in this account.



Results

The Apocynaceae is represented in Namibia by 153 species distributed among 46 genera (Table 3). Taxonomic changes at generic level since 1967 have led to several genera in the *Brachystelma* alliance being abandoned (Dyer 1980). On the other hand, many more genera are now recognised among the 'stapeliads', though many of these were informally recognised by Huber (1967) and so the number of genera in the family in Namibia has only risen from 43 to 46 since 1967. Huber had a relatively broad concept of species, so that very few species that he recognised in 1967 have been sunk in the interim. More importantly, the last 50 years have seen the discovery of nearly 30 species that had not been recorded in Namibia by 1967.

With 19 out of 153 (12%) endemic species, the Apocynaceae exhibits endemism that is close to the level for the flora as a whole. Almost all of these endemics are amongst species from the Namib and its edges and so fit roughly the patterns identified by Simmons *et al.* (1998) and Craven & Vorster (2006), except for *Brachystelma codonanthum* Bruyns from the 'Northern Kalahari' and four endemic species (*Hoodia juttae* Dinter, *Orbea albocastanea* (Marloth) Bruyns, *Raphionacme namibiana* Venter & R.L.Verh., *Stapelia pearsonii* N.E.Br.) from the arid south, mainly around the Great Karas Mountains, a region that has not been considered important for endemic plants in Namibia before (Simmons *et al.* (1998); Craven & Vorster (2006)).

TABLE 3.—Distribution of the Namibian species among the subfamilies and tribes of the Apocynaceae

Subfamily	Tribe	Number of species	Number of endemics	Stem-succulents	Geophytes
Rauvolfioideae		3	0	0	0
	Carisseae	2	0	0	0
	Melodineae	1	0	0	0
Apocynoideae		7	0	2	0
	Baisseeae	1	0	0	0
	Malouetieae	2	0	2	0
	Nerieae	4	0	1	0
Periplocoideae		11	3	0	6
Secamonoideae		1	0	0	0
Asclepiadoideae		131	16	71	35
	Asclepiadeae	33	3	4	11
	' <i>Asclepias</i> alliance'	14	0	0	10
	Ceropegieae	90	12	67	20
	<i>Brachystelma</i> + <i>Ceropegia</i>	29	2	9	20
	'stapeliads'	59	11	59	0
	Fockeeae	4	0	0	4
	Marsdenieae	4	1	0	0
TOTAL		153	19	73	41

With the relatively dry climate in Namibia, plants well suited to seasonally dry savanna and semi-arid scrubland predominate. Consequently, as Table 3 shows, 86% of the 153 species known in Namibia belong to the subfamily Asclepiadoideae. Also, the large cohort of species in the 'Asclepias-alliance', particularly prevalent in the moist grasslands of the eastern flank of southern Africa (Fishbein *et al.* 2011), has only 14 species in Namibia, making up 9% of the Apocynaceae in Namibia, with no endemic species known. These species are mainly found in the moister *Bergsavanna* und *Karstveld* and *Hochlandsavanna* of Giess (1971), around the towns of Grootfontein-Tsumeb and Windhoek respectively. Unsurprisingly, the best-represented group in the family in Namibia is the Ceropegieae, to which more than half (59%) of the species found in the country belong. The largest genera in the Apocynaceae in Namibia belong to this tribe and are *Brachystelma* R.Br. ex Sims (14 species) and *Ceropegia* L. (15 species) and they are only about a quarter of the size of the largest genera in Namibia (Table 2). For both these genera, their greatest diversity in Namibia is on the moister, eastern side of the country. *Brachystelma* is especially associated with areas covered by Kalahari sands and forms part of the relatively rich geophytic flora of these

sands. In the same tribe, the distinctive group of stem-succulents collectively known as the stapeliads has 59 species in Namibia (which makes up 38% of the Namibian Apocynaceae). However, although proportionately well-represented (and providing 58% of the endemic Apocynaceae), the species mostly belong to different genera. Results from molecular data (Bruyns *et al.* 2014) show that no lineages in the stapeliads have diversified significantly in Namibia and unpublished results (Bruyns *et al.*, in press) show that the same is true in the closely related genera *Brachystelma* and *Ceropegia*.

Three of the most widely distributed members of the Apocynaceae in the Old World (*Carissa spinarum* L., *Gymnema sylvestre* (Retz.) R.Br. ex Schult. and *Cynanchum viminalis* (L.) Bassi ex L.) occur in Namibia. Many other species found in Namibia are widely distributed in Africa. Some Namibian species have been speculated to have their closest relatives in northeastern Africa (De Winter 1971) and many genera have representatives in both these areas (Thulin 1994). In the Apocynaceae this includes genera such as *Adenium* Roem. & Schult., *Carissa* L., *Ceropegia* L., *Duvalia* Haw., *Huernia* R.Br., *Orbea* Haw., *Stigmatorhynchus* Schltr. and *Tylophora* R.Br. However, many of the examples

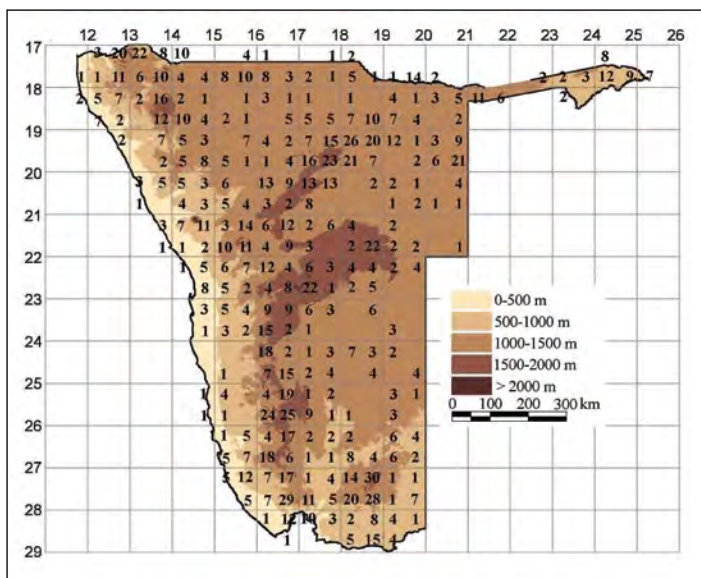
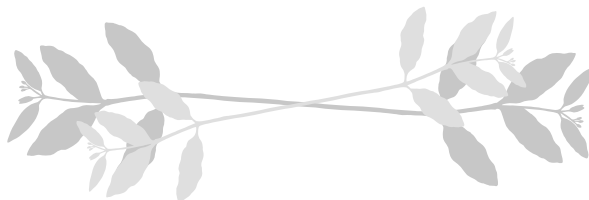


FIGURE 1.—Diversity of species of Apocynaceae in Namibia.

originally cited of closely related species occurring in the two areas have, on closer examination, proved to be relatively distantly related within their respective genera. In other cases the species in these areas are closely related, though are not sisters. This is the case in *Turnera* (Turneraceae), with a single species in each of southwestern Africa and northeastern Africa and over 135 species in the Americas (Thulin *et al.* 2012a). Another example is *Tribulocarpus dimorphanthus* (Pax) S.Moore (Aizoaceae), which occurs in both Namibia and northeastern Africa and has been found to vary very little morphologically between the two areas, although differences in certain DNA-regions were detected (Thulin *et al.* 2012b); again representatives from the two areas are closely related but are not sisters. For the Apocynaceae the primary example is *Tylophora fleckii* (Schltr.) N.E.Br., which is also reported from northern Kenya, Somalia and northern Tanzania (Goyder 2006a) but this seems more likely to be a case of morphological convergence and needs to be examined more carefully.

Diversity in the Apocynaceae in Namibia is clearly higher in mountainous areas (Figure 1), where rainfall is higher and more reliable and where the variety of geological and ecological niches is greatest. Greater collecting activity around centres of population such as Windhoek (2217C) and Grootfontein (1918A) clearly plays a significant role in the accumulation of data and makes the data for these areas more reliable, in contrast possibly to that from the more poorly-researched Kaokoveld. It is remarkable that the most diverse places for Apocynaceae are in the relatively remote parts of southern Namibia in the Rosh Pinah district (2716D), where 29 species are known and in the Karasburg district in the Great Karas Mountains (2718B), where 30 species have been recorded, the highest number in the entire country. The diversity in the Great Karas Mountains much exceeds that of the Kaokoveld and of the Khomas Hochland around Windhoek and is only approached in the mountains of the Grootfontein district (1918A) in the northeast and in the Tiras Mountains (2516C, D), also in the south of the country.

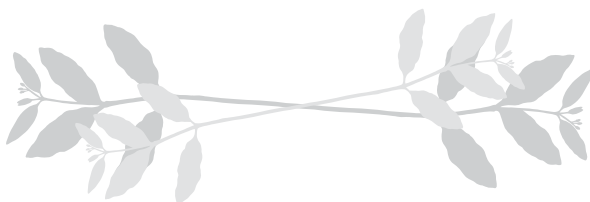




Taxonomic account

In this account the subfamilies are listed in their systematic order: Rauvolfioideae, Apocynoideae, Periplocoideae, Secamonoideae and Asclepiadoideae (Endress & Bruyns 2000). Recent results (Livschultz *et al.* 2007) have shown that the Baisseeae are sister to the clade consisting of Secamonoideae + Asclepiadoideae with

the Periplocoideae sister to Baisseeae + Secamonoideae + Asclepiadoideae. The Baisseeae were placed in the Apocynoideae (Endress & Bruyns 2000; Endress *et al.* 2007; Endress *et al.* 2014) and are kept there in this treatment, though this does not reflect the most recent results.



Apocynaceae Juss.

Erect, climbing or twining, sometimes thorny shrubs, trees or shrubby to small fleshy nearly leafless succulents, often containing milky latex. *Leaves* opposite, rarely alternate or whorled, always entire. *Flowers* in terminal cymes or next to axils of leaves, sometimes solitary, with calyx and corolla, bisexual, radially symmetric, 5-merous except for paired ovaries. *Corolla* often with well-developed tube, *lobes* in bud dextrorse (overlapping to right) or sinistrorse (overlapping to left). *Corona* corolline and inserted in throat of corolla tube or staminal (usually then in two series) and attached to staminal column and usually closely surrounding very reduced anthers, rarely absent. *Stamens* 5, in one whorl, attached to corolla tube or fused into cylinder around style at

base of tube and then filaments usually absent. *Anthers* mostly modified, with lignified guide-rails and mostly with apical appendage, frequently attached to style head and forming gynostegium (free from style head and without guide-rails in Rauvolfioideae). *Ovary* superior, usually of two carpels, in *Carissa* globose to ovoid, two-locular and berry-like when mature, in all other genera carpels free except apically where united just beneath common style head, when mature forming a pair of dry follicles each dehiscing by a longitudinal ventral split, sometimes single by abortion. *Seeds* often with tuft of hairs at micropylar end, mostly dorsiventrally flattened and often with raised margins, with sparse endosperm.

Key to subfamilies

- 1a Pollen grains loose in anthers and sometimes falling from ripe anthers onto translator (if present) alongside them 2.
- 1b Pollen grains gathered into and enclosed in waxy masses (pollinia) 4.
- 2a Style head without well-developed translators between anthers, pollen removed directly from sides of anthers by adhering to part of pollinator 3.
- 2b Style head with well-developed translators in grooves between anthers, translators consisting of sticky flattened end on outside (which adheres to pollinator for removal) and spoon- to cornet-shaped receptacle into which pollen grains fall from anthers, with short neck joining the two parts **Periplocoideae**
- 3a Anthers without hardened horny margins, not fused to style head; fruit an indehiscent berry or a pair of dry hard dehiscent follicles with at most 4 seeds; seeds sometimes winged but without hairs **Rauvolfioideae**
- 3b Anthers with hardened horny margins, fused to style head; fruit a pair of dry follicles with many seeds; seeds with tuft of hairs at one or both ends **Apocynoideae**
- 4a Each anther with 4 chambers and producing 4 pollinia; pollinaria each with 4 minute pollinia attached directly to corpuscle which is much larger than pollinia **Secamonoideae**
- 4b Each anther with 2 chambers and producing 2 pollinia; pollinaria each with 2 pollinia attached directly or with intervening caudicle to corpuscle, pollinia at least as large as corpuscle **Asclepiadoideae**

RAUVOLFIOIDEAE Kostel.

Key to the tribes

- 1a Fruit a fleshy indehiscent berry; seeds without wings; branches repeatedly dichotomously branched, with paired and often branched thorns **Carisseae** (*Carissa*)
- 1b Fruit a hard, thick-walled pair of laterally compressed dehiscent follicles; seeds winged on one side; branching not dichotomous, thorns absent **Melodineae** (*Diplorhynchus*)

CARISSEAE Dumort.

Carissa L.

Spiny erect to sprawling hard-stemmed pubescent to glabrous shrubs to small trees, stems branching dichotomously from axils of leaves subtending terminating pairs of often forked spines, sap milky. *Leaves* persistent, firmly leathery, opposite, shortly petiolate, ovate, elliptic or circular, acute to obtuse, without obvious veins. *Inflorescence* a sessile or shortly pedunculate false umbel of 1–5 flowers. *Corolla* pale pink to white, salver-shaped, 6–25 mm long, 6–10 mm diam., fragrant; *tube* slender, cylindrical and slightly constricted near mouth, hairy within, including

anthers; *lobes* spreading, to half as long as tube, dextrorse or sinistrorse in bud, mostly glabrous; anthers included in tube, inserted above middle of tube and not fused to style head, without horny margins, thecae filled to rounded base with pollen. *Fruit* a 1–4-seeded fleshy indehiscent plum-shaped berry; *seeds* without hairs or wings.

7 species (Leeuwenberg & Van Dilst 2001), Cape in South Africa to South Asia, Australia and New Caledonia.

Key to species

- 1a Spines mostly forked; corolla lobes in bud overlapping to left; young branches and leaves glabrous or puberulous ***C. bispinosa***
- 1b Spines mostly simple; corolla lobes in bud overlapping to right; young branches and leaves pubescent to puberulous ***C. spinarum***

Carissa bispinosa (L.) Merxm., *Mitt. Bot. Staats-samml. München* 2: 399 (1957). *Arduina bispinosa* L. *Mant. Pl.* 1: 52 (1767). Type: from Africa (lecto., Codd 1961).

Carissa dinteri Markgr., *Notizb. Bot. Gart. Berlin* 15: 758 (1942). Type: Namibia, Otavifontein, Jan. 1925, Dinter 5359 (Z, holo.; A, G, GH, K, SAM, iso.).

Much-branched often sprawling shrub to 3 m, with young branches glabrous to minutely puberulous bearing pairs of forked (rarely sim-



FIGURE 2.—*Carissa bispinosa*, flowering specimen with immature fruit and large, forked spines, Namuskluft, near Rosh Pinah. Photo: Coleen Mannheimer.



FIGURE 3.—*Carissa bispinosa*, specimen with unripe fruit and the characteristic large forked spines, Jericho, southeast of Warmbad. Photo: Coleen Mannheimer.

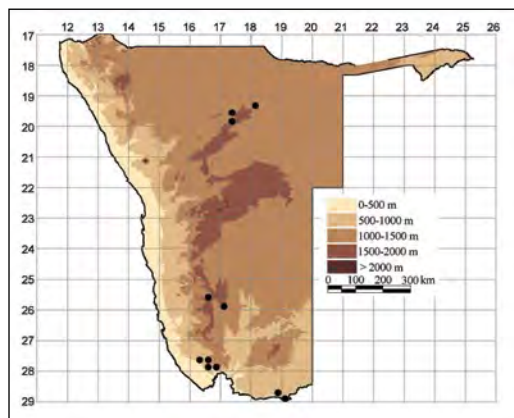


FIGURE 4.—Distribution of *Carissa bispinosa*.

ple) spines 20–80 mm long. *Leaves* ovate to nearly circular, obtuse, 13–60 × 10–35 mm, glabrous above. *Inflorescence* a lax terminal few to many-flowered nearly sessile cyme. *Corolla*; tube 5–9 mm long; lobes overlapping to right in bud, ovate-acuminate. *Fruit* 11–13 mm long, red later turning black, with 1–2 seeds. Figures 2 & 3.

Habitat: Stony slopes or gravelly flats to open woodland, 800–1 600 m. Plants in southern Namibia are especially heavily spined.

Flowering time: Sep.–Mar.

Distribution: Angola, Botswana, Namibia, northwards to Kenya. Figure 4.

Voucher: Dinter 5359 (A, G, GH, K, SAM, Z).

Note: This name is often cited as *C. bispinosa* (L.) Desf. ex Brenan, *Mem. New York Bot. Gard.* 8: 502 (1954). However, no new combination was made by Brenan in this publication and Merxmüller was the first to combine Linneaus' name under the genus *Carissa*.

***Carissa spinarum* L., Mant. Pl. 1: 52 (1767) (= *C. edulis* Vahl).** Type: from India (lecto., Huber 1973).

Carissa pilosa Schinz, *Verh. Bot. Ver. Prov. Brandenburg.* 30: 258 (1888). Type: Namibia, Grootfontein, Schinz 223 (Z, holo.).

Azima pubescens Suess., *Mitt. Bot. Staatssaml. München* 1: 334 (1953). Type: Namibia, Otjirakuku, 31 Dec. 1952, E. & H. Walter 810 (M, lecto., Leeuwenberg & Van Dilst 2001).

Much-branched shrub to 5 m, with young branches densely pubescent to puberulous bearing pairs of simple (rarely forked) spines 4–70 mm long. *Leaves* ovate to elliptic or nearly circular, acute to obtuse, 20–70 × 12–50 mm, often glabrous above. *Inflorescence* a lax terminal few- to many-flowered nearly sessile cyme. *Corolla*; tube 9–20 mm long; lobes overlapping to right in bud, lanceolate. *Fruit* 5–11 mm long, green later turning red to black, with 2–4 seeds. Figures 5 & 6.

Habitat: Rocky hillsides to open woodland and seasonally flooded plains, sometimes on termitaria, 1 000–1 300 m.

Flowering time: Sep.–Dec.

Distribution: Widespread in Africa from South Africa to Senegal and Sudan, in Arabia and eastwards to India to Australia and New Caledonia. One of the most widely distributed of all Apocynaceae along with *Gymnema sylvestre* and *Cynanchum viminale*. Figure 7.

Voucher: Mueller 1855 (WIND).



FIGURE 5.—*Carissa spinarum*, slightly pubescent leaves with undivided spines, west of Grootfontein. Photo: Coleen Mannheimer.



FIGURE 6.—*Carissa spinarum*, flowering specimen with the characteristically undivided spines, west of Grootfontein. Photo: Coleen Mannheimer.

MELODINEAE G. Don

Diplorhynchus Welw. ex Ficalho & Hiern

Unarmed glabrous or puberulent shrub or tree, 1–15 m tall, with drooping branches, trunk to 0.5 m thick with longitudinally or reticulately fissured bark, sap milky. *Leaves* persistent, thinly leathery, opposite, borne on petiole 7–25 mm long, obovate to nearly circular, acute to mucronate, 30–100 × 15–60 mm, glabrescent to pubescent. *Inflorescence* lax to dense, terminal or in axils of upper leaves. *Corolla* white, salver-shaped, 6–8 mm long; *tube* cylindrical, 2–3 × 1.0–1.5 mm long, narrowing towards mouth, including anthers; *lobes* almost rectangular, obtuse or acute, ± 5 mm long, sinistorse in bud; *anthers* not fused to style head, without horny margins, thecae filled to rounded base with pollen. *Fruit* a pair of oblong fairly hard and thick-walled laterally compressed dehiscent follicles dotted outside with pale lenticles, spreading at about 180°, 2–4-seeded, 30–60 × 10–20 mm broad; *seeds* 35–45 mm long, winged on one side.

1 species (Plaizier 1980), Africa, subtropical South Africa to Congo and Tanzania.

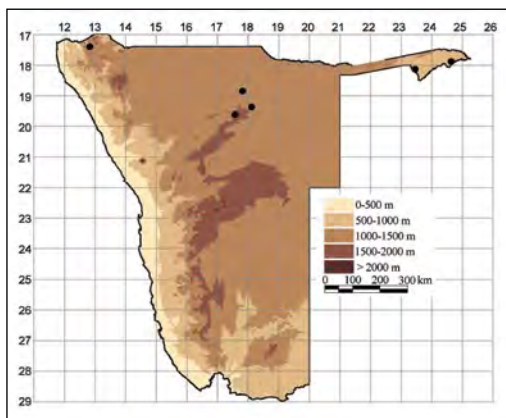


FIGURE 7.—Distribution of *Carissa spinarum*.

Diplorhynchus condylocarpon (Müll.Arg.) Pichon, *Bull. Mus. Natl. Hist. Nat., Sér. 2*, 19: 368 (1947). Type: probably from Angola. Figures 8 & 9.



FIGURE 8.—*Diplorhynchus condylocarpon*, leaves. Photo: Barbara Curtis.



FIGURE 9.—*Diplorhynchus condylocarpon*, leaves and a fruit placed on the trunk. Photo: Chris Hines.

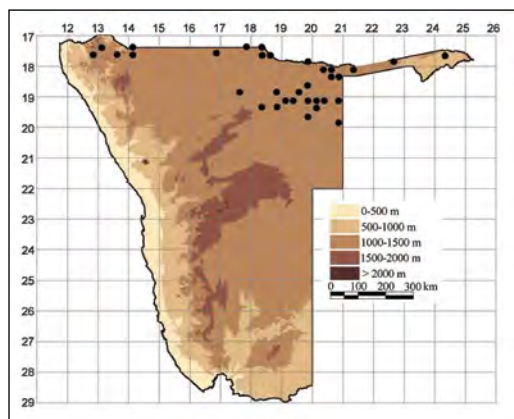


FIGURE 10.—Distribution of *Diplorhynchus condylocarpon*.

Habitat: Rocky hillsides to open often deciduous woodland, 1 000–1 300 m.

Flowering time: Oct.–Dec.

Distribution: As for genus. In Namibia only in northern parts from Kaokoveld to Caprivi. Figure 10.

Voucher: Merxmüller & Giess 1815 (M, WIND).

APOCYNOIDAE Burnett

Key to the tribes

- 1a Stems and branches succulent; leaves alternate and spirally arranged **2.**
- 1b Stems and branches non-succulent; leaves in opposite pairs or whorled **3.**
- 2a Stem and branches with thorns **Malouetieae** (*Pachypodium*)
- 2b Stem and branches without thorns **Nerieae** (*Adenium*)
- 3a Flowers with 10 small corolline corona lobes at mouth of corolla tube below sinuses of lobes, corolla lobes 25–160 mm long, tuft of hairs on seeds borne on stalk **Nerieae** (*Strophanthus*)
- 3b Flowers without corona at mouth of corolla tube below sinuses of lobes, corolla lobes 7–30 mm long, tuft of hairs on seeds sessile **Baisseeae** (*Baissea*)

BAISSEEAE M.E.Endress

Baissea A.DC.

Unarmed small rhizomatous subshrub to twiner to 6 m, young shoots, inflorescences and fruits shortly red-brown tomentose, sap milky. *Leaves* persistent, opposite, on short pubescent petioles 0.4–6.0 mm long, oblong-ovate to lanceolate or narrowly elliptic, acute to slightly mucronate, pubescent to glabrescent, with inconspicuous veins, 6–47 × 4–15 mm. *Inflorescence* shortly pedunculate, 1- to 3-flowered in small cymes alongside axils of leaves or in terminal panicles of up to 15 flowers. *Corolla* white with red longitudinal lines inside, broadly campanulate to nearly rotate, sparsely pubescent outside; *tube* 3–5 mm long, including anthers, cupular, with short stiff hairs near base; *lobes* linear, tapering to slender tips, longer than tube, 7–30 mm long, dextrorse in bud; *anthers* tilting conically together and firmly connected to style head, with horny margins, tapering sagittately at bases into sterile tails. *Fruit* a pair of dehiscent many-seeded thin-walled very slenderly fusiform pendulous follicles spreading at about 60°, 80–500 × 3–8 mm,

FIGURE 11.—*Baissea wulfhorstii*. Photo: Andy Moore.

somewhat constricted between seeds; seeds dorsoventrally flattened, with sessile tuft of hairs at micropylar end.

18 species (Van Dilst 1995), Namibia to West Africa.

Baissea wulfhorstii Schinz, *Bull. Herb. Boissier* 4: 816 (1896). Type: Namibia, Amboland, Omupanda in Ukuanyama, 15 Sept. 1894, Wulfhorst 2 (Z, holo.; K, iso). Figure 11.

Habitat: Flat, open woodland in deep Kalahari sand among trees and often growing within shrubs, 900–1 300 m.

Flowering time: Feb.–Nov.

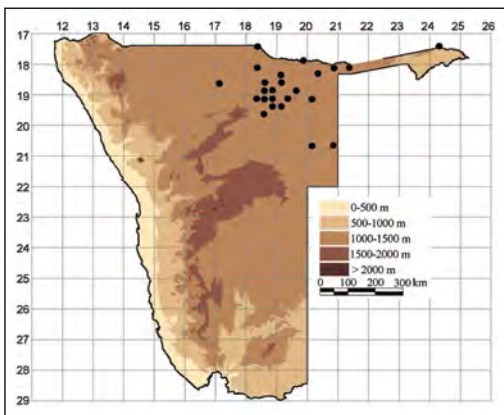
Distribution: Angola, Botswana, Namibia, Zambia. Figure 12.

Voucher: De Winter 3735 (PRE, WIND).

NERIEAE Baill.

Key to the genera

- 1a Stems and branches succulent; leaves alternate and spirally arranged **Adenium**
- 1b Stems and branches non-succulent; leaves in opposite pairs **Strophanthus**

FIGURE 12.—Distribution of *Baissea wulfhorstii*.

Adenium Roem. & Schult.

Unarmed dwarf succulent shrub with swollen underground stem to small tree with bottle-shaped to cylindrical fleshy stem and branches, sap clear. *Leaves* deciduous, alternate to spirally arranged near tips of branches, $\pm$ sessile, broadly elliptical to linear, with short sparse to dense pubescence. *Inflorescence* shortly pedunculate to sessile, with several flowers in short, terminal cymes. *Corolla* crimson to pink, rarely white, salver-shaped; tube 20–40 mm long, including anthers, with short cylindrical basal portion and bell-shaped to funnel-shaped upper portion; lobes obovate, shorter than tube, dextrorse in bud; *anthers* tilting conically together and firmly connected to style head, with horny margins, tapering sagittately at bases into sterile tails, tips elongated into slender subulate hairy appendages. *Fruit* a pair of dehiscent many-seeded fairly thin-walled fusiform follicles spreading at 180° , 80–200 $\times$ 8–12 mm; *seeds* $\pm$ fusiform and slightly flattened, with sessile tuft of hairs at each end.

5 species (Plaizier 1980), mainly in tropical Africa, southern Arabia and Socotra.

Key to species

- 1a Shrub to small tree to 2 m high, with bottle-shaped stem above ground; leaves obovate to broadly elliptic with conspicuous veins, usually more than 15 mm broad **A. boehmianum**

1b Dwarf shrub to 0.25 m high with swollen subterranean stem; leaves linear with inconspicuous veins, 4–15 mm broad **A. oleifolium**

Adenium boehmianum Schinz, *Verh. Bot. Vereins Prov. Brandenburg* 30: 259 (1888). *A. obesum* subsp. *boehmianum* (Schinz) Rowley, *Repert. Pl. Succ.* 29: 3 (1980). Type: Namibia, Ovamboland, Olukonda, Schinz 216 (K, lecto., Plaizier 1980).

Shrub to small tree to 2 m high, with bottle-shaped swollen stem to 0.5 m thick around base. Leaves obovate to broadly elliptic, 60–200 × 15–100 mm, coriaceous, finely pubescent, obtuse or mucronate. Corolla tube ca. 40 mm long, completely glabrous inside above stamens. Figures 13 & 14.

Habitat: Rocky slopes to sandy flat areas, arid to semi-arid, often with sparse covering of other trees and shrubs, 300–1 300 m.

Flowering time: Dec.–Jun.



FIGURE 13.—*Adenium boehmianum*, large shrub about 2 m tall. Photo: Coleen Mannheimer.

Distribution: Angola, Namibia. Figure 15.

Voucher: De Winter & Leistner 5406 (PRE, WIND).

Adenium oleifolium Stapf, *Bull. Misc. Inform.* 1907: 53 (1907). Type: from South Africa.

Dwarf shrub to 0.25 m high with slender branches arising from swollen subterranean stem. Leaves linear, 40–150 × 4–15 mm, glaucous, pubescent, acute. Corolla tube up to 30 mm long, inside almost evenly farinose-papillate above stamens.

Habitat: Flat semi-arid terrain, usually in firm but fairly deep sand or loam among scattered



FIGURE 14.—*Adenium boehmianum*. Photo: Coleen Mannheimer.

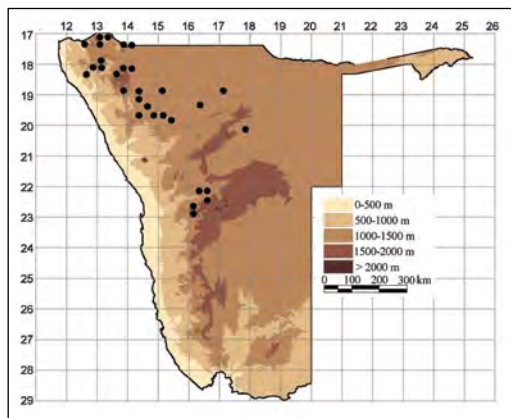


FIGURE 15.—Distribution of *Adenium boehmianum*.

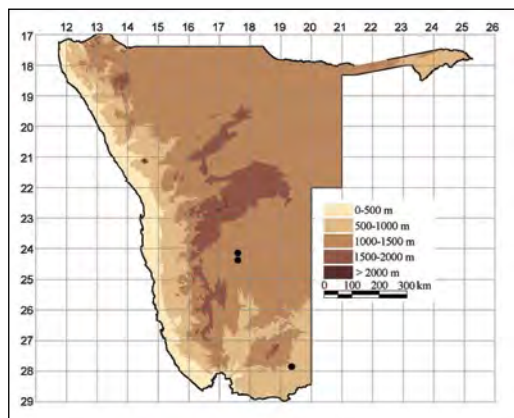


FIGURE 16.—Distribution of *Adenium oleifolium*.

trees and shrubs, occasionally with surface limestone, 700–1 300 m.

Flowering time: Dec.–Mar.

Distribution: Botswana, Namibia, South Africa. Figure 16.

Voucher: Kolberg & Tholkes 1426 (WIND).

***Strophanthus* DC.**

Unarmed, glabrous shrub to liane, sap clear or white. *Leaves* opposite, shortly petiolate, broadly ovate, glabrous to hispid, with several colleters in axils. *Inflorescences* terminal (often in forks between 2 leaves), usually many, several-flowered. *Corolla* campanulate with short tube and long slender lobes; *tube* 15–25 mm long, with cylindric basal part widening abruptly into funnel-shaped upper part, with 10 short erect coronal teeth at mouth in pairs below sinuses of lobes, anthers included; *lobes* linear and spreading or abruptly narrowing into long pendulous tails, dextrorse in bud; *anthers* tilting conically together and firmly connected to style head, with horny margins at least near base, tapering sagittately at base into sterile tails, tips acuminate but not elongated. *Fruit* a pair of dehiscent many-seeded firmly woody fusiform follicles spreading at 180° or more, up to 470 × 30 mm; *seeds* ± fusiform and slightly flattened, with tuft of hairs on a long stalk on one end.

38 species (Beentje 1982), sub-Saharan Africa, Madagascar, south Asia.

Key to species

- 1a Corolla lobes 25–75 mm long, gradually narrowing into spreading tails, tube 2.0–6.5 times as long as sepals, lower narrow part occupying a third of length of tube ***S. amboensis***
 1b Corolla lobes 100–160 mm long, narrowing (often abruptly after 3–16 mm) into pendulous tails, tube 1.0–1.7 times as long as sepals, lower narrow part occupying half of length of tube . . ***S. kombe***

Strophanthus amboensis (Schinz) Engl. & Pax, *Bot. Jahrb. Syst.* 15: 376 (1892). *S. petersianus* var. *amboensis* Schinz, *Verh. Bot. Vereins Prov. Brandenburg* 30: 259 (1888). Type: Namibia, Ovamboland, Cunene R., Schinz 222 (Z, holo.; K, ZT, iso.).

Shrub 1–4 m tall (rarely climbing to 10 m), branches brown and lenticillate. *Leaves* on petiole 2–19 mm long, ovate, 20–120 × 12–60 mm, thinly coriaceous, glabrous to pubescent. *Inflorescences* several, terminal on shoots, 1- to 12-flowered usually with several flowers open at once, glabrous to pubescent. *Corolla* usually pubescent, orange-yellow turning dark purple outside, inside with white streaks, *tube* 15–27 mm long, widening after a third into cylindrical to



FIGURE 17.—*Strophanthus amboensis*, plant in flower. Photo: Chris Hines.



FIGURE 18.—*Strophanthus amboensis*, plant with fruit dehiscent. Photo: Willy Giess.

slightly funnel-shaped upper part, coronal teeth 2–7 mm long; lobes 25–75 mm long, spreading, 3–7 mm broad at base narrowing gradually into slender spreading tails. *Follicles* glabrous to pubescent, 120–270 × 15–25 mm, spreading at 180–270°. Figures 17 & 18.

Habitat: Rocky hillsides in woodland, 800–1 600 m.

Flowering time: Sep.–Feb.

Distribution: Namibia to the Democratic Republic of the Congo. Figure 19.

Voucher: Giess 11516 (WIND).

Strophanthus kombe Oliv., *Hooker's Icon. Pl.* 11: 79, t. 1098 (1871). Type: from Malawi.

Shrub 1–4 m tall or climbing to 10 m, branches dark brown scabrous and lenticillate, roots swollen and fleshy. *Leaves* on petiole 1.5–5.0 mm long, ovate to elliptic, 80–230 × 50–160 mm, thinly coriaceous, hispid when young becoming glabrescent. *Inflorescences* several, terminal on shoots, 1- to 12-flowered usually with several flowers open at once, densely hispid. *Corolla* densely pubescent outside, white turning yellow outside and inside, inside with red spots and streaks, *tube* 13–24 mm long, widening around middle into cup-shaped upper part, coronal teeth 1–3 mm long; lobes 100–160 mm

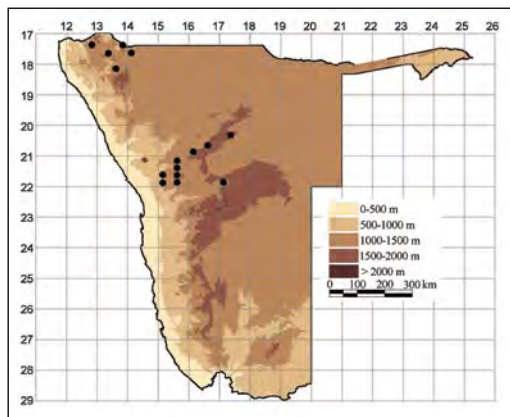


FIGURE 19.—Distribution of *Strophanthus amboensis*.

long, spreading then pendulous, 4–8 mm broad at base narrowing abruptly into slender pendulous tails. *Follicles* densely hispid when young and glabrescent later, 150–470 × 15–25 mm, spreading at 180°.

Habitat: Woodland, 900–1 100 m.

Flowering time: Oct.–Nov.

Distribution: Kenya to South Africa and Botswana. In Namibia only known in Caprivi. Figure 20.

Voucher: Curtis 1335 (WIND).

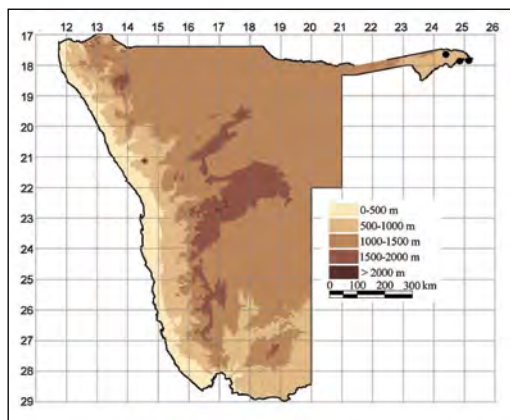


FIGURE 20.—Distribution of *Strophanthus kombe*.

MALOUETIEAE Müll.Arg.

Pachypodium Lindl.

Spiny shrubs to trees with thick columnar trunks, simple or with few ascending to spreading branches, sap clear. *Leaves* deciduous, thinly leathery, stiffly pubescent to almost glabrous, spirally arranged, $\pm$ sessile, seated on short tubercle and subtended by 2 strong spines laterally in stipular position and often with smaller spine slightly above in axillary position. *Inflorescences* many, in terminal or axillary cymes near tips of stems and branches, few-flowered, sessile. *Corolla* crimson with white or red, red-brown and yellow, salver-shaped to cylindrical; *tube* with short cylindrical basal part and bell- or funnel-shaped upper part, 25–50 mm long, including anthers; *lobes* obovate or elliptic, shorter than tube, twisted to right in bud; *anthers* tilting conically together and firmly connected to style head, with horny margins, tapering sagittately at bases into sterile tails, tips without hairy appendages. *Fruit* a pair of dehiscent many-seeded fairly thin-walled slender to short and stumpy fusiform follicles, 50–150 mm long; *seeds* dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

15 species, southern Africa, Angola and most diverse in Madagascar.

Key to species

- 1a Trunk with slender spiny spreading branches in upper half; inflorescence sparsely hairy to $\pm$ glabrous, corolla crimson and white, glabrous outside; follicles glabrous **P. lealii**
 1b Trunk simple or with few thick spiny erect branches near apex; inflorescence densely pubescent, corolla greenish yellow to brown and pubescent outside; follicles pubescent **P. namaquanum**

Pachypodium lealii Welw., *Trans. Linn. Soc. London* 27: 43 (1869). Type: from Angola.

Pachypodium giganteum Engl., *Bot. Jahrb. Syst.*, 19: 147 (1894). Type: Namibia, Otjitambi, 27 Nov. 1888, *Gürich* 15 (missing).

Tree (rarely shrub to 1 m) to 8 m tall, trunk usually spineless and somewhat swollen below, with many spreading spiny branches towards the top, with silvery grey bark. *Leaves* oblong-



FIGURE 21.—*Pachypodium lealii*, tree about 5 m tall, Otjihipa Mountains, Kaokoveld, PVB.

obovate, 20–100 $\times$ 10–40 mm, finely pubescent to glabrous, glossy, subtended laterally by 2 stout stipular thorns 5–40 mm long, sometimes with further spine 5–10 mm long in axil. *Inflorescences* with sparse short hairs to $\pm$ glabrous. *Corolla* salver-shaped, 25–40 mm long, crimson and white, glabrous outside; *tube* slender, 25–40 $\times$ 4–6 mm; *lobes* 15–25 mm long, spreading, narrowly deltate, one margin slightly crisped. *Follicles* glabrous, 70–150 $\times$ 6–10 mm, spreading at 180°. Figures 21 & 22.

Habitat: Rocky hillsides in semi-arid sparse deciduous woodland, 700–1 400 m.

Flowering time: Jul.–Oct.

Distribution: Angola, Namibia. In Namibia only in northwestern parts. Figure 23.

Voucher: De Winter 3690 (PRE, WIND).



FIGURE 22.—*Pachypodium lealii*, dwarf plant about 1 m tall, north of Palmwag, PVB.

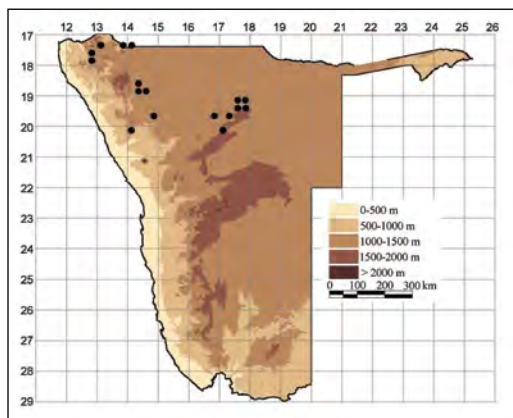


FIGURE 23.—Distribution of *Pachypodium lealii*.

Pachypodium namaquanum (Wyley ex Harv.)
Welw., *Trans. Linn. Soc. London* 27: 45
(1869). Type: from South Africa.

Tree to 3 m tall, usually with single swollen spiny trunk sometimes with few thick branches near apex, to 0.3 m diam. at base and tapering above, with shiny silvery grey bark. *Leaves* in apical rosette, elliptic to oblanceolate, 30–120 × 10–40 mm, soft, stiffly pubescent, subtended laterally by 2 stout stipular thorns 20–70 mm long, with further spine 10–70 mm long in axil of other two. *Inflorescences* densely and shortly pubescent. *Corolla* cylindrical, pubescent and greenish yellow to brown outside, inside purple to red-brown on lobes to yellow in tube; *tube* 25–60 × 6–10 mm, *lobes* 5–10 mm long, erect, broadly ovate, obtuse. *Follicles* pubescent, 25–40 × 10–15 mm, spreading at 30–60°. Figures 24 & 25.



FIGURE 24.—*Pachypodium namaquanum*, south of Sebrafontein, steep stony slope with many other succulents, PVB.



FIGURE 25.—*Pachypodium namaquanum*, quartzitic outcrop near Umduas, north of Steinkopf, South Africa, PVB.

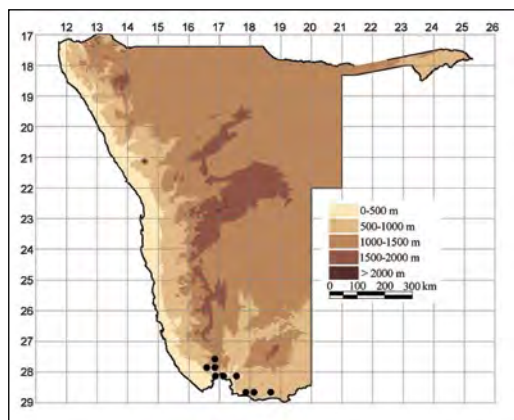


FIGURE 26.—Distribution of *Pachypodium namaquanum*.

Habitat: Rocky hillsides in arid succulent scrub, 200–1100 m.

Flowering time: Aug.–Nov.

Distribution: Namibia, South Africa. In Namibia only in and near the Orange River Valley from Rosh Pinah to near Onseepkans (Jankowitz 1979). Figure 26.

Voucher: De Winter & Giess 6341 (PRE, WIND).

PERIPLOCOIDEAE R.Br. ex Endl.

Key to the genera

- 1a Flowers large, with tube 50–80 mm long **Cryptostegia***
- 1b Flowers small, with tube 2–12 mm long or without tube **2.**
- 2a Anthers arising on inside of raised swollen 'staminal foot', each with a corona lobe immediately behind it arising on same foot **3.**
- 2b Anthers not arising on raised 'staminal foot', without corona lobe immediately behind each anther (anthers arising alone in base of cylindrical corolla tube with small corolline corona lobes inserted at mouth of tube well above anthers and just below sinuses of corolla lobes) **Ectadium**
- 3a Corolla with 5 or 10 small corolline corona lobes consisting of single flap or two small lobules at mouth of tube beneath sinuses of lobes, with another series of 5 corona lobes immediately behind anthers lower down in tube . . . **Cryptolepis**
- 3b Corolla without corolline corona lobes, only with series of 5 variously divided corona lobes immediately behind anthers **4.**
- 4a Corona inserted in base of campanulate corolla, corolla lobed nearly right to base but laterally touching for lower 0.5–1 mm to form false tube **Tacazzea**
- 4b Corona inserted at mouth of distinct corolla tube 2–12 mm long **Raphionacme**

Cryptolepis R.Br. (incl. **Curroria** Planch. ex Benth.)

Stiff erect to somewhat twining entirely glabrous shrub with smooth or papillate branches, sap milky. *Leaves* opposite or in tufts on short shoots, shortly or indistinctly petiolate, linear to lanceolate or spatulate, 15–70 × 2–20 mm, paler green below. *Inflorescences* sessile or shortly pedunculate, often crowded, 1- to several-flowered. *Corolla* ± rotate, greenish white to purple, 4–12 mm broad; *tube* much shorter than lobes, including anthers, with 10 short erect corolline coronal teeth or flaps at mouth in pairs just below sinuses of lobes; *lobes* spreading, obtuse; *corona* with 5 simple connivent club-shaped lobes opposite sepals, arising in corolla tube near middle immediately behind anthers and reaching near its mouth; *anthers* joined to corolla tube

just below middle, tilting conically together and firmly connected to style head, without horny margins, tips acuminate. *Fruit* mostly a pair of dehiscent many-seeded fusiform follicles spreading at 60–180°, 35–100 × 5–9 mm; *seeds* dorsiventrally flattened, smooth, with sessile tuft of hairs at micropylar end.

32 species, South Africa to southern Arabian Peninsula.

Key to species

- 1a Leaves in small tufts on short shoots to opposite, linear to spatulate, 2–7 mm broad, same colour below as above; inflorescence 1- to 3-flowered ***C. decidua***
 1b Leaves strictly opposite, lanceolate, 5–20 mm broad, paler below than above; inflorescence several-flowered ***C. oblongifolia***

Cryptolepis decidua (Planch. ex Benth.) N.E.Br., *Fl. Trop. Afr.* 4 (1): 243 (1902). (= *Curroria decidua* Planch. ex Benth.). Type: from Angola.

Stiff, erect shrub, branches smooth. *Leaves* mostly tufted on short shoots or some opposite, linear to narrowly spatulate, blunt or somewhat acute, 15–60 × 2–7 mm, grey-green on both sides. *Inflorescences* solitary, 1- to 3-flowered; pedicels 3–15 mm long. *Corolla* white or pale purple, 10–12 mm broad; *tube* ± 2 mm long, cup-shaped; *lobes* 6–7 mm long, spreading; *corona* with 5 simple connivent filiform to subulate lobes opposite sepals, arising in corolla tube near middle and reaching near its mouth. *Follicles* spreading at 90–180°, 35–90 × 5–6 mm.

Habitat: Arid stony hillsides to rocky flats, 300–1 200 m.

Flowering time: Dec.–Apr.

Distribution: Angola, Botswana, Namibia, South Africa. In Namibia mainly associated with the edges of the Namib but also extending eastwards along the Cunene River to Ruacana and eastwards along the Orange River to the Great Karas Mountains. Figure 27.

Voucher: De Winter & Giess 7105 (PRE, WIND).

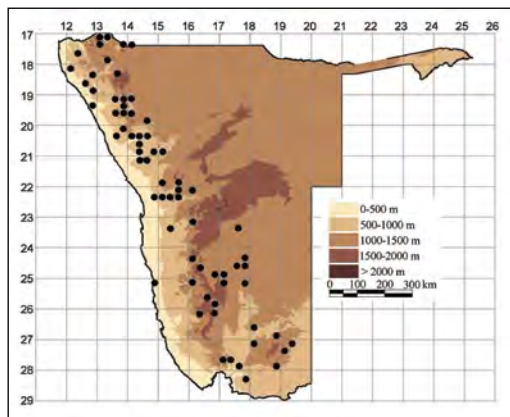


FIGURE 27.—Distribution of *Cryptolepis decidua*.

Note: Both *Curroria* and *C. decidua* are usually given as published by 'Hook.f. & Benth.'. However, Hooker & Bentham (1849: 333) stated: 'This and the succeeding Orders have been entirely worked up by Mr Bentham...'. Since *Curroria* and *C. decidua* appeared on p. 457, they fall among the 'succeeding Orders' and so their authorship is 'Planch. ex Benth.'.

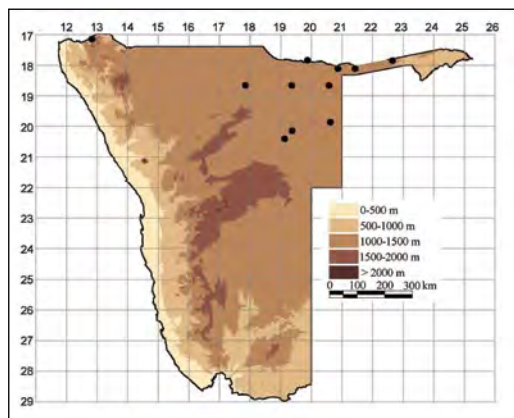
Cryptolepis oblongifolia (Meisn.) Schltr., *J. Bot.* 34: 315 (1896). Type: from South Africa.

Cryptolepis arenicola Schltr. ex Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 16: 364 (1920). Type: Namibia, Heisib Oms bei Gaub, Jan. 1912, Dinter 2430 (SAM).

Erect or somewhat twining shrub with red-brown papillate branches. *Leaves* opposite, shortly or indistinctly petiolate, lanceolate, acute, 20–70 × 5–20 mm, paler green below. *Inflorescences* sessile or shortly pedunculate, often crowded, several-flowered. *Corolla* greenish white, 4–10 mm broad, *tube* 1.0–1.5 mm long, cup-shaped; *lobes* 2–3 mm long; *corona* with 5 simple connivent club-shaped lobes opposite sepals, arising in corolla tube near middle and reaching near its mouth. *Follicles* spreading at 60–90°, 70–105 × 6–9 mm.

Habitat: Woodland, 1 000–1 200 m.

Flowering time: Nov.–Feb.

FIGURE 28.—Distribution of *Cryptolepis oblongifolia*.

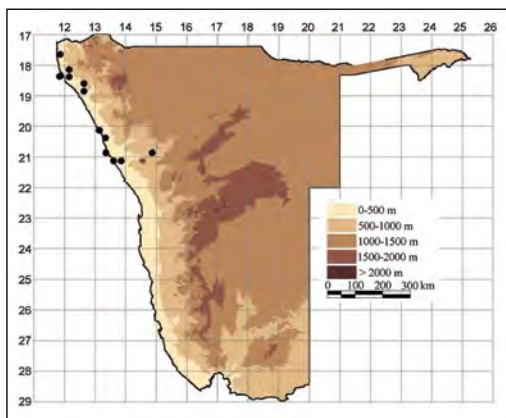
Distribution: South Africa to tropical Africa. In Namibia in extreme north, from Kaokoveld to Caprivi. Figure 28.

Voucher: De Winter & Marais 4742 (PRE, WIND).

Ectadium E.Mey.

Stiff, erect to decumbent shrub, branches and leaves shortly grey-haired when young, sap milky. *Leaves* opposite, shortly and indistinctly petiolate, linear to obovate and to almost circular, 20–90 × 3–20 mm, pale green, firmly leathery and often pitted beneath, soon glabrescent. *Inflorescences* with grey hairs, shorter than leaves, axillary. *Corolla* cream or pale green to yellow, salver-shaped; *tube* 3–5 mm long, cylindrical to slightly constricted at mouth, including anthers, with 5 short erect subulate coronal teeth inserted on broader base at mouth just below sinuses of lobes and giving rise to 5 ridges running down tube inside to near middle; *lobes* linear, 3–5 mm long, somewhat twisted along length; *anthers* connected to corolla tube only near base, connivent and extended into subulate hairy appendages to exceed middle of tube, enclosed in tube; *staminal corona* absent. *Fruit* a pair of dehiscent many-seeded fusiform follicles spreading at 180°, 60–140 × 5–10 mm; *seeds* dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

2 species, Namibia and South Africa.

FIGURE 29.—Distribution of *Ectadium rotundifolium*.

Key to species

- 1a Plant spreading to decumbent; leaves obovate to almost circular, 20–32 mm long, narrowing abruptly into petiole **E. rotundifolium**
 1b Plant spreading to erect; leaves linear to narrowly ovate or obovate, 40–80 mm long **E. virgatum**

Ectadium rotundifolium (H. Huber) Venter & Kotze, *S. African J. Bot.* 56: 120 (1990). *E. virgatum* var. *rotundifolium* H. Huber, *Mitt. Bot. Staatssamml. München* 4: 295 (1962). Type: Namibia, c. 21 km east of Torra Bay, Giess 3865 (M, holo.; PRE, iso.).

Spreading to decumbent often hemispherical shrub 0.5–1.0 m tall often with prostrate branches, which may root adventitiously at nodes. *Leaves* on petiole 1–2 mm long, obovate to almost circular, 20–32 × 15–20 mm.

Habitat: Rocky outcrops to gravelly flats or sandy river beds, 50–300 m.

Flowering time: Oct.–May.

Distribution: Namibia. Associated with the central Namib from Cape Cross northwards to near the Khumib River. Figure 29.

Voucher: Giess 9078 (M, WIND).



FIGURE 30.—*Ectadium virgatum*, flowers and fruit, Lorelei, near Orange River. Photo: Coleen Mannheimer.



FIGURE 31.—*Ectadium virgatum*, plant, Lorelei, near Orange River. Photo: Coleen Mannheimer.

Ectadium virgatum E.Mey., *Comm. Pl. Afr. Austr.*: 188 (1838). Type: from South Africa.

Ectadium latifolium (Schinz) N.E.Br., *Fl. Cap.* 4 (1): 532 (1907). *E. virgatum* var. *latifolium* Schinz. *Verh. Bot. Vereins Prov. Brandenburg* 30: 261 (1888). Type: Namibia, Lüderitz, 25 Jul. 1885, *Schenck 11* (Z, lecto., designated here; duplicates in K, PRE).

Erect to spreading shrub 1–3 m tall with hard and rigid to somewhat weeping branches. Leaves on petiole 1–5 mm long, linear to narrowly ovate or obovate, 40–80 × 3–14 mm. Figures 30 & 31.

Habitat: Rocky outcrops to gravelly flats or sandy river beds, 50–300 m.

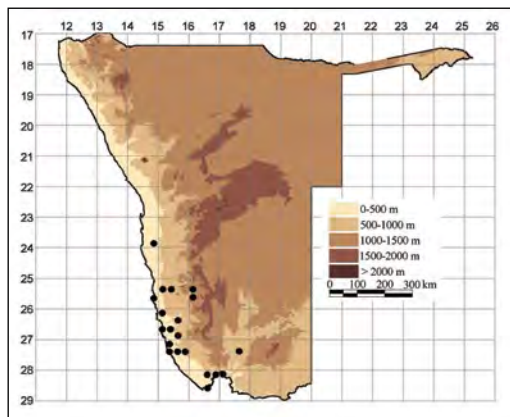


FIGURE 32.—Distribution of *Ectadium virgatum*.

Flowering time: mainly Sep.–Mar.

Distribution: Namibia, South Africa. In Namibia mainly associated with the southern Namib from Spencer Bay and Uri Hauchab to Oranjemund and extending eastwards along the Orange River valley to the mouth of the Fish River. Figure 32.

Voucher: Giess & Van Vuuren 736 (WIND).

Note: Several collections from the distribution area of 'latifolium' [Seely & Robinson 270 (WIND), Kolberg & Maggs 181 (WIND)] have the narrow leaves of 'virgatum' and cannot reliably be placed under either species. Therefore *E. latifolium* and *E. virgatum* are regarded here as a single species.

The lectotypification by Venter & Verhoeven (1990b) is set aside. On the sheet of *Schenck 11* at K, N.E. Brown wrote 'from the type in Prof. Schinz's herbarium, Oct. 1894'. Therefore, the specimen of this collection used by Schinz was in Z and this is selected as the lectotype, rather than the sheet at PRE, designated by Venter & Verhoeven (1990b) as the lectotype.

Raphionacme Harv.

(including *Chlorocyathus* Oliv.)

Geophytes with few erect, spreading to twining stems becoming slightly woody only at base, with large subterranean tuber, sap milky (clear

in *R. namibiana*), above-ground parts deciduous, mostly shortly downy to felty. *Leaves* opposite, with a short or indistinct petiole, linear-lanceolate to elliptic, spatulate or obovate, usually pubescent. *Inflorescences* usually few near or at apex of stem, usually with 5–20 flowers opening in quick succession, pedunculate, flowers pedicellate. *Corolla* green, yellow-green to violet, campanulate, 8–12 mm long, mostly pubescent outside; *tube* cupular, with corona and anthers inserted at mouth and 10 nectarial ridges extending below to base of tube; *lobes* spreading from mouth of tube, 2–5 × as long as tube. *Corona* in throat of corolla tube, with 2- or 3-partite segments. *Stamens* fused up to halfway or higher with corolla tube, anthers exserted. *Fruit* a pair of dehiscent many-seeded fusiform follicles spreading at 60–150° or solitary by abortion, 35–100 × 5–20 mm; *seeds* dorsiventrally flattened, smooth, with sessile tuft of hairs at micropylar end or with hairs all round margin (*R. namibiana*).

36 species (Venter 2009), widespread in sub-Saharan Africa, also in Oman in Arabian Peninsula.

Key to species

- 1a Corona consisting of 5 slender and tapering to filiform lobes each flanked laterally by 2 shorter lobules, 2 teeth or 2 truncate swellings, access to anthers not restricted 2.
- 1b Corona consisting of 5 linear lobes with truncate to bifid tips, without lateral lobules and with narrow openings between them to anthers **R. lanceolata**
- 2a Corolla lobes 8–15 mm long 3.
- 2b Corolla lobes 2–6 mm long 4.
- 3a Stem twining; corolla nodding and facing downwards **R. monteiroae**
- 3b Stem erect to slightly spreading but not twining; corolla facing upwards **R. namibiana**
- 4a Leaves pubescent (at least on midrib and lower surface); flowers opening after development of leaves 5.
- 4b Leaves glabrous with slight waxy covering; flowers opening before leaves develop ... **R. haeneliae**
- 5a Corona consisting of slender almost filiform (usually green) central lobe 5–7 mm long with 2 minute spreading lateral lobules on swollen base **R. inconspicua**
- 5b Corona with slender (usually purple) central lobe 2–3 mm long with 2 erect lateral lobules rising alongside it and tapering into base **R. velutina**

Raphionacme haeneliae Venter & R.L.Verh., *S. African J. Bot.* 62: 316 (1996). Type: Namibia, Namib Naukluft Park, 4 Mar. 1994, C. Hänel (WIND, holo.).

Stems few, erect to 400 mm from rosette of several tubers to 250 mm beneath ground. *Leaves* ovate, 40–60 × 6–10 mm, grey-green, slightly fleshy, glabrous with slight waxy covering. *Inflorescence* terminal, glabrous, with several flowers opening in quick succession before leaves develop, on peduncle 3–5 mm long, pedicels 2–3 mm long. *Corolla* pale green and glabrous outside; *tube* ± 2 mm long, cup-shaped; *lobes* 4 × 2 mm, spreading, glabrous inside, pale green to cream marked with purple along centre inside; *corona* with slender almost filiform middle tooth 4–5 mm long incurved towards tip, with broad base, yellow-white. *Follicles* mostly paired, erect, spreading at ± 120°, 60–70 × 5–6 mm, glabrous.

Habitat: Around bases of granitic outcrops or in gravelly plains of Namib with no other vegetation, 400–600 m.

Flowering time: Jan.–Feb.

Distribution: Namibia. In Namib Desert east and southeast of Walvis Bay. Figure 33.

Voucher: Seely & Robinson 10 (WIND).

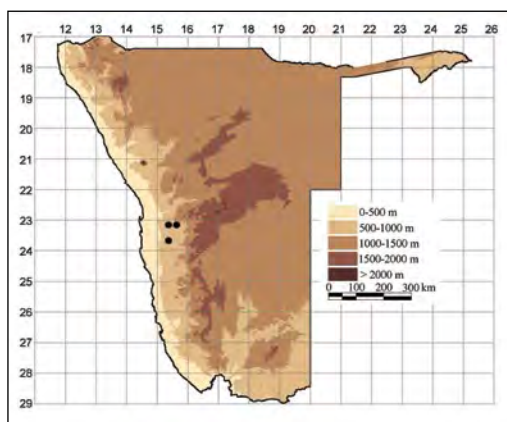


FIGURE 33.—Distribution of *Raphionacme haeneliae*.

Raphionacme inconspicua H. Huber, Mitt. Bot. Staatssamml. München 2: 73 (1955). Type: Namibia, Outjo, Volk 2718 (M, holo.).

Stems few, erect to 300 mm from solitary tuber just beneath ground. *Leaves* obovate, 30–50 × 7–15 mm, pale green, pubescent. *Inflorescence* terminal, pubescent, with several flowers opening in quick succession, on peduncle 7–15 mm long, pedicels 2–10 mm long. *Corolla* pale green and pubescent outside; *tube* ± 2 mm long, cup-shaped; *lobes* 5–6 × 1.5–2.5 mm, spreading, finely and sparsely pubescent inside,

green or marked with purple inside; *corona* with slender erect almost filiform middle lobe 5–7 mm long slightly incurved towards tip, with 2 minute subulate lateral lobules on swollen base, pale green to nearly white near base. *Follicles* mostly paired, erect, spreading at 90–120°, 60–90 × 5–6 mm, pubescent. Figure 34.

Habitat: Among rocky outcrops often in open deciduous woodland, 800–1 800 m.

Flowering time: Nov.–Feb.

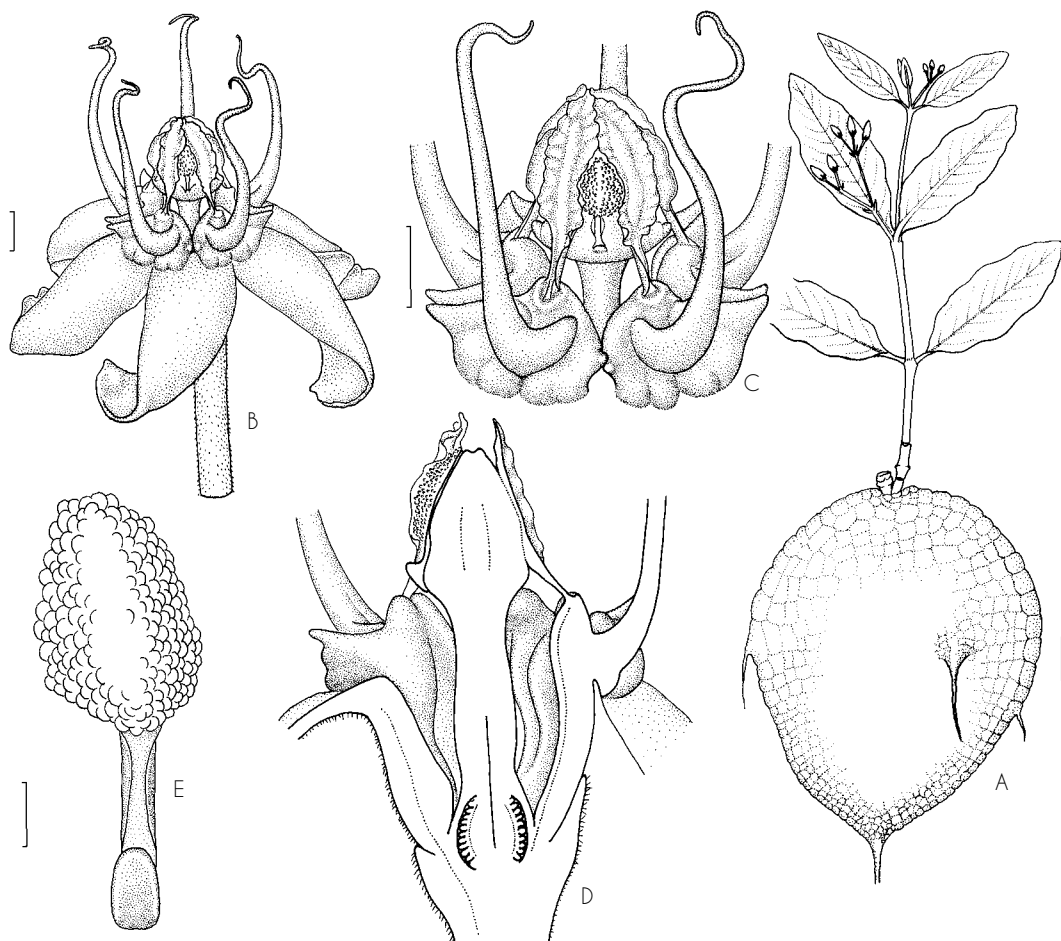
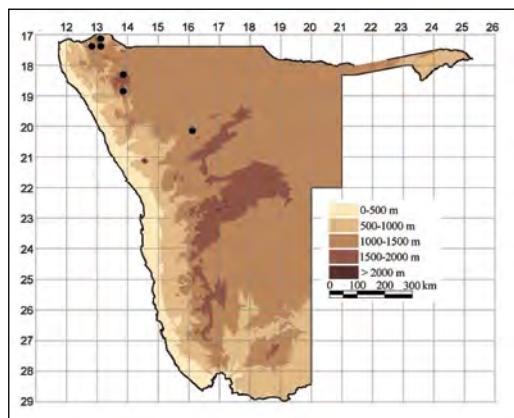


FIGURE 34.—*Raphionacme inconspicua*, Bruyns 5552. A, plant; B, side view of flower; C, enlarged view of centre of flower; D, longitudinal section of flower; E, pollinarium. Scale bars: A, 10 mm; B–D, 1 mm; E, 0.25 mm.

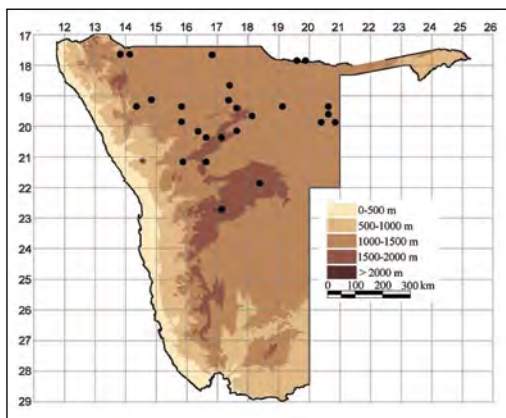
FIGURE 35.—Distribution of *Raphionacme inconspicua*.

Distribution: Angola, Botswana?, Namibia. In Namibia only known in the northwest from Outjo to the Kaokoveld. Figure 35.

Voucher: Bruyns 7994 (WIND).

Raphionacme lanceolata Schinz, *Verh. Bot. Vereins Prov. Brandenburg* 30: 263 (1888). Type: Namibia, Omandongo, Schinz 167 (Z, lecto., designated here; duplicate at K).

Stem usually solitary but branching above ground to form small clump to 200(–400) mm tall, from perennial subterranean stem and often large solitary tuber 0.1–0.3 m beneath surface. *Leaves* lanceolate to elliptic or obovate (circular), 20–90 × 7–50 mm, grey-green, sparsely pubescent. *Inflorescences* next to axils of leaves, 1- to 5-flowered opening in quick succession usually before leaves fully developed, pubescent, sessile or on peduncles up to 20 mm long, pedicels 2–9 mm long. *Corolla* pale green and pubescent outside; *tube* 2–3 mm long, cup-shaped; *lobes* 5–6 × 2–3 mm, spreading, puberulous to glabrous inside, pale green becoming purplish towards tips inside; *corona* with 5 ± linear to subulate truncate to shallowly bifid yellow-green to faintly purple lobes 4–6 mm long without lateral teeth, connivent around style head with narrow openings between them. *Follicles* paired or solitary, erect, 40–110 × 5–7 mm, sparsely pubescent.

FIGURE 36.—Distribution of *Raphionacme lanceolata*.

Habitat: Sandy soil in open woodland, occasionally among rocks, 1 100–1 600 m.

Flowering time: Nov.–Feb.

Distribution: Angola, Botswana, Mozambique, Namibia, South Africa, Zimbabwe. In Namibia mainly in the parts covered by Kalahari sands from Gobabis and the Auas Mountains northwards. Figure 36.

Voucher: Strohbach 1256 (WIND).

Raphionacme monteiroae (Oliv.) N.E.Br., *Fl. Cap.* 4 (1): 533 (1907). Type: from Mozambique. (= *Chlorocyathus monteiroae* Oliv.).

Stems few, twining to 0.5–2.0 m, annual above ground, from short subterranean stem arising from solitary tuber to 0.1 m below surface. *Leaves* lanceolate to narrowly ovate, 20–60 × 7–20 mm, grey-green, pubescent. *Inflorescence* terminal or next to axils of leaves, with several flowers often opening in quick succession, pubescent, on peduncle 4–10 mm long, pedicels 3–6 mm long bending downwards so flowers nodding. *Corolla* green outside; *tube* 4–6 mm long, slightly urceolate; *lobes* 8–12 × 4–5 mm, ascending, sparsely puberulous within, green; *corona* with slender subulate middle tooth 1.5–2.5 mm long strongly incurved over style head, subtended by very short obtusely triangular lateral lobules. *Follicles* not recorded. Figure 37.



FIGURE 37.—*Raphionacme monteiroae*, Mambone, Mozambique, PVB 7678.

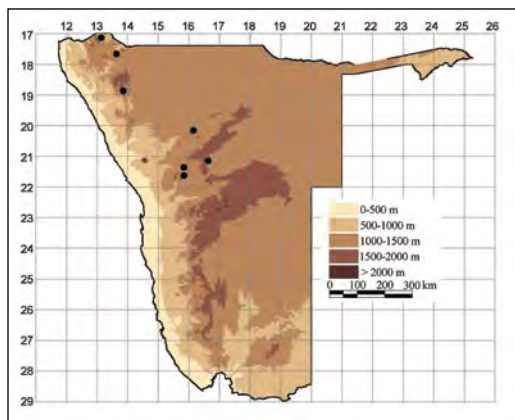


FIGURE 38.—Distribution of *Raphionacme monteiroae*.

Habitat: Among rocky outcrops in open deciduous woodland, 800–1 800 m.

Flowering time: Nov.–Feb.

Distribution: Angola, Botswana, Namibia, South Africa to Tanzania. In Namibia mainly in moister parts of the west, from Erongo Mountains to Kaokoveld and Otjiwarongo to Outjo. Figure 38.

Voucher: Von Koenen 451 (WIND).

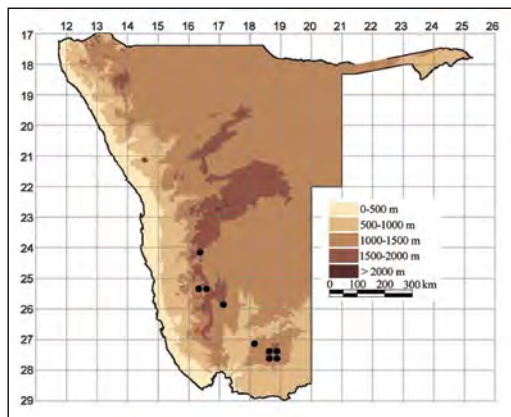


FIGURE 39.—Distribution of *Raphionacme namibiana*.

Raphionacme namibiana Venter & R.L.Verh., *S. African J. Bot.* 52: 332 (1986). Type: Namibia, Helmeringhausen, Kleinfontein, Marloth 5017 (PRE, holo.).

Stems few, erect and annual above ground to 120 mm from perennial subterranean stem and large solitary tuber 0.50–0.75 m beneath surface. *Leaves* lanceolate to narrowly ovate, 40–150 × 10–30 mm, grey-green with purple veins, puberulous and soon glabrous. *Inflorescence* terminal, with few flowers opening in quick succession, slightly puberulous, on peduncle 1–5 mm long, pedicels 6–8 mm long. *Corolla* pale green outside; *tube* 8–12 mm long, cylindrical; *lobes* 10–15 × 3–6 mm, spreading, glabrous above, slightly puberulous below, purple with pale yellow to green patch on lower central area inside; *corona* with slender erect filiform middle tooth 4–9 mm long slightly incurved towards tip, with 2 truncate lateral bulges at base, purple around base becoming white above. *Follicles* solitary, pendulous, 40–60 × 18–20 mm, glabrous.

Habitat: Among rocks at base of hills and on plateaux, with very little other vegetation, 1 000–1 600 m.

Flowering time: Nov.–Jan.

Distribution: Namibia. Known from the eastern base of the Naukluft Mountains to the Great Karas Mountains. Figure 39.

Voucher: Strohbach & al. 2935 (WIND).

Raphionacme velutina Schltr., *Bot. Jahrb. Syst.* 20, Beibl. 51: 12 (1895). Type: from South Africa. (= *R. burkei* N.E.Br.).

Raphionacme dinteri Schltr. ex Schinz, *Vierteljahrsschr. Naturf. Ges. Zürich* 55: 245 (1910). Type: Namibia, 10 km east of Orumbo, *Dinter* 1326 (Z, lecto., designated here).

Stem usually solitary but branching above ground to form small clump to 120(–400) mm tall, from perennial subterranean stem and solitary tuber 0.1–0.2 m beneath surface. *Leaves* linear-lanceolate to narrowly obovate, 15–50 × 3–12 mm, grey-green, pubescent. *Inflorescences* next to axils of leaves, dense and 5- to 15-flowered, flowers opening in quick succession, pubescent, sessile or on peduncles up to 2 mm long, pedicels 2–4 mm long. *Corolla* pale green and pubescent outside; *tube* 2–3 mm long, cup-shaped; *lobes* 2–4 × 2 mm, spreading, puberulous to glabrous inside, yellow-green inside; *corona* with subulate usually purple middle lobe 2–3 mm long subtended by 2 shorter pale yellow-green lateral lobules tapering to base. *Follicles* paired, erect, 40–70 × 5–7 mm, pubescent.

Habitat: Sandy soil in open woodland, occasionally among rocks, 1 200–1 600 m.

Flowering time: Nov.–Jan.(–May).

Distribution: Angola, Botswana, Namibia, South Africa. In Namibia mainly in the parts

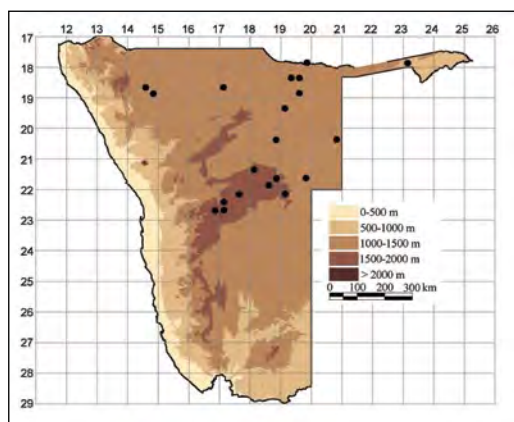


FIGURE 40.—Distribution of *Raphionacme velutina*.

covered by Kalahari sands from Gobabis and the Awas Mountains northwards. Figure 40.

Voucher: *De Winter* 3764 (PRE, WIND).

Note: Venter (2009) did not designate a lectotype properly, rendering his lectotypification invalid. This is rectified here.

Tacazzea Decne.

Erect shrub to liane twining to 5 m, young stems somewhat tomentose, sap milky. *Leaves* opposite, on petioles 10–30 mm long, broadly lanceolate to elliptic and obtuse to slightly cordate at base, 40–110 × 20–50 mm, often dark green and nearly glabrous above, pale green and tomentose below. *Inflorescences* on long slender branched peduncles, mostly longer than subtending leaf, whitish tomentose. *Corolla* glabrous, dull red, campanulate and lobed nearly to base, to ± 10 mm broad; *tube* ± absent; *lobes* 5–7 mm long, laterally touching and erect for lower 0.5–1.0 mm to form short cupular false tube above which lobes spread strongly; *corona* of 5 erect often apically intertwined filiform segments fused with corolla only at base; *anthers* connivent over style head and arising from inside of corona lobes. *Fruit* a pair of dehiscent many-seeded fusiform follicles spreading at 180°, 50–70 × 5–12 mm, grey-tomentose; *seeds* dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

4 species (Venter & Verhoeven 1990a), widespread in and endemic to sub-Saharan Africa.

Tacazzea apiculata Oliv., *Trans. Linn. Soc. London* 29: 108 (1875). Type: from Uganda.

Habitat: Rocky outcrops or dense bush near rivers, 500–1 000 m.

Flowering time: Oct.–May.

Distribution: West Africa to South Africa. Associated with the Cunene, Cuando, Okavango and Zambezi Rivers in northern Namibia. Figure 41.

Voucher: *Giess* 8951 (PRE, WIND).

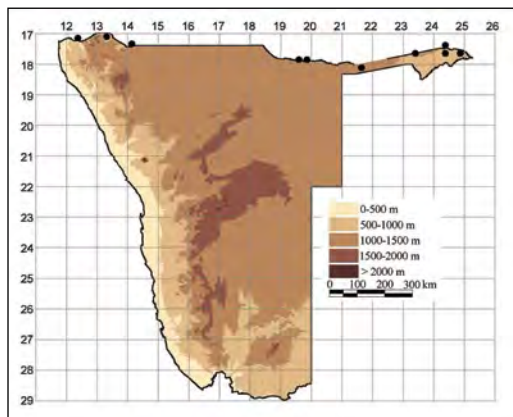


FIGURE 41.—Distribution of *Tacazzea apiculata*.

Note: *Periploca graeca* L. was included by Craven (1999) on the basis of the specimen *Range 1196* (SAM), which Range identified as this species. He mentioned as well that it was an 'Adventivschlingpflanze im Garten' at Kuibis, so this was from a cultivated plant in a private garden. The specimen is fragmentary and the identity is doubtful.

SECAMONOIDEAE Endl.

Secamone R.Br.

Unarmed wiry shrub or twiner to 4 m, young shoots, inflorescences and fruits green and glabrous, sap milky. *Leaves* persistent, opposite, on short petiole 0.2–3.0 mm long, linear to lanceolate or narrowly elliptic, acute, glabrous, with inconspicuous veins, 12–50 × 1–10 mm. *Inflorescences* shortly pedunculate, 1- to 10-flowered, in small mostly terminal cymes, pedicels 0.5–2.0 mm long. *Corolla* orange or yellow, broadly campanulate, glabrous outside; *tube* 0.5 mm long, not quite including anthers, broadly bowl-shaped, with 5 pairs of fleshy corolline coronal ridges running from sinuses of lobes to base; *lobes* obovate, longer than tube, ± 2 mm long; *corona* of 5 short obtuse ascending peg-like lobes opposite sepals attached to gynostegium; *anthers* connivent and firmly connected to style head, truncate and with minute horny

margins below, without sterile appendages; *pollinaria* extremely small, each with 4 minute pollinia attached directly to corpuscle; style head extended into clavate apex above anthers. *Fruit* a pair of dehiscent many-seeded thin-walled slender fusiform follicles spreading at about 180°, 40–60 × 4–5 mm; *seeds* dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

80 species (Goyder 1992), Africa with greatest diversity in Madagascar.

Secamone punctulata Decne. in DC., *Prodr.* 8: 502 (1844). Type: from Tanzania.

Habitat: Steep rocky slopes with *Aloe coralina* I. Verd. and *Euphorbia eduardoi* L.C. Leach west of Baynes Mountains, ± 1 200 m.

Flowering time: Dec.–Feb.

Distribution: Angola to West Africa. In Namibia only known from two collections in the Kaokoveld. Figure 42.

Voucher: Bruyns 8023 (BOL, K, WIND).

ASCLEPIADOIDEAE R.Br. ex Burnett

Key to the tribes

- 1a Corona in 2 series, outer series tubular below then divided into 20 small spreading to erect

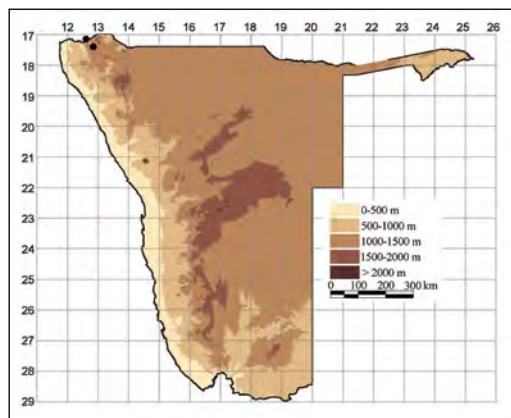


FIGURE 42.—Distribution of *Secamone punctulata*.

slender lobules around mouth of this tube; anthers extended into erect inflated translucent white sterile appendages filling up coronal tube; pollinarium with 2 small flattened pollinia joined directly to corpuscle **Fockeeae**

- 1b Corona in 1 or 2 series but not as above; anthers often with appendages but not filling up coronal tube (if present); pollinarium with 2 swollen to flattened pollinia attached to corpuscle by often slender caudicle **2.**
- 2a Pollinia developing in part of anther above position of corpuscle (horizontal or ascending in anthers) **3.**
- 2b Pollinia developing in part of anther below position of corpuscle (pendulous in anthers) **Asclepiadeae**
(except *Sphaerocodon* and *Tylophora*)
- 3a Pollinia with insertion crest along outer margin (relative to anther); corolline corona absent; gynostegial corona in 2 series; anthers without sterile apical appendages **Ceropegieae**
- 3b Pollinia without insertion crest; corolline corona sometimes present as 5 segments fused with tube and reaching its mouth; staminal corona in one series opposite anthers or absent; anthers often with small sterile membranous appendages around tips **4.**
- 4a Ovaries narrowing gradually into slender neck below style head; appendages of anthers with basal horizontal slits **Asclepiadeae**
(*Sphaerocodon* and *Tylophora*)
- 4b Style head sessile on ovaries that lack slender neck; appendages of anthers without basal horizontal slits **Marsdenieae**

FOCKEEAE H.Kunze, Meve & Liede

Fockea Endl.

Erect to twining herb with underground napiform tuber or massive thick-stemmed liane without tuber, sap milky. *Stems* slightly fleshy, finely pubescent when young. *Leaves* opposite, subcoriaceous, pubescent to glabrous, often sessile, linear to elliptic, apiculate, deciduous. *Inflorescences* extra-axillary, 1- to 20-flowered, umbellate, pubescent, often sessile. *Corolla* rotate with short tube; outside pubescent; inside puberulous to glabrous, green to brown; *tube* cupular, shorter than lobes; *lobes* linear, obtuse, spreading, usually spiralling to left; *corona* of 2 series of lobes, white, glabrous; *outer series* a

cylindrical tube divided at its mouth into 20 lobules; *inner series* of 5 erect lobules partly fused to outer coronal tube lower down, pressed to backs of anther-appendages and exceeding them; *anthers* connivent $\pm$ quadrangular fertile part firmly connected to style head, truncate and with minute horny margins below, above extended into inflated erect transparent-white sterile appendages 2–3 mm long filling inside of coronal tube; *pollinaria* 2 per anther, small $\pm$ flat and elliptical, erect, sessile on corpuscle. *Follicles* pendulous, broadly fusiform and narrowing into slender beak, glabrous, single by abortion; *seeds* dorsiventrally flattened, slightly papillate, with sessile tuft of hairs at micropylar end or with hairs all round margin (*F. sinuata*).

6 species (Bruyns & Klak 2006), southern Kenya to South Africa.

Key to species

- 1a Leaves rarely more than 30 mm long and not more than 20 mm broad; stems short and erect or climbing to 1–2 m, arising via narrow neck from subterranean tuber **2.**
- 1b Leaves usually more than 30 $\times$ 25 mm; stems usually massive and often climbing on trees to 15 m, not arising from tuber **F. multiflora**
- 2a Margins of leaves revolute, leaves with dense adpressed pubescence; outer corona without spreading flap behind each longest terete lobule **3.**
- 2b Margins of leaves not revolute, leaves with sparse pubescence; outer corona usually with spreading flap behind each longest terete lobule **F. angustifolia**
- 3a Margins of leaves strongly undulate; corpuscle relatively massive and nearly half as broad as pollinia **F. sinuata**
- 3b Margins of leaves not undulate; corpuscle very slender and much less than half as broad as pollinia **F. comaru**

Fockea angustifolia K.Schum., *Bot. Jahrb. Syst.* 17: 146 (1893). Type: from South Africa.

Fockea dammarana Schltr., *Bot. Jahrb. Syst.* 38: 56 (1905). Type: Namibia. Damaraland, 1879, T.J.G. Een (BM, holo.).

Small geophytic herb or climber with tuber, stems erect to twining to 2 m, young growth finely tomentose. *Leaves* with petiole 1–3 mm

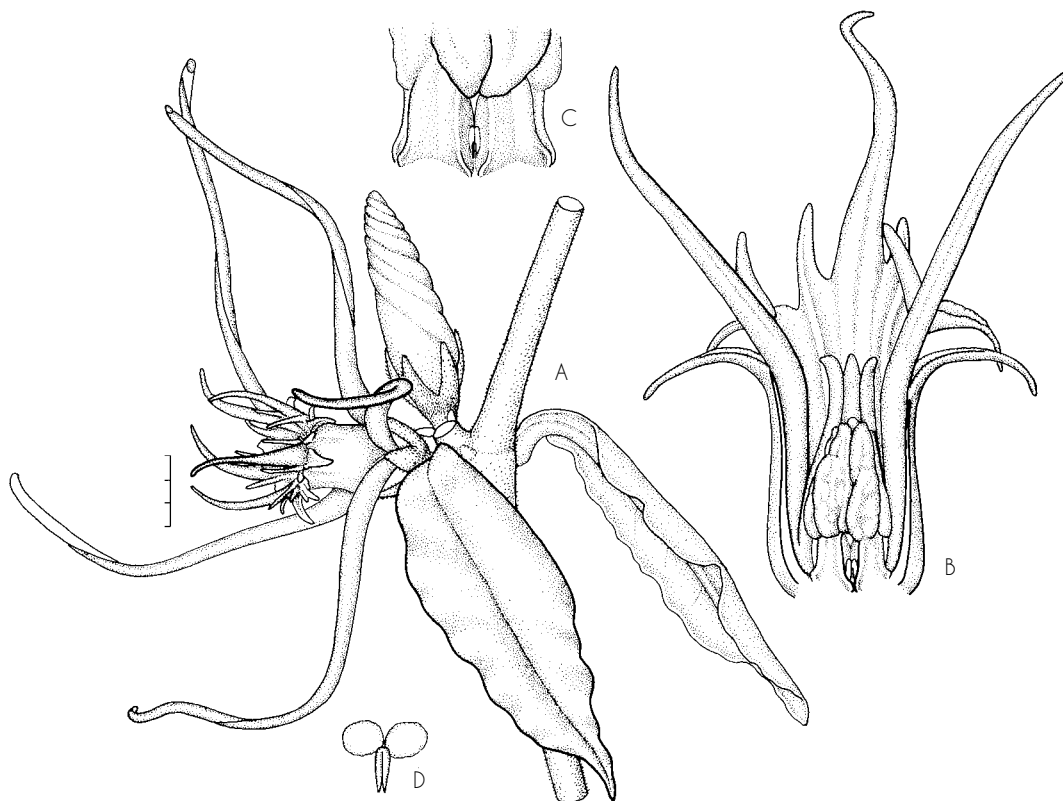


FIGURE 43.—*Fockea angustifolia*, Lobatse, Bayer 1431 (NBG). A, part of flowering branch; B, side view of dissected gynostegium; C, side view of anthers; D, pollinarium. Scale bar: A, 3 mm; B, 1 mm (at A); C, 0.5 mm (at A); D, 0.25 mm (at A).

long, greyish to brownish green, linear to elliptic, $13\text{--}65 \times 1.5\text{--}15.0$ mm, obtuse to acute, glabrous to sparsely pubescent, margins usually neither revolute nor undulate. *Inflorescence* 1- to 6-flowered, flowers opening in succession, sessile; *pedicels* 1 mm long. *Corolla* 10–40 mm diam.; outside pubescent; inside green to brown, sparsely pubescent; *tube* $1.5\text{--}2.0 \times \pm 2.5$ mm, cupular; *lobes* $4\text{--}18 \times 1\text{--}2$ mm, linear, obtuse, spreading, with margins reflexed; *outer corona* 4–6 mm long, then divided into 20 slender lobules up to 5 mm long, longest outer lobes each usually with another spreading lanceolate lobule behind them; *inner corona* of 5 terete linear lobes ± 3 mm long adpressed to backs of anthers then erect. *Follicles* $70\text{--}200 \times 8\text{--}12$ mm, smooth. Figure 43.

Habitat: Stony slopes or flats sometimes with surface limestone or calcrete, 1 000–1 700 m.

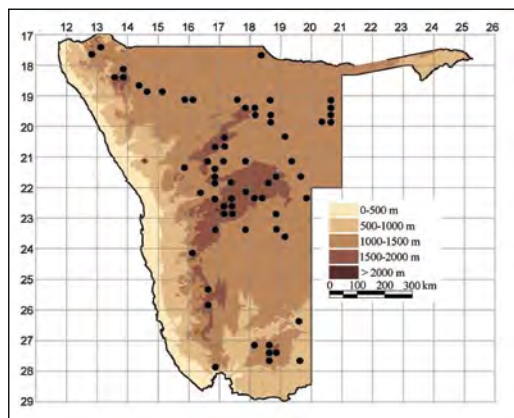
Flowering time: Oct.–May.

Distribution: Angola, Botswana, Kenya, Malawi, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe. Very widespread in Namibia. Figure 44.

Voucher: Seydel 1419 (M, PRE).

Fockea comaru (E.Mey.) N.E.Br., *Fl. Cap.* 4 (1): 781 (1908). Type: from South Africa.

Small geophytic herb with tuber, stems usually erect to 200 mm, young growth finely tomentose.

FIGURE 44.—Distribution of *Fockea angustifolia*.

tose. *Leaves* with petiole to 1 mm long, green to bluish green, linear, $25\text{--}65 \times 1.5\text{--}4.0$ mm, obtuse, upper surface darker than lower, margins strongly revolute, sometimes weakly undulate. *Inflorescence* 1- to 6-flowered, flowers opening in succession, sessile; *pedicels* 1–2 mm long. *Corolla* 8–27 mm diam.; outside finely pubescent; inside grey-green to brown-green, sparsely pubescent; *tube* $1.5\text{--}3 \times \pm 2$ mm, cupular; *lobes* $4\text{--}12 \times 1\text{--}2$ mm, linear, obtuse, spreading, margins strongly reflexed; *outer corona* 4–6 mm long, then divided into 20 slender spreading lobules $2.0\text{--}2.5$ mm long; *inner corona* of 5 terete linear lobes adpressed to backs of anthers then erect. *Follicles* $50\text{--}100 \times 10\text{--}12$ mm, smooth.

Habitat: Stony slopes, 1 400–2 000 m.

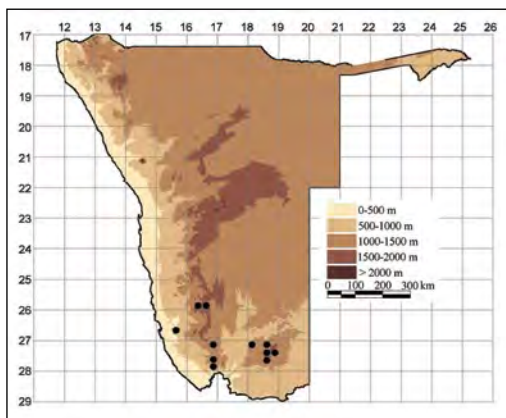
Flowering time: Oct.–May.

Distribution: Namibia, South Africa. In Namibia only in south, from Tiras Mountains to Rosh Pinah and in Great Karas Mountains. Figure 45.

Voucher: Strohbach & Dauth 3800 (WIND).

Fockea multiflora K.Schum., *Bot. Jahrb. Syst.* 17: 145 (1893). Type: from Tanzania.

Large climber to 15 m without tuber, with stout trunk to 300 mm thick sprawling on ground or twisting around trees for support, rarely

FIGURE 45.—Distribution of *Fockea comaru*.

shrub-like; stems fleshy, young stems tomentose, later covered with grey, shiny bark. *Leaves* with petiole 8–25 mm long, oblong to broadly elliptic, $30\text{--}150 \times 25\text{--}100$ mm, tomentose to glabrous above, below tomentose, margins not revolute or undulate. *Inflorescence* 10- to 30-flowered, flowers opening $\pm$ simultaneously, on peduncle 5–15 mm long; *pedicels* 5–13 mm long. *Corolla* 10–15 mm diam.; outside pubescent; inside yellowish green to brown, glabrous to sparsely pubescent; *tube* $1.5\text{--}2.0 \times \pm 3$ mm, shallowly cupular; *lobes* $5\text{--}10 \times 2$ mm, broadly linear, obtuse, spreading, with margins slightly reflexed; *outer corona* 2–3 mm long, then divided into 20 slender lobules; *inner corona* of 5 flattened linear lobes adpressed to backs of anthers then intertwined above them. *Follicles* $100\text{--}220 \times 15\text{--}30$ mm, smooth. Figures 46 & 47.

Habitat: On low hills or among rocks around the base of hills, in dry deciduous woodland, especially *mopane* (*Colophospermum mopane* (J.Kirk ex Benth.) J.Kirk ex J.Léonard) 1 100–1 400 m.

Flowering time: Aug.–Dec.

Distribution: Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe. In Namibia only in northern edge in Kakoveld, also in hills between Otavi and Grootfontein and in Caprivi. Figure 48.

Voucher: De Winter & Wiss 4430 (PRE, WIND).



FIGURE 46.—*Fockea multiflora*, climbing in other trees, west of Outjo, PVB.



FIGURE 47.—*Fockea multiflora*, flowers, Gulwe, Tanzania, PVB 9651.

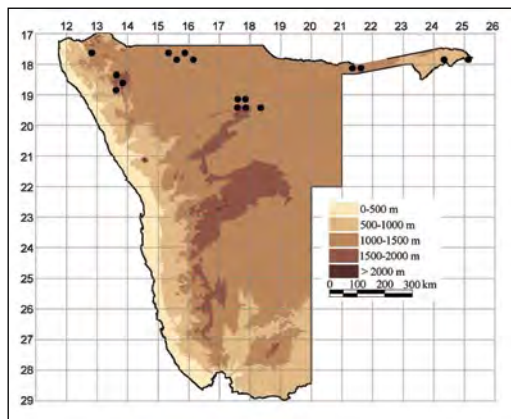


FIGURE 48.—Distribution of *Fockea multiflora*.

Fockea sinuata (E.Mey.) Druce, *Bot. Soc. Exch. Club Brit. Isles*: 623 (1917). Type: from South Africa.

Small geophytic herb with tuber, stems erect to 100 mm or twining to 450 mm. *Leaves* sessile, brown- to grey-green, linear, $25-65 \times 2-4$ mm, obtuse, lower surface pubescent mainly on midrib, margins strongly undulate and revolute. *In-florescence* 1- to 10-flowered, flowers opening in succession, $\pm$ sessile; *pedicels* 1–3 mm long. *Corolla* 8–12 mm diam.; outside sparsely pubescent; inside green to brown, sparsely pubescent; *tube* 1.5–2.5 mm deep, $\pm$ 3 mm broad at mouth, cupular; *lobes* $3.0-4.5 \times 2$ mm, linear, obtuse, spreading, with margins strongly reflexed; *outer corona* 4–6 mm long, divided at mouth of tube into 20 slender terete or flattened spreading lobules 1.5–2.5 mm long; *inner corona* of 5 terete linear lobes adpressed to backs of anthers then erect in column. *Follicles* $50-80 \times 10-12$ mm, often warty. Figure 49.

Habitat: Flat, pan-like areas or in gravelly flats with various species of *Salsola* and *Zygophyllum*, sometimes with *Rhigozum trichotomum*, 900–1 500 m.

Flowering time: Oct.–May.

Distribution: Namibia, South Africa. In Namibia known from Maltahöhe to Grünau and southeast of Warmbad. Figure 50.

Voucher: Giess, Volk & Bleissner 5300 (WIND).



FIGURE 49.—*Fockea sinuata*, plant in flower, near Warmbad. Photo: Silke Bartsch.

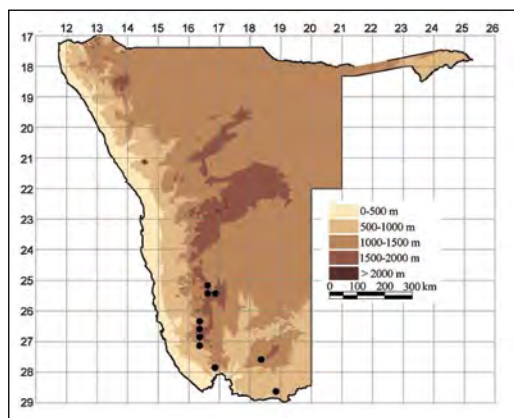


FIGURE 50.—Distribution of *Fockea sinuata*.

MARSDENIEAE Benth.

Key to the genera

- 1a. Staminal corona absent **2.**
- 1b. Staminal corona present **3.**
- 2a. Corolline corona of 5 truncate segments filling tube around gynostegium, fused with tube to base and reaching its mouth; style head projecting beyond anthers **Gymnema**
- 2b. Corolline corona absent (corolla without corolline segments fused to sides of tube); style head entirely covered by anthers and their appendages **Rhyssolobium**
- 3a. Style head extended as slender cylinder well beyond anthers and beyond mouth of tube; se-

pals about half as long as corolla lobes; corolla lobes 3–4 mm long **Stigmatorhynchus**

- 3b. Style head broad and low, just exceeding appendages of anthers; sepals nearly as long as corolla lobes; corolla lobes 6–10 mm long ...

..... **Marsdenia**

Gymnema R.Br.

Shrubby non-succulent climber to 3 m with woody, young stems pubescent, later grey with many lenticels, sap clear. *Leaves* shortly petiolate, obovate to elliptic, 15–80 × 10–20 mm, rounded or shortly cuneate at base, acute, shortly hairy to glabrescent. *Inflorescence* a shortly pedunculate umbel often arising in pairs at nodes, pubescent, pedicels 2–4 mm long. Corolla pale yellow or cream inside, shortly campanulate, inside finely pubescent on lobes and with patches of short hairs on sides of corona lobes; *tube* 1.5–2.0 mm long, cupular, with 5 truncate corolline corona lobes inserted below sinuses of lobes, fused to sides of tube to base and ± filling space around gynostegium (pressed on inner side to gynostegium); *lobes* 1.5–2.0 mm long, spreading and recurved, ovate to deltate, glabrous; *gynostegial corona* absent; *anthers* with short membranous apical appendage; *pollinia* erect, without hyaline insertion crest; style head protruding and conical-obtuse beyond anthers. *Follicles* solitary, fusiform and beaked, 50–80 × 6–8 mm, smooth and glabrous; *seeds* dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

± 20 species, Africa to Asia, South Africa to China.

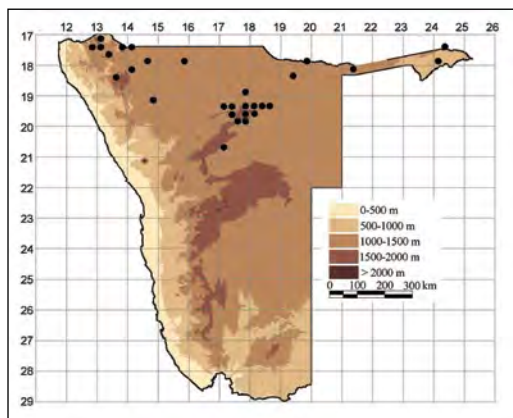
Gymnema sylvestre (Retz.) R.Br. ex Schult., *Syst. Veg.* 6: 57 (1820). Type: from India. (= *Marsdenia sylvestre* (Retz.) P.I.Forst.).

Habitat: Among rocks in hilly areas or in bushveld, 1 000–1 900 m.

Flowering time: Dec.–Apr.

Distribution: South Africa to Arabia, India to China. In Namibia in the north, from Kaokoveld to Grootfontein and to Caprivi. Figure 51.

Voucher: De Winter & Leistner 5327 (PRE, WIND).

FIGURE 51.—Distribution of *Gymnema sylvestre*.

Marsdenia R.Br.

Non-succulent shrub or twiner to 5–10 m, branches initially densely short-haired, later glabrescent and slightly woody with many lenticels, sap clear. *Leaves* ovate or ovate-lanceolate, with petiole 10–30 mm long, 20–90 × 15–60 mm, rounded or shallowly cordate at base, acute, soon glabrescent. *Inflorescence* a many-flowered pedunculate extra-axillary umbel, rusty-pubescent, pedicels 10–20 mm long, with prominent sepals nearly as long as lobes. *Corolla* cream, rotate-campanulate, inside covered with white hairs except in tube; *tube* 2–3 mm deep, cupular; *lobes* 6–10 mm long, broadly linear, blunt or emarginate; *gynostegial corona* in 1 series of 5 simple erect lanceolate to oblong lobes behind and slightly shorter than anthers; *anthers* with short membranous apical appendage; *pollinia* erect, without hyaline insertion crest; *style head* broadly truncate and just exceeding tube. *Follicles* fusiform and beaked, 50–80 × 20–35 mm, smooth and glabrous; *seeds* dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

± 110 species, Old and New World but most diverse in Australasia.

Marsdenia macrantha (Klotzsch) Schltr., Bot. Jahrb. Syst. 51: 143 (1913). Type: from Mozambique. Figures 52 & 53.

FIGURE 52.—*Marsdenia macrantha*, Shoshong, Botswana, PVB 6430.

Habitat: Among scrub to deciduous bushland, 1 000–1 500m.

Flowering time: Nov.–Mar.

Distribution: Namibia to Tanzania. In Namibia widespread north of Okavango. Figure 54.

Voucher: De Winter & Leistner 5340 (PRE, WIND).

Rhyssolobium E.Mey.

Densely branched dwarf non-succulent shrub 150–300 mm tall with stiff erect to spreading hard and woody branches with spinescent tips, stems with short adpressed hairs, later glabrescent, sap clear. *Leaves* sessile or with petiole 1–2 mm long, narrowly elliptic to oblong-elliptic, 5–15 × 1.5–3.0 mm, cuneate at base, blunt, margins folded back, fleshy becoming firmly leathery, above pubescent to glabrescent, below densely pubescent. *Inflorescence* a ± sessile 1- to 3-flowered extra-axillary fascicle, pubescent. *Corolla* campanulate, inside purple to yellow or white and densely pubescent especially in tube; *tube* ± 2 mm long, broader than deep; *lobes* 2–3 mm long; *gynostegial corona* absent; *anthers* with short membranous apical appendage; *pollinia* erect, without hyaline insertion crest; *style head* not protruding beyond anthers. *Follicles* broadly ovate to nearly spherical, 25–35 × 15–25 mm,

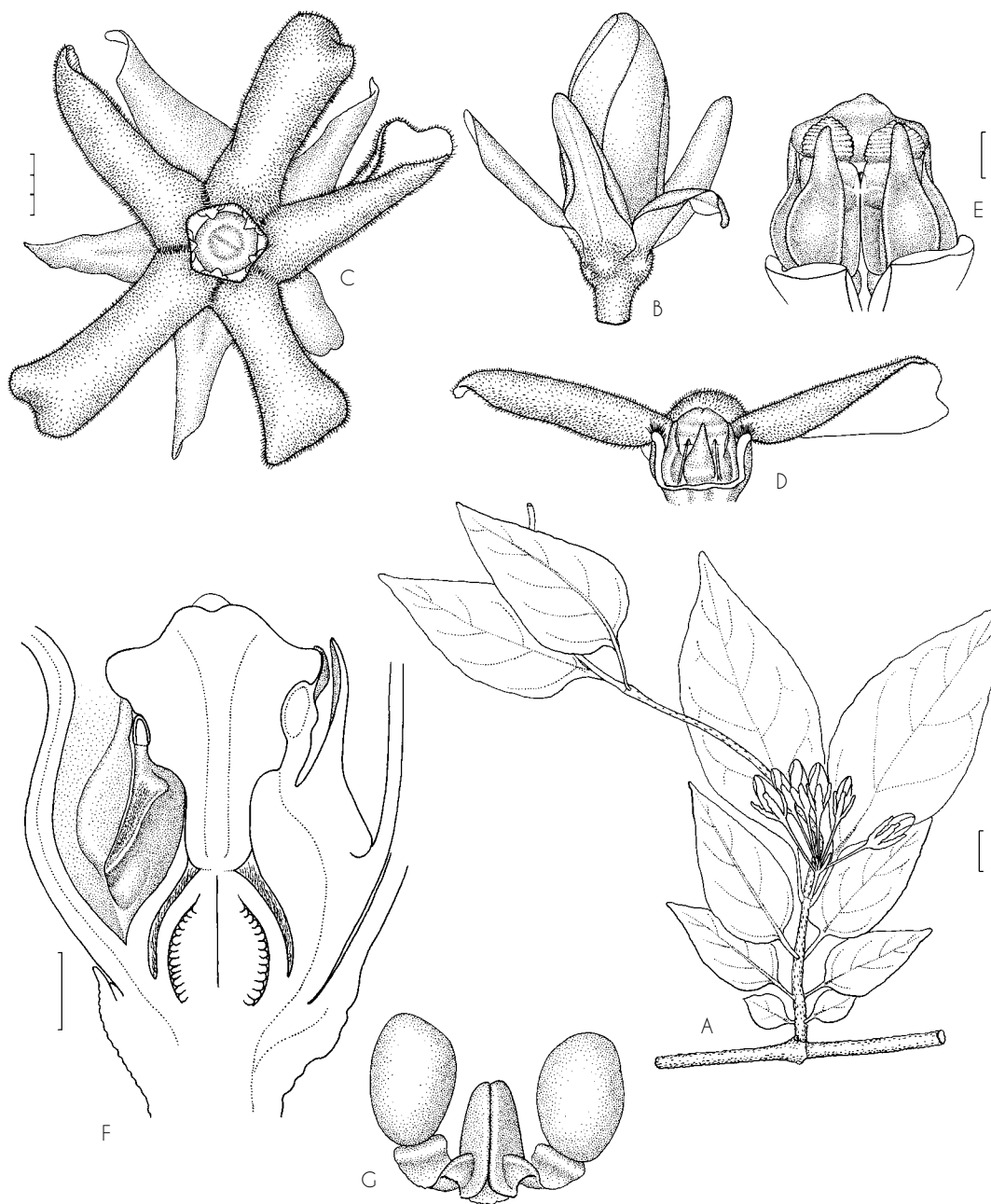
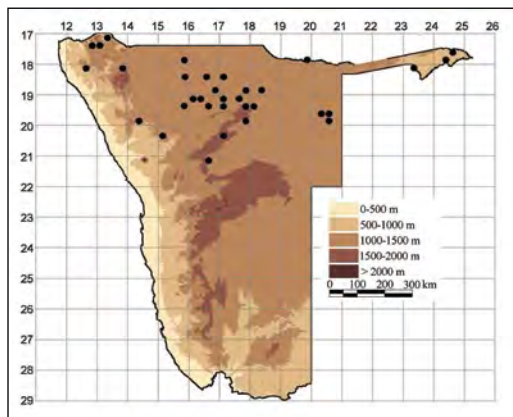


FIGURE 53.—*Marsdenia macrantha*, Okonguati, Namibia, Bruyns 4091. A, portion of plant; B, bud; C, face view of flower; D, side view of dissected flower with sepals removed; E, side view of gynostegium; F, half-flower; G, pollinarium. Scale bar: A, 10 mm; B–D, 3 mm (at C); E, 1 mm; F, 1 mm; G, 0.25 mm (at C).

FIGURE 54.—Distribution of *Marsdenia macrantha*.

smooth and glabrous; seeds dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

1 species, Namibia, South Africa.

Rhyssolobium dumosum E.Mey., *Comm. Pl. Afr. Austr.*: 217 (1838). Type: from South Africa. Figures 55 & 56.

Habitat: Gravelly to rocky flat very arid areas receiving rain in winter, often with some wind-blown sand, 10–150 m.

FIGURE 55.—*Rhyssolobium dumosum*, flowers, South Africa, south bank of Orange River near Alexander Bay, PVB 3948.FIGURE 56.—*Rhyssolobium dumosum*, fruit, South Africa, south bank of Orange River near Alexander Bay, PVB 3948.

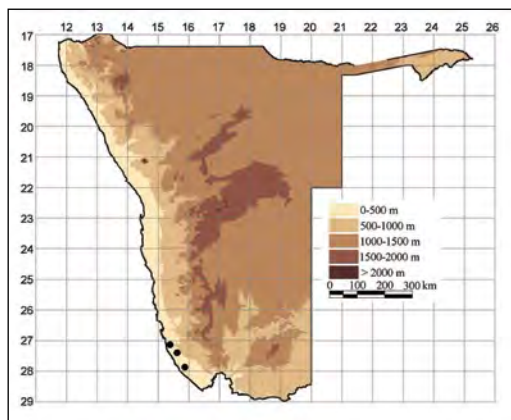
Flowering time: Jun.–Sep.

Distribution: Namibia, South Africa. In Namibia only in coastal parts of southern Namibia south of Lüderitz. Figure 57.

Voucher: Dinter 6350 (BOL).

***Stigmatorhynchus* Schltr.**

Erect somewhat rigid non-succulent shrub 0.5–3.0 m tall, initially with short hairs later glabrescent with many lenticels, sap milky. *Leaves* ovate to ovate-lanceolate, elliptic or spatulate,

FIGURE 57.—Distribution of *Rhyssolobium dumosum*.

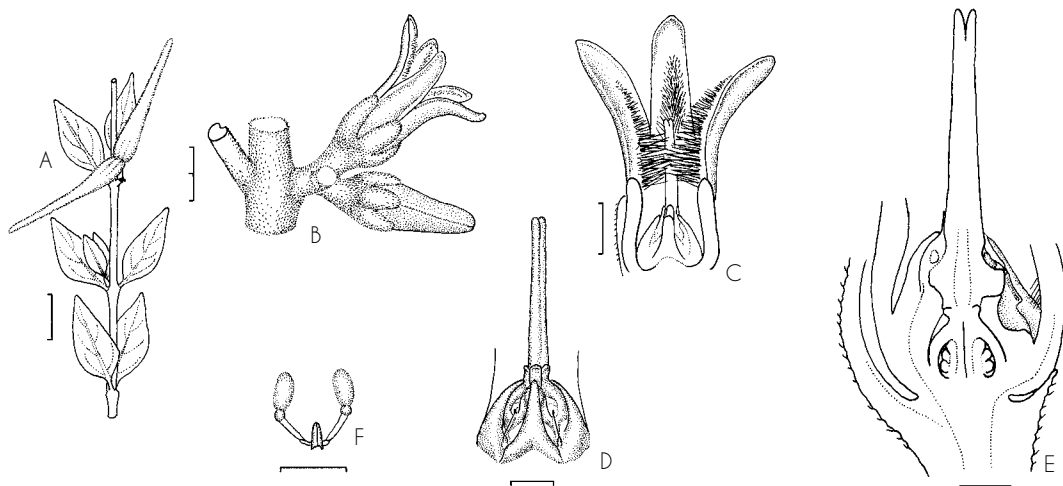


FIGURE 58.—*Stigmatorhynchus hereroensis*, Bruyns 5833. A, portion of plant; B, flower; C, dissected flower; D, gynostegium; E, half-flower; F, pollinarium. Scale bars: A, 10 mm; B, 2 mm; C, 1 mm; D, 0.5 mm; E, 0.5 mm; F, 0.25 mm.

with petiole 1–5 mm long, $10\text{--}30 \times 6\text{--}12$ mm, acute, soon glabrescent. *Inflorescence* a 1- to 4-flowered sessile extra-axillary fascicle, finely pubescent, pedicels 1.0–1.5 mm long. *Corolla* white, narrowly campanulate, inside with dense white hairs near bases of lobes and in tube; *tube* 1.5 mm long, cupular; *lobes* 3–4 mm long, linear, erect and spreading near tips; *gynostegial corona* in one series of 5 simple incurved lobes behind and slightly shorter than anthers; *anthers*

with short membranous apical appendage; *pollinia* erect, without hyaline insertion crest; style head extended into cylindrical apically bifid beak ± 2 mm long and exceeding tube. *Follicles* fusiform and beaked, $25\text{--}35 \times 4\text{--}5$ mm, smooth and glabrous, with 1–2 seeds; *seeds* dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

2 or 3 species, Namibia, Somalia, Tanzania.



FIGURE 59.—*Stigmatorhynchus hereroensis*, near Kaoko Otavi, PVB.

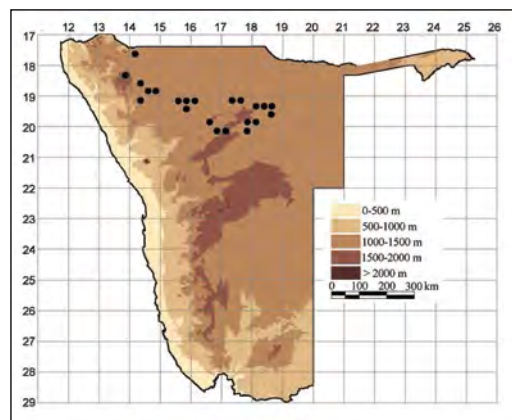


FIGURE 60.—Distribution of *Stigmatorhynchus hereroensis*.

Stigmatorhynchus hereroensis Schltr., *Bot. Jahrb. Syst.* 51: 142 (1913). Type: Namibia, Okavakuatjivi, 3 Dec. 1908, *Dinter* 917 (SAM, lecto., designated here). Figures 58 & 59.

Habitat: Flat areas with short bushes and scattered trees with much broken limestone on surface, 1 100–1 600 m.

Flowering time: Nov.–Mar.

Distribution: Namibia. In Namibia from Ruacana to east of Grootfontein. Figure 60.

Voucher: Merxmüller & Giess 1307 (PRE, WIND).

Note: There is no evidence that Schlechter saw the specimen *Dinter* 917 (SAM) and so this is designated as the lectotype.

ASCLEPIADEAE (R.Br.) Duby

Key to the genera

- 1a. Pollinia developing in part of anther above position of corpuscle (horizontal or ascending in anthers) 2.
- 1b. Pollinia developing in part of anther below position of corpuscle (pendulous in anthers) 3.
- 2a. Corolla rotate; corona not raised above base of corolla **Tylophora**
- 2b. Corolla cupular; corona raised above base of corolla **Sphaerocodon**
- 3a. Sap clear and usually sparse 4.
- 3b. Sap milky and usually copious 5.
- 4a. Corolla urceolate to cylindrical with lobes at most half as long as tube; corolline corona often present as tubercles on inside of corolla tube near bases of anthers; gynostegial corona absent **Microlooma**
- 4b. Corolla rotate without tube and with spreading lobes; corolline corona absent; gynostegial corona present in 2 series, outer series fused into urceolate to bowl-shaped cup around gynostegium and $\pm$ equalling it **Schizostephanus**
- 5a. Outer series of corona fused into urceolate to bowl-shaped cup around gynostegium and $\pm$ equalling or exceeding it **Cynanchum**
- 5b. Outer series of corona not fused into urceolate to bowl-shaped cup around gynostegium and less than half as tall as it 6.
- 6a. Succulent with erect to twining green or grey-green cylindrical stems, leaves absent or as minute sessile scales on young growth **Cynanchum**
- 6b. Non-succulent herb to shrub or twiner with well-developed leaves 7.
- 7a. Stem twining; leaves cordate, with long petiole; inflorescence with long peduncle elongating with development of flowers into raceme 8.
- 7b. Stems erect and not twining; leaves much narrower than broad, with short petiole or sessile; inflorescence with short peduncle not elongating into raceme as flowers develop 9.
- 8a. Corolla red-brown, green or whitish, glabrous inside, without distinct tube, lobes mostly recurved; pollinia without fine insertion crest on inner edge **Pentarrhinum**
- 8b. Corolla white to cream, white-bearded inside, with distinct tube (with corona joined to corolla at mouth of tube), lobes spreading; pollinia with fine insertion crest on inner edge **Pergularia**
- 9a. Margins of inner corona lobes folded inwards to form ascending hollow cavity; margins sometimes extended into conspicuous keels touching backs of anthers and occasionally with tongue protruding from inside cavity 12.
- 9b. Inner corona lobes solid or flat; margins not folded inwards to form cavity 10.
- 10a. Corolla lobes glabrous inside; pollinium attached to corpuscle by caudicle much longer than pollinium **Periglossum**
- 10b. Corolla lobes densely pubescent to finely papillate inside; pollinium attached to corpuscle by caudicle much shorter than pollinium 11.
- 11a. Inner corona lobes fleshy and broadly wedge-shaped, obovate or transversely elliptic, without any appendages on inner face **Xysmalobium**
- 11b. Inner corona swollen with small subapical horn projecting towards style head, or erect and cross-shaped or flat with ascending projection on inner face. **Schizoglossum**

- 12a. Margins of inner corona lobes extended into conspicuous keels near base, keels nearly half as tall as lobes ... **Pachycarpus**
 12b. Margins of inner corona lobes with small and insignificant keels less than one quarter as tall as lobes **13.**
 13a. Rootstock fibrous or woody, not forming napiform tuber; either short-lived perennial shrubs with stems branching and rebranching above ground, or perennial herbs with simple annual stems; inflorescences many, extra-axillary and terminal **Gomphocarpus**
 13b. Rootstock a slender to stout tuberous taproot; perennial herbs with annual mostly simple stems; inflorescences mostly terminal **Asclepias**

Asclepias L.

Spreading non-succulent herb 0.15–0.30 m tall, with simple erect or spreading annual stems arising from apex of tuberous taproot, pubescent, sap milky. *Leaves* narrowly linear, scantily pubescent. *Inflorescence* a many-flowered pedunculate extra-axillary umbel alongside upper leaves, finely pubescent. *Corolla* yellow to brown, campanulate, very deeply lobed, lobes oblong-ovate, recurved, 2.5–4.5 × 2.0–2.5 mm, finely hairy outside, glabrous inside; *gynostegial corona* in 2 series, outer series of 5 minute lobules beneath bases of guide-rails, inner series of 5 prominent lobes arising behind anthers with margins folded inwards to form cup-like structure (sometimes with tooth inside cup); *anthers* with short apical appendages pressed against but not covering style head; *pollinia* pendent in anthers, flattened, without translucent insertion crest, longer than broad; style head nearly flat on top and depressed in centre. *Follicles* narrowly fusiform, beaked, usually single by abortion, erect, ± 30 × 6–8 mm, smooth and thinly pubescent to glabrous, with many seeds; *seeds* ovate, dorsiventrally flattened, papillate, with sessile tuft of hairs at micropylar end.

Over 200 species, Africa and America.

Key to species

- 1a. Leaves 3–4 mm broad; plant branching profusely from base with spreading stems **A. randii**
 1b. Leaves 1–1.5 mm broad; plant usually single-stemmed and erect **A. aurea**

Asclepias aurea (Schltr.) Schltr., *J. Bot.* 34: 455 (1896). Type: from South Africa.

Slender herb 100–250 mm tall, with few erect stems ± 1 mm thick, finely pubescent in a

single line along each internode. *Leaves* ± sessile, linear, up to 70.0 × 1.1 mm, scantily pubescent on both sides. *Inflorescence* 3- to 7-flowered, peduncle to 20 mm long, finely pubescent in a single line, pedicels 10–12 mm long, sparsely pubescent. *Corolla* yellow to brown, rotate, ± 8 mm diam., sparsely pubescent outside, glabrous inside; *tube* absent; *lobes* 2.5–4.5 × ± 2 mm, spreading with ascending tips; *gynostegial corona* usually raised above corolla on very short column, bright yellow, lobes ± 2.5 mm long, channelled part tapering into slender spreading-ascending beak, papillate inside cavity.

Habitat: Stony slopes among grass, ± 1 600 m.

Flowering time: Jan.

Distribution: Botswana, Lesotho, South Africa, Swaziland, Zimbabwe. In Namibia only known from a single gathering in Auas Mountains near Windhoek. Figure 61.

Voucher: Seydel 4109 (WIND).

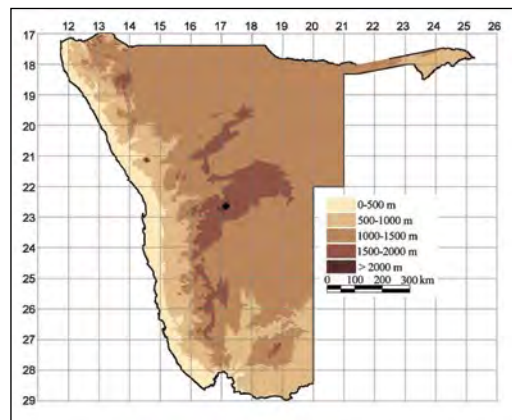


FIGURE 61.—Distribution of *Asclepias aurea*.

Asclepias randii S.Moore, *J. Bot.* 40: 255 (1902).
Type: from Zimbabwe.

Spreading herb 80–200 mm in diam., with few sprawling stems $\pm$ 2 mm thick, finely pubescent. *Leaves* with very short petiole 1–3 mm long, linear, up to $40\text{--}70 \times 2\text{--}4$ mm, acute, pubescent above and glabrous below except on midrib, with margins recurved. *Inflorescence* 3- to 6-flowered, flowers opening $\pm$ simultaneously, facing upwards on peduncle 10–20 mm long, finely pubescent; *pedicels* 9–11 mm long, ascending, pubescent. *Corolla* white suffused with brown, rotate, $\pm$ 10 mm diam., pubescent outside, glabrous inside; *tube* absent; *lobes* 4.0×2.5 mm, ovate, obtuse, spreading with ascending tips;

gynostegial corona raised above corolla on very short column, brown in cavity, white near base, lobes $\pm$ 3.5 mm long, 1.5 mm broad, channelled part erect and exceeding style head, papillate inside cavity. Figure 62.

Habitat: Loamy gentle slopes among grass, 1 800 m.

Flowering time: Jan.–Feb.

Distribution: Namibia, Zimbabwe. In Namibia only known from a single gathering from the Otavi Mountains near Grootfontein. Figure 63.

Voucher: Bruyns 5487 (BOL).

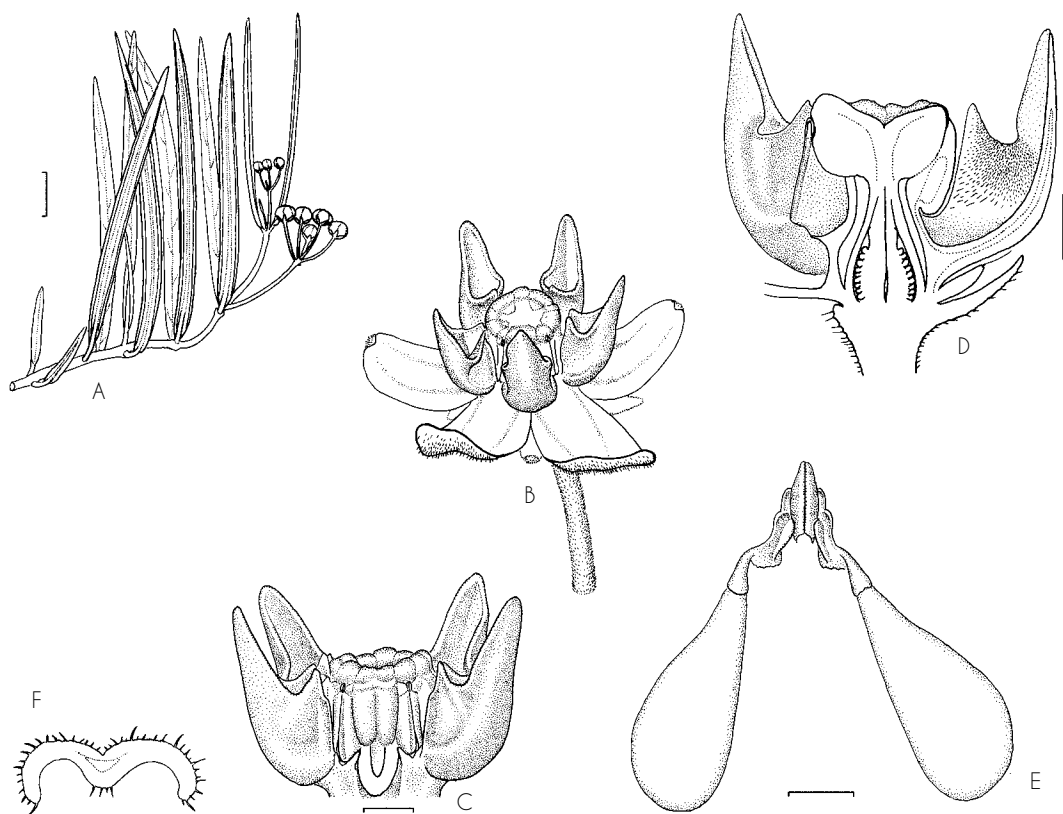
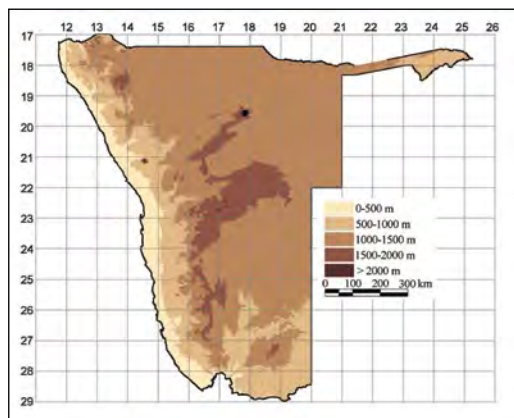


FIGURE 62.—*Asclepias randii*, Bruyns 5487. A, portion of plant; B, flower; C, gynostegium with one corona lobe removed; D, half-flower; E, pollinarium; F, cross-section of leaf near middle. Scale bars: A, 10 mm; B, 2 mm; C, F, 1 mm; D, 1 mm; E, 0.25 mm.

FIGURE 63.—Distribution of *Asclepias randii*.

Cynanchum L.
(incl. **Sarcostemma R.Br.**)

Small non-succulent herb, rigid shrub to herbaceous or $\pm$ leafless succulent climber, pubescent to glabrescent, sap milky. *Leaves* petiolate, ovate to lanceolate or linear, sometimes reduced to minute sessile caducous scale-like rudiments pressed to branch. *Inflorescences* usually several, few- to many-flowered extra-axillary umbels, flowers opening in succession to simultaneously, $\pm$ sessile or shortly pedunculate, pubescent. *Corolla* white to yellow or greenish inside, rotate to campanulate, deeply lobed; *tube* absent; *lobes* oblong or ovate, ascending then spreading to reflexed, glabrous to finely pubescent outside, inside glabrous; *gynostegial corona* in 1 or 2 series, not raised above corolla on column, usually white, outer series fused into cup with 5 lobules opposite anthers at mouth, inner series absent or present as 5 lobes adpressed to backs of anthers and fused into outer coronal cup; *anthers* with membranous apical appendage covering style head except at apex; *pollinia* pendent, swollen, without translucent insertion crest. *Follicles* fusiform, often with lateral ridges, usually solitary by abortion, $30\text{--}120 \times 5\text{--}12$ mm, pendulous, smooth, glabrous; *seeds* ovate, dorsiventrally flattened, papillate, with sessile tuft of hairs at micropylar end.

$\pm$ 250 species, cosmopolitan, tropics and temperate regions.

Key to species

- 1a. Outer series of corona not fused into urceolate to bowl-shaped cup around gynostegium and less than half as tall as it **2.**
- 1b. Outer series of corona fused into urceolate to bowl-shaped cup around gynostegium and $\pm$ equalling or exceeding it **3.**
- 2a. Corolla lobes twisted, with medial groove towards base, outer corona consisting of erect truncate to bifid or apically finely toothed lobules between inner lobes, inner lobes without dorsal projections **C. pearsonianum**
- 2b. Corolla lobes straight, without medial groove towards base, outer corona forming continuous ring around bases of anthers with dorsal projections of inner lobes, limb of outer corona bent horizontally inwards **C. viminale**
- 3a. Succulent $\pm$ leafless trailer to climber ... **C. gerrardii**
- 3b. Non-succulent leafy climber, rigid shrub or small herb **4.**
- 4a. Slender-stemmed leafy climber with inflorescences on slender peduncles 5–20 mm long **C. schistoglossum**
- 4b. Plant not climbing, peduncles 1–4 mm long **5.**
- 5a. Rigid shrub with spreading to weeping initially almost tomentose branches; leaves circular, ovate or elliptic, 4–10 mm broad, with petiole 1–4 mm long **C. meyeri**
- 5b. Slender herb with fine ascending $\pm$ glabrescent branches; leaves linear and $\pm$ 1 mm broad, sessile **C. orangeanum**

Cynanchum gerrardii (Harv.) Liede, *Taxon* 40: 117 (1991). Type: from South Africa.

Succulent trailer to climber to 3 m, with grey-green cylindrical slightly roughened branches arising from fibrous roots, glabrescent. *Leaves* reduced to minute lanceolate sessile scale-like rudiments $1.0\text{--}1.5 \times 0.7\text{--}1.0$ mm pressed to branch, caducous. *Inflorescence* 1- to 5-flowered, flowers opening in close succession, sessile to shortly knobbly-pedunculate; *pedicels* 3–5 mm long, spreading, glabrous. *Corolla* 3–6 mm diam., rotate with lobes reflexed and divided to near bases; outside glabrous; inside glabrous, green; *tube* absent; *lobes* 1.5–2.5 mm long, ovate-deltate, acute; *gynostegial corona* in 2 series, white; outer lobes fused into pentagonal cup slightly shorter than style head; inner lobes 5, pressed to backs of anthers and fused dorsally to outer coronal cup, obtuse, shorter than style head. *Follicles* 60–

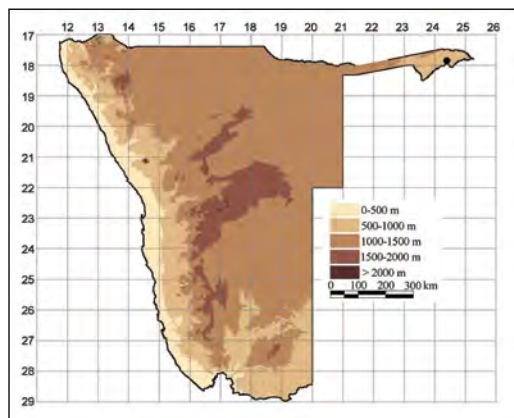


FIGURE 64.—Distribution of *Cynanchum gerrardii*.

120 × 5–8 mm, pendulous, fusiform, glabrous, smooth and without lateral wings.

Habitat: Loamy flats among deciduous bush, 1 200 m.

Flowering time: Jan.–Mar.

Distribution: South Africa to Arabia. In Namibia only known from a single collection from eastern Caprivi around Lake Liambesi. Figure 64.

Voucher: Bruyns 2335 (WIND).

Cynanchum meyeri (Decne.) Schltr., *Bot. Jahrb. Syst.* 20, *Beibl.* 51: 2 (1895). Type: from South Africa.

Cynanchum pearsonii N.E.Br., *Bull. Misc. Inform.* 1914: 18 (1914). Type: Namibia, north of Rotkuppe Station, *Pearson 4466* (K, holo. BOL, iso.).

Rigid perennial non-succulent densely branched shrub 150–400 mm tall, with grey-green branches arising from fibrous roots, densely short-pubescent. *Leaves* with petiole 1–4 mm long, grey-green, circular to elliptic or ovate-deltate, 7–20 × 4–10 mm, acute, coriaceous and persistent, pubescent, margins not recurved. *Inflorescence* 5- to 15-flowered, flowers opening in gradual succession, on spreading peduncle 2–4 mm long; *pedicels* 2–4 mm long, spreading, pubescent. *Corolla* 3–5 mm diam., rotate to cam-

panulate with lobes fused into tube near bases; outside finely pubescent; inside glabrous, white to cream; *tube* very shallow; *lobes* 1.5–2.0 mm long, ovate-deltate, obtuse; *gynostegial corona* apparently in 1 series fused into pentagonal cup with obtuse apically slightly spreading lobes opposite anthers, slightly exceeding style head. *Follicles* 30–40 × 5–8 mm, pendulous, slightly inflated, sparsely pubescent, smooth and with slight lateral wings. Figures 65 & 66.

Habitat: Rocky gneissic slopes and stony flats, 50–700 m.

Flowering time: Jun.–Sep.



FIGURE 65.—*Cynanchum meyeri*, plant about 1 m in diameter, Orange River, PVB 3949.

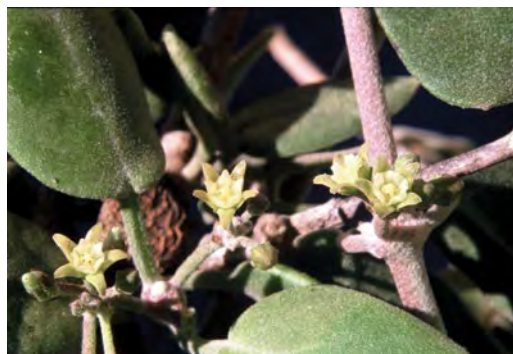


FIGURE 66.—*Cynanchum meyeri*, flowers, Orange River, PVB 3949.

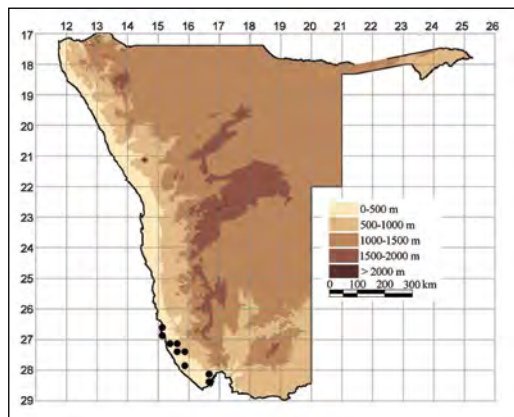


FIGURE 67.—Distribution of *Cynanchum meyeri*.

Distribution: Namibia, South Africa. In Namibia only known from southwest in hills of coastal plain from Lüderitz to Obib Mountains and Skilpad along Orange River. Figure 67.

Voucher: Merxmüller & Giess 3072 (M, WIND).

Cynanchum orangeanum (Schltr.) N.E.Br., *Fl. Cap.* 4 (1): 745 (1908). Type: from South Africa.

Small non-succulent herb 50–200 mm tall, with slender branched annual stems arising from slightly swollen carrot-like perennial rootstock, sparsely pubescent with denser patch of hairs in vertical line on internodes. *Leaves* sessile, grey-green to brown, linear, $20\text{--}50 \times \pm 1$ mm, acute, herbaceous, $\pm$ glabrous, margins recurved. *Inflorescence* 1- to 5-flowered, flowers opening in gradual succession, on ascending peduncle 1–3 mm long; *pedicels* 3–7 mm long, ascending, sparsely pubescent. *Corolla* 5–7 mm diam., rotate to shortly campanulate with lobes free to bases; outside glabrous; inside glabrous, grey to brown; *tube* absent; *lobes* 2–3 mm long, lanceolate, obtuse; *gynostegial corona* in 2 series each of 5 lobes joined near base, slightly exceeding style head; outer lobes lanceolate, bending inwards and pressed close to guide rails; inner lobes broadly subulate, slightly spreading then incurved and pressed to tops of anthers. *Follicles* $40\text{--}60 \times 5\text{--}7$ mm, pendulous, slightly inflated, glabrous, smooth and without lateral ridges. Figures 68 & 69.



FIGURE 68.—*Cynanchum orangeanum*, flowers, foot of Great Karas Mountains, PVB 5793.



FIGURE 69.—*Cynanchum orangeanum*, plant in fruit, foot of Great Karas Mountains, PVB 5793.

Habitat: Gravelly to sandy flats, 1 000–1 300 m.

Flowering time: Nov.–Apr.

Distribution: Botswana, Namibia, South Africa, Zimbabwe. In Namibia from Ojtiwarongo to Great Karas Mountains. Figure 70.

Voucher: Giess & Van Vuuren 956 (WIND).

Cynanchum pearsonianum Liede & Meve, *Kew Bull.* 67: 753 (2012). *Sarcostemma pearsonii* N.E.Br., *Bull. Misc. Inform.* 1913: 301 (1913). Type: Namibia, Great Karas Mountains, stony plains SW of Kraikluft, 1 600 m, Pearson 8460 (K, holo.; BOL, iso.).

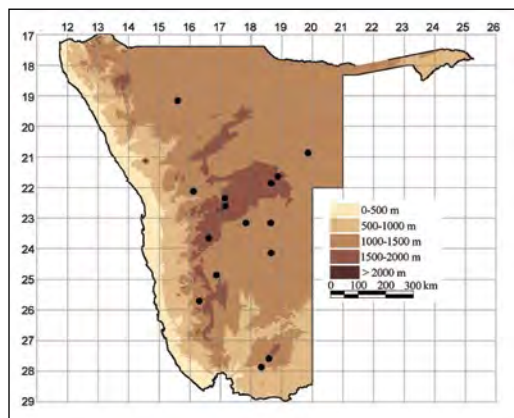


FIGURE 70.—Distribution of *Cynanchum orangeanum*.

Rigid succulent shrub to 0.5×1.5 m; *stems* 3–5 mm thick, mostly erect with occasionally spreading stems around perimeter rooting readily where touching ground, initially finely pubescent but soon glabrous, grey-green to purplish green. *Leaves* reduced to minute ovate-lanceolate sessile scale-like rudiments $1.0\text{--}1.5 \times 0.7\text{--}1.0$ mm pressed to branch, caducous. *Inflorescence* a 3- to 7-flowered mostly terminal umbel, flowers opening $\pm$ simultaneously, $\pm$ sessile, finely pubescent, pedicels 2–7 mm long. *Corolla* pale yellow and glabrous outside; glabrous and yellow inside, rotate; *tube* absent; *lobes* linear, obtuse, spreading but with basal third erect and pressed to gynostegium, slightly twisted, $5.0\text{--}6.5 \times 0.7\text{--}1.0$ mm, with medial groove at least in lower half; *outer corona* lobes erect, truncate and bifid to finely toothed, joined to sides of inner lobes, *inner lobes* $0.7\text{--}1.0$ mm long, with nearly spherical base and deltoid-acute limb pressed to anthers and slightly shorter than fertile part of anther, without dorsal projections. Figures 71 & 72.

Habitat: Rocky flats and gentle slopes, 900–1 700 m.

Flowering time: Oct.–Apr.

Distribution: Namibia, South Africa. In Namibia from Nauchas to Tiras Mountains and to Great Karas Mountains. Figure 73.

Voucher: Bruyns 5684 (WIND).

Cynanchum schistoglossum Schltr., *J. Bot.* 33: 271 (1895). Type: from South Africa.

Non-succulent climber to 3 m, with slender stems, glabrescent. *Leaves* with petiole 10–25 mm long, $35\text{--}60 \times 15\text{--}35$ mm, softly herbaceous, sparsely pubescent, usually with several tiny leaflets in axils, margins flat. *Inflorescence* 5- to 20-flowered, flowers opening $\pm$ simultaneously on ascending peduncle 5–20 mm long; *pedicels* 3–10 mm long, ascending, pubescent in narrow row. *Corolla* 3–5 mm diam., rotate to slightly campanulate, lobes divided to near bases; outside $\pm$ glabrous; inside glabrous, pale green; *tube* $\pm$ absent; *lobes* 1.5–2.0 mm long, ovate-deltate, obtuse; *gynostegial corona* in 1 series fused into shallow pentagonal cup with 5 deltate obtuse teeth opposite anthers and about as long as style head. *Follicles* $50\text{--}65 \times 5\text{--}6$ mm, pendulous, fusiform, glabrous, slightly warty and without lateral wings.

Habitat: Loamy flats in woodland, 1 200 m.

Flowering time: Jan.–Mar.

Distribution: South Africa to Rwanda and Uganda. In Namibia only known in Caprivi near Andara. Figure 74.

Voucher: Giess 11436 (WIND).

Cynanchum viminale (L.) Bassi ex L., *Mant. Pl.*, ed. 2: 392 (1771). (*Sarcostemma viminale* (L.) R.Br.). Type: from Africa.

Rigid succulent shrub to 0.5×1.5 m or scrambler covering many square metres to twiner; *stems* 3–8 mm thick, erect to sprawling or twining, rooting readily where touching ground, initially finely pubescent but soon glabrous, grey- to yellow-green to purplish green. *Leaves* reduced to minute ovate-lanceolate sessile scale-like rudiments $1.0\text{--}1.5 \times 0.7\text{--}1.0$ mm pressed to branch, caducous. *Inflorescence* a 3- to 15-flowered mostly terminal umbel, flowers opening $\pm$ simultaneously, $\pm$ sessile or with much scarred peduncle to 15 mm long, finely pubescent, pedicels 5–12 mm long. *Corolla* pale yellow and glabrous outside; glabrous, yellow to yellow-green or pinkish white inside, rotate; *tube* absent; *lobes* ovate-oblong, obtuse, spread-

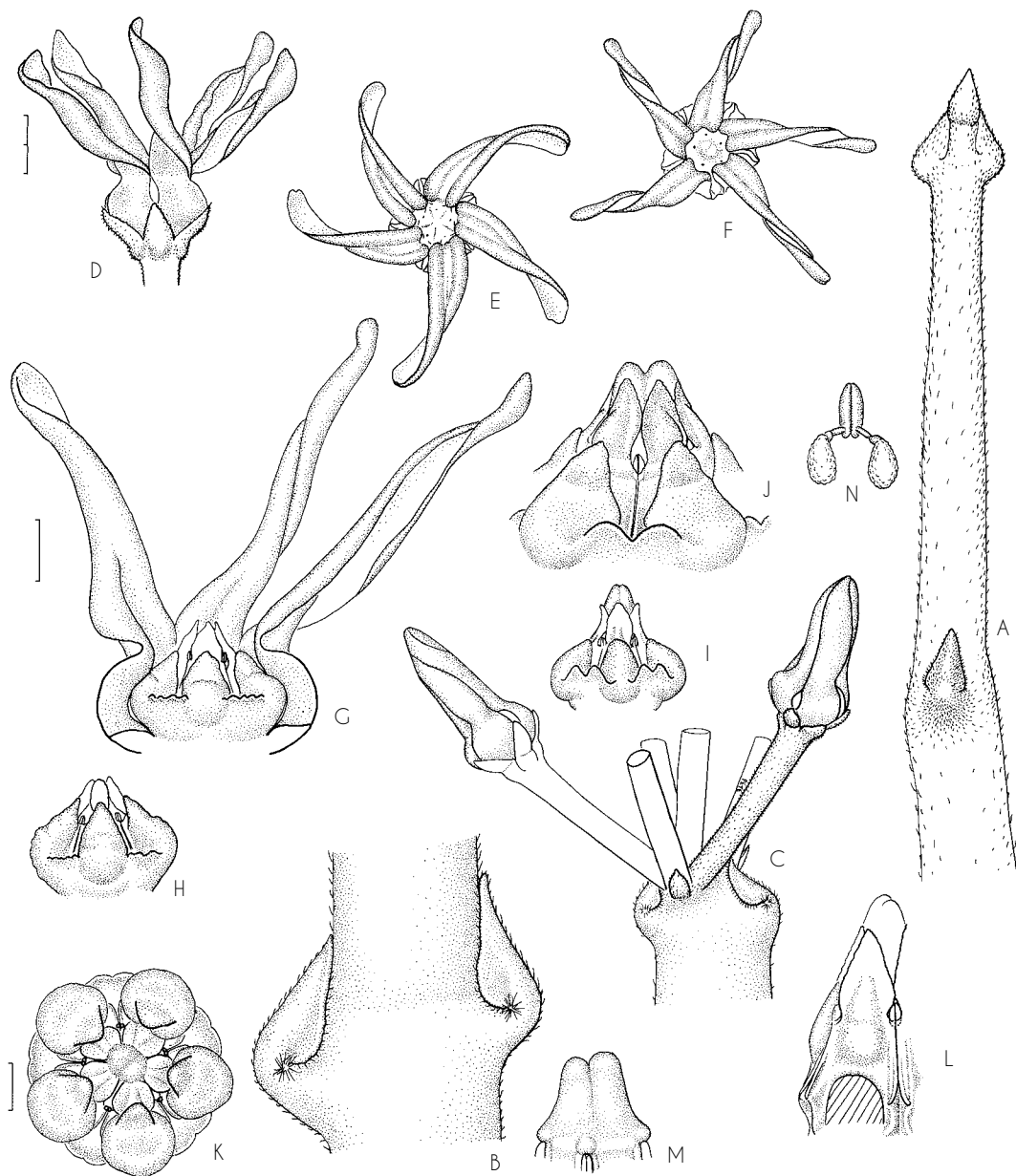


FIGURE 71.—*Cynanchum pearsonianum*, Great Karas Mountains, Namibia, Bruyns 3534; E, I Upington, South Africa, Bruyns 3479. A, young stem; B, leaves (pubescence over entire surface not shown); C, inflorescence; D, side view of flower; E, F, face view of flower; G, side view of dissected flower; H, I, side view of gynostegium; J, enlarged view of gynostegium; K, face view of gynostegium; L, side view of gynostegium with inner corona cut away; M, style-apex with appendages of anthers removed; N, pollinarium. Scale bars: A, C, D, E, F, 2 mm (at D); B, G, H, I, 1 mm (at G); J, L, M, 0.5 mm (at G); K, 0.5 mm; N, 0.25 mm (at G).



FIGURE 72.—*Cynanchum pearsonianum*, flowers, near Witputz, PVB 7192.

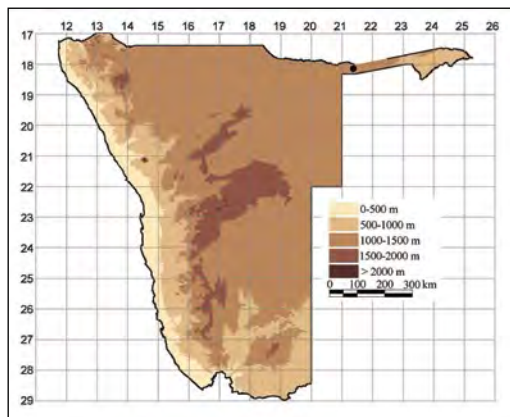


FIGURE 74.—Distribution of *Cynanchum schistoglossum*.

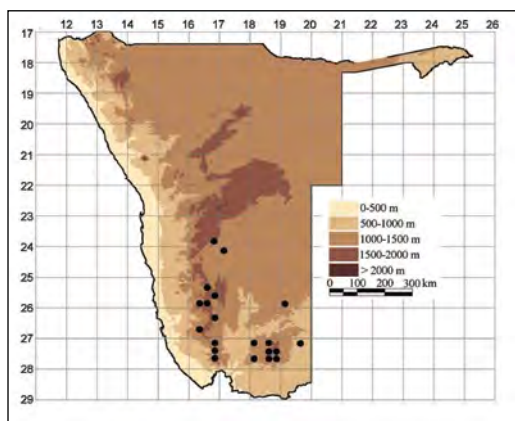


FIGURE 73.—Distribution of *Cynanchum pearsonianum*.

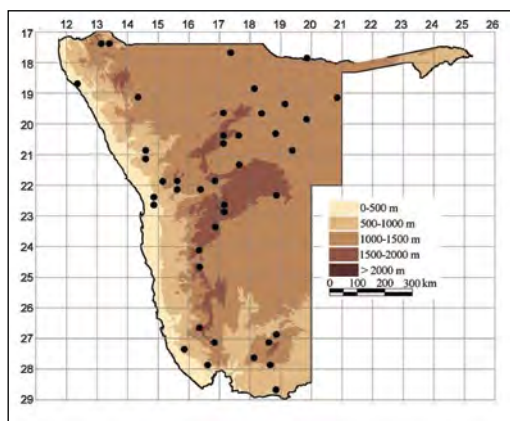


FIGURE 75.—Distribution of *Cynanchum viminale*.

ing from base, not twisted, $4-8 \times 2-4$ mm, without medial groove; *outer corona* lobes bulging at base and with rounded entire apex spreading horizontally inwards, joined to dorsal appendages of inner lobes, *inner lobes* 1.5–2.0 mm long, with ovoid base and ovate-acute limb pressed to anthers and exceeding fertile part of anther (but not sterile appendages), with somewhat spreading cupular dorsal projections at level of and joined to outer lobes.

Habitat: Rocky flats and gentle slopes to deciduous bush on Kalahari sands, 300–1 900 m.

Flowering time: Sep.–May.

Distribution: South Africa to Arabia, to India and to Australia. Widespread in Namibia. Figure 75.

Voucher: De Winter 4040 (PRE, WIND).

Note: The various subspecific names recognised by Meve & Liede-Schumann (2012) and earlier have proved to be difficult to apply to Namibian material with any certainty or consistency, so they are not recognised here.

According to Mossetti (2007: 59), Linnaeus made the new combination *Cynanchum viminale* on the basis of a letter dated 13 December 1767

from Ferdinando Bassi. In this letter, Bassi suggested this name for *Euphorbia viminalis* L., after having grown this species in the Botanic Garden at the Academy of Sciences in Bologna and having realised that it had been placed in the wrong family and the wrong genus. Bassi's account of this species was presented before the Academy in Bologna on the same day but only appeared in print in 1783, nine years after Bassi's death. Linnaeus (1771) mentioned a letter from Bassi under this species as well and consequently the name is cited as *Cynanchum viminale* (L.) Bassi ex L.

Gomphocarpus R.Br.

Erect non-succulent herb or shrub 0.5–3.0 m tall, with simple or branched erect to spreading stems, pubescent to glabrescent, sap milky. *Leaves* sessile to shortly petiolate, lanceolate to linear, 30–150 × 1–20 mm. *Inflorescence* a many-flowered pedunculate extra-axillary umbel, finely pubescent. *Corolla* greenish white or pale yellow, rotate and lobed nearly right to base, inside glabrous or minutely papillate; *tube* absent; *lobes* 5–8 × 3–5 mm, oblong-ovate, spreading to reflexed; *gynostegial corona* in 2 series, outer series of 5 minute lobules beneath bases of guide-rails, inner series of 5 prominent lobes arising behind anthers with margins folded inwards to form cup-like structure (sometimes with tooth inside cup); *anthers* with short apical appendages pressed against but not covering style head; *pollinia* pendent in anthers, flattened, without translucent insertion crest, longer than broad; style head nearly flat on top and depressed in centre. *Follicles* fusiform or inflated and ± ovoid, beaked, usually single by abortion, erect, 20–70 × 5–30 mm, smooth and glabrous to ornamented with pubescent slender bristle-like processes, with many seeds; *seeds* ovate, dorsiventrally flattened, papillate, with sessile tuft of hairs at micropylar end.

20 species (Goyder & Nicholas 2001), Africa and Arabia to Dead Sea.

Key to species

- 1a. Leaves 1–2 mm broad; follicles slender, 5–7 mm broad **G. filiformis**
- 1b. Leaves more than 3 mm broad; follicles swollen and usually more than 15 mm broad when mature **2.**

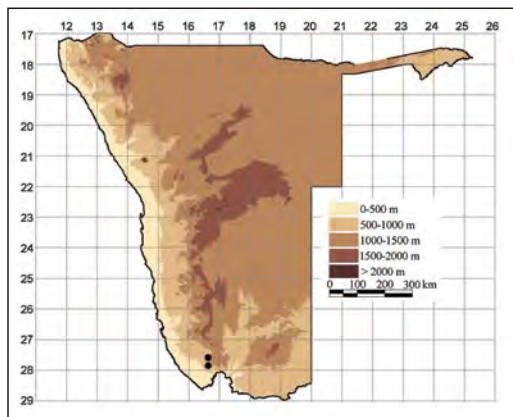
- 2a. Stems produced annually, simple, glabrous in all parts and slightly glaucous on leaves; leaves at least 25 mm broad **G. semiamplectens**
- 2b. Stems perennial, extensively branched, pubescent or puberulous at least on young shoots and leaves; leaves at most 20 mm broad **3.**
- 3a. Leaves oblong-lanceolate to elliptic, truncate or cordate to rounded at base, coriaceous **G. cancellatus**
- 3b. Leaves linear, tapering gradually into petiole, thin **4.**
- 4a. Young stems, pedicels and follicles thinly pubescent; corona slightly laterally compressed with sides not close to one another at top and leaving broad entrance to cavity, upper ends next to anther appendages extended into teeth pointing back into cavity **G. fruticosus**
- 4b. Young stems, pedicels and follicles tomentose; corona strongly laterally compressed with sides close to one another at top and leaving narrow slits to cavity, upper ends next to anther appendages not extended into teeth pointing back into cavity **G. tomentosus**

Gomphocarpus cancellatus (Burm.f.) Bruyns, *Bothalia* 25: 165 (1995). Type: from South Africa.

Robust perennial shrub to 1.5 m tall with stout erect perennial stems arising from fibrous roots, densely covered with short hairs. *Leaves* ± sessile, grey-green, oblong-lanceolate to elliptic, 20–50 × 10–20 mm, acute to obtuse, truncate or cordate to rounded at base, coriaceous, pubescent, margins not recurved. *Inflorescence* 10- to 25-flowered, flowers opening ± simultaneously, nodding on peduncle 5–20 mm long; *pedicels* 15–25 mm long, slender, spreading, pubescent. *Corolla* 10–12 mm diam., rotate with lobes strongly reflexed; outside pubescent; inside glabrous to finely setulose, white to cream; *lobes* 5–7 mm long, ovate to elliptic, acute; *gynostegial corona* not raised above corolla on column, lobes of inner series ± 3 × 2 mm, ± equalling style head, not laterally compressed, upper ends next to anther appendages extended into spreading teeth pressed to anther appendages, without tooth in cavity. *Follicles* 40–60 × 20–30 mm, erect, inflated, pubescent, covered with slender bristles up to 6 mm long.

Habitat: Rocky gneissic slopes, 1 400 m.

Flowering time: Jul.–Sep.

FIGURE 76.—Distribution of *Gomphocarpus cancellatus*.

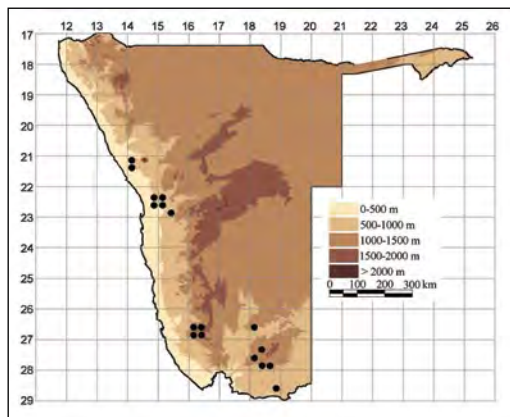
Distribution: Namibia, South Africa. In Namibia only known in southwest from gneissic hills north of Rosh Pinah. The specimen 'Namibia, Bushmanland, Nieuwfontein, Pearson 3432 (K)', listed in Goyder & Nicholas (2001) is from Kliprand (= Nieuwfontein) in southern Bushmanland in South Africa and the species is restricted to the area receiving winter-rainfall. Figure 76.

Voucher: Bruyns 8309 (K, WIND).

***Gomphocarpus filiformis* (E.Mey.) D.Dietr.,**
Syn. Pl. 2: 900 (1840). Type: from South Africa.

Asclepias buchenaviana Schinz, *Verh. Bot. Vereins Prov. Brandenburg* 30: 261 (1888). *A. filiformis* var. *buchenaviana* (Schinz) N.E.Br., *Fl. Trop. Afr.* 4(1): 336 (1902). Type: Namibia, Hereroland, Aug. 1886, Schinz 166 (Z, lecto., Goyder & Nicholas 2001).

Slender perennial shrub 1.0–2.5 m tall with slender erect often slightly spreading perennial stems arising from fibrous roots, younger stems grey-green with pale waxy bloom, glabrous except in inflorescence. *Leaves* sessile, grey-green, linear to filiform, 40–80 × 1–2 mm, acute, short-lived, glabrous, margins revolute. *Inflorescence* 6- to 12-flowered, flowers opening ± simultaneously, nodding on peduncle 5–20 mm long; *pedicels* 10–20 mm long, filiform, spreading, tomentose. *Corolla* 10–12 mm diam., rotate with lobes strongly reflexed; outside finely pubescent to glabrous;

FIGURE 77.—Distribution of *Gomphocarpus filiformis*.

inside finely setulose, greenish yellow; lobes 3.5–5.0 mm long, ovate to elliptic, acute; *gynostegial corona* raised above corolla on short column 0.5–1.0 mm long, lobes of inner series ± 3 × 2 mm, slightly exceeding style head, only very slightly laterally compressed leaving broad entrance to cavity, upper ends next to anther appendages extended into erect teeth, with obtuse tooth arising in base of cavity and usually projecting slightly. *Follicles* 20–30 × 5–7 mm, pendulous, pubescent when young and later glabrous, smooth.

Habitat: Gravelly flats among scattered bushes or stones, often along roadsides, 200–1 500 m.

Flowering time: recorded throughout year.

Distribution: Namibia, South Africa. In Namibia from near Brandberg West to Aus, Keetmanshoop and Warmbad. Figure 77.

Voucher: Merxmüller & Giess 1753 (WIND).

***Gomphocarpus fruticosus* (L.) W.T.Aiton,**
Hort. Kew., ed. 2, 2: 80 (1811). Epitype (Goyder & Nicholas 2001): from South Africa.

Perennial shrub to 1.5 m tall with erect perennial stems arising from fibrous roots, pubescent on young shoots. *Leaves* with petiole 1–8 mm long, yellow-green, linear, 40–80 × 3–7 mm, acute, thin and persistent, finely pubescent, margins only slightly recurved. *Inflo-*

rescence 3- to 10-flowered, flowers opening $\pm$ simultaneously, nodding on peduncle 10–30 mm long; *pedicels* 10–25 mm long, slender, spreading, pubescent. *Corolla* 12–15 mm diam., rotate with lobes spreading or reflexed; outside pubescent; inside glabrous to finely setulose, yellow-green; *lobes* 5–8 mm long, ovate to elliptic, acute; *gynostegial corona* raised above corolla on short distinctly fluted column 1.0–1.5 mm tall, lobes of inner series $\pm 3 \times 3$ mm, slightly exceeding style head, slightly laterally compressed with sides not close to one another at top and leaving broad entrance to cavity, upper ends next to anther appendages extended into teeth pointing back into cavity, without tooth arising in cavity. *Follicles* 40–80 $\times$ 15–20 mm, erect, inflated, pubescent, covered with slender bristles up to 10 mm long.

Habitat: Widespread weed of disturbed places, 1 000–2 200 m.

Flowering time: Feb.–May.

Distribution: South Africa to Arabia. Widespread in Namibia. Of the five subspecies recognised, subsp. *fruticosus* (widespread) and subsp. *rostratus* (N.E.Br.) Goyder & Nicholas (Caprivi only) occur in Namibia. Figure 78.

Voucher: Merxmüller & Giess 1774 (PRE, WIND).

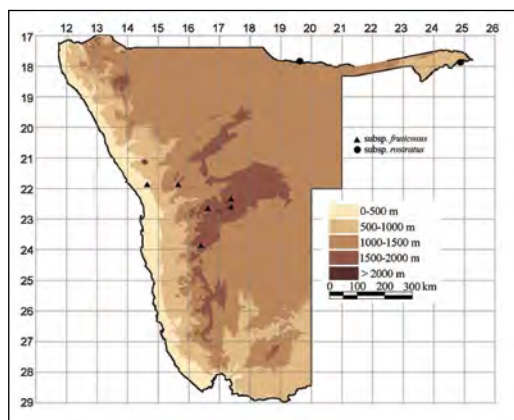


FIGURE 78.—Distribution of *Gomphocarpus fruticosus*.

Gomphocarpus semiamplectens K.Schum., *Bot. Jahrb. Syst.* 17: 128 (1893). Type: from Angola.

Perennial herb to 1 m tall with simple annual erect stems arising from swollen perennial rootstock, glabrous. *Leaves* $\pm$ sessile, green or glaucous, broadly ovate, 50–80 $\times$ 25–50 mm, acute to obtuse, firm and persistent, glabrous, margins not recurved. *Inflorescence* 10- to 30-flowered, flowers opening $\pm$ simultaneously, nodding on peduncle 40–80 mm long; *pedicels* 15–30 mm long, slender, spreading, glabrous. *Corolla* 20–25 mm diam., rotate with lobes strongly reflexed; outside $\pm$ glabrous; inside glabrous, yellow-green; *lobes* 5–8 mm long, ovate to elliptic, acute; *gynostegial corona* raised above corolla on short column 1 mm tall, *lobes* of inner series 2–3 $\times$ 2.5–3.5 mm, $\pm$ equalling style head, not laterally compressed, without tooth in cavity. *Follicles* 40–80 $\times$ 15–25 mm, erect, inflated, glabrous, smooth.

Habitat: Seasonally moist sandy areas in woodland, 1 200 m.

Flowering time: Dec.

Distribution: Angola, Cabinda, Congo, Namibia, Zambia. In Namibia only known in Kavango along road to Tsintsabis. Figure 79.

Voucher: De Winter 3881 (WIND).

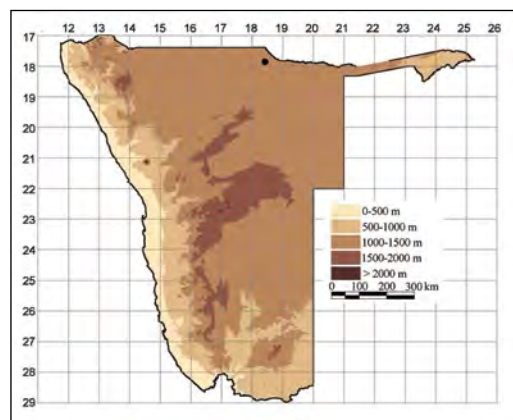


FIGURE 79.—Distribution of *Gomphocarpus semiamplectens*.

Gomphocarpus tomentosus Burch., *Trav. S. Africa* 1: 543 (1822). Type: from South Africa.

Perennial shrub to 1.5 m tall with erect perennial stems arising from fibrous roots, grey-tomentose on young shoots. *Leaves* with petiole 1–8 mm long, grey-green, linear, 50–80 × 3–7 mm, acute, thin and persistent, finely pubescent above and tomentose below, margins only slightly recurved. *Inflorescence* 3- to 10-flowered, flowers opening ± simultaneously, nodding on peduncle 10–20 mm long; *pedicels* 10–15 mm long, slender, spreading, pubescent. *Corolla* 12–15 mm diam., rotate with lobes spreading or reflexed; outside pubescent; inside glabrous to finely setulose, yellow-green; *lobes* 5–7 mm long, ovate to elliptic, acute; *gynostegial corona* raised above corolla on short column 0.5–1.0 mm tall, lobes of inner series ± 3 × 3 mm, slightly exceeding style head, strongly laterally compressed with



FIGURE 80.—*Gomphocarpus tomentosus*, Orapa, Botswana, PVB.

sides close to one another at top and leaving narrow slits to cavity, upper ends next to anther appendages not extended into teeth pointing back into cavity, without tooth arising in cavity. *Follicles* 40–80 × 15–20 mm, erect, inflated, pubescent, covered with slender bristles up to 10 mm long. Figure 80.

Habitat: Rocky flats and disturbed patches in grassland, 1 000–2 200 m.

Flowering time: Feb.–May.

Distribution: Angola, Botswana, Mozambique, Namibia, South Africa, Zimbabwe. Of the two subspecies recognised, only subsp. *tomentosus* is found in Namibia, where it is widespread. Figure 81.

Voucher: De Winter 2483 (PRE, WIND).

Microloma R.Br.

Erect somewhat rigid non-succulent often dwarf shrub 0.1–1.0 m tall sometimes with branches twining above, pubescent to glabrous, sometimes spinescent, sap clear. *Leaves* linear to ovate or ovate-lanceolate, petiole 0.5–5.0 mm long, 2–55 × 1–7 mm, acute to obtuse, pubescent to glabrous. *Inflorescence* a 1- to 15-flowered ± sessile extra-axillary fascicle with flowers opening ± simultaneously, finely pubescent, pedicels 1–9 mm long. *Corolla* green to yellow or pink to

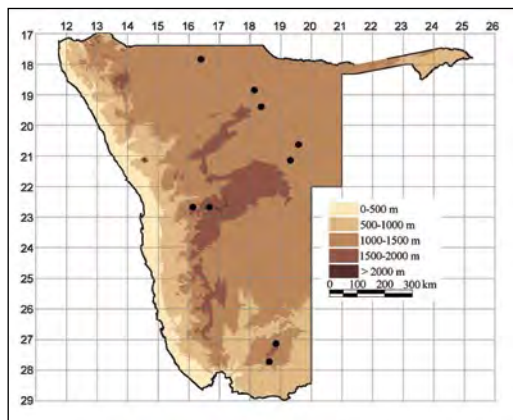


FIGURE 81.—Distribution of *Gomphocarpus tomentosus*.

red and sometimes with several bright colours, cylindrical mostly with lobes connivent over mouth of tube and closing it completely, inside glabrous except for 5 patches of hairs or ring of hairs in tube below middle; *tube* 2–9 mm long, cylindrical and usually strongly pentagonal, sometimes with corolline corona of 5 rounded tubercles projecting inside from walls opposite anthers and alternating with patches of hairs; *lobes* 0.5–3.5 mm long, deltoid, acute, erect or remaining connivent over tube and closing mouth of tube completely; *gynostegial corona* absent; *anthers* with membranous apical appendage pressed to style head and mostly exceeding it; *pollinia* pendent in anthers, without translucent insertion crest, often flat, longer than broad; style head conical above anthers. *Follicles* fusiform and beaked, single by abortion, pendulous, 20–70 × 3–5 mm, smooth and glabrous to pubescent, with many seeds; *seeds* ovate, dorsiventrally flattened, papillate, with sessile tuft of hairs at micropylar end.

10 species (Bruyns & Linder 1991), Namibia, South Africa.

Key to species

- 1a. Corolla tube white, lobes bright green and glabrous, erect to spreading and not closing mouth of tube at anthesis **M. poicilanthum**
 - 1b. Corolla tube greenish yellow to pink or red, lobes at least finely pubescent (sometimes dull green), connivent or pressed into tube, closing mouth of tube at anthesis **2.**
 - 2a. Corolla 5.5–10.0 mm long; gynostegium at least 3.5 mm tall; corolline corona present as series of 5 tubercles projecting from walls of tube near level of bases of anthers; pollinia > 1 mm long, conspicuously flattened **4.**
 - 2b. Corolla mostly 2–4 mm long (except **M. longitubum**); gynostegium < 2.3 mm tall; corolline corona absent; pollinia < 0.5 mm long, not conspicuously flattened **3.**
 - 3a. Corolla tube 6.0–9.5 mm long; pollinarium with caudicles nearly as long as pollinia **M. longitubum**
 - 3b. Corolla tube 2–4 mm long, caudicles of pollinarium less than half length of pollinia **M. armatum**
 - 4a. Plant a climber with stems twining around surrounding vegetation **5.**
 - 4b. Plant not a climber, forming erect, free-standing shrub **6.**
- 5a. Sepals broader towards middle, glabrous except for few scattered hairs near base, almost equalling corolla tube; corolla tube about twice as long as corolla lobes **M. calycinum**
 - 5b. Sepals narrowing from base, pubescent underneath, much shorter than corolla tube; corolla tube ± 4× as long as corolla lobes **M. hereroense**
 - 6a. Leaves sagittate with widened base; plant a shrub 0.3–1.5 m tall **7.**
 - 6b. Leaves tapering into petiole, not sagittate with widened base; plant a dwarf, usually heavily grazed shrublet usually < 150 mm tall **M. calycinum**
 - 7a. Stems green, ± glabrous, rigid, branches straight and not twining above; sepals glabrous within **M. penicillatum**
 - 7b. Stems densely whitish tomentose, branches often twining around each other above; sepals pubescent within **M. incanum**

Microloma armatum (Thunb.) Schltr. ex Gilg & Benedict, *Bot. Jahrb. Syst.* 53: 167 (1915).
Type: from South Africa.

Microloma spinosum N.E.Br., *Bull. Misc. Inform.* 1909: 307 (1909). Type: Namibia, near Aus, 1 200 m, Marloth 4662 (K, holo.).

Microloma spinosum subsp. *dinteri* (Schltr.) Wanntorp, *Opera Bot.* 98: 62 (1989). *Microloma dinteri* Schltr., *Bot. Jahrb. Syst.* 51: 130 (1913). Type: Namibia, Naukluft, Dinter 8333 (B, holo.; BM, BOL, K, M, PRE, S, W, Z, iso.).

Microloma spinosum subsp. *velutinum* Wanntorp, *Opera Bot.* 98: 62 (1989). Type: Namibia, Witpütz, between Inachab and Lüderitz, Dinter 2 (Z, holo.).

Small rigid shrub 0.1–0.3 m tall, younger stems green or grey-green soon becoming rigid and often somewhat spiny, pubescent to tomentose. *Leaves* with petiole 0.5–1.0 mm long, green or grey-green, deltate, 2–8 × 1–4 mm, acute, pubescent. *Inflorescence* 1- to 6-flowered, flowers opening ± simultaneously, sessile; *pedicels* 2–4 mm long, erect to spreading. *Corolla* 2–4 mm long, cylindrical to urceolate; outside finely pubescent and greenish yellow (often changing to red-brown after anthesis); inside with ring of deflexed hairs below middle of tube, otherwise ± glabrous; *tube* 2–4 × ± 1.5–3.0 mm, cupular to urceolate, corolline corona absent; *lobes* 0.5–1.0 mm long, deltate, acute, bent at right angles to mouth of tube, connivent over it to depressed into it, closing off entrance to tube, slightly folded inwards along midrib.

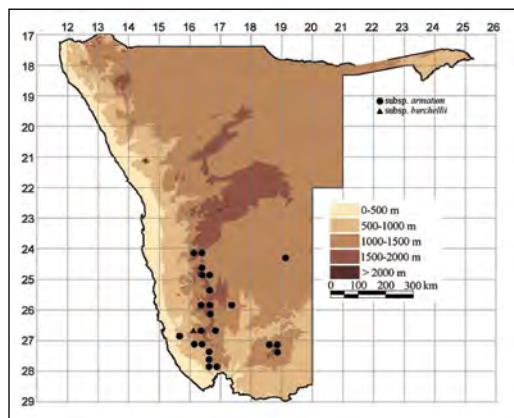


FIGURE 82.—Distribution of *Microloma armatum*.

Habitat: Stony gneissic or quartzitic slopes, 700–2 100 m.

Flowering time: Sep.–Mar.

Distribution: Namibia, South Africa. In Namibia from near Nauchas to Rosh Pinah and Great Karas Mountains. Of the two varieties recognised, both var. *armatum* and var. *burchellii* (N.E.Br.) Bruyns occur in Namibia, with the latter only known around Aus. Figure 82.

Voucher: Dinter 8333 (B, BM, BOL, K, M, PRE, S, WIND, Z) for var. *armatum*.

Microloma calycinum E.Mey., *Comm. Pl. Afr. Aust.*: 223 (1838). Type: from South Africa.

Small slender climber, stems green and twining to 1 m or eaten back to small dense almost spiky shrublet, young growth very sparsely pubescent to glabrous and covered with slight waxy bloom. *Leaves* with petiole 1.5–2.0 mm long, grey-green, linear to narrowly lanceolate, 6–18 × 2–4 mm, acute, often decurrent, glabrous. *Inflorescence* 3- to 10-flowered, flowers opening ± simultaneously, on short peduncle 1–7 mm long; *pedicels* 3–9 mm long, ascending (sepals bright red and ± equalling tube). *Corolla* 6–10 mm long, cylindrical and slightly widening towards mouth; outside setulose; inside with 5 patches of deflexed hairs below middle of tube between corona lobes, otherwise glabrous; *tube*



FIGURE 83.—*Microloma calycinum*, Schwarzekuppe, west of Witpütz, PVB.

5–8 × ± 2.5 mm, cylindrical, bright pink-red changing to green near base outside, corolline corona present as 5 tubercles a little below middle of tube; lobes 2–3 mm long, deltate, acute, spirally twisted towards apices, ascending and connivent over tube to close off entrance to tube, grey-green with red margins, folded inwards along midrib. Figure 83.

Habitat: Stony gneissic to quartzitic slopes sometimes climbing in other shrubs, 200–1 500 m.

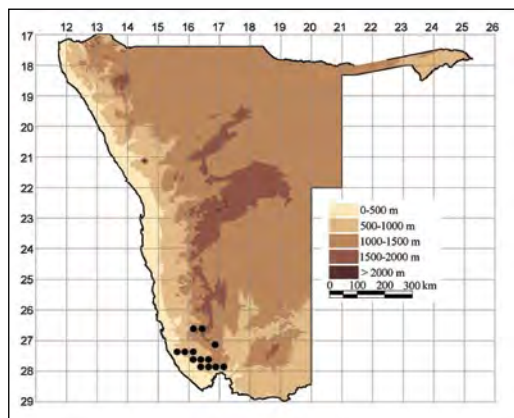
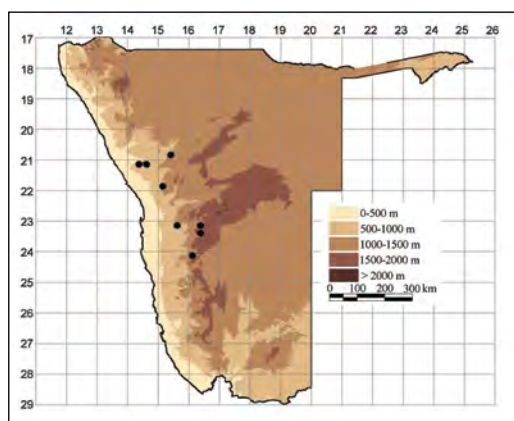
Flowering time: Apr.–Nov.

Distribution: Namibia, South Africa. In Namibia in winter-rainfall area from Aus to Rosh Pinah. Figure 84.

Voucher: Merxmüller & Giess 2945 (WIND).

Microloma hereroense Wanntorp, *Svensk Bot. Tidskr.* 63: 337 (1969). Type: Namibia, table mountain near Ozondati, 90 km from Omaruru to Fransfontein, 11 Apr. 1968, Wanntorp 839 (S, holo.; K, WIND, iso.).

Small slender climber, stems green and twining to 1 m, young growth very sparsely pubescent to glabrous and covered with slight waxy bloom. *Leaves* with petiole 1–2 mm long, grey-green, linear to filiform, 20–50 × 1–3 mm, acute, often pendent, glabrous. *Inflorescence* 5- to 15-flowered, flowers opening ± simultaneously, on short peduncle 1–3 mm long; *pedicels* 3–9 mm long, ascending. *Corolla* 5.5–10.0 mm long, cylindrical;

FIGURE 84.—Distribution of *Microloma calycinum*.FIGURE 85.—Distribution of *Microloma hereroense*.

outside setulose; inside with 5 patches of deflexed hairs below middle of tube between corona lobes, otherwise glabrous; tube $5-9 \times \pm 2.5$ mm, cylindrical, pale pink to greenish outside, corolline corona present as 5 low tubercles a little below middle of tube; lobes $2.0-2.5$ mm long, deltate, acute, ascending and connivent over tube to close off entrance to tube, pale green with red margins, folded inwards along midrib.

Habitat: Stony granitic to shaly slopes climbing in other shrubs, 1 200–2 500 m.

Flowering time: Jul.–Feb.

Distribution: Namibia. In high places along eastern edge of Namib from Gamsberg northwards via higher parts of Brandberg to near Ozondati. Figure 85.

Voucher: Bruyns 2693 (NBG, WIND).

Microloma incanum Decne. in DC., *Prodr.* 8: 511 (1844). Type: from South Africa.

Erect somewhat tangled free-standing shrub 0.3–1.0 m tall, stems whitish grey with upper young stems twining on each other, covered with dense indumentum of adpressed white hairs. Leaves with petiole 1–5 mm long, grey-green, linear, shortly sagittate to conspicuously auriculate at base, $4-35 \times 1-7$ mm, obtuse, spreading, pubescent. Inflorescence 1- to 6-flowered, flowers opening $\pm$ simultaneously, sessile or on short peduncle to 2 mm long; pedicels 1–3 mm long, erect. Corolla 7–10 mm long, cylindrical; outside pubescent; inside with 5 patches of deflexed hairs below middle of tube between corona lobes, otherwise glabrous; tube $7-9 \times 2.5-3.0$ mm, cylindrical, whitish in upper half to pink in lower half outside (sometimes all pink), corolline corona present as 5 tubercles a little below middle of tube; lobes $2.5-3.5$ mm long, deltate, acute, spirally twisted towards apices, ascending and connivent over tube to close off entrance to tube, white at base and grey-green with red margins, folded inwards along midrib. Figure 86.

Habitat: Stony gneissic to shaly slopes or rocky flat areas, 900–1 800 m.

Flowering time: recorded $\pm$ throughout year.

Distribution: Namibia, South Africa. In Namibia in south, mainly east of winter-rainfall area, from Duwisib to Keetmanshoop and Ariamsvlei. Figure 87.

Voucher: De Winter 3279 (WIND).

Microloma longitubum Schltr., *Bull. Herb. Boissier* 4: 445 (1896), as '*longituba*'. Type: Namibia, among rocks near Keetmanshoop, 1892, *Fleck 264a* (Z, holo.).

Small shrub 0.3–0.5 m tall, younger stems grey-green becoming slightly rigid (occasion-

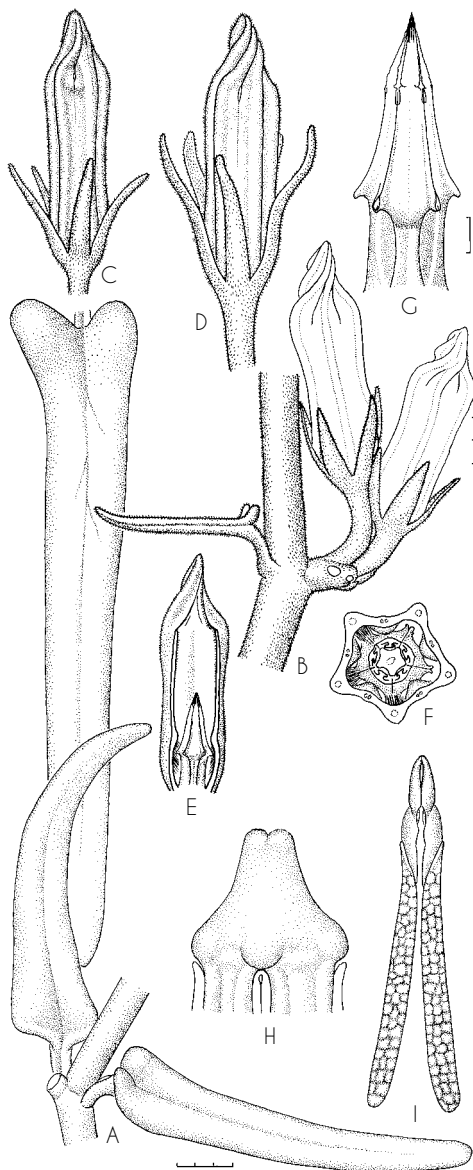


FIGURE 86.—*Microloma incanum*, A, Bruyns 3158; B, E, G, Bruyns 2680; C, F, H, I, Bruyns 3296; D 30 km north of Karasburg, Namibia, Bruyns. A, B, portion of plant; C, D, flower; E, side view of dissected flower; F, cross-section of corolla tube; G, side view of gynostegium; H, apex of style; I, pollinarium. Scale bars: A, 3 mm; B–E, 2 mm (at B); F, 1 mm (at A); H, I, 0.25 mm (at A).

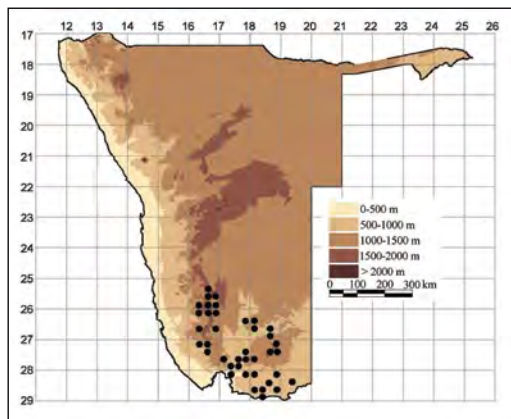


FIGURE 87.—Distribution of *Microloma incanum*.

ally slightly spiny), finely pubescent. *Leaves* with petiole 0.5–1.0 mm long, grey-green, lanceolate to deltate, 4–8 × 2–3 mm, acute, pubescent. *Inflouescence* 1- to 6-flowered, flowers opening in succession, sessile; *pedicels* 1–2 mm long, erect to spreading. *Corolla* 6.0–9.5 mm long, cylindrical; outside finely pubescent and greenish yellow (often changing to red-brown after anthesis); inside with ring of deflexed hairs below middle of tube, otherwise ± glabrous; *tube* 6–9 × ± 1.7–2.0 mm, cylindrical, corolline corona absent; *lobes* 1.0–1.5 mm long, deltate, acute, bent at right angles to mouth of tube, connivent over it, closing off entrance to tube, slightly folded inwards along midrib.

Habitat: Stony gneissic or shaly slopes, 900–1 700 m.

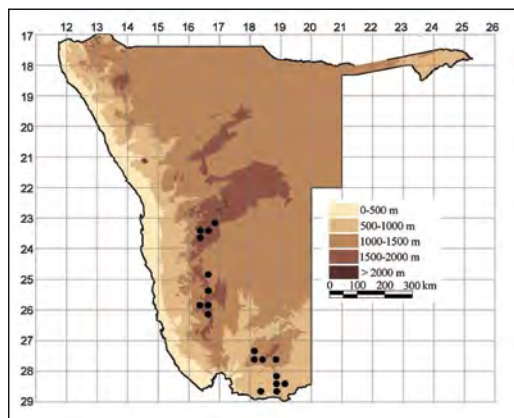
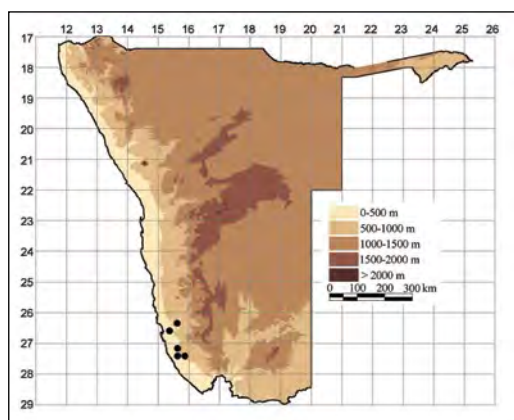
Flowering time: Nov.–Apr.

Distribution: Namibia, South Africa. In Namibia from near Nauchas to foot of Tiras Mountains and Warmbad-Karasburg district. Figure 88.

Voucher: Merxmüller & Giess 841 (M, WIND).

***Microloma penicillatum* Schltr., Bot. Jahrb. Syst. 51: 129 (1913).** Type: Namibia, Rotkuppe, Dinter 1027 (SAM).

Microloma incanum var. *glabra* L.Bol. in *Ann. S. African Mus.* 9: 179 (1912). Type: Namibia, mountains

FIGURE 88.—Distribution of *Microloma longitubum*.FIGURE 89.—Distribution of *Microloma penicillatum*.

near Rotkuppe, Pearson 4462 (BOL, holo.; BM, K, SAM, iso.).

Microloma rotkuppense N.E.Br., Bull. Misc. Inform. 1914: 19 (1914). Type: Namibia, mountains near Rotkuppe, Pearson 4192 (K, holo.).

Erect untidy spiky free-standing shrub 0.3–1.5 m tall, stems rigid and brittle, green, without any twining tendency, glabrescent. *Leaves* with petiole 1–3 mm long, green, lanceolate, sagittate with auriculate base, 4–22 × 1.5–7.0 mm, obtuse, spreading, glabrescent to glabrous. *Inflorescence* 2- to 6-flowered, flowers opening ± simultaneously; sessile; pedicels 1.5–3.0 mm long, erect. Co-

rolla 7–9 mm long, cylindrical; outside setulose; inside with 5 patches of deflexed hairs below middle of tube between corona lobes, otherwise glabrous; tube 6.5–7.0 × 2.5–4.0 mm, cylindrical and widening towards mouth, red between angles in upper half to pink or green in lower half outside, corolline corona present as 5 tubercles a little below middle of tube; lobes 2.5–3.5 mm long, deltate, acute, ascending and connivent over tube to close off entrance to tube, green with red margins, folded inwards along midrib.

Habitat: Stony gneissic to quartzitic slopes, 200–700 m.

Flowering time: Jul.–Sep.

Distribution: Namibia. In southern Namib in coastal winter-rainfall area, from Sturmhaube (northeast of Lüderitz) to Klinghardt Mountains. Figure 89.

Voucher: Dinter 6678 (B, BM, BOL, K, M, PRE, S, SAM, Z).

Microloma poicilanthum H. Huber, Mitt. Bot. Staatssamml. München 4: 34 (1961). Type: Namibia, around Aus, Dinter 3613 (PRE, holo.; BOL, iso.).

Small slender climber, stems green and erect to twining to 0.5 m, becoming rigid, young growth finely pubescent. *Leaves* with petiole 1–2 mm long, green, narrowly elliptic to broadly linear, 4–17 × 1.5–4.0 mm, acute, glabrescent. *Inflorescence* 1- to 8-flowered, flowers opening ± simultaneously, on short dependent peduncle 1–2 mm long; pedicels 2–3 mm long, dependent so flower nodding. *Corolla* 4.5–5.0 mm long, cylindrical to campanulate; outside glabrous; inside with 5 patches of deflexed hairs below middle of tube, otherwise glabrous; tube 2.5–3.0 × ± 2.5 mm, cupular, white (fading to yellow and brown after anthesis), corolline corona absent; lobes 1.5–2.0 mm long, deltate, acute, erect to slightly spreading, bright green, folded inwards along midrib.

Habitat: Stony gneissic slopes or flats usually climbing in other shrubs, 1 000–1 900 m.

Flowering time: Jul.–Feb.

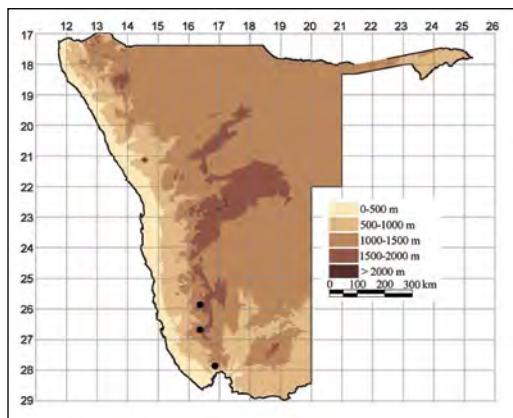


FIGURE 90.—Distribution of *Microloma poicilanthum*.

Distribution: Namibia, South Africa. In Namibia from the Tiras Mountains to Aus and Rosh Pinah. Figure 90.

Voucher: Bruyns 8102 (WIND).

(*Microloma lanatum* Wanntorp is only known from collections of Dinter from around Pomona in Luderitz district [Rheinpfaiz, Pomona, Dinter 6337 (B, BM, BOL, K, L, M, PRE, S, SAM); Dinter 6357 (B); Dinter 6487 (B)] and is likely to be conspecific with one of the above. Huber (1967) included Dinter 6337 and 6357 under *M. armatum*.)

***Pachycarpus* E.Mey.**

Perennial herb to 0.5 m tall with 1–several simple annual erect stems arising from swollen perennial rootstock, densely pubescent. *Leaves* with petiole 4–10 mm long, slightly grey-green, ovate to ovate-lanceolate, 30–70 × 20–50 mm, obtuse, firm, coarsely pubescent, with margins not recurved. *Inflorescence* 4- to 10-flowered, flowers opening ± simultaneously, nodding on peduncle 20–55 mm long; *pedicels* 15–18 mm long, spreading, pubescent. *Corolla* 30–35 mm diam., rotate-campanulate; outside pubescent, white suffused with red; inside glabrous except towards one margin of each lobe, white with greyish red veining; *tube* absent; *lobes* 10–15 × 8–9 mm, ovate to elliptic, acute; *gynostegial corona* in 2 series, raised above corolla on short



FIGURE 91.—*Pachycarpus lineolatus*, west of Grootfontein, PVB 5484.

column 1 mm tall, outer series of 5 small lobes beneath guide-rails; inner series of 5 large lobes 7–8 mm long alongside anthers, with margins folded inwards into two deltate plates touching anthers and equalling style head, exceeding style head, not laterally compressed, without tooth in cavity; *anthers* with membranous apical appendage covering sides of style head; *pollinia* pendent in anthers, without insertion crest, attached to corpuscle with slender caudicle. *Follicles* to 120 × 70 mm, ovoid to fusiform, erect, inflated, pubescent, smooth; *seeds* ovate, dorsiventrally flattened, papillate, with sessile tuft of hairs at micropylar end.

37 species (Goyder 1998), subtropical to tropical, sub-Saharan Africa and temperate South Africa.

***Pachycarpus lineolatus* (Decne.) Bullock, *Kew Bull.* 1953: 333 (1953). Type:** from Angola. Figures 91 & 92.

Habitat: Stony slopes or flats in grassland, 1 000–1 800 m.

Flowering time: Jan.–Mar.

Distribution: Namibia to West Africa. In Namibia in hills west of Grootfontein and in seasonally moist sandy flats north of Tsumkwe. Figure 93.

Voucher: Bruyns 5484 (BOL, K).

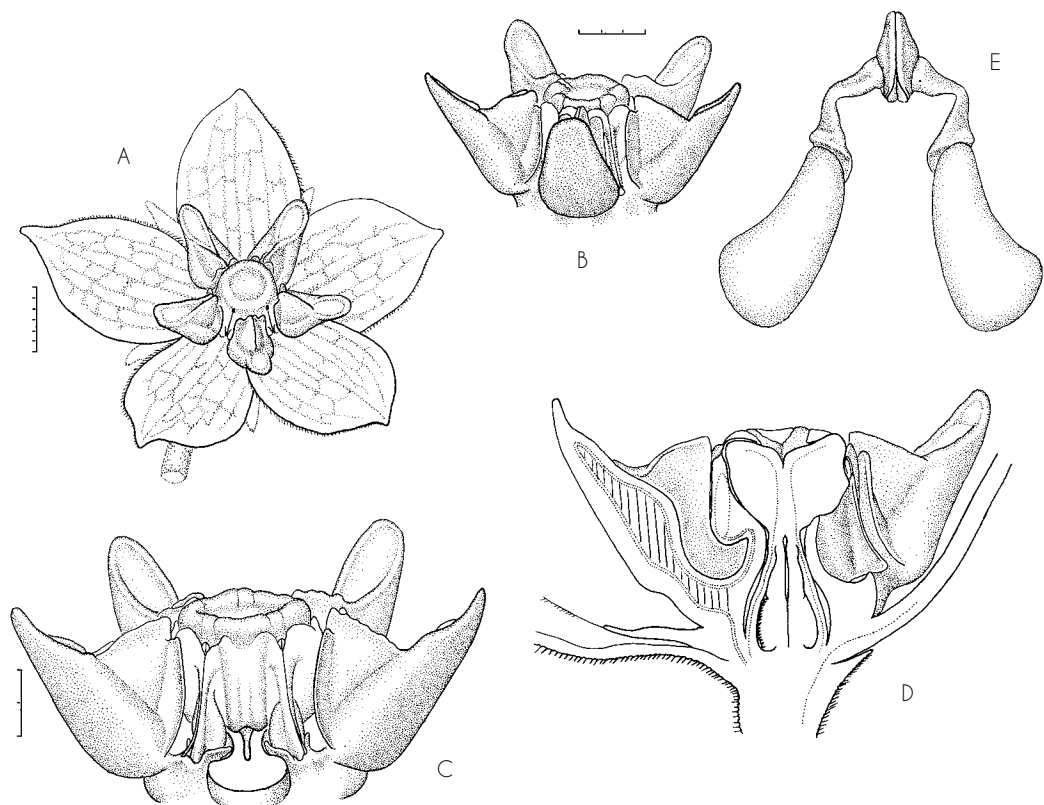


FIGURE 92.—*Pachycarpus lineolatus*, Bruyns 5484. A, flower; B, gynostegium; C, gynostegium with one corona lobe removed; D, half-flower; E, pollinarium. Scale bars: A, 6 mm; B, 3 mm; C, D, 2 mm (at C); E, 0.25 mm.

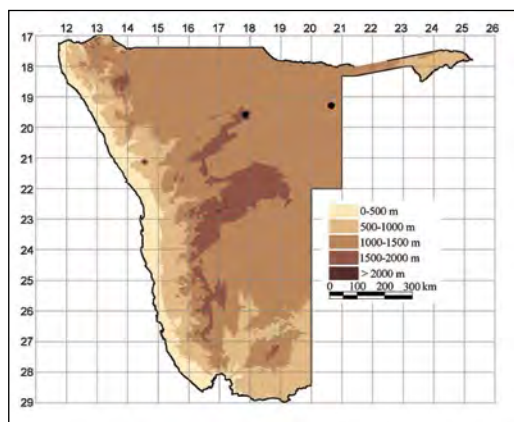


FIGURE 93.—Distribution of *Pachycarpus lineolatus*.

Pentarrhinum E.Mey.

Non-succulent twiner to 3 m, $\pm$ glabrous, sap clear. Leaves cordate, 20–80 $\times$ 10–50 mm, petiole 10–50 mm long. *Inflorescence* a many-flowered extra-axillary fascicle initially umbellate and later elongating into raceme. *Corolla* red-brown or greenish, rotate and lobed nearly to base, glabrous; *tube* absent; *lobes* 4–5 $\times$ 2–3 mm, oblong or oblong-lanceolate to ovate, acute, spreading or reflexed, margins with fine cilia; *gynostegial corona* in 2 series, outer series of 5 small lobules beneath guide rails confluent with bases of inner series; inner series of 5 free lobes equaling to twice as high as style head, obcuneate or slipper-shaped, obliquely truncate or rounded at tip, bearing a horn projecting inwards from

slightly concave apex; *anthers* with membranous apical appendage not covering style head; *pollinia* pendent in anthers, without translucent insertion crest, somewhat swollen and joined by short caudicle to corpuscle. *Follicles* spindle-shaped, usually paired, erect, 30–70 × 15–20 mm, prickly-warty or smooth, sometimes glabrous; *seeds* ovate, dorsiventrally flattened, papillate, with sessile tuft of hairs at micropylar end.

2 species (Liede & Nicholas 1992), sub-Saharan Africa.

Note: the distribution of the two species as given for Namibia in Liede & Nicholas (1992) is not correct. Specimens from the south (NBG, WIND) and from near the mouth of the Orange River in South Africa, determined by Liede as *P. abyssinicum* have all been found to be of *Pergularia daemia*.

The two species are so similar that separate descriptions are not provided here.

Key to species

- 1a. Corona lobes thin, slipper-shaped, not papillate, almost twice as high as style head, apical horn mostly bent slightly inwards and usually not reaching over style head; corolla greenish yellow or white ***P. abyssinicum***
- 1b. Corona lobes thick and fleshy, papillate, usually as high as style head, apical horn straight and usually reaching over style head; corolla greenish yellow mostly strongly suffused with red-brown ***P. insipidum***

Pentarrhinum abyssinicum Decne. in DC., *Prodr.* 8: 553 (1844). Type: from Africa.

Habitat: Stony slopes or flats in woodland, usually climbing in shrubs and trees, 1 000–1 300 m.

Flowering time: Dec.–Mar.

Distribution: Namibia to West Africa. In Namibia in the north from Kaokoveld to Caprivi. Figure 94.

Voucher: De Winter & Leistner 5529 (PRE, WIND).

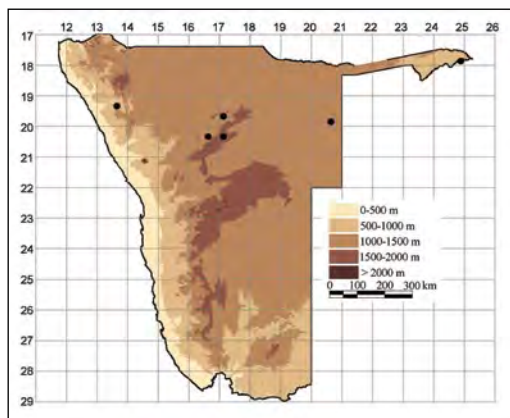


FIGURE 94.—Distribution of *Pentarrhinum abyssinicum*.

Pentarrhinum insipidum E.Mey., *Comm. Pl. Afr. Austr.*: 200 (1838). Type: from South Africa.

Habitat: Stony slopes or flats in woodland, usually climbing in shrubs and trees, 900–2 100 m.

Flowering time: Nov.–Apr.

Distribution: South Africa to West Africa. Widespread in Namibia. Figure 95.

Voucher: Merxmüller & Giess 1326 (PRE, WIND).

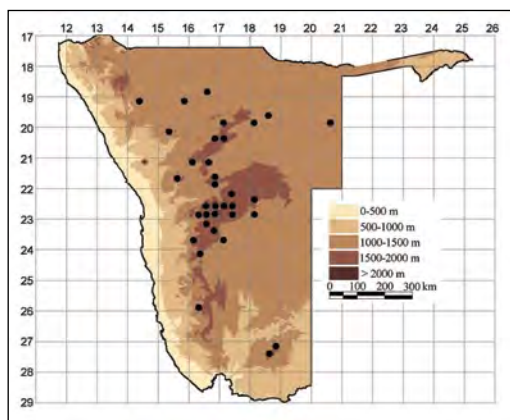


FIGURE 95.—Distribution of *Pentarrhinum insipidum*.

Pergularia L.

Non-succulent twiner to 3 m, coarsely pubescent to glabrous, sap milky. *Leaves* cordate, petiole 10–80 mm long, 15–120 × 10–100 mm, acute, pubescent to glabrous. *Inflorescence* a many-flowered extra-axillary fascicle initially umbellate and later elongating into raceme on long peduncle, pubescent to glabrous, pedicels 15–40 mm long and slender. *Corolla* white or yellowish white, campanulate, inside bearded towards edges of lobes, outside glabrous; *tube* 3–4 mm long with corona fused to corolla at mouth; *lobes* 6–8 × 3–4 mm, oblong-ovate, acute to obtuse, spreading; *gynostegial corona* in 2 series, outer series of 5 short truncate lobes beneath guide-rails attached at mouth of tube, inner series of 5 prominent lobes behind anthers extended into subulate, inwards-curved tips connivent over style head and with rounded spreading ridge at rear near base; *anthers* with membranous apical appendage covering most of style head; *pollinia* pendent in anthers, with fine translucent insertion crest on inner edge (relative to anther), somewhat swollen and almost directly joined to corpuscle. *Follicles* fusiform, usually paired, erect, 50–80 × 10–15 mm, firmly bristly or sometimes smooth, pubescent to glabrous, with many seeds; *seeds* ovate, dorsiventrally flattened, velvety-papillate, with sessile tuft of hairs at micropylar end.

2 species (Goyder 2006b), South Africa to Arabia and eastwards to Bangladesh.

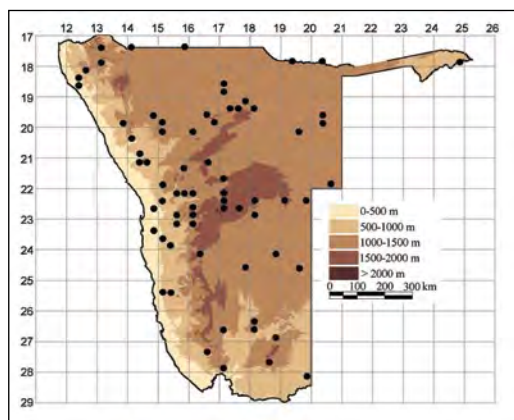


FIGURE 96.—Distribution of *Pergularia daemia*.

Pergularia daemia (Forssk.) Chiov., *Res. Scient. Miss. Stef.-Paoli Som. Ital* 1: 115 (1916). Neotype (Goyder 2006b): from Arabia.

Habitat: Among rocks and bushes, often climbing on fences, 200–1 600 m.

Flowering time: Recorded throughout year but mostly in summer, flowers open only at night and close next morning, pollinated by moths.

Distribution: South Africa to Arabia and Indian subcontinent. Widespread in Namibia. Figure 96.

Voucher: De Winter & Leistner 5456 (PRE, WIND).

Periglossum Decne.

Non-succulent herb, 50–600 mm tall, with ascending, simple annual stem arising from small subterranean tuber, sparsely pubescent on upper part, sap milky. *Leaves* linear, 60–110 × 1.5–2.0 mm, glabrous above and very scantily pubescent below. *Inflorescences* several, each a 6- to 15-flowered globose extra-axillary fascicle, peduncle 10–50 mm long, finely pubescent along one side only, pedicels 0.6–1.0 mm long, slightly pubescent. *Corolla* campanulate and lobed almost to base; *tube* absent; *lobes* ovate-lanceolate, glabrous outside and inside; *gynostegial corona* in 2 series, outer series of 5 minute lobes beneath guide-rails, inner series of 5 spatulate lobes longer than style head; *anthers* with truncate membranous apical appendages covering small style head; *pollinia* pendent in anthers, without insertion crest, attached to corpuscle with fairly stout caudicle about twice as long as pollinia; style head small with apical knob. *Follicles* unknown.

3 species, mainly in southern Africa.

Periglossum mackenii Harv., *Thes. Cap.* 2: 7, t. 111 (1860–63). Type: from South Africa.

Habitat: Swampy flats in grassland, 1 200 m.

Flowering time: Dec.–Feb.

Distribution: Botswana, Namibia, South Africa. In Namibia only in Omuramba Kaudom, south of Rundu. Figure 97.

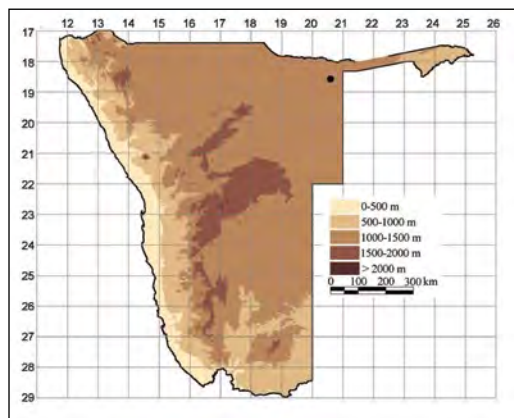


FIGURE 97.—Distribution of *Periglossum mackenii*.

Voucher: De Winter & Marais 4690a (PRE).

Note: Huber (1967) listed the name *Cordylodyne argillicola* Dinter (Dinter 1919), which he believed was a *nom. nud.* and expressed doubt that this genus occurred in Namibia. However, Dinter (1919) explained how this differed from *C. globosa* E.Mey. and so it was validly described. Dinter mentioned two specimens (Aris, Dinter 2254; Farm Hoffnung, Dinter), but these have not been traced. Since these specimens have not been located, it is unclear whether this name also referred to *P. mackenii*.

Schizoglossum E.Mey.

Non-succulent herb, 50–150 mm tall, with ascending, simple or branched annual stems arising from small subterranean tuber, pubescent, sap milky. *Leaves* linear, 20–70 × 1.5–3.0 mm, glabrous above and pubescent below. *Inflorescence* a 4- to 5-flowered extra-axillary fascicle, flowers opening ± simultaneously, peduncle 0–20 mm long, often pubescent along one side only, pedicels 1–9 mm long, pubescent. *Corolla* green, rotate to campanulate and lobed almost to base; *tube* absent to very short; *lobes* ovate-lanceolate, glabrous outside, densely pubescent to finely papillate inside; *gynostegial corona* in 2 series, outer series of 5 minute lobes beneath guide-rails, inner series of 5 variously shaped lobes often with process projecting hori-

zontally above style head; *anthers* with truncate membranous apical appendages covering sides of style head only to much exceeding style head and hiding it; *pollinia* pendent in anthers, without insertion crest or with faint crest, attached to corpuscle with fairly broad- to slender-based but slender caudicle; style head conical to flat on top with slightly depressed centre. *Follicles* slender, solitary by abortion, erect, usually pubescent.

± 110 species, Africa mainly south of equator.

Note: the system of three genera, *Aspidoglossum*, *Miraglossum* and *Schizoglossum* of Kupicha (1984), does not appear to work for Namibia and is unlikely to work elsewhere. From this account (Kupicha 1984), an attempt was made to produce a key to the genera *Aspidoglossum*, *Miraglossum*, *Schizoglossum* and *Stenostelma* that would work for the Namibian taxa (Bruyns 1995) but, according to it, *S. saccatum* belongs to *Miraglossum*, which is highly unlikely considering its distribution. Furthermore, this key does not appear to work. Therefore, all species have been treated here in *Schizoglossum*, a sub-Saharan African genus of about 110 species.

Key to species

- 1a. Style head broadly conical; anther appendages much exceeding style head, connivent in centre and hiding it completely; corolla lobes incurved above base then erect and finally spreading, inner corona lobes inverted cross-shaped **S. (*Stenostelma*) capense**
- 1b. Style head flattened on top and slightly depressed in centre; anther appendages pressed to and covering its sides but not hiding it; corolla lobes spreading from base; inner corona lobes not inverted cross-shaped **2.**
- 2a. Inner corona lobes consisting of dorsiventrally flattened erect part with conspicuous process on inner surface projecting over style head; pollinia with slight insertion crest on inner side (relative to anthers), joined to corpuscle with slender caudicle with slender base **3. (*Aspidoglossum*)**
- 2b. Inner corona lobes inflated and ovoid with small apical process projecting horizontally towards style head; pollinia without insertion crest, joined to corpuscle with slender caudicle with broad base **S. saccatum**

- 3a. Dorsiventrally flattened part of inner corona attenuated into deltoid apex **S. biflorum**
 3b. Dorsiventrally flattened part of inner corona without deltoid apex **S. masaicum**

Schizoglossum biflorum (E.Mey.) Schltr., J. Bot. 32: 259 (1894). (= **Aspidoglossum biflorum** E.Mey.). Type: from South Africa (lecto., Kupicha 1984).

Non-succulent herb, 50–200 mm tall, with erect, simple annual stems arising from small subterranean turnip-shaped tuber, pubescent, sap milky. *Leaves* linear, 20–70 × 1.5–3.0 mm, pubescent. *Inflorescence* a 4- to 5-flowered extra-axillary fascicle, flowers opening ± simultaneously, ± sessile, pedicels 1–3 mm long, pubescent. *Corolla* green, rotate and lobed nearly to base; *tube* ± absent; *lobes* ovate-deltate, 2.5–3.0 × 1.5 mm, glabrous outside, densely pubescent inside; *gynostegial corona* in 2 series, inner series of 5 dorsiventrally flattened lobes with rectangular base 1 × 1.5 mm extended into deltoid apex, with additional slender tapering process 1.5–2.0 mm long on inner surface projecting over style head and meeting in centre above it; *anthers* with truncate membranous apical appendage covering sides of style head only; *pollinia* pendent in anthers, with very slight insertion crest, attached to corpuscle with slender-based and slender caudicle; style head flat on top with slightly depressed centre. *Follicles* fusiform, erect, solitary by abortion, 30–60 × ± 5–6 mm, pubescent, with many seeds.

Habitat: Gentle stony slopes in grassland, 1 800 m.

Flowering time: Dec.–Feb.

Distribution: South Africa, Namibia. In Namibia only in mountains between Otavi and Grootfontein. Figure 98.

Voucher: Dinter 844 (SAM).

Note: The specimen Dinter 844 (SAM) from 'Bubus' (assumed to be the same as 'Bobos', near Tsumeb) is the same species as Bruyns 5488. It was identified as *S. pentheri* by Dinter, '*Schizoglossum* sp. nov.' by P.J. Greenway, and '*Aspidoglossum biflorum*' by F. Kupicha. Consequently Kupicha (1984) listed *A. biflorum* (*S. biflorum*) for

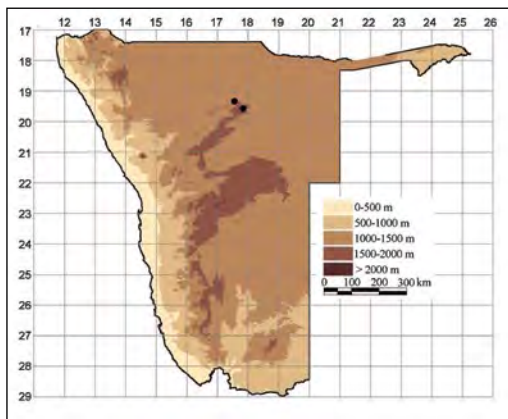


FIGURE 98.—Distribution of *Schizoglossum biflorum*.

Namibia. The specimen Bruyns 5488 keys out as *S. pentheri* in Huber (1967) and as *A. carinatum* in Kupicha (1984), rather than *A. erubescens* (Schltr.) Bullock, which is where Kupicha tentatively placed *S. pentheri*. Consequently it was listed as *Aspidoglossum carinatum* in Bruyns (1995). Kupicha (1984: 641) mentioned that *A. biflorum* and *A. carinatum* were 'difficult to separate absolutely'. According to Kupicha, *A. carinatum* is restricted to 'NE Cape Prov., and coastal Natal', while *A. biflorum* is more widespread. Here, I therefore place these collections from Namibia under *A. biflorum* and so *S. carinatum* (*A. carinatum*) is not known in Namibia. Huber (1967) listed Dinter 4414 and 5626 but these specimens have not been seen.

Schizoglossum capense (Schltr.) H. Huber, Mitt. Bot. Staatssamml. München 4: 35 (1961). Type: from South Africa. (= **Stenostelma capense** Schltr.).

Non-succulent herb, 50–150 mm tall, with ascending, simple or branched annual stems arising from small subterranean tuber, pubescent, sap milky. *Leaves* linear, sessile, 20–70 × 1.5–2.0 mm, pubescent. *Inflorescence* a 3- to 5-flowered extra-axillary fascicle, flowers opening ± simultaneously, peduncle 4–20 mm long, pubescent along one side only, pedicels 7–9 mm long, pubescent. *Corolla* dirty white or greyish, campanulate and lobed nearly to base; *tube* ± 0.5 mm long, shallowly bowl-shaped;

lobes narrowly lanceolate, 4–5 × 1 mm, bent inwards near base then erect and pressed to each other laterally for nearly 2 mm to form apparent tube and then spreading-recurved towards tips, glabrous outside, finely papillate inside towards tips; *gynostegial corona* in 2 series, outer series of 5 minute acute lobules beneath guide-rails, inner series of 5 tall inverted cross-shaped very slender lobes slightly exceeding corolla lobes; *anthers* with ascending membranous apical appendage covering style head completely and exceeding it; *pollinia* pendent in anthers, without insertion crest, attached to corpuscle with fairly broad-based but slender caudicle; style head bluntly conical above. *Follicles* fusiform, solitary by abortion, 40–60 × ± 6 mm, glabrous?, with many seeds. Figures 99 & 100.



FIGURE 99.—*Schizoglossum capense*, east of Tsumkwe, PVB.

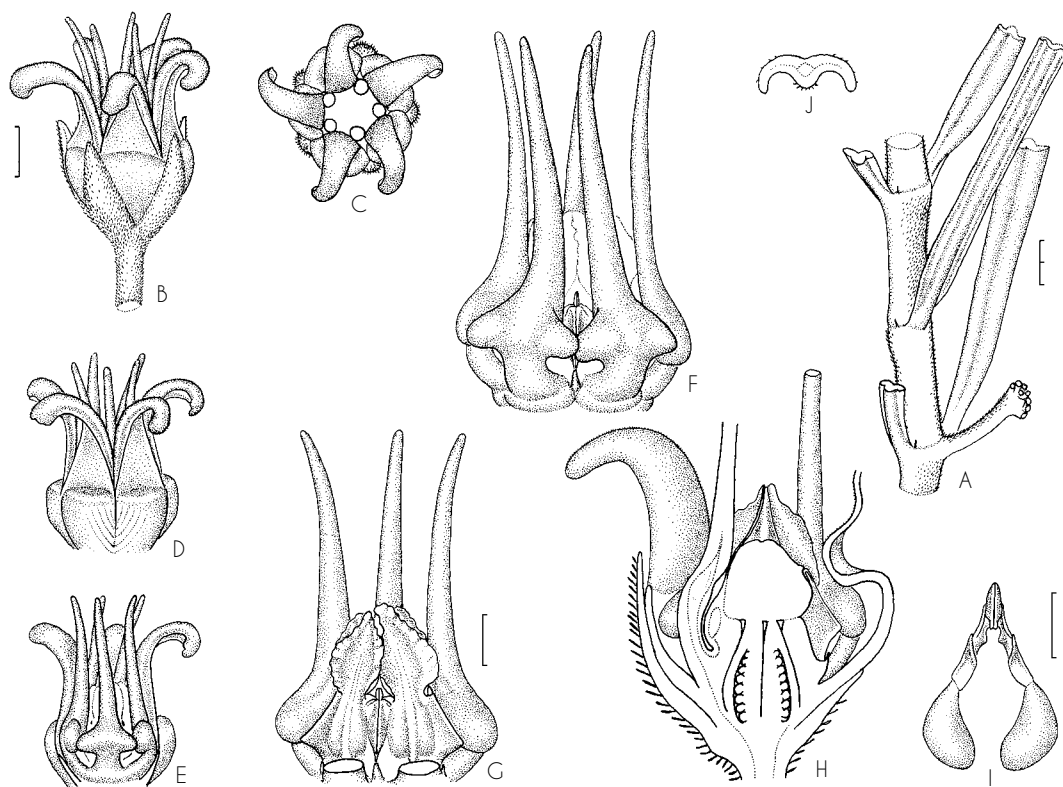
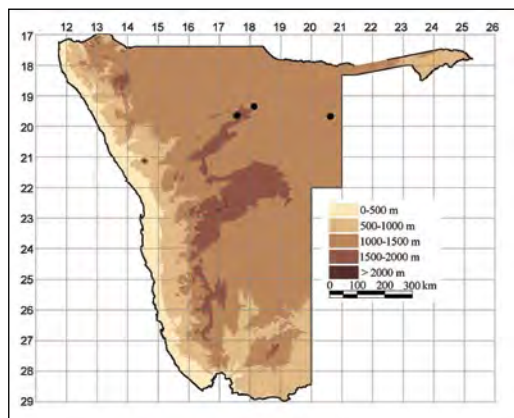


FIGURE 100.—*Schizoglossum capense*, Bruyns 5834. A, portion of plant; B, C, flower; D, flower with sepals removed; E, flower with two corolla lobes removed; F, gynostegium; G, gynostegium with two corona lobes removed; H, half-flower; I, pollinarium; J, cross-section of leaf near middle. Scale bars: A, 2 mm; B–E, J, 1 mm (at B); F–H, 0.5 mm (at G); I, 0.25 mm.

FIGURE 101.—Distribution of *Schizoglossum capense*.

Habitat: Stony flats and gentle slopes in woodland, 1 100–1 400 m.

Flowering time: Dec.–Feb.

Distribution: Namibia, South Africa. In Namibia known from west of Grootfontein to near Tsumkwe. Figure 101.

Voucher: Giess & Smook 10614 (WIND).

Schizoglossum masaicum N.E.Br., *Bull. Misc. Inform.* 1895: 252 (1895). Type: from Kenya. (= *Aspidoglossum masaicum* (N.E.Br.) Kupicha).

Like *Schizoglossum biflorum* but leaves only 1–2 mm broad, inner series of corona lacking deltoid apex to dorsiventrally flattened lobes, pollinia with more obvious insertion crest.

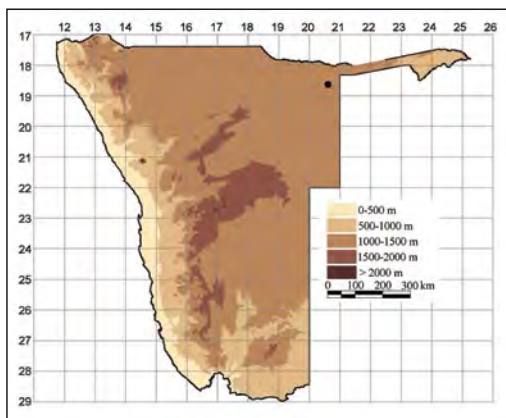
Habitat: Swampy flats in grassland, 1 200 m.

Flowering time: Feb.

Distribution: Namibia to Ethiopia. In Namibia known in Omuramba Khaudum, south of Rundu. Figure 102.

Voucher: De Winter & Marais 4686 (PRE, WIND).

Note: The collections De Winter & Marais 4686 (PRE, WIND) and Strey 2661 (PRE), were

FIGURE 102.—Distribution of *Schizoglossum masaicum*.

placed under *Schizoglossum baumii* Schltr. by Huber (1967), which was included in *Aspidoglossum masaicum* by Kupicha (1984).

Schizoglossum saccatum Bruyns, *Bothalia* 25: 169 (1995). Type: Namibia, south of Kaoko Otavi, 1 400 m, Bruyns 5558 (BOL, holo.; K, WIND, iso.).

Non-succulent herb, 50–150 mm tall, with ascending, simple or branched annual stems arising from small subterranean tuber, pubescent, sap milky. *Leaves* linear, 20–70 × 1.5–3.0 mm, glabrous above and pubescent below. *Inflorescence* a 4- to 5-flowered extra-axillary fascicle, flowers opening ± simultaneously, peduncle 7–20 mm long, pubescent along one side only, pedicels 7–9 mm long, pubescent. *Corolla* green with faint purple veins, rotate and lobed to base; *tube* absent; *lobes* ovate-lanceolate, 5–6 × 2.5 mm, glabrous outside, densely white-pilose inside; *gynostegial corona* in 2 series, inner series of 5 inflated ovoid lobes with small apical process projecting horizontally onto anther appendage; *anthers* with truncate membranous apical appendage covering sides of style head only; *pollinia* pendent in anthers, without insertion crest, attached to corpuscle with fairly broad-based but slender caudicle; style head flat on top with slightly depressed centre. *Follicles* unknown. Figure 103.

Habitat: Stony flats and gentle slopes among trees, 1 200–1 400 m.



FIGURE 103.—*Schizoglossum saccatum*, south of Kaoko Otavi, PVB 5558.

Flowering time: Dec.–Feb.

Distribution: Angola, Namibia. In Namibia only known in Kaokoveld. Figure 104.

Voucher: Bruyns 5558 (BOL, K, WIND).

Note: Craven (1999) mentioned two specimens (Curson 1247 and 1251) of *Schizoglossum periglossoides* Schltr. at PRE, but neither has been located and the species is unlikely to occur in Namibia.

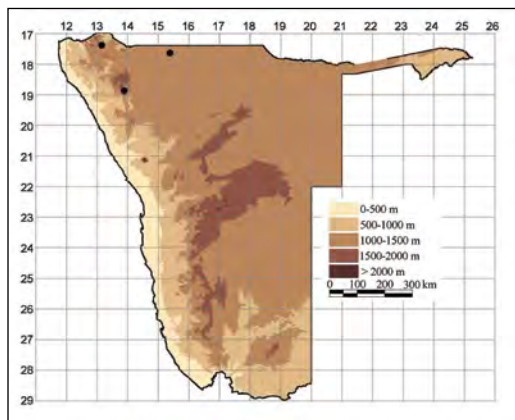


FIGURE 104.—Distribution of *Schizoglossum saccatum*.

Schizostephanus Hochst.

Spreading deciduous shrub with succulent stems to 1.5 m or climber to 3–4(10) m; *stems* 5–15 mm thick, initially finely pubescent and bright green later with grey-brown bark, sap clear. *Leaves* ovate-cordate, petioles 20–40 mm long, 30–60 × 25–50 mm, acute, glabrescent, flat, deciduous. *Inflorescences* many alongside nodes on younger stems, racemose with peduncle 30–80 × 1.5–2.0 mm, finely pubescent, flowers in groups of 1–2 and opening in gradual succession; pedicels 4–6 mm long. *Corolla* yellow becoming maroon in lower third of lobes inside, rotate and lobed nearly to base, 7–8 mm diam., inside with fine scattered hairs up to 0.25 mm long near bases of lobes; *tube* ± absent; *lobes* lanceolate to oblong-lanceolate, obtuse, 2.5–3.5 × 1.5 mm, spreading and slightly twisted; *gynostegial corona* in 2 series, outer series fused into urceolate to bowl-shaped tube 2–3 mm long, usually with 10 small lobules around mouth, inner series of 5 fleshy keeled lobules to 1 mm long, arising behind anthers and touching their bases; *anthers* with membranous apical appendage covering style head except at apex; *pollinia* pendent in anthers, with fine insertion crest along inner edge (relative to anther), attached to corpuscle with slender caudicle. *Follicles* fusiform and flattened, paired, spreading at 180°, 60–90 × 12–20 mm, glabrous, with many seeds; *seeds* ovate, dorsiventrally flattened, with sessile tuft of hairs at micropylar end.

2 species (Bruyns & Klak 2009), Africa, from Ethiopia to South Africa.

Schizostephanus gossweileri (S.Moore) Liede, *J. Linn. Soc., Bot.* 114: 92 (1994). Type: from Angola. Figures 105–107.

Habitat: Rocky slopes, sprawling over rocks, 1 900 m.

Flowering time: Dec.–Feb.

Distribution: Angola, Namibia. In Namibia only in high mountains of Kaokoveld. Figure 108.

Voucher: Van Jaarsveld & Ems 18876 (BOL).

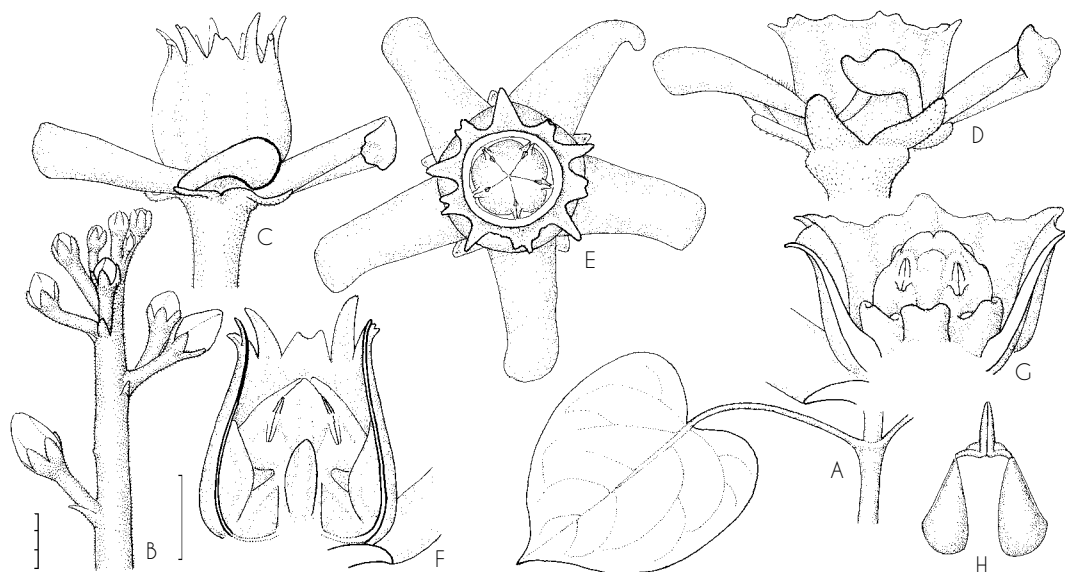


FIGURE 105.—*Schizostephanus gossweileri*, A, B, C, E, F, H, Bruyns 10677; D, G, Van Jaarsveld & Ems 18876. A, piece of young stem with leaf; B, upper part of inflorescence; C, D, side view of flower; E, face view of flower; F, G, side view of centre of dissected flower; H, pollinarium. Scale bars: A, 15 mm (at B); B, 3 mm; C, D, E, 1 mm (at B); F, G, 1 mm (at F); H, 0.25 mm (at B).



FIGURE 106.—*Schizostephanus gossweileri*, with Dan Cra-
ven, west of Oncocua, Angola, PVB 10677.



FIGURE 107.—*Schizostephanus gossweileri*, west of On-
cocua, Angola, PVB 10677.

Sphaerocodon Benth.

Non-succulent herb 150–500 mm tall with erect branched annual stems from small subterranean stem and series of slightly swollen roots, pubescent, sap clear. *Leaves* oblong-elliptic, with short indistinct petiole, 18–30 × 7–15 mm, rounded at base, glabrous above, pubescent

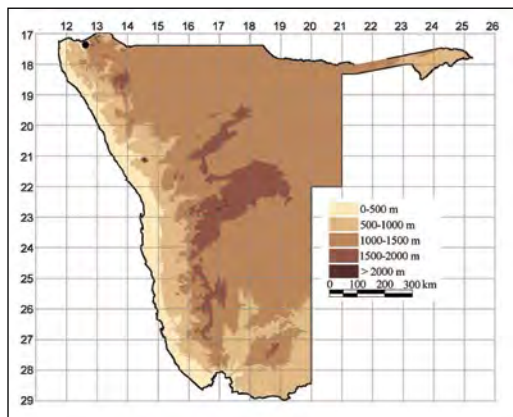


FIGURE 108.—Distribution of *Schizostephanus gossweileri*.

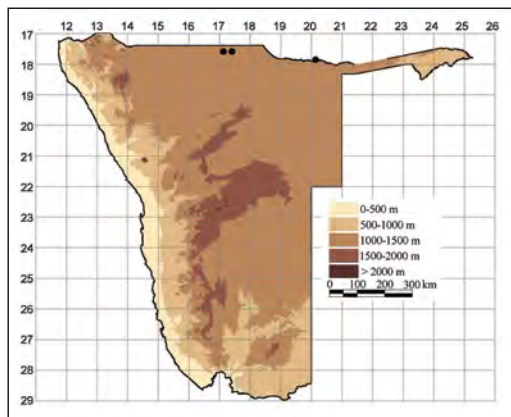


FIGURE 109.—Distribution of *Sphaerocodon melananthus*.

on nerves below. *Inflorescences* several along-side nodes near apex of stems, 1- to 3-flowered, flowers opening in succession, with slender peduncle 10–20 mm long, pubescent. *Corolla* dark red-brown to blackish violet, cupular and lobed half to two-thirds of way to base, 6–8 mm diam., glabrous; *tube* broadly bowl-shaped; *lobes* $\pm 3 \times 2$ mm, ovate, $\pm$ twice as long as tube, obtuse; *gynostegial corona* of 5 lobes in 1 series, lobes opposite anthers, ovoid and obtuse, spreading beneath anthers at top of cylindrical column ± 1 mm tall (raised well above base of tube); *anthers* with very short membranous apical appendage; *pollinia* erect, without insertion crest, attached by slender caudicles to very small corpuscle. *Follicles* unknown.

2 species, South to southern tropical Africa.

Sphaerocodon melananthus N.E.Br., *Fl. Trop. Afr.* 4 (1): 412 (1903). Type: from Angola.

Habitat: Sandy flats among bushland, 1 200–1 300 m.

Flowering time: Jan.–Feb.

Distribution: Angola, Namibia. In Namibia from Ovamboland to Caprivi. Figure 109.

Voucher: De Winter 4097 (PRE, WIND).

Tylophora R.Br.

Non-succulent slightly rigid shrub 150–600mm tall with erect branched stems, pubescent, sap clear. *Leaves* ovate to ovate-lanceolate, petiole 2–6 mm long, $10\text{--}30 \times 4\text{--}15$ mm, finely pubescent. *Inflorescences* several alongside nodes near apex of stems, 1- to 7-flowered, flowers opening in succession, with slender peduncle 5–15 mm long. *Corolla* cream, rotate and lobed nearly to base, glabrous; *tube* plate-like with slightly thickened ring around gynostegium; *lobes* $2.5\text{--}4.0 \times 2.0\text{--}2.5$ mm, ovate-lanceolate, obtuse; *gynostegial corona* of 5 lobes in 1 series, lobes opposite anthers, ovoid and obtuse to rectangular and slightly apically notched, spreading beneath anthers on base of tube (not raised above base of tube); *anthers* with membranous apical appendage pressed to sides of style head; *pollinia* erect, very small, almost spherical, without insertion crest, attached by slender caudicles to very small corpuscle. *Follicles* acutely ovate, about $25\text{--}60 \times 8\text{--}15$ mm, smooth, glabrous; seeds ovate, flattened with one flat and one convex face, papillate, with sessile tuft of hairs at micropylar end.

± 50 species, Old World, South Africa to Australia.

Tylophora fleckii (Schltr.) N.E.Br., *Fl. Cap.* 4 (1): 766 (1908). *Tylophoropsis fleckii* Schltr., Bull. Herb. Boissier 7: 39 (1899). Type: Na-



FIGURE 110.—*Tylophora fleckii*, Tiras Mountains, PVB 5738.

mibia, Gamsberg, 1888–9, *Fleck* 431 (missing). Figures 110 & 111.

Habitat: On slopes, often among large rocks, 1 200–2 500 m.

Flowering time: Dec.–Apr.

Distribution: Namibia. Widespread but poorly recorded, from Kaokoveld via Brandberg to Tiras, Huns and Great Karas Mountains. It is stated (Goyder 2006a) that this species occurs in Kenya, Somalia and Tanzania, but this is very unlikely. Figure 112.

Voucher: Merxmüller & Giess 944 (PRE, WIND).

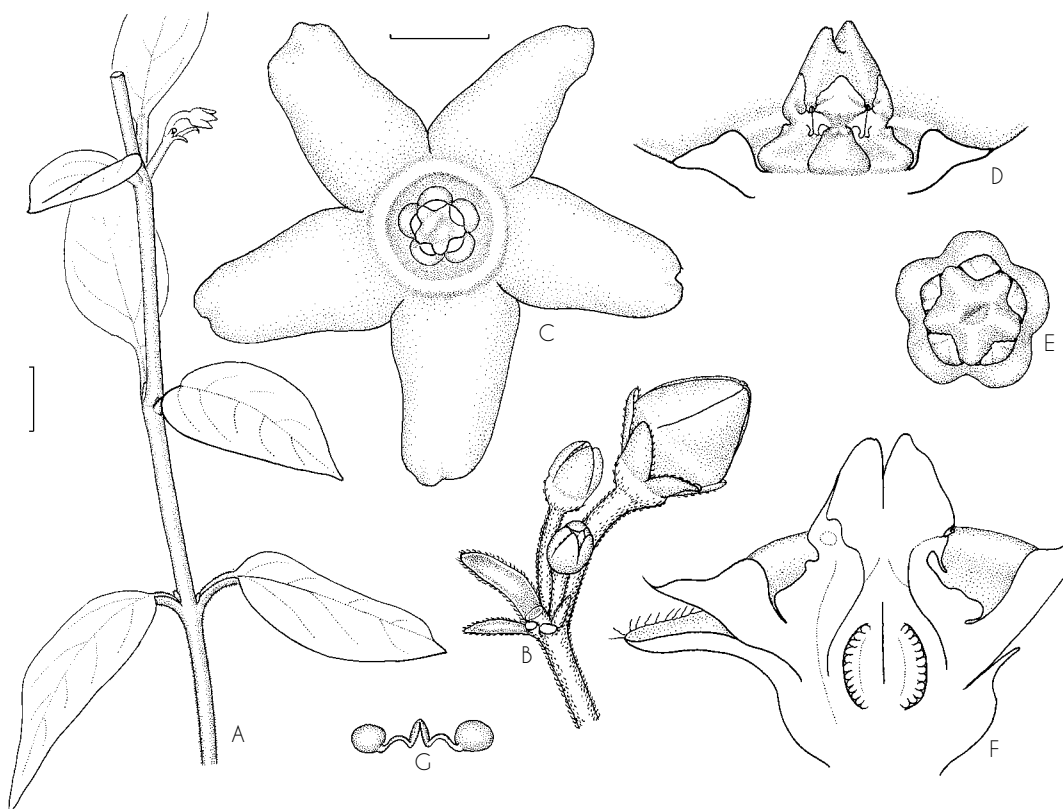
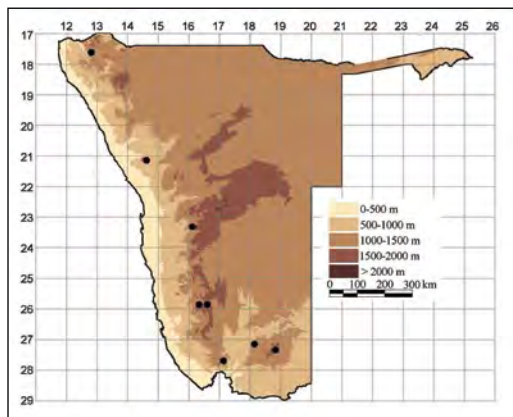
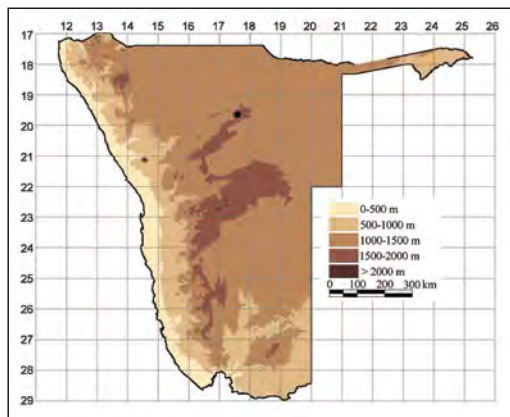


FIGURE 111.—*Tylophora fleckii*, Brandberg, Namibia, *Bruyns* 3319. A, portion of stem; B, side view of inflorescence; C, face view of flower; D, side view of centre of dissected flower; E, face view of gynostegium; F, centre of half-flower; G, pollinarium. Scale bars: A, 5 mm; B, C, 2 mm (at C); D, E, 1 mm (at C); F, 0.5 mm (at A); G, 0.25 mm (at A).

FIGURE 112.—Distribution of *Tylophora fleckii*.FIGURE 113.—Distribution of *Xysmalobium undulatum*.

Xysmalobium R.Br.

Robust, non-succulent shrub to 1.5 m tall with few erect, simple stems with short hairs, sap milky. *Leaves* oblong-ovate to ovate-lanceolate, petiole 1.5–5.0 mm long, 80–200 × 30–80 mm, rounded to ± cordate at base, acute, sparsely pubescent, rough on flat margins. *Inflorescences* many alongside nodes near apex of stem, many-flowered globose umbels, with peduncle 12–40 mm long. *Corolla* green to brown, globose-campanulate and lobed nearly to base; *tube* absent; *lobes* oblong-elliptic, 9–12 × 5–6 mm, inside pubescent towards apices; *gynostegial corona* in 2 series; outer series of 5 minute lobules beneath bases of guide rails; inner series shorter than anthers, of 5 almost free fleshy and broadly wedge-shaped, obovate or transversely elliptic lobes inserted at base of staminal column; *anthers* with membranous apical appendage covering style head; *pollinia* pendent in anthers, without insertion crest, attached to corpuscle with slender caudicle. *Follicles* obliquely ovoid, usually sol-

itary, 70–120 × 35–40 mm, finely pubescent and covered with many long bristle-like outgrowths; *seeds* ovate, dorsiventrally flattened, papillate, with sessile tuft of hairs at micropylar end.

± 40 species, Africa south of Sahara.

Xysmalobium undulatum (L.) Aiton f., *Hort. Kew.*, ed. 2,2: 79 (1811). Type: from South Africa (lecto., Wijnands 1983).

Habitat: Rocky slopes and gravelly grassy plains, 1 300 m.

Flowering time: Jan.–Mar.

Distribution: Widespread in Africa from South Africa to Ethiopia. In Namibia only known in the hills between Otavi and Grootfontein. Figure 113.

Voucher: Merxmüller & Giess 2171 (PRE, WIND).

CEROPEGIEAE Decne. ex Orb.

Key to the genera

- 1a Stems thin, occasionally fleshy but then ± cylindrical and without tubercles joined or arranged in rows along stems; leaves conspicuous (rarely rudimentary) **2.**

- 1b Stem fleshy, not cylindrical but with (usually conspicuous) tubercles joined or arranged into rows along stems; leaves reduced to spines, subulate rudiments or minute scales on tips of tubercles 4 [stapeliads].
- 2a. Staminal corona consisting of one series of lobes **Orthanthera**
- 2b. Staminal corona consisting of two series of lobes, outer series alternating with anthers and inner opposite anthers and adpressed to backs of anthers 3.
- 3a. Corolla tube 5–70 mm long, cylindrical or bottle-shaped, basally inflated around corona then narrowing into slender neck and usually funnel-shaped at mouth, longer than corolla lobes, outer corona lobes forming cup-like structure around level of anthers with inner lobes rising from this structure to meet in centre and rise in column above apex of style **Ceropegia**
- 3b. Corolla tube 0–45 mm long, mostly 0–3 mm long and much shorter than lobes (when longer than lobes then outer corona urceolate and inner lobes reduced to cushions touching backs of anthers and much shorter than anthers: *B. gymnopodium*) and without basal inflation, slender neck and funnel-shaped mouth, corona variable but inner lobes mostly much shorter than anthers (though cf. *B. blepharanthra* and *B. schultzei*) ... **Brachystelma**
- 4a. Outer and inner series of corona lobes vertically well separated on staminal tube and neither partly nor wholly fused to one another (outer corona often disc-like) 5.
- 4b. Outer and inner series of corona lobes not vertically separated on staminal tube and partly or wholly fused to one another 6.
- 5a. Leaf-rudiments with small stipular denticles; corona raised above base of tube on stipe, outer series resting on rim or sides of small cupular tube formed entirely by annulus **Duvalia**
- 5b. Leaf-rudiments without stipular denticles; corona very rarely raised above base of tube on stipe (though cf. *H. oculata*), outer series spreading on base of tube and often partly fused to it, tube often with annular thickening around mouth but not formed entirely by annulus **Huernia**
- 6a. Tubercles on stem arranged into 6 or more rows or angles 7.
- 6b. Tubercles on stem arranged into 4–5 rows or angles 10.
- 7a. Inflorescence usually only 1 per stem near base 8.
- 7b. Inflorescences several per stem, mainly towards apex 9.
- 8a. Leaf-rudiment slightly sunken into apex of obtuse tubercle and < 1 mm long **Lavrania**
- 8b. Tubercle tapering into leaf-rudiment which is not at all sunken into apex of tubercle, leaf-rudiment consisting of 3 sharp spines **Tavaresia**
- 9a. Each tubercle on stem armed at apex (at least when young) with a spine (1.5–)3–15 mm long **Hoodia**
- 9b. Each tubercle on stem with small persistent and not spine-like leaf-rudiment < 1 mm long usually sunken into apex of tubercle or leaf-rudiment absent **Larryleachia**
- 10a. Stems, pedicels, sepals and outside of corolla at least finely pubescent (stems sometimes nearly glabrous); leaf-rudiments deciduous, erect; corolla often covered inside with fine slender hairs **Stapelia**
- 10b. Stems, pedicels, sepals and outside of corolla glabrous (or finely papillate); leaf-rudiments spreading or absent; corolla inside papillate or with short, thickened hairs 11.
- 11a. Inflorescences produced mainly in upper half of stem, usually several per stem 12.
- 11b. Inflorescences arising in lower half of stem, usually only 1 per stem 15.
- 12a. Outer corona much reduced to absent (as spreading lobe beneath guide-rails), deep nectarial cavity present beneath guide-rails **Piarranthus**
- 12b. Outer corona not much reduced, nectarial cavity shallow or absent 13.
- 13a. Young tubercle tipped without leaf-rudiment constricted slightly at base above tubercle 14.
- 13b. Young tubercle either without leaf-rudiment or with tubercle continuing (without constriction) into hard, often spike-like leaf-rudiment **Quaqua**
- 14a. Surface of stem smooth; corolla inside covered with papillae, corolla lobes not crested along middle **Australluma**
- 14b. Surface of stem rugulose; corolla inside without papillae, corolla lobes crested along middle **Baynesia**
- 15a. Inner corona lobes laterally flattened, rising above anthers and connate in centre well above style head **Stapeliopsis**
- 15b. Inner corona lobes dorsiventrally flattened and adpressed to backs of anthers for most of their length 16.
- 16a. Surface of stems micro-papillate (dull and not shiny); tubercles obtuse and not tapering to tip; leaf-rudiments ± absent **Tromotricha**
- 16b. Surface of stems smooth (± shiny); tubercles not obtuse but tapering into leaf-rudiment; leaf-rudiments present 17.
- 17a. Leaf-rudiment deltoid to subulate, slightly constricted at base, caducous, with small multicellular hairs in stipular position and along margin but lacking stipular denticles; corolla inside usually covered with multicellular papillae **Tridentea**

- 17b. Tubercle tapering $\pm$ uniformly to tip and leaf-rudiment without basal constriction, without small hairs in stipular position but frequently with small stipular denticles; corolla inside from deeply rugulose to smooth but rarely with multicellular papillae **Orbea**

Australluma Plowes

Dwarf spineless highly rhizomatous succulent to 80 mm diam. *Stems* 40–150 $\times$ 3–5 mm, obtusely 4-angled, erect from underground rhizomes (to 200 mm long), glabrous, silvery grey-green, obscurely tuberculate, each tubercle tipped with small $\pm$ deltoid leaf-rudiment. *Inflorescences* glabrous, 1–10 per stem in upper half, 1- to 3-flowered, sessile, pedicel 1–7 $\times$ 1.0–1.5 mm, descending with flower nodding. *Corolla* 7–17 mm diam., rotate, deeply lobed; outside glabrous; inside yellow-green, without annulus, papillate; *tube* 0.5–1.0 mm deep, shallowly bowl-shaped; *lobes* 3–7 $\times$ 2–4 mm, spreading, ovate-deltate, acute, upper surface convex from recurved ciliate margins; *gynostegial corona* of 2 closely intergrown series of lobes, $\pm$ 2 $\times$ 4 mm, glabrous, $\pm$ sessile; *outer series* $\pm$ continuous around gynostegium, shallowly cupular, bifid in middle and shortest opposite guide-rails and longest behind anthers; *inner series* of 5 lobes 0.5–1.0 mm long, dorsiventrally flattened, adpressed to backs of and shorter than anthers;

anthers horizontal on top of style head, $\pm$ semi-circular; *pollinia* $\pm$ D-shaped, with translucent insertion crest on outer margin. *Follicles* paired, erect, terete-fusiform, slender, glabrous, smooth.

2 species, Angola, Mozambique, Namibia, South Africa, Swaziland, Zimbabwe.

Australluma peschii (Nel) Plowes, *Haseltonia* 3: 54 (1995). *Caralluma peschii* Nel, *Jahrb. Deutsch. Kakteen-Ges.* 1: 41 (1935). Type: Namibia, Omaruru, *Pesch sub STE 7082* (BOL, holo.). Figures 114 & 115.

Habitat: Stony or gravelly flats among trees and low bushes, 1 000–1 400 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Namibia. In Namibia from Okahandja northwards to Kaokoveld. Figure 116.

Voucher: Bruyns 2349 (WIND).

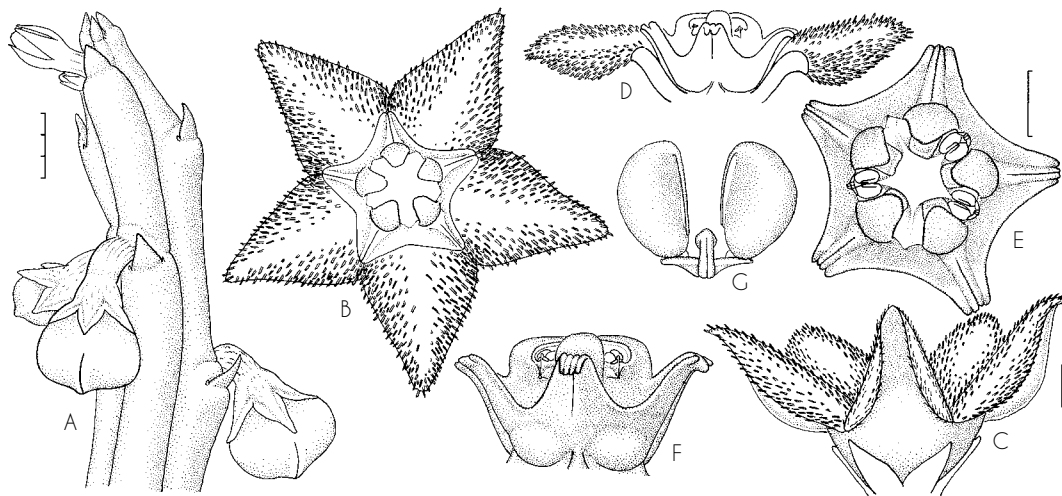


FIGURE 114.—*Australluma peschii*, Omaruru townlands, Namibia, Bruyns 2345. A, apex of stem with several buds; B, face view of flower; C, side view of flower; D, side view of dissected flower; E, face view of gynostegium; F, side view of gynostegium; G, pollinarium. Scale bars: A, 3 mm; B–D, 1 mm (at C); E, F, 1 mm (at E); G, 0.25 mm (at E).



FIGURE 115.—*Australluma peschii*, south of Grootfontein, PVB 10311.

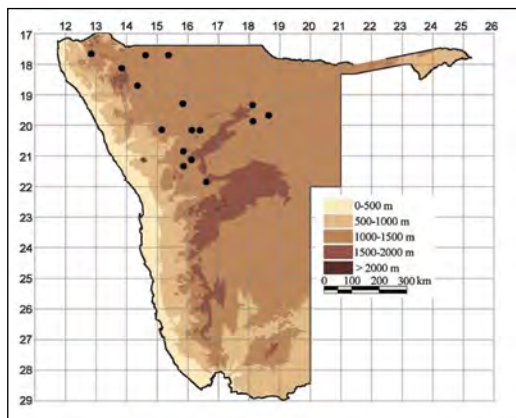


FIGURE 116.—Distribution of *Australluma peschii*.

Baynesia Bruyns

Dwarf spineless non-rhizomatous succulent to 80 mm diam. *Stems* 30–80 × 6–12 mm, obtusely 4-angled, erect, glabrous, somewhat transversely rugulose and finely papillate, green to suffused with brownish, obscurely tuberculate, each tubercle with small cordate-acute leaf-rudiment. *Inflorescences* glabrous, 3–10 per stem towards apex, 1- to 3-flowered, sessile, pedicel 1.5–2.5 × < 1 mm, descending with flower nodding. *Corolla* 3–4 × 6–8 mm, campanulate, shallowly lobed; outside glabrous; inside deep maroon, cream in base, without annulus, glabrous, sparsely papillate; *tube* ± 1.5 mm deep, ± hemispherical; *lobes* ± 2 × 2 mm broad, erect,



FIGURE 117.—*Baynesia lophophora*, Baynes Mountains, PVB 8000.

ovate-acute, folded along midrib so that inside crested towards apex, margins eciliate; *gynostegial corona* of 2 series of lobes partly intergrown, ± 1 × 2 mm, glabrous, on very short stipe; *outer series* of 5 lobes ± 0.5 × 0.5 mm, deltoid, acute, spreading; *inner series* of 5 lobes ± 0.5 mm long, dorsiventrally flattened, adpressed to backs of anthers and mostly equalling them, with obtuse swollen dorsal projection between outer lobes, cream; *anthers* horizontal on top of style head, rectangular; *pollinium* ellipsoidal, broader than long, with insertion-crest exactly along outer edge. *Follicles* paired, 25–35 × 2.5–3.5 mm, erect, terete-fusiform, slender, glabrous, smooth.

1 species, Namibia.

Baynesia lophophora Bruyns, *Novon* 10: 354 (2000). Type: Namibia, Kaokoveld, Baynes Mountains, *Bruyns* 8000 (BOL, holo.; K, MO, PRE, WIND, iso.). Figures 117 & 118.

Habitat: Stony ground among low bushes and tufts of grass above sandstone cliffs, 1 500–1 600 m.

Flowering time: Nov.–Mar.

Distribution: Namibia. Only known from type collection from Baynes Mountains of Kaokoveld. Figure 119.

Voucher: *Bruyns* 8000 (BOL, K, MO, PRE, WIND).

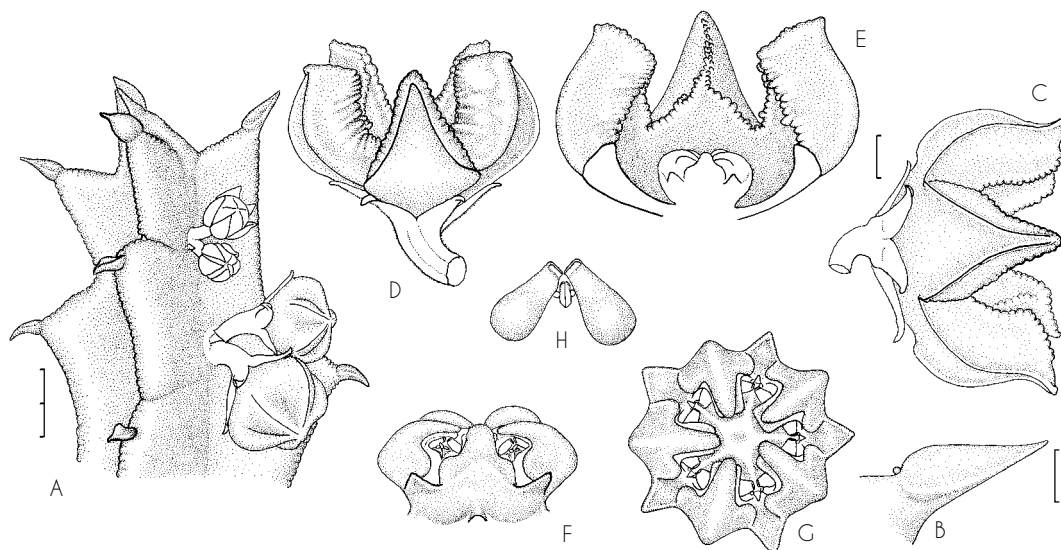


FIGURE 118.—*Baynesia lophophora*, Baynes Mountains, Namibia, Bruyns 8000. A, apex of stem with several buds; B, leaf-rudiment; C, D, side view of flower; E, side view of dissected flower; F, side view of gynostegium; G, face view of gynostegium; H, pollinarium. Scale bars: A, 2 mm; B, F, G, 0.5 mm (at B); C, D, 1 mm (at C); E, 1 mm (at B); H, 0.25 mm (at A).

Brachystelma R.Br. ex Sims

Erect often very small herb arising from flattened and disc-like to elongated top-shaped subterranean tuber, pubescent, sap clear, stems deciduous. *Leaves* narrowly linear to broadly ovate or circular, petioles often short. *Inflorescences*

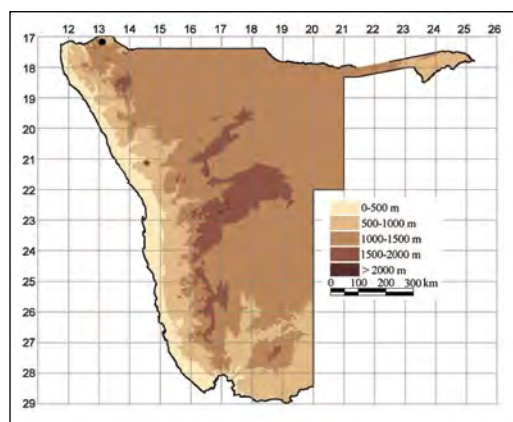


FIGURE 119.—Distribution of *Baynesia lophophora*.

several in mostly sessile cymes, 1- to 20-flowered, flowers usually opening in succession. *Corolla* rotate to tubular usually with lobes free (occasionally remaining united at tips), outside finely pubescent, inside glabrous to finely pubescent; *tube* 0–45 mm long, shallowly plate-like to cylindrical, straight or decurved and without swollen basal inflation around corona; *lobes* filiform to linear to deltate, *gynostegial corona* of 2 series slightly intergrown, often raised on short stout stipe; *outer series* of 5 free, bifid or undivided segments or fused into cup-like structure around or beneath anthers; *inner series* of 5 lobes, simple, cushion-like and touching anthers only at base to linear and adpressed to backs of anthers and exceeding them to rise up sometimes in column in centre; *anthers* horizontal on top of style head, margins shrinking back to expose pollinia, rectangular; *pollinium* ± D-shaped, with insertion-crest along outer edge. *Follicles* paired, erect, terete, usually pubescent, smooth.

± 100 species, sub-Saharan Africa and India to Australia.

Key to species

- 1a. Outer corona lobes united into entire or 5-lobed cup with inner lobes cushion-like and only reaching bases of anthers 2.
- 1b. Outer corona not fused into cup, inner corona lobes not cushion-like and nearly equalling anthers or longer than them 6.
- 2a. Corolla tube more than twice as long as lobes **B. gymnopodium**
- 2b. Corolla tube shorter than lobes 3.
- 3a. Corolla lobes ovate-lanceolate to deltate at base becoming linear above, erect over mouth of tube and remaining fused at apices **B. stenophyllum**
- 3b. Corolla lobes deltate to oblong and not becoming linear above, free at apices and widely spreading beyond mouth of tube 4.
- 4a. Cup formed by outer corona neither containing anthers nor containing inner corona lobes (both anthers and inner corona lobes projecting beyond its mouth) **B. discoideum**
- 4b. Cup formed by outer corona much exceeding height of anthers and inner corona lobes 5.
- 5a. Corolla lobes oblong and 4.5–6.0 mm long; cup formed by outer corona with five small notches in margin **B. cupulatum**
- 5b. Corolla lobes deltate and 3–4 mm long; cup formed by outer corona deeply 5-lobed with each lobe bifid and narrowing towards apex **B. codonanthum**
- 6a. Inner corona lobes meeting in centre and then either rising up in column above style head or widely diverging above it 7.
- 6b. Inner corona lobes shorter than anthers or just meeting in centre, neither rising in column above style head nor widely diverging above it 9.
- 7a. Corolla tube 4–6 mm long, urceolate, lobes dark maroon-black; flowers in simultaneously opening evil-smelling clusters **B. mafekingense**
- 7b. Corolla tube not more than 1.5 mm long, shallowly plate-like to cupular, lobes not dark maroon-black; flowers few and opening in gradual succession 8.
- 8a. Corolla lobes lanceolate-oblong to narrowly deltate, 2–4 times as long as broad at base; inner corona lobes usually swollen towards tips **B. blepharantha**
- 8b. Corolla lobes $\pm$ filiform, about 10 times as long as broad at base or more; inner corona lobes not swollen towards tips **B. schultzei**
- 9a. Pedicel 10–35 mm long 10.
- 9b. Pedicel 1–4 mm long 13.
- 10a. Corolla lobes not recurved, with subclavate pendulous cilia along margins **B. schinzii**
- 10b. Corolla lobes recurved, without cilia along margins 11.
- 11a. Corolla lobes 2–3 mm long, deltate to ovate-lanceolate 12.
- 11b. Corolla lobes 6–8 mm long, with deltoid base then becoming linear and recurved above **B. recurvatum**
- 12a. Corolla glabrous within **B. arnotii**
- 12b. Corolla pubescent within, with slender crinkled hairs adhering to corona **B. pruinsum**
- 13a. Corolla faintly rugulose inside, lobes $\pm$ deltate (1.0–1.5 times as long as broad at base) and free at tips **B. dinteri**
- 13b. Corolla smooth within, lobes linear to filiform (at least 4 times as long as broad at base) and remaining joined at tips **B. circinatum**

Brachystelma arnotii Baker, *Refug. Bot.* 1: t. 9 (1869). Type: from South Africa.

B. grossartii Dinter, *Neue Pfl. Südw.-Afri.*: 16, t. 8 (as '*grossarthii*') (1914). Type: Namibia, Okakuja, *Grossart sub Dinter 2698* (SAM, holo.).

Small finely pubescent herb 30–100 mm tall, from flattened-discoid tuber. *Stem* mostly solitary and simple, 1.5 mm thick. *Leaves* ovate to linear, 10–40 $\times$ 5–15 mm, with entire margins.

Inflorescences sessile, of few successively opening flowers, pedicels 10–35 $\times$ 0.5 mm, descending. *Corolla* rotate, 6–10 mm diam.; outside pale green and finely pubescent, inside purple-brown with green tips to lobes, glabrous, smooth; *tube* $\pm$ absent; *lobes* 2–3 $\times$ 1–2 mm, ovate-lanceolate to deltate, spreading to reflexed. *Corona* raised on small stipe, green, glabrous and finely papillate on outer lobes; *outer lobes* $\pm$ 1 mm long, linear and truncate or apically notched, ascending

and with longitudinal groove along upper surface; *inner lobes* < 0.5 mm long, touching backs of anthers at bases of anthers, reduced to small cushion-like swellings, dorsally confluent with outer lobes.

Habitat: Widespread on Kalahari sand among trees and bushes, 1 200–1 600 m.

Flowering time: Dec.–Mar.

Distribution: Botswana, Namibia, South Africa. In Namibia known from Otjiwarongo to Gobabis. Figure 120.

Voucher: Woortman 221 (WIND).

***Brachystelma blepharantha* H. Huber, Mitt.**

Bot. Staatssaml. München 4: 33 (1961). Type: Namibia, Otjihua, Okahandja, flow. Jan. 1909, *Dinter* 410 (SAM, lecto., designated here).

Blepharantha dinteri Schltr., *Bot. Jahrb. Syst.* 51: 146 (1913). *Brachystelma dinteri* (Schltr.) E. Phillips, *Bothalia* 4: 38 (1941), *nom. illegit., non* Schltr. (1913). Type: Namibia, Otjihua, Okahandja, flow. Jan. 1909, *Dinter* 410 (SAM, lecto., designated here).

Blepharantha edulis Schltr., *Bot. Jahrb. Syst.* 51: 147 (1913). Type: Namibia, Brakwater, *Dinter* 1514 (missing).

Small very sparsely pubescent herb 20–300 mm tall, from elongated irregularly top- to

carrot-shaped tuber. *Stem* usually solitary, 1.5 mm thick. *Leaves* narrowly elliptic, 10–22 × 3–7 mm, with entire undulating margins. *Inflorescences* sessile, of few successively opening flowers, pedicels 8–11 × 0.5 mm, ascending to descending. *Corolla* campanulate, 4–10 × 4–10 mm; outside pale green to pink and finely pubescent, inside pale green to pink and white in tube, glabrous, finely papillate towards bases of lobes (each papilla tipped with a hair) otherwise smooth; *tube* 1.0–1.5 mm deep, broadly cupular; *lobes* 2–5 mm long, lanceolate-oblong to narrowly deltate, ascending. *Corona* ± 3–4 × 3–6 mm, ± sessile, white with green inner lobes, glabrous; *outer lobes* ± 0.5 mm long, spreading, truncate; *inner lobes* 2–4 mm long, adpressed to backs of anthers near bases then rising in centre and then connivent or diverging, linear and usually swollen towards tips.

Habitat: Flat gravelly patches or among rocks and *driedoring* (*Rhigozum trichotomum* Burch.) shrubs in flats, sometimes on gentle slopes, 1 200–1 900 m.

Flowering time: Dec.–Apr.

Distribution: Angola, Namibia. Known from Etosha to Gobabis and south to Helmeringhausen. Figure 121.

Voucher: Bruyns 5818 (BOL, WIND).

Note: Schlechter (1913) cited two specimens: Namibia, Otjihua, Okahandja, flow. Jan. 1909,

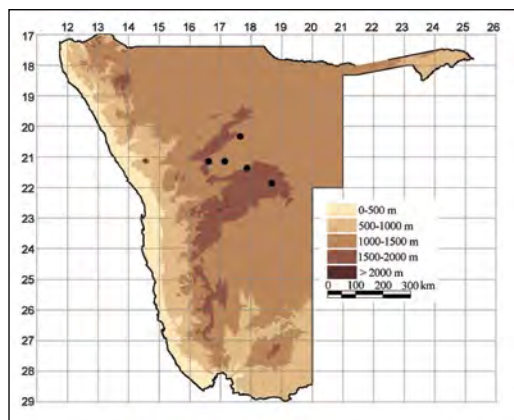


FIGURE 120.—Distribution of *Brachystelma arnotii*.

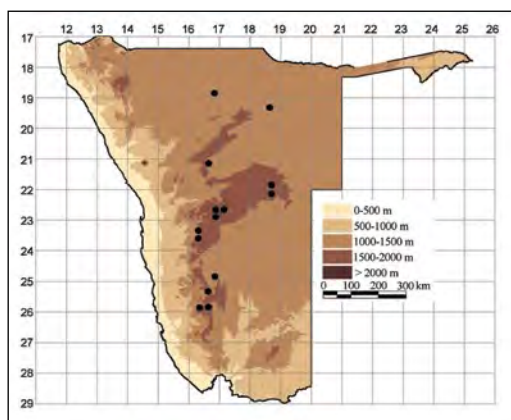


FIGURE 121.—Distribution of *Brachystelma blepharantha*.

Dinter 410; Neitsas, flow. Dec. 1910, *Dinter 680*. Both are present in SAM and one is selected as lectotype.

Brachystelma circinatum E.Mey., *Comm. Pl. Afr. Austr.*: 196 (1838). Type: from South Africa.

Small finely pubescent erect herb 50–100 mm tall, from flattened-discoid tuber. *Stem* often branched, 1.5 mm thick. *Leaves* ovate-lanceolate to linear-lanceolate, 10–30 × 3–8 mm, with entire often undulating margins. *Inflorescences* sessile, of several successively opening flowers, pedicels 1–3 × 0.5 mm, spreading. *Corolla* divided nearly to base and lobes remaining fused at tips in cage-like structure, 8–12 × 3–5 mm; outside pale green and finely pubescent, inside green-yellow to cream, finely pubescent, smooth; *tube* 0.5–1.0 × ± 2.5 mm, shallowly bowl-like; *lobes* 6–8 × 1–2 mm, linear tapering slightly from broader base. *Corona* ± 2 × 2 mm, sessile, cream, glabrous; *outer lobes* ± 0.5 mm long, erect, deeply bifid into narrow erect lobules; *inner lobes* < 1 mm long, adpressed to backs of anthers and exceeding them to meet in centre, linear, obtuse.

Habitat: Widespread on Kalahari sand among trees and bushes in flats, also on stony hills around Windhoek and east of Tsumeb, 1 100–1 800 m.

Flowering time: Dec.–Mar.

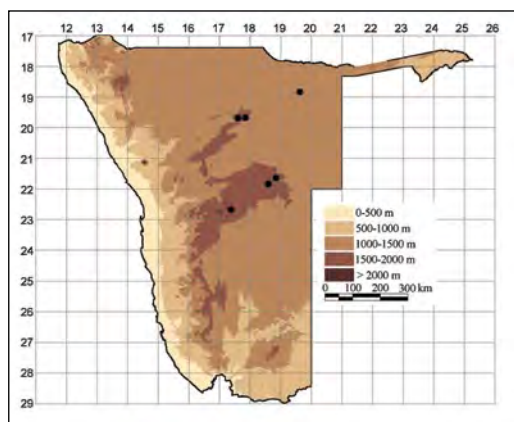


FIGURE 122.—Distribution of *Brachystelma circinatum*.

Distribution: Botswana, Mozambique, Namibia, Swaziland, Zimbabwe. In Namibia known from Kombat to Gobabis and near Windhoek. Figure 122.

Voucher: Braine sub Giess 9054 (NBG, WIND).

Brachystelma codonanthum Bruyns, *Bothalia* 25: 157 (1995). Type: Namibia, northeast of Grootfontein, Bruyns 5518 (BOL, holo.).

Small finely pubescent herb 20–150 mm tall, from flattened-discoid tuber. *Stem* usually solitary, 1.5 mm thick. *Leaves* elliptic, 11–22 × 9–15 mm, with entire margins. *Inflorescences* sessile, of several successively opening flowers, pedicels 2–3 × 0.5 mm, spreading. *Corolla* campanulate, 5 × 9–10 mm; outside pale green to brown and finely pubescent, inside green to brown with greenish tips to lobes, glabrous, obscurely transversely rugulose; *tube* 2.5 mm deep, broadly conical; *lobes* 3–4 mm long, deltate, spreading. *Corona* ± 1.5 × 3 mm, sessile, dark brown, glabrous; *outer lobes* erect and fused into cup ± 1.5 mm tall containing anthers, ± deltate and notched near apex; *inner lobes* ± 0.5 mm long, adpressed to backs of anthers near bases of anthers and much shorter than them, swollen and cushion-like, dorsally confluent with outer lobes.

Habitat: Deep white sand in open forest, 1 200 m.

Flowering time: Jan.–Mar.

Distribution: Namibia. Known only from two collections from northeast of Grootfontein. Figure 123.

Voucher: Bruyns 5990 (BOL).

Brachystelma cupulatum R.A.Dyer, *Bothalia* 10: 375 (1971). Type: Namibia, 5 miles west of Aha Hills, Story 6400 (PRE, holo.).

Small finely pubescent erect herb 50–500 mm tall, from flattened-discoid tuber. *Stems* often several and branched, 1.5–2 mm thick. *Leaves* ovate-lanceolate to elliptic or linear-lanceolate, 20–80 × 4–15 mm, with entire often undulating margins. *Inflorescences* sessile, of several succes-

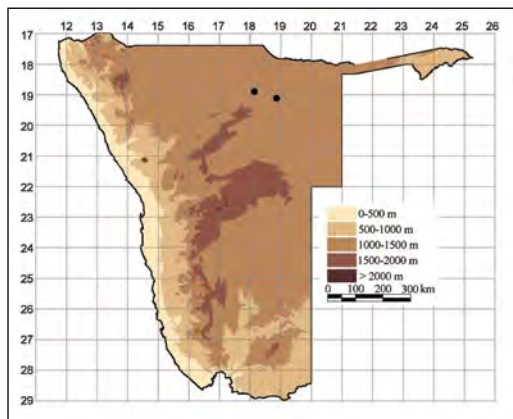


FIGURE 123.—Distribution of *Brachystelma codonantherum*.

sively opening flowers, pedicels $2-3 \times 0.5$ mm, spreading. *Corolla* $\pm$ rotate, 10–18 mm diam.; outside pale green and finely pubescent, inside green below usually changing to yellow around middle of lobes, glabrous, smooth to transversely rugulose; *tube* $1.5-3.0 \times \pm 2.5$ mm, cupular and closely surrounding corona; *lobes* $4.5-6.0 \times 2.5-4.0$ mm, oblong, broadly spreading. *Corona* $1.5-2.0 \times 2.5$ mm, slightly raised on very short stipe, green, glabrous; *outer lobes* fused into cup ± 1.5 mm tall with incurved margins, pentagonal

or rounded in cross-section, with fine notches in middle of lobes; *inner lobes* < 0.5 mm long, touching backs of anthers at bases of anthers, reduced to cushion-like swellings dorsally confluent with outer lobes. Figure 124.

Habitat: Widespread on Kalahari sand among trees and bushes in flats, 1 200–1 600 m.

Flowering time: Dec.–Mar.

Distribution: Botswana, Namibia. In Namibia known from east of Waterberg to Aha Hills, Gobabis and near Rehoboth. Figure 125.

Voucher: Dinter 2699 (PRE, SAM).

Brachystelma dinteri Schltr., *Bot. Jahrb. Syst.* 51: 144 (1913). Type: Namibia, foothills of Auasberge, flow. Mar. 1911, *Dinter* 1890 (SAM, lecto., designated here).

Small finely pubescent erect herb 50–500 mm tall, from flattened-discoïd tuber. *Stem* solitary and simple, 1.5–4.0 mm thick. *Leaves* ovate to elliptic, 10–50 $\times$ 6–20 mm, with entire margins. *Inflorescences* sessile, of several flowers opening in quick succession, pedicels $1-4 \times 0.5$ mm, spreading. *Corolla* rotate, 8–11 mm diam.; outside pale green and finely

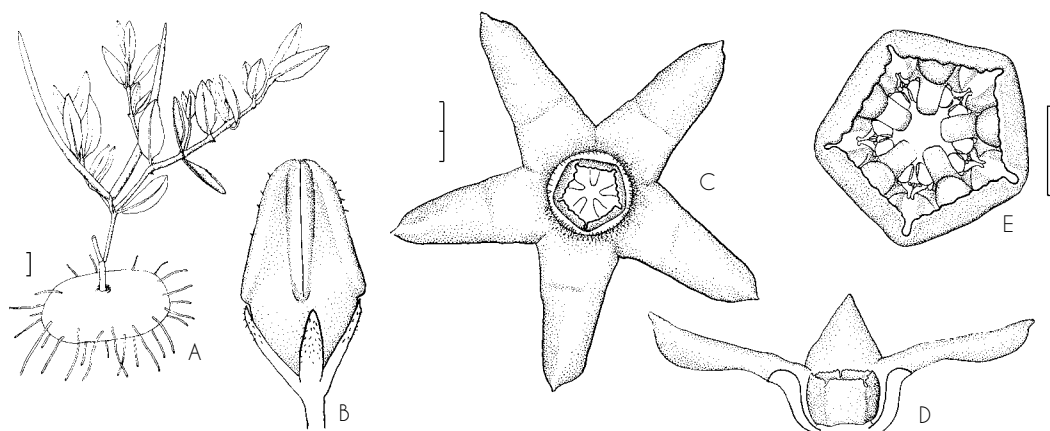
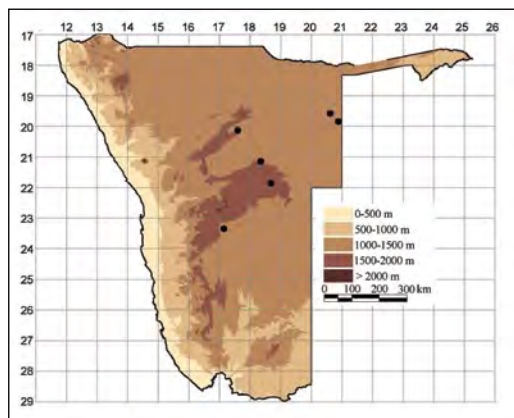


FIGURE 124.—*Brachystelma cupulatum*, A, B, near Witvlei, Namibia, *Bruyns* 1953; C–E, Botswana, *Cole* 425. A, plant; B, bud; C, face view of flower; D, side view of dissected flower; E, face view of gynostegium. Scale bars: A, 10 mm; B, C, D, 2 mm (at C); E, 1 mm.

FIGURE 125.—Distribution of *Brachystelma cupulatum*.

pubescent, inside green to speckled with brown, glabrous, smooth to finely transversely rugulose; *tube* ± 0.5 mm long; *lobes* $2-3 \times 2-3$ mm, ovate-deltate, spreading. *Corona* $1.5-2.0 \times 4$ mm, sessile, brownish green, glabrous; *outer lobes* ± 0.5 mm long, almost square and truncate or apically notched, erect and incurved towards tips; *inner lobes* < 0.5 mm long, touching backs of anthers at bases of anthers, reduced to rectangular cushion-like swellings dorsally confluent with outer lobes.

Habitat: Widespread, usually on stony slopes among trees and bushes but also in flats in sand among trees, 1 100–1 600 m.

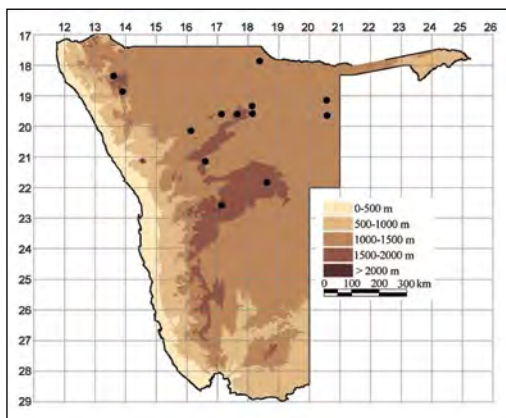
Flowering time: Dec.–Mar.

Distribution: Angola, Botswana, Namibia, Zimbabwe. In Namibia known from Kaokoveld to Grootfontein and southwards to Windhoek. Figure 126.

Voucher: Giess & al. 11075 (M, PRE, WIND).

Brachystelma discoideum R.A.Dyer, *Flow. Pl. Afr.* 42: t. 1668 (1973). Type: from South Africa.

Small finely pubescent herb 50–100 mm tall, from flattened-discoid tuber. *Stem* mostly solitary and simple, 2 mm thick. *Leaves* elliptic, $10-25 \times 8-15$ mm, with entire margins. *Inflores-*

FIGURE 126.—Distribution of *Brachystelma dinteri*.

cences sessile, of several successively opening flowers, pedicels $8-30 \times 0.5$ mm, spreading. *Corolla* rotate, $15-22$ mm diam.; outside pale green and finely pubescent, inside purple-black, glabrous, transversely rugulose; *tube* ± 1 mm long, cupular; *lobes* $8-12 \times 1-2$ mm, linear-lanceolate, ascending to spreading. *Corona* $\pm 1.5 \times 2$ mm, sessile, white below, purple on lobes, glabrous; *outer lobes* ± 1 mm long, truncate, erect and forming deep cup below anthers, slightly notched at tips; *inner lobes* < 0.5 mm long, adpressed to backs of anthers near bases of anthers and much shorter than them, slightly swollen and cushion-like, dorsally confluent with cup of outer lobes.

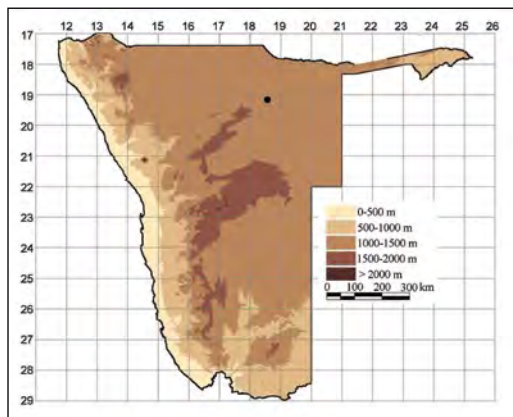
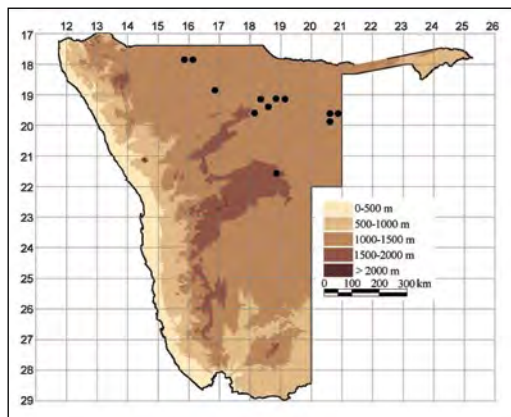
Habitat: Widespread but rare on Kalahari sand among trees and bushes, 1 200 m.

Flowering time: Dec.–Mar.

Distribution: Botswana, Namibia, South Africa, Zimbabwe. In Namibia known from a single collection from northeast of Grootfontein. Figure 127.

Voucher: Bruyns 10337 (BOL).

Note: The plant photographed in Leffers (2003) and represented in WIND by the specimens *Hines* 350 and *Firestone* N-5-2 is not *B. discoideum* and appears to be an undescribed species.

FIGURE 127.—Distribution of *Brachystelma discoideum*.FIGURE 128.—Distribution of *Brachystelma gymnopodum*.

Brachystelma gymnopodum (Schltr.) Bruyns, *Bothalia* 25: 161 (1995). *Ceropegia gymnopoda* Schltr., *Bull. Herb. Boissier* 4: 450 (1896). Type: Namibia, Ukuambi, 22 Feb. 1894, Rautanen 82 (Z, holo.).

Ceropegia pygmaea Schinz, *Verh. Bot. Vereins Prov. Brandenburg* 30: 265 (1888). Type: Namibia, Olukonda, Jan. 1886, Schinz 147 (Z, holo.).

Small finely pubescent herb 50–120 mm tall, from flattened-discoïd tuber. *Stem* mostly solitary, 1.5 mm thick. *Leaves* linear to spatulate-obovate, 25–100 × 5–20 mm, with entire margins. *Inflorescences* on decurved peduncle 4–10 × 1–2 mm, of few successively opening flowers, pedicels 3–15 × 0.5 mm, ascending to descending. *Corolla* cylindrical, 15–50 × 4–8 mm; outside pale green and finely pubescent, inside deep maroon with base becoming red above, with hairs often with swollen apex; *tube* 15–45 mm long, cylindrical, often bent downwards below middle; *lobes* 2–3 mm long, broadly deltate, erect around mouth of tube, longitudinally folded. *Corona* ± 2.5–3.5 × 3.0–3.5 mm, sessile, dark maroon, glabrous; *outer lobes* fused into urceolate tube 2.5–3.5 mm long, with 5 small spreading deltate-obtuse lobules around mouth; *inner lobes* ± 0.5 mm long, adpressed to backs of anthers near bases of anthers and much shorter than them, swollen and cushion-like, dorsally confluent with cup of outer lobes.

Habitat: Widespread on Kalahari sand among trees and bushes in flats, 100–1450 m.

Flowering time: Dec.–Apr.

Distribution: Angola, Botswana, Namibia, South Africa, Zimbabwe. In Namibia known from Ondangua to Grootfontein and near Aha Hills. Figure 128.

Voucher: Giess & al. 11080 (PRE, WIND).

Brachystelma mafekingense N.E.Br., *Fl. Cap.* 4 (1): 854 (1908). (= *Ceropegia mafekingensis* (N.E.Br.) R.A.Dyer). Type: from South Africa.

Small finely pubescent herb 30–150 mm tall, from flattened-discoïd tuber. *Stem* mostly solitary, often much branched, 1.5–2.0 mm thick. *Leaves* oblong-lanceolate to elliptical, 7–30 × 5–10 mm, with entire often undulating margins. *Inflorescences* sessile, of many ± simultaneously opening flowers, pedicels 3–12 × 0.5 mm, ascending. *Corolla* campanulate, 10–12 mm long; outside cream spotted with dark purple and very sparsely pubescent, inside dark maroon-black becoming paler in tube, glabrous; *tube* 4–6 × 3.0–3.5 mm, urceolate and pentagonal in cross-section; *lobes* 5–7 mm long, broadly linear from deltate base, spreading from mouth of tube and slightly incurved near tips. *Corona* 2.5 × 2 mm, raised on short stipe, dark purple, glabrous; *outer lobes* fused into short cup < 1 mm tall below anthers and behind inner lobes, deeply divided opposite guide-rails; *inner lobes* 1–2 mm long, adpressed

to backs of anthers then rising in column in centre, linear, dorsally confluent with cup of outer lobes.

Habitat: Widespread on Kalahari sand among trees and bushes in flats but also in hills around Windhoek, 1 500–1 900 m.

Flowering time: Dec.–Apr.

Distribution: Namibia, South Africa. In Namibia known from Kombat to near Gobabis and near Windhoek. Figure 129.

Voucher: Dinter 2701 (SAM, WIND).

Note: This species is unusual for its dense clusters of simultaneously opening, foul-smelling, almost black flowers.

Brachystelma pruinosum Bruyns, *Novon* 19: 18 (2009). Type: Namibia, Otjihipa above Okombambi, Bruyns 8021 (BOL, holo.; K, WIND, iso.).

Small finely pubescent herb 50–100 mm tall, from flattened-discoid tuber. *Stem* mostly solitary and simple, 1.5 mm thick. *Leaves* narrowly elliptic, 15–25 × 3–8 mm, with entire margins. *Inflorescences* almost sessile, of several successively opening flowers, pedicels 10–15 × 0.5 mm, descending. *Corolla* rotate, 5–8 mm diam.; outside dark green and finely pubescent, inside purple-

brown with paler patch near tips of lobes, pubescent with fine white crinkled hairs; *tube* ± 0.5 mm long, shallowly cupular; *lobes* 2–3 × 1.5–2.0 mm, deltate to ovate-deltate, reflexed. *Corona* ± 1.75 × 2.00 mm, sessile, white below, black on lobes, glabrous; *outer lobes* ± 1 mm long, deltate, erect and slightly incurved, bifid to near middle; *inner lobes* < 0.5 mm long, adpressed to backs of anthers and shorter than them, deltoid.

Habitat: Stony ground among scattered trees and bushes, 1 200–1 800 m.

Flowering time: Dec.–Mar.

Distribution: Angola, Namibia. In Namibia known from single collection from the Otjihipa Mountains in the Kaokoveld. Figure 130.

Voucher: Bruyns 8021 (BOL, K, WIND).

Brachystelma recurvatum Bruyns, *Bothalia* 25: 156 (1995). Type: Namibia, Otavi Mountains, Bruyns 5486 (BOL, holo.; WIND, iso.).

Slender finely pubescent herb 60–300 mm tall, from flattened-discoid tuber. *Stem* often solitary, 1–2 mm thick. *Leaves* linear-lanceolate, 30–90 × 3–13 mm, with entire margins. *Inflorescences* almost sessile, of several successively opening flowers, pedicels 10–16 × 0.25 mm, spreading. *Corolla* rotate-reflexed, 7–8 mm diam.; outside pale green and finely pubescent, inside green-

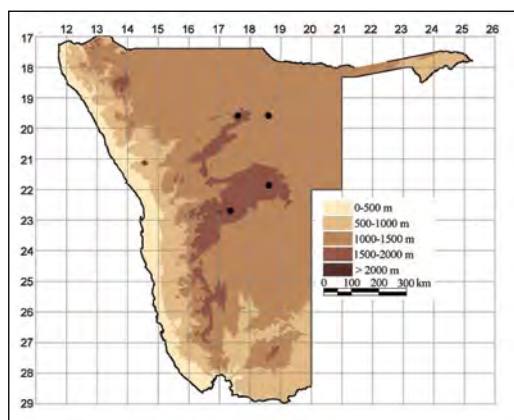


FIGURE 129.—Distribution of *Brachystelma mafekingense*.

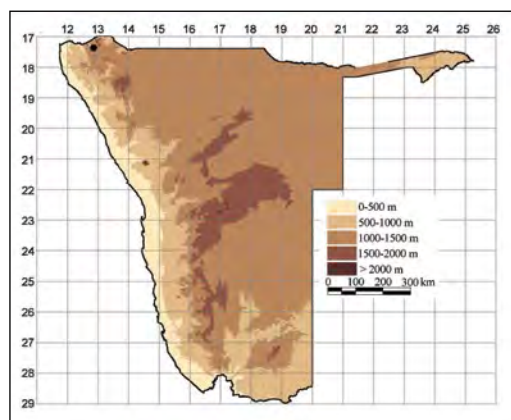


FIGURE 130.—Distribution of *Brachystelma pruinosum*.

black blotched with yellow, pubescent, smooth; *tube* 0.5 mm long, shallowly plate-like; *lobes* 6–8 mm long, deltate and erect for lower 1.5 mm then becoming slender, linear and recurved above, inside brown-green and pubescent. *Corona* $\pm 1 \times 1.5$ mm, sessile, pale yellow, glabrous; *outer lobes* ± 0.5 mm long, erect, truncate and notched near apex; *inner lobes* ± 0.5 mm long, adpressed to backs of anthers and almost equaling them, slender and linear, with broad dorsal projection confluent with outer lobes.

Habitat: Stony sloping ground among grasses and trees, 1 200–1 800 m.

Flowering time: Jan.–Mar.

Distribution: Angola, Namibia. In Namibia known from Grootfontein to Outjo. Figure 131.

Voucher: Bruyns 5486 (BOL, WIND).

Brachystelma schinzii (K.Schum.) N.E.Br., *Fl. Trop. Afr.* 4 (1): 471 (1903). *Craterostemma schinzii* K.Schum., *Bot. Jahrb. Syst.* 17: 154 (1893). Type: Namibia, Ovamboland, near Olukonda, Jan. 1886, *Schinz* 163 (Z, holo.).

Small finely pubescent herb 50–100 mm tall, from flattened-discoid tuber. *Stem* mostly solitary and sparsely branched, 1.5 mm thick. *Leaves* linear, 10–50 $\times$ 2–5 mm, with entire margins. *Inflorescences* sessile, of several successively opening flowers, pedicels 12–16 $\times$ 0.5 mm, ascending.

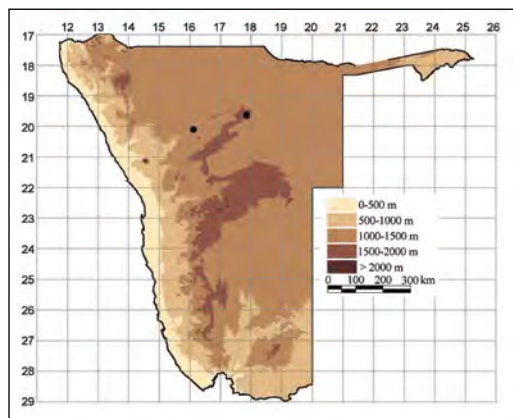


FIGURE 131.—Distribution of *Brachystelma recurvatum*.

Corolla rotate, 8–10 mm diam.; outside pale green and finely pubescent, inside purple-brown with white centre, pubescent with fine hairs to glabrous, smooth; *tube* ± 0.5 mm long, shallowly cupular; *lobes* 4–6 $\times$ 2–4 mm, ovate to lanceolate, spreading and not recurved, with pendulous subclavate cilia along margins. *Corona* sessile, white with purple-brown margins, glabrous; *outer lobes* < 1 mm long, truncate, annular or cup-like around anthers, slightly notched around margins; *inner lobes* < 0.5 mm long, adpressed to backs of anthers near bases of anthers and much shorter than them, slightly swollen and cushion-like, dorsally confluent with cup of outer lobes.

Habitat: Flat areas with white sand among trees, 1 100 m.

Flowering time: Dec.–Mar.

Distribution: Namibia, Zimbabwe. In Namibia known from near Ondangua. Figure 132.

Voucher: Sheuyanga 1295 (WIND).

Brachystelma schultzei (Schltr.) Bruyns, *Bothalia* 25: 162 (1995). *Tenaris schultzei* (Schltr.) E.Phill., *Bothalia* 4: 41 (1941). *Kinpetalum schultzei* Schltr., *Bot. Jahrb. Syst.* 51: 150 (1913). Type: Namibia, Okakuja, Dinter 2528 (SAM, lecto., Bruyns 1995).

Small finely pubescent herb 50–200 mm tall, from flattened-discoid tuber. *Stem* mostly solitary

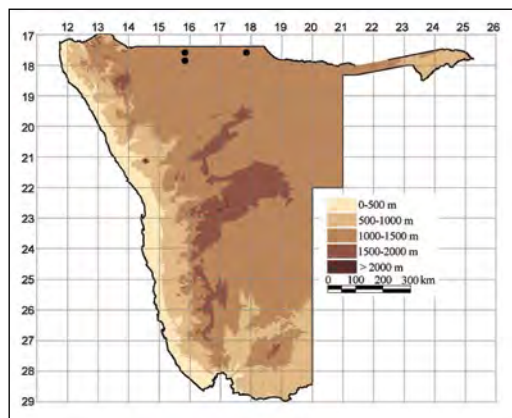


FIGURE 132.—Distribution of *Brachystelma schinzii*.

and branched above, 1.5 mm thick. *Leaves* linear, 25–50 × 1–3 mm, with entire margins. *Inflorescences* sessile, of few successively opening flowers, pedicels 5–12 × 0.5 mm, spreading. *Corolla* rotate, 60–100 mm diam.; outside pale green and finely pubescent, inside pale green with fine darker spots near centre, pubescent, with clavate hairs near centre; *tube* < 0.5 mm long, plate-like; *lobes* 30–50 × 1–2 mm, linear from slightly deltate base, spreading. *Corona* ± 3.5 × 2.5 mm, sessile, glabrous; *outer lobes* ± 0.5 mm long, deltate, ascending, deeply notched near apex; *inner lobes* ± 2 mm long, adpressed to backs of anthers near bases then rising in centre and connivent, linear, with finely papillate tips.

Habitat: Widespread but rare on Kalahari sand among trees and bushes in flats, 1 100–1 300 m.

Flowering time: Dec.–Apr.

Distribution: Botswana, Namibia, South Africa. In Namibia known from near Gobabis. Figure 133.

Voucher: Grabow 8 (WIND).

Brachystelma stenophyllum (Schltr.) R.A. Dyer, *Bothalia* 10: 376 (1971). *Siphonostelma stenophyllum* Schltr., *Bot. Jahrb. Syst.* 51: 148 (1913). Type: Namibia, near Grootfontein, flow. Jan. 1912, *Dinter* 2361 (SAM, lecto., designated here).

Small finely pubescent herb 30–150 mm tall, from flattened-discoid tuber. *Stem* mostly solitary, sometimes branched, 1.5 mm thick. *Leaves* narrowly linear, 20–50 × 2–5 mm, with entire margins. *Inflorescences* sessile, of few successively opening flowers, pedicels 3–8 × 0.5 mm, ascending. *Corolla* narrowly campanulate, 12–20 × 3.0–4.5 mm; outside pale green and finely pubescent, inside maroon, glabrous; *tube* 3–8 mm long, cupular and slightly pentagonal in cross-section; *lobes* 4–14 mm long, linear from ovate-lanceolate to deltate base, erect around mouth of tube and remaining joined at tips. *Corona* 1.5–2.0 × 2.5 mm, sessile, yellow, glabrous; *outer lobes* fused into urceolate tube 1.5–2.0 mm long, with 5 small erect deltate-obtuse lobules

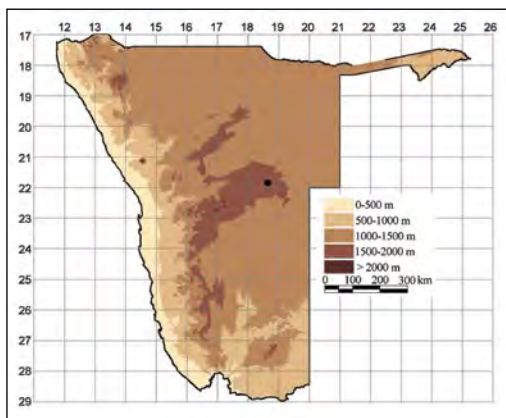


FIGURE 133.—Distribution of *Brachystelma schultzei*.

around mouth; *inner lobes* ± 0.5 mm long, adpressed to backs of anthers near bases of anthers and about half their length, swollen and cushion-like near base becoming narrower above, dorsally confluent with cup of outer lobes.

Habitat: Widespread on Kalahari sand among trees and bushes in flats, 1 400–1 600 m.

Flowering time: Dec.–Apr.

Distribution: Namibia, South Africa. In Namibia known from Kombat to near Gobabis. Figure 134.

Voucher: Braine sub Giess 9055 (M, NBG, WIND).

Note: There is no evidence that Schlechter saw the specimen *Dinter* 2361 (SAM) and so this is designated as the lectotype.

***Ceropegia* L.**

Sometimes slightly succulent climber to erect herb with swollen fusiform roots or subterranean tuber, often pubescent, sap clear to slightly milky. *Leaves* narrowly linear to broadly ovate or circular, petioles often short and indistinct. *Inflorescences* several in pedunculate or sessile cymes, 1- to 20-flowered, flowers usually opening in succession. *Corolla* tubular with lobes free or remaining united at tips; *tube* 10–70 mm long, bottle-shaped or cylindrical,

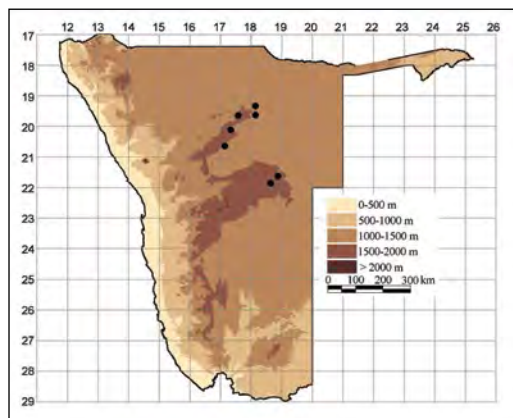


FIGURE 134.—Distribution of *Brachystelma stenophyllum*.

straight or mostly with slender curved cylindrical part above swollen basal inflation (around corona) becoming broader and often funnel-like at mouth, sometimes pilose, basal inflation

sometimes papillate; lobes often slender and brightly coloured inside; gynostegial corona of 2 series slightly fused, often raised on short stout stipe; outer series of 5 lobes, as free, bifid or undivided segments or fused into cup-like structure around or beneath anthers; inner series of 5 lobes, simple, adpressed to backs of anthers and mostly far exceeding them to rise up in column in centre, linear and often becoming broader above base; anthers horizontal on top of style head, margins shrinking back to expose pollinia, rectangular; pollinium $\pm$ D-shaped, with insertion-crest along outer edge. Follicles paired, erect to spreading at 180°, terete, usually glabrous, smooth.

$\pm$ 160 species, South Africa to India, China and northern Australia. *C. filiformis* and *C. floribunda* have been discovered in Namibia since the account of Bruyns (1984), making this the largest genus in the Apocynaceae in Namibia.

Key to species

- 1a. Plant with one or more flattened, discoid, fleshy or hard tubers 2.
- 1b. Plant without a tuber, rootstock a cluster of swollen, fusiform roots 10.
- 2a. Leaves succulent 3.
- 2b. Leaves not at all succulent 6.
- 3a. Plant a dwarf succulent to 120 mm tall; basal inflation of corolla tube without scattered wart-like papillae inside **C. occidentalis**
- 3b. Plant a climber to 1–3 m; basal inflation of corolla tube with scattered wart-like papillae inside 4.
- 4a. Flowers sessile, corolla glabrous outside, corolla lobes linear-attenuate and remaining fused at tips or tapering to filiform usually free and widely spreading tips 5.
- 4b. Flowers borne on distinct peduncle 10–20 mm long, corolla finely pubescent outside, corolla lobes remaining fused at apices into cage over tube **C. pachystelma**
- 5a. Corolla lobes tapering to filiform usually free and widely spreading tips **C. multiflora**
- 5b. Corolla lobes linear-attenuate but not becoming filiform and remaining joined at tips **C. floribunda**
- 6a. Plant an erect non-climbing herb to 0.4 m tall with linear leaves; flowers solitary **C. dinteri**
- 6b. Plant a climber to 1–3 m with ovate-lanceolate to elliptic leaves; flowers several per inflorescence 7.
- 7a. Peduncles 15–35 mm long; tuber usually more than one per plant, fleshy with smooth soft epidermis; corolla tube bent at right angle above basal inflation **C. purpurascens**
- 7b. Peduncles not exceeding 10 mm long or absent; tuber solitary, hard with rough exterior; corolla tube straight from base or scarcely bent above basal inflation 8.
- 8a. Tuber covered with elliptic protuberances; corolla 10–15 mm long; outer corona lobes recurved and spreading towards base of tube **C. stenoloba**
- 8b. Tuber without elliptic protuberances; corolla 16 mm long or more; outer corona lobes ascending or broadly spreading but not recurved towards base of tube 9.
- 9a. Corolla 16–22 mm long; sepals 2–3 mm long; outer corona lobes broadly spreading and deeply bifid **C. paricyma**
- 9b. Corolla 40–60 mm long; sepals 5–12 mm long; outer corona lobes ascending to spreading near tips only and entire **C. meyeri**
- 10a. Stems with slight ridges originating at base of each leaf-pair, giving stem slightly angular cross-section 11.

- 10b. Stems without ridges originating at base of each leaf-pair, stem with circular cross-section 13.
 11a. Inflorescence sessile; leaves with entire margin; corolla uniformly pale yellow to cream outside **C. stenantha**
 11b. Inflorescence borne on distinct peduncle 10–30 mm long; leaves with finely denticulate margins; corolla mottled on pale background outside 12.
 12a. Basal inflation of corolla tube constricted around middle then broader and becoming narrow again; corolla lobes slender and attenuated or forming $\pm$ triangular cage over tube **C. nilotica**
 12b. Basal inflation of corolla tube not constricted around middle; corolla lobes forming $\pm$ circular cage over tube **C. crassifolia**
 13a. Leaves linear and 3–6 mm broad; corolla tube with longitudinal ridges of papillae in basal inflation ... **C. filiformis**
 13b. Leaves ovate to lanceolate or elliptic and at least 7 mm broad; corolla tube without papillae in basal inflation ... 14.
 14a. Stems 3–8 mm thick, slightly succulent; basal inflation of corolla with hairs; corona sessile but outer lobes not fused to base of tube, outer lobes bifid near tips only **C. lugardiae**
 14b. Stems 1–2 mm thick, wiry; basal inflation of corolla glabrous; outer corona fused to base of tube and outer lobes bifid right to point of fusion to corolla tube **C. carnosa**

Ceropegia carnosa E.Mey., *Comm. Pl. Afr. Austr.*: 193 (1838). Type: from South Africa (incl. *Ceropegia racemosa* N.E.Br.).

Ceropegia cynanchioides Schltr., *Bot. Jahrb. Syst.* 51: 153 (1913). Type: Namibia, Gaub, flow. Jan. 1912, Dinter 2410 (SAM, lecto., designated here).

Finely pubescent climber to scrambler to 1–3 m with scarcely succulent stems and herbaceous leaves, from cluster of swollen fleshy roots. Stems 1–2 mm thick, circular in cross-section, mostly deciduous. Leaves elliptic to ovate or circular, 10–30(60) $\times$ 7–20 mm, with entire margins. Inflorescences with slender spreading or descending peduncle 20–30 $\times$ 1–2 mm, pedicels 10–15 $\times$ 1–2 mm, ascending. Corolla 20–30 mm long; outside pale pink-green to yellow and shortly pubescent from mouth of tube to middle, inside pink becoming deep maroon in lower half of tube; tube 12–20 $\times$ 7–8 mm, basal inflation almost ovate then strongly constricted into tube, funnel-like towards mouth, pubescent except above basal inflation below funnel; lobes 5–12 mm long, ovate near base then tapering to linear near tips, inside grey with reticulation of purple-grey veins and white hairs with uniformly maroon upper half. Corona 4–5 $\times$ 3–4 mm, dark maroon with pale yellow inner lobes, sessile and fused to base of tube, pubescent with hairs $\pm$ 1 mm long on outer lobes and bases of inner; outer lobes broadly cupular slightly below anthers, deeply bifid right to base, tips connivent; inner lobes 3.0–3.5 mm long, adpressed to backs of anthers then ascending in column in centre and slightly recurved near tips, linear.

Habitat: Among trees on stony hillsides, 900–1 600 m.

Flowering time: Dec.–Apr.

Distribution: South Africa to West Africa, Madagascar. In Namibia recorded from Kaokoveld to Omaruru and Otavi Mountains. Figure 135.

Voucher: Giess 12471 (PRE, WIND).

Ceropegia crassifolia Schltr., *J. Bot.* 33: 273 (1895). Type: from South Africa.

Ceropegia tuberculata Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 19: 178 (1923). Type: Namibia, Awas Mountains, 1 900–2 000 m, 4 Feb. 1923, Dinter 4423 (missing).

Glabrous climber to 2 m with succulent stems and leaves, from cluster of swollen fleshy

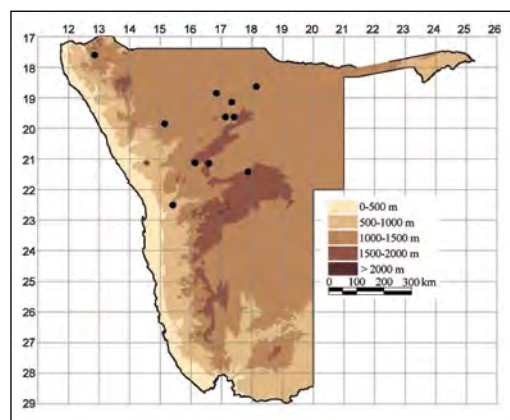


FIGURE 135.—Distribution of *Ceropegia carnosa*.

roots. *Stems* 3–6 mm thick, slightly 4-angled in cross-section, deciduous. *Leaves* elliptic or ovate-lanceolate to linear, 30–100 × 5–40 mm, with finely denticulate margins. *Inflorescences* with ascending peduncle 10–15 × 2–3 mm, pedicels 10–20 × 2–3 mm, ascending. *Corolla* 25–50 mm long; outside white with purple blotches and glabrous, inside white with maroon lines; *tube* 20–40 × 10–15 mm, basal inflation almost spherical then constricted into narrow tube widening slightly towards mouth, pubescent except in basal inflation where longitudinally ridged; *lobes* 5–16 mm long, ovate but folded and linear, inside pale green with reticulation of purple-grey veins and maroon hairs. *Corona* ± 2–3 × 4–5 mm, white with maroon patches, sessile, glabrous; *outer lobes* broadly cupular containing anthers, slightly spreading above; *inner lobes* ± 0.8 mm long, adpressed to backs of anthers then just meeting in centre, very slender from broad base.

Habitat: Among trees on stony hillsides to sandy flats, 1 200–2 000 m.

Flowering time: Dec.–Mar.

Distribution: Namibia and South Africa to Kenya. In Namibia sparsely recorded from Windhoek and Gobabis to near Kombat. Figure 136.

Voucher: Toelken 175 (WIND).

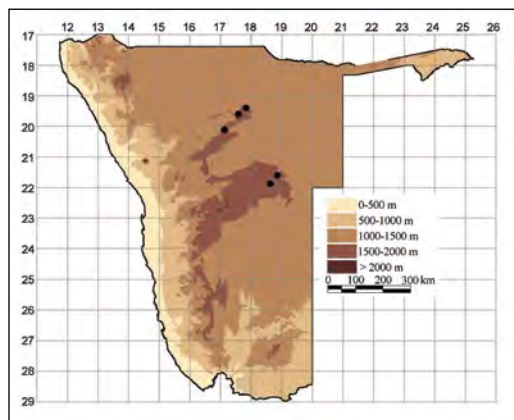


FIGURE 136.—Distribution of *Ceropegia crassifolia*.

Ceropegia dinteri Schltr., *Bot. Jahrb. Syst.* 51: 153 (1913). Type: Namibia, Rehoboth, flow. Jan. 1912, *Dinter 2527* (SAM, lecto., designated here).

Dwarf slender erect herb to 0.4 m tall, from flattened-discoïd tuber. *Stem* usually solitary, 1.5–2.0 mm thick, circular in cross-section, deciduous. *Leaves* linear, 50–150 × 3–4 mm, with entire margins. *Inflorescences* sessile, single-flowered, pedicels 10–25 × 1 mm, ascending. *Corolla* 60–120 mm long; outside white with green-purple spots and glabrous, inside brown between green lines above basal inflation; *tube* 20–50 × 5–6 mm, basal inflation ellipsoidal then constricted slightly into narrow tube widening slightly to mouth, glabrous; *lobes* 30–50 mm long, slightly ovate near base then folded above into slender linear tails usually twisted together above mouth of tube, inside green and purple above paler base, with marginal cilia. *Corona* ± 6 × 5 mm, yellow with red spots, on short stipe, glabrous; *outer lobes* broadly cupular well below anthers, erect; *inner lobes* ± 2.5 mm long, adpressed to backs of anthers then rising in column in centre, linear becoming slightly broader above base.

Habitat: Among stones on rocky slopes and in sandy flats among trees, 1 000–1 650 m.

Flowering time: Nov.–Feb.

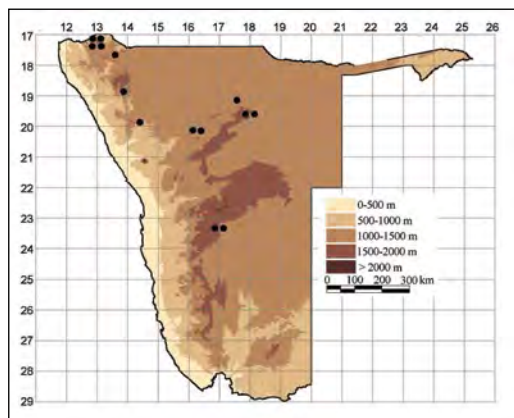
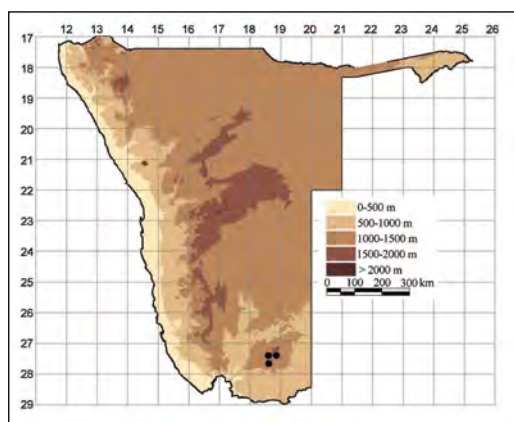
Distribution: Angola, Namibia. In Namibia recorded from Rehoboth to mountains of Kaokoveld. Figure 137.

Voucher: Kolberg 1443 (WIND).

Note: There is no evidence that Schlechter saw the specimen *Dinter 2527* (SAM) and so this is designated as the lectotype.

Ceropegia filiformis (Burch.) Schltr., *Bot. Jahrb. Syst.* 21, *Beibl.* 54: 13 (1896). Type: from South Africa.

Glabrous climber or scrambler to 1 m with herbaceous stems and leaves, from cluster of swollen fleshy roots. *Stems* 1–2 mm thick, circular in cross-section, deciduous. *Leaves* linear-lanceolate to linear, 20–50 × 3–6 mm, with entire margins. *Inflorescences* with spreading peduncle 6–10 mm

FIGURE 137.—Distribution of *Ceropegia dinteri*.FIGURE 138.—Distribution of *Ceropegia filiformis*.

long, pedicels 6–12 × 1 mm, ascending. *Corolla* 30–50 mm long; outside faintly white with green lines on basal inflation becoming maroon-blotched above on white and glabrous, inside white with green lines and scattered green papillae in basal inflation (mouth of tube with black edges), glabrous; *tube* 25–35 × 6–9 mm, spherical to ellipsoidal base constricted strongly after ± 12 mm, broadening slightly near funnel-like mouth; *lobes* 12–17 mm long, narrowly linear from narrowly deltate base and twisted together apically, inside with black margins and white midrib area, glabrous. *Corona* 5 × 3.5–5.0 mm, purple-red and yellow flecked with red, raised on very slight stipe,

pubescent on outer and bases of inner lobes; *outer lobes* cupular containing anthers, deeply bifid with spherical apices; *inner lobes* ± 3 mm long, adpressed to backs of anthers then erect in column in centre, linear.

Habitat: In flat, stony areas among short bushes, 1 600–1 700 m.

Flowering time: Dec.–Mar.

Distribution: Namibia, South Africa. In Namibia only known on the flat plateaux of the Great Karas Mountains. Figure 138.

Voucher: Bruyns 3523 (BOL, WIND).

Ceropegia floribunda N.E.Br., *Fl. Trop. Afr.* 4 (1): 460 (1903). Type: from Botswana.

Glabrous climber to 2 m with wiry-fleshy stems and fleshy leaves, from fleshy tuber with fibrous roots. *Stems* 1.5–2.0 mm thick, circular in cross-section, often deciduous. *Leaves* elliptic, 15–25 × 8–15 mm, with entire margins. *Inflorescences* sessile, pedicels 4–10 × 1 mm, ascending. *Corolla* 20–30 mm long (in bud with slender apex); outside green and glabrous, inside sparsely pubescent with white hairs, with white papillae in basal inflation; *tube* 10–12 × 4–6 mm, basal inflation ellipsoidal then constricted into narrow tube hardly widening at all towards mouth; *lobes* 6–8 mm long, slender and linear, remaining joined at tips. *Corona* ± 3 × 3 mm, white with few maroon patches, on short stipe, glabrous; *outer lobes* broadly cupular just reaching height of anthers, slightly spreading above; *inner lobes* ± 1 mm long, adpressed to backs of anthers then rising in column in centre, linear becoming slightly broader above base.

Habitat: Among bushes and trees in sand, 1 000–1 100 m.

Flowering time: Nov.–Mar.

Distribution: Botswana, Namibia. In Namibia known near Tsumkwe. Figure 139.

Voucher: Story 6483 (PRE).

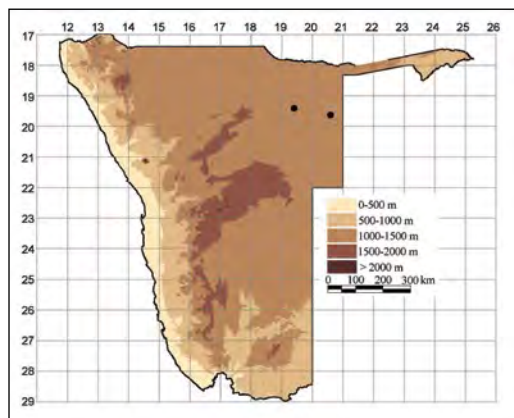


FIGURE 139.—Distribution of *Ceropegia floribunda*.

Ceropegia lugardiae N.E.Br., *Gard. Chron. Ser.* 3, 30: 302 (1901). Type: from Botswana.

Ceropegia apiculata Schltr., *Bot. Jahrb. Syst.* 51: 152 (1913). Type: Namibia, Aitsas, flow. Dec. 1908, Dinter 703 (SAM, lecto., designated here).

Glabrous climber to 1–3(10) m with slightly succulent stems and herbaceous leaves, from cluster of swollen fleshy roots. *Stems* 3–8 mm thick, with slight waxy bloom, circular in cross-section, perennial. *Leaves* elliptic to ovate, 20–60 × 10–45 mm, with entire margins. *Inflorescences* with spreading peduncle 20–30 × 2 mm, pedicels 15–20 × 1–2 mm, ascending. *Corolla* 25–50 mm long; outside pale green with purple blotches and glabrous or very shortly pubescent, inside grey-yellow becoming deep maroon in lower half of tube; *tube* 15–30 × 10–12 mm, basal inflation almost rectangular then slightly constricted into tube, broadly funnel-like towards mouth, pubescent except above basal inflation below funnel; *lobes* 10–20 mm long, ovate near base then tapering to linear and slightly broader near tips (tapering portion sometimes absent), inside grey with reticulation of purple-grey veins and white hairs with uniformly beige to maroon upper half. *Corona* 5–6 × 3–4 mm, yellow with maroon patches, sessile, pubescent on outer lobes and bases of inner lobes; *outer lobes* broadly cupular containing anthers, deeply bifid, erect; *inner lobes* 3.0–3.5 mm long, adpressed to backs of anthers then ascending in column in centre and recurved near tips, linear. Figure 140.

Habitat: Among trees on stony hillsides to sandy flats, 1 200–1 600 m.

Flowering time: Dec.–Mar.

Distribution: Angola, Botswana, Namibia, Zimbabwe. In Namibia recorded from Otjiwarongo to Ondangwa and Rundu and in Caprivi. Figure 141.

Voucher: De Winter & Giess 6847 (PRE, WIND).

Note: Plants from eastern Caprivi lack the narrower apical portion of the lobes so that the top of the corolla is more or less circular in outline.

Ceropegia meyeri Decne. in DC., *Prodr.* 8: 645 (1844). Type: from South Africa.

Slender finely pubescent climber to 2 m, from small, slightly flattened, hard tuber with fibrous and thickened roots. *Stem* usually solitary, 1–3 mm thick, circular in cross-section, deciduous. *Leaves* ovate-lanceolate, 25–120 × 10–45 mm, with entire margins. *Inflorescences* sessile, pedicels 5–20 × 1 mm, ascending. *Corolla* 40–60 mm long; outside cream finely lined with brown and glabrous, inside glabrous; *tube* ± 45 × 8 mm, bottle-shaped with long basal inflation gradually constricted into narrow neck widening slightly at mouth; *lobes* 6–10 mm long, ovate near base then folded and linear above, inside black and green, pubescent especially towards margins. *Corona* ± 2.5 × 3 mm, raised on short stipe, finely pubescent; *outer lobes* ascending, much exceeding height of anthers, linear, obtuse; *inner lobes* ± 1.5 mm long, adpressed to backs of anthers then rising and connivent in centre, linear with broadened obtuse tips.

Habitat: Stony ground among bushes and trees, ± 1 000 m.

Flowering time: Jan.–Mar.

Distribution: South Africa to Zambia. In Namibia only known on Impalela Island in the Zambezi River and south of Rundu. Figure 142.

Voucher: De Winter & Marais 4633 (BOL, PRE).

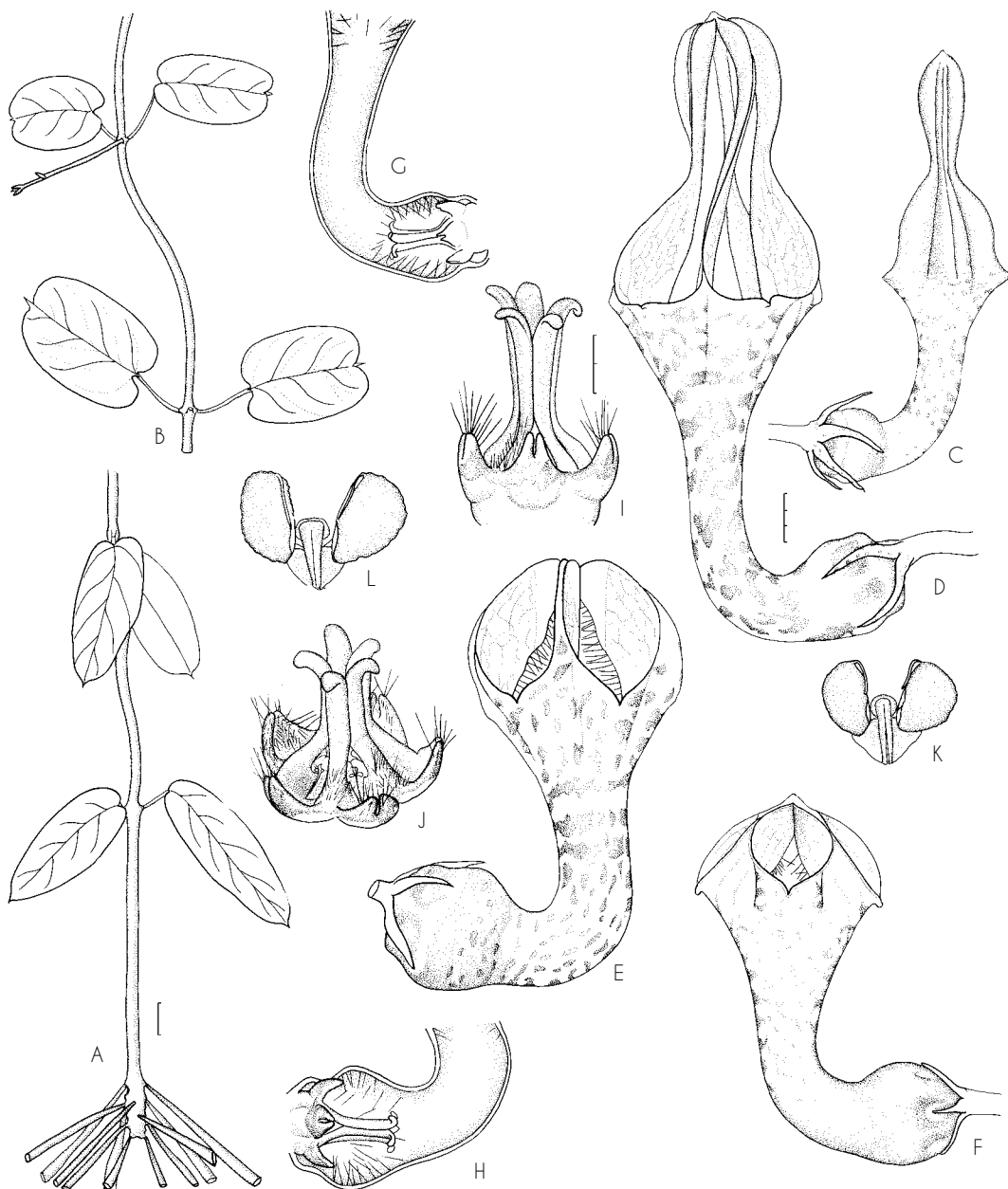


FIGURE 140.—*Ceropogia lugardiae*, A, B, near Witvlei, Namibia, Bruyns 2276; C, Rundu, Namibia, Bruyns 2312; D, G, I, K, near Otavi, Namibia, Bruyns 1943; E, H, J, L, Katima Mulilo, Namibia, Bruyns 2286; F, NW of Molepolole, Botswana, Bruyns. A, B, part of plant; C, bud; D, E, F, side view of flower; G, H, side view of centre of dissected flower; I, J gynostegium; K, L, pollinarium. Scale bars: A, B, 10 mm (at A); C–H, 3 mm (at D); I, J, 2 mm (at I); K, L, 0.25 mm (at D).

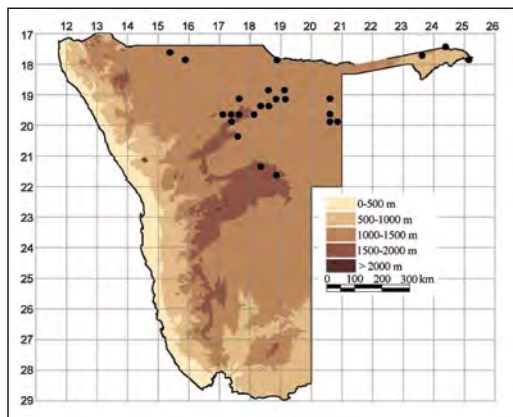


FIGURE 141.—Distribution of *Ceropogia lugardiae*.

Note: Plants from Namibia have been referred to *C. bonafouxii* K.Schum. (e.g. Dyer 1980), but it is impossible to separate these from *C. meyeri*, under which they are included here.

Ceropogia multiflora Baker, *Refug. Bot.* 1: t. 10 (1869). Type: from South Africa.

Glabrous climber to 3 m with wiry-fleshy stems and fleshy leaves, from fleshy tuber with fibrous roots. *Stems* 1.5–2.0 mm thick, circular in cross-section, often deciduous. *Leaves* linear near base of plant becoming ovate or circular above, 20–70 × 4–30 mm, with entire margins. *Inflorescences* sessile, pedicels 4–10 × 1 mm, ascending. *Corolla* 20–45 mm long (in bud with filiform apex); outside green suffused with brown and glabrous, inside pale pink, pubescent and with white papillae in basal inflation; *tube* 16–30 × 4–6 mm, basal inflation ellipsoidal then constricted into narrow tube widening slightly towards mouth; *lobes* 10–16 mm long, linear becoming filiform towards tips, inside olive-green with short white hairs. *Corona* ± 3 × 3 mm, white with few maroon patches, on short stipe, glabrous; *outer lobes* broadly cupular just reaching height of anthers, slightly spreading above; *inner lobes* ± 2 mm long, adpressed to backs of anthers then rising in column in centre, linear becoming slightly broader above base.

Habitat: Among stones and bushes or in sand among trees, 1 000–1 600 m.

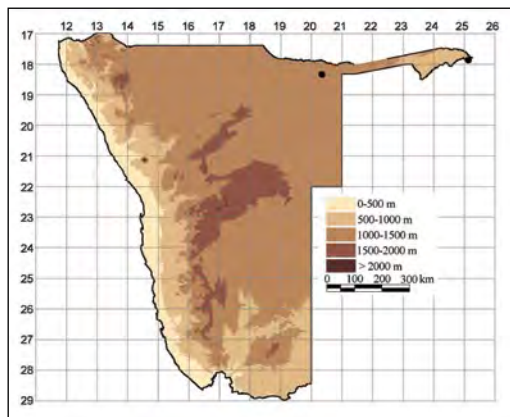


FIGURE 142.—Distribution of *Ceropogia meyeri*.

Flowering time: Nov.–Mar.

Distribution: Widespread in southern Africa. In Namibia from Kaokoveld to Caprivi and south to Okavandja and Gobabis. Figure 143.

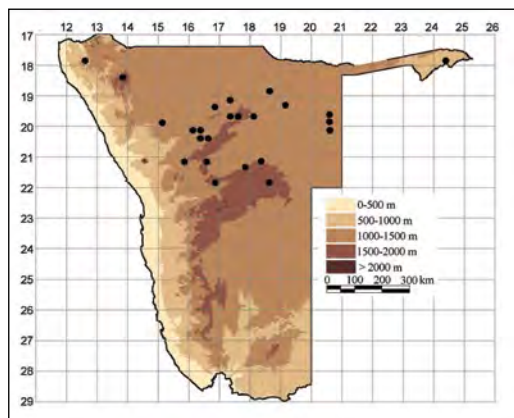
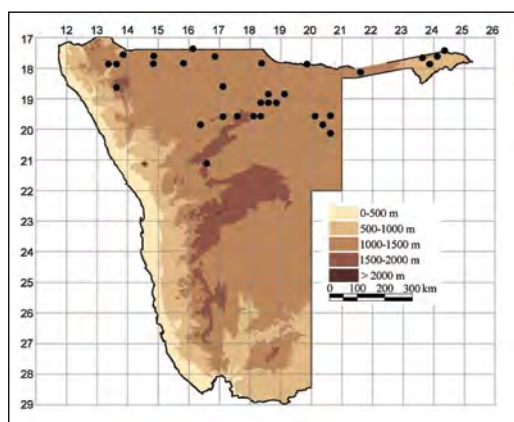
Voucher: Abner 79 (PRE, WIND).

Note: Material in Namibia is usually referred to subsp. *tentaculata* (N.E.Br.) H.Huber.

Ceropogia nilotica Kotschy, *Sitzungsber. Kaiserl. Akad. Wiss. Math.-Naturwiss. Cl., Abt. 1*, 51: 356 (1865). Type: from Sudan.

Ceropogia boussingaultifolia Dinter, *Neue Pfl. Südw.-Afr.* 21 (1914). Type: Namibia, 'Grootfontein', Jan. 1912, Dinter 2780 (SAM, lecto., designated here).

Glabrous climber to 5 m with slightly succulent stems and leaves, from cluster of swollen fleshy roots. *Stems* 3–5 mm thick, slightly 4-angled in cross-section, deciduous. *Leaves* ovate-lanceolate, 25–70 × 5–30 mm, with finely denticulate margins. *Inflorescences* with spreading or descending peduncle 10–30 × 1–2 mm, pedicels 10–20 × 2 mm, ascending. *Corolla* 25–55 mm long; outside green- to yellow-white with purple blotches and glabrous, inside white to yellow becoming maroon in basal inflation, pubescent except above and in lowest inflation where longitudinally ridged; *tube* 20–40 × 10–12 mm, swollen base constricted after ± 8 mm then

FIGURE 143.—Distribution of *Ceropegia multiflora*.FIGURE 144.—Distribution of *Ceropegia nilotica*.

abruptly swollen again, broadly funnel-like towards mouth; *lobes* 7–25 mm long, deltate-ovate or linear from ovate base, inside with successive $\pm$ horizontal bands of white, green and black, pubescent. *Corona* $\pm$ 4–5 $\times$ 2.5 mm, yellow, raised on stipe, glabrous; *outer lobes* cupular below anthers, slightly spreading above; *inner lobes* $\pm$ 2.5 mm long, adpressed to backs of anthers then erect in column in centre, slightly broader beyond anthers.

Habitat: Among trees on stony hillsides to sandy flats, 900–1 500 m.

Flowering time: Dec.–Mar.

Distribution: Namibia and South Africa to Ethiopia. In Namibia widespread in north from Kaokoveld to Caprivi. Figure 144.

Voucher: De Winter & Leistner 5518 (PRE, WIND).

Note: Plants with long, slender corolla lobes and others with short, broad lobes are found in Namibia.

Ceropegia occidentalis R.A.Dyer, *Bothalia* 12: 445 (1978). Type: from South Africa.

Dwarf glabrous creeping to scandent succulent to 120 mm tall with fleshy stems and leaves, from 1–several fleshy tubers with fibrous roots. *Stems* 1.5–2.0 mm thick, circular in cross-section, persistent. *Leaves* lanceolate to linear, 7–15 $\times$ 2–6 mm, with entire margins. *Inflorescences* $\pm$ sessile, pedicels 5–10 $\times$ 1 mm, ascending. *Corolla* 25–33 mm long; outside green with faint purple stripes and glabrous, inside green with raised maroon spots and lines in basal inflation and pubescent only around mouth of basal inflation; *tube* 16–24 $\times$ 6–8 mm, basal inflation ellipsoidal then constricted into narrow tube widening to funnel-shaped mouth; *lobes* 8–10 mm long, ovate near base then folded above to linear, inside green with reticulation of purple-grey veins and maroon hairs. *Corona* $\pm$ 3 $\times$ 2 mm, white with maroon patches, on short stipe, pubescent around edges of outer lobes; *outer lobes* broadly cupular well below anthers, slightly spreading above; *inner lobes* $\pm$ 2 mm long, adpressed to backs of anthers then rising in column in centre, linear becoming slightly broader above base.

Habitat: Among stones on rocky hilltop, $\pm$ 1 300 m.

Flowering time: Nov.–Dec.

Distribution: Namibia, South Africa. In Namibia recorded only in mountains north of Rosh Pinah. Figure 145.

Voucher: Lavarinos & Pehlemann 20134 (WIND).

Ceropegia pachystelma Schltr., *Bot. Jahrb. Syst.* 20, *Beibl.* 51: 47 (1895). Type: from South Africa.

Ceropegia acacietorum Schltr. ex Dinter, *Neue Pfl. Südw.-Afr.*: 20 (1914). Type: Namibia, Okasewa, Dinter 2723 (SAM, lecto., designated here).

Ceropegia boerhaavifolia Schinz, *Vierteljahrsschr. Naturf. Ges. Zürich* 71: 139 (1926), *nom. illegit., non Deflers* (1896). Type: Namibia, Auasberge, Dinter 292 (Z, holo.).

Ceropegia schinziana Bullock, *Kew Bull.* 1955: 626 (1956). Type: Namibia, Auasberge, Dinter 292 (Z, holo.).

Sparsely pubescent climber to 3 m with wiry-fleshy stems and fleshy leaves, from fleshy tuber with fibrous roots. *Stems* 1.5–3.0 mm thick, circular in cross-section, often deciduous. *Leaves* ovate-lanceolate, 20–60 × 12–45 mm, with entire often undulating margins. *Inflorescences* with spreading or descending peduncle 10–25 × 1 mm, pedicels 10–25 × 1 mm, ascending. *Corolla* 20–35 mm long; outside grey-green and finely pubescent, inside pale green or pink, pubescent except in basal inflation where with maroon papillae; *tube* 15–25 × 4–5 mm, basal inflation broadly ellipsoidal then constricted into narrow tube widening slightly towards mouth; *lobes* 5–10 mm long, linear with distinct fold above base, inside purple-brown to green near base and pubescent. *Corona* ± 2 × 3 mm, white, raised on short stipe, sparsely pubescent on outer lobes; *outer lobes* broadly cupular well below

height of anthers, slightly spreading above; *inner lobes* ± 2 mm long, adpressed to backs of anthers then rising in column and diverging above, linear becoming distinctly broader above base.

Habitat: Among stones and bushes or in sand among trees, 1 000–1 600 m.

Flowering time: Nov.–Mar.

Distribution: Botswana, Namibia, Mozambique, South Africa, Swaziland, Zimbabwe. In Namibia from Auas Mountains to Okahandja and Gobabis. Figure 146.

Voucher: Giess 7667 (WIND).

Ceropegia paricyma N.E.Br., *Bull. Misc. Inform.* 1898: 309 (1898). Type: from Malawi.

Slender finely pubescent climber to 1 m, from flattened-discoïd hard tuber. *Stem* usually solitary, 1.5–3.0 mm thick, circular in cross-section, deciduous. *Leaves* broadly ovate-lanceolate (much larger near base of plant), sometimes lobed at base, 20–100 × 15–40 mm, with entire margins. *Inflorescences* with short descending peduncle 3–10 × 1 mm, pedicels 10–15 × 1 mm, ascending. *Corolla* 16–22 mm long; outside pinkish purple and glabrous, inside glabrous in tube; *tube* 10–15 × 5 mm, basal inflation almost spherical then constricted into narrow tube not widening towards mouth; *lobes* 5–7 mm long, ovate near base then folded and widening slightly to

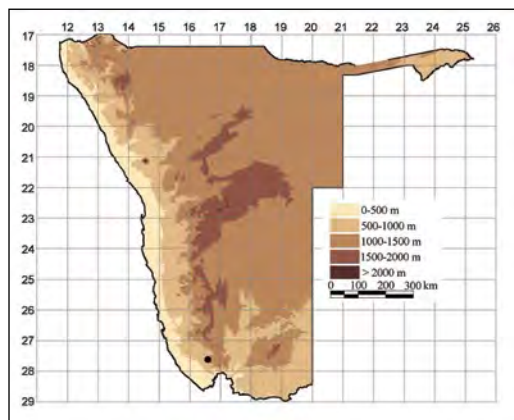


FIGURE 145.—Distribution of *Ceropegia occidentalis*.

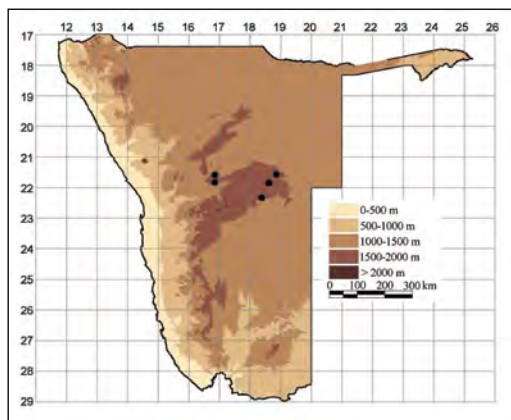


FIGURE 146.—Distribution of *Ceropegia pachystelma*.

wards apices, inside green and pubescent. *Corona* $\pm 4 \times 4$ mm, sessile, pubescent inside outer lobes; *outer lobes* plate-like not reaching height of anthers, widely spreading and deeply bifid into slender teeth; *inner lobes* ± 2.5 mm long, adpressed to backs of anthers then rising in centre and diverging, slender and linear.

Habitat: Among dense bushes and trees, $\pm 1\ 000$ m.

Flowering time: Jan.–Mar.

Distribution: Namibia to Tanzania. In Namibia only known on Impalela Island in the Zambezi River. Figure 147.

Voucher: Killick & Leistner 3349 (PRE).

Ceropegia purpurascens K.Schum., *Bot. Jahrb. Syst.* 17: 152 (1893). Type: from Angola.

Slender finely pubescent climber to 2 m, from 1–several flattened-discoid slightly fleshy tubers. *Stem* usually solitary, 1.5–2.0 mm thick, circular in cross-section, partly deciduous. *Leaves* broadly ovate-lanceolate to elliptical, 20–80 $\times$ 15–35 mm, with entire margins. *Inflorescences* with slender descending peduncle 15–35 $\times$ 1 mm, pedicels 10–20 $\times$ 1 mm, ascending. *Corolla* 20–30 mm long; outside green suffused with red and glabrous, inside pubescent except in basal inflation; *tube* 10–15 $\times$ 5–6 mm, basal inflation ellipsoidal

then constricted slightly into narrow tube widening to funnel-shaped mouth; *lobes* 12–17 mm long, ovate near base then folded and slender above usually slightly spiralling, inside pale yellow and pubescent. *Corona* $\pm 4 \times 3$ mm, on short stipe, pubescent on outer lobes and bases of inner; *outer lobes* broadly cupular containing anthers, erect and deeply bifid; *inner lobes* ± 2 mm long, adpressed to backs of anthers then rising in column in centre, linear becoming laterally flattened above base.

Habitat: Among dense bushes and trees in sandy ground, 1 000–1 100 m.

Flowering time: Jan.–Mar.

Distribution: Botswana and Namibia to Congo. In Namibia only known in Caprivi. Figure 148.

Voucher: Bruyns 2281 (NBG, WIND).

Ceropegia stenantha K.Schum., *Bot. Jahrb. Syst.* 17: 152 (1893). Type: from Sudan.

Glabrous climber or scrambler to 3 m with slightly succulent stems and leaves, from cluster of swollen fleshy roots. *Stems* 2–4 mm thick, slightly 4-angled in cross-section, deciduous. *Leaves* lanceolate to linear, 20–80 $\times$ 3–20 mm, with entire margins. *Inflorescences* $\pm$ sessile, pedicels 10–15 $\times$ 1–2 mm, ascending. *Corolla* 20–30 mm long; outside pale yellow to cream

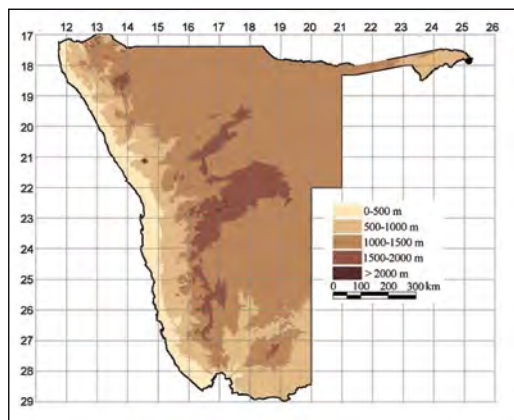


FIGURE 147.—Distribution of *Ceropegia paricyma*.

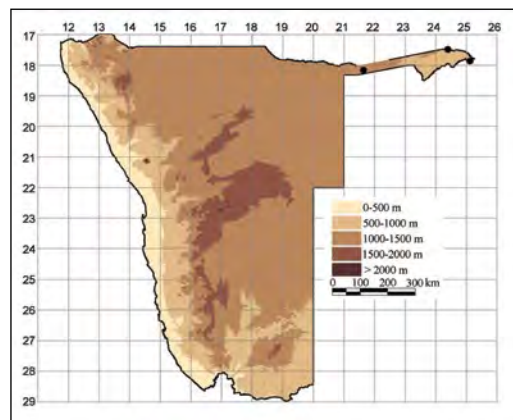


FIGURE 148.—Distribution of *Ceropegia purpurascens*.

and glabrous, inside cream with scattered pink spots, pubescent mainly around mouth of basal inflation; *tube* 10–14 × 2–3 mm, slightly swollen ellipsoidal base constricted slightly after ± 6 mm, broadening slightly near funnel-like mouth; *lobes* 7–15 mm long, narrowly linear from narrow deltate base, inside cream, glabrous. *Corona* ± 3 × 2 mm, white except for maroon outer corona and bases of inner, raised on very slight stipe, glabrous; *outer lobes* cupular well below anthers, slightly spreading above; *inner lobes* ± 2 mm long, adpressed to backs of anthers then erect in column in centre and diverging above, slightly broader beyond anthers.

Habitat: Among trees on stony hillsides to sandy flats, 1 100–1 300 m.

Flowering time: Feb.–Apr.

Distribution: Botswana, Namibia and South Africa to Ethiopia. In Namibia in Caprivi only. Figure 149.

Voucher: Hilbert 135 (WIND).

Note: The flowers are unusual in being sweetly scented.

Ceropegia stenoloba Hochst. ex Chiov., *Ann. Bot. (Rome)* 10: 395 (1912). Type: from Ethiopia.

Ceropegia stenoloba var. *australis* H. Huber, *Mem. Soc. Brot.* 12: 164 (1957). Type: Namibia, Nama Pan, Story 5309 (PRE, holo.).

Ceropegia aberrans Schltr., *Bot. Jahrb. Syst.* 51: 151 (1913). Type: Namibia, limestone ridges at Aukas, flow. Dec. 1908, Dinter 843 (missing).

Slender finely pubescent climber to 2 m, from small slightly flattened hard tuber with thick roots arising in ring underneath. *Stem* usually solitary, 1.0–1.5 mm thick, circular in cross-section, deciduous. *Leaves* ovate-deltate, 15–35 × 10–25 mm, with entire margins. *Inflorescences* with very short descending peduncle 3–5 × 1 mm, pedicels 5–10 × 1 mm, ascending. *Corolla* 10–15 mm long; outside pale green flecked with brown and glabrous, inside glabrous in tube; *tube* 6–8 × 3 mm, basal inflation almost spherical then slightly constricted into short tube widening only very slightly at mouth; *lobes* 2.0–2.5 mm long, narrowly ovate near base then folded and linear

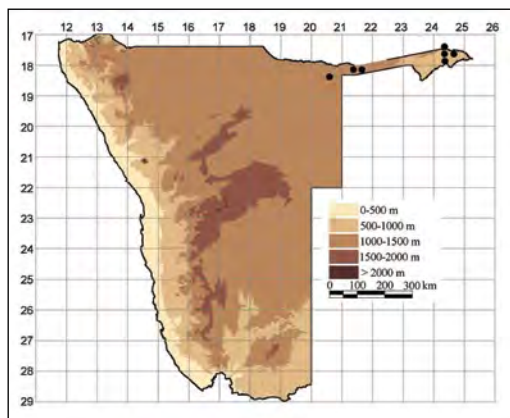


FIGURE 149.—Distribution of *Ceropegia stenantha*.

above, inside brown-green and pubescent. *Corona* ± 2.5 × 2 mm, raised on short stipe, glabrous; *outer lobes* spreading horizontally or recurved, entire and truncate; *inner lobes* ± 1.8 mm long, adpressed to backs of anthers then rising and meeting in centre, slender and linear.

Habitat: Stony ground among bushes and trees, 1 000–1 300 m.

Flowering time: Jan.–Mar.

Distribution: Namibia to Ethiopia. In Namibia known from Grootfontein to east of Tsumkwe. Figure 150.

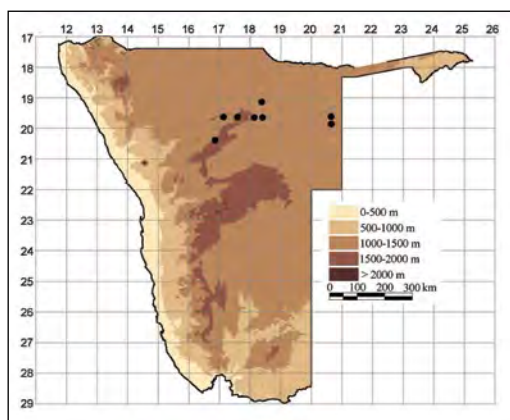


FIGURE 150.—Distribution of *Ceropegia stenoloba*.

Voucher: Giess 12458 (WIND).

Note: Plants in Namibia are usually referred to var. *australis* H. Huber.

Ceropegia ampliata E. Mey. was considered to occur in Namibia by Süssenguth & Merxmüller (1952) and Huber (1957) but later Huber (1967) considered this unlikely. No specimens exist from Namibia, though the species is known to occur in Botswana.

Duvalia Haw.

Dwarf spineless sometimes rhizomatous mat-forming succulent 40–300 mm diam. *Stems* 8–100 × 6–25 mm, 4- to 6-angled, glabrous, green to purplish, tuberculate, each tubercle tipped with small non-persistent leaf-rudiment. *Inflorescence* glabrous, 1 per stem in lower half, few-flowered, ± sessile, pedicel 8–25 × 1.5–2.0 mm, holding flower facing upwards close to ground. *Corolla* 15–30 mm diam., rotate, deeply lobed; outside glabrous, flat near centre; inside with central part thickened into fleshy circular to pentagonal annulus, papillate to hairy on annulus and around bases of lobes; *tube* 1–4 mm long, shallowly conical to bowl-shaped, formed entirely by annulus; *lobes* 3.5–16.0 × 1.5–8.0 mm, longitudinally folded ± tightly along midrib so mostly narrowly linear-acute to -acuminate, spreading, margins often ciliate; *gynostegial corona* of 2 series of lobes arising on staminal tube and well separated from one another, 2.5–4.5 × 2–5 mm; *outer lobes* forming pentagonal to circular spreading disc, included in tube to spreading on top of and covering annulus; *inner lobes* 0.5–1.0 mm long, adpressed to backs of anthers, dorsiventrally flattened, at base with rounded obtuse ascending to spreading dorsal projection 0.8–1.5 mm long; *anthers* horizontal on top of style head, rectangular; *pollinium* ellipsoidal, longer than broad, with insertion-crest along outer edge. *Follicles* paired, erect, terete-fusiform, 60–120 × 4–7 mm, glabrous and smooth.

14 species, southern Africa, Arabia and northeast Africa.

Key to species

- 1a. Annulus ± glabrous, with fine papillae < 0.5 mm long 2.

- 1b. Annulus with conspicuous hair-like papillae 0.5–1.5 mm long, corolla with hair-like papillae over most of inner surface **D. caespitosa**
 2a. Outer corona within tube formed by annulus; corolla lobes tightly folded longitudinally along midrib **D. maculata**
 2b. Outer corona ± level with or slightly above top of annulus; corolla lobes convex above and only laxly folded along midrib **D. polita**

Duvalia caespitosa (Masson) Haw., Syn. Pl. Succ.: 45 (1812). Type: from South Africa.

Dwarf succulent forming mat 30–200 mm diam. *Stems* 10–50 × 6–22 mm, not rhizomatous, 4- to 5-angled. *Corolla* 18–32 mm diam.; inside pink-brown to purplish, covered at least on annulus and bases of lobes with hair-like papillae 0.5–1.5 mm long; annulus 1.5–3.0 × 6–12 mm, ring-like, with corona resting on its upper surface; *lobes* 9–12 mm long, 3–5 mm broad at base, folded tightly along midrib for at least half of length and there narrowly linear-acute, margins not ciliate. *Corona* 4.5–7.0 mm diam., reddish to purplish brown; *outer lobes* ± at mouth of tube and completely closing it; *inner lobes* ± 0.5–1.0 mm long.

Habitat: Stony slopes or flats under small shrubs, 1 000–1 600 m.

Flowering time: Nov.–May.

Distribution: Namibia, South Africa. In Namibia only known in the winter-rainfall region of the southwest, from Aus to Rosh Pinah. Of the three subspecies recognised (Bruyns 2005) only subsp. *pubescens* (N.E.Br.) Bruyns occurs in Namibia. Figure 151.

Voucher: Bruyns 3909 (BOL).

Duvalia maculata N.E.Br., Fl. Cap. 4 (1): 1033 (1909). Type: from South Africa.

Duvalia minuta Nel in A.C. White & B. Sloane, Stap., ed. 2, 3: 1168 (1937). Type: Namibia, Great Karas Mountains, Mickberg, E.F.T. Rusch (missing). Type: White & Sloane, Stap., ed. 2, 3: fig. 1218 (lecto., Meve 1997).

Dwarf succulent forming mat 30–150 mm diam. *Stems* 10–40 × 6–12 mm, rarely slightly rhizomatous, 4- to 5-angled. *Corolla* 15–25 mm

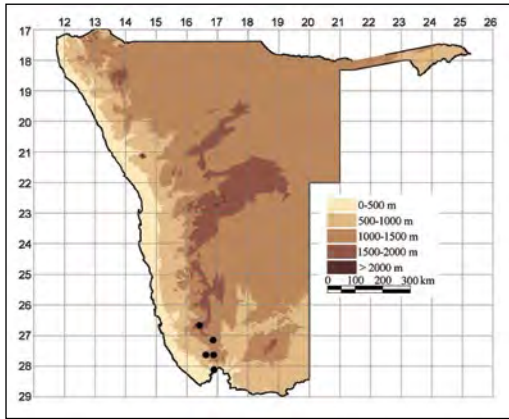


FIGURE 151.—Distribution of *Duvalia caespitosa*.

diam.; inside purplish, reddish to yellowish brown, somewhat shiny on lobes; annulus 1.5–2.5 × 5–8 mm, often pentagonal, often heavily indented around rim, somewhat constricted towards base, almost completely containing corona, cream to white speckled with pale brown, covered with fine papillae < 0.5 mm long; lobes

5–10 mm long, 3–5 mm broad at base, tightly folded along midrib so linear-acute, margins not ciliate. Corona 3.0–3.6 mm diam., bright to dull yellow to pale orange; *outer lobes* ± at middle of tube and completely contained in it; *inner lobes* ± 0.5 mm long. Figures 152 & 153.

Habitat: Stony slopes or flats under small shrubs, 1 000–2 100 m.

Flowering time: Nov.–Mar.

Distribution: Namibia, South Africa. In Namibia only known in the higher parts of the Tiras Mountains, southwest of Helmeringhausen, also in and around the Great Karas Mountains. Figure 154.

Voucher: Bruyns 8095 (K, MO, WIND).

Duvalia polita N.E.Br., *Gard. Chron.* N.S. 6: 130 (1876). Type: from South Africa.

Small succulent forming clump to 150 mm diam., often rhizomatous. Stems 20–100 × 7–15 mm, often spreading horizontally under-

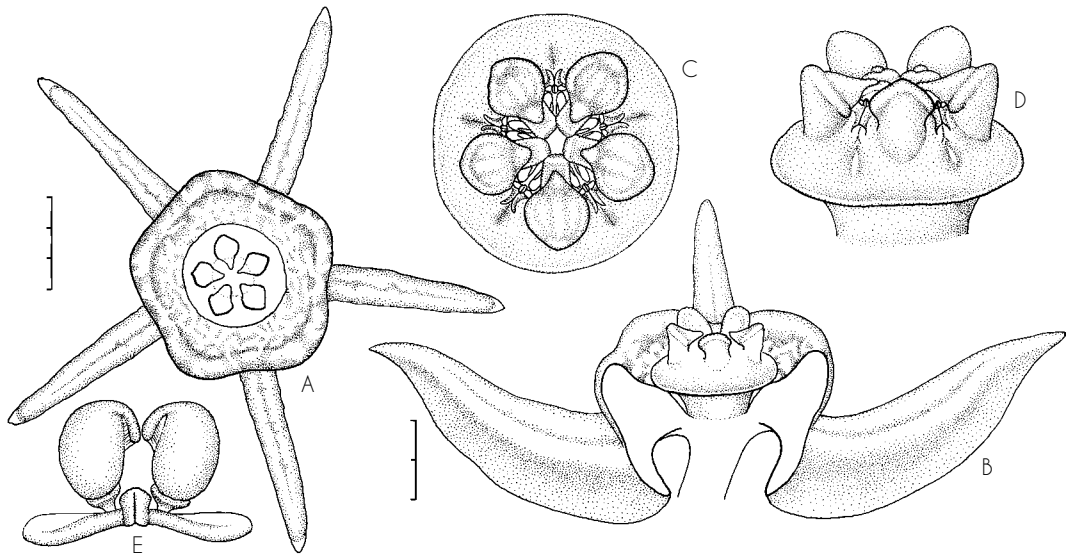


FIGURE 152.—*Duvalia maculata*, South Africa, Bruyns 3045. A, face view of flower; B, side view of dissected flower; C, face view of gynostegium; D, side view of gynostegium; E, pollinarium. Scale bars: A, 3 mm; B, 2 mm; C–D, 1 mm (at B); E, 0.25 mm (at B).



FIGURE 153.—*Duvalia maculata*, Tiras Mountains, PVB 5737.

ground for up to 300 mm, cylindrical, 6-angled. Corolla 20–35 mm diam.; inside shiny to dull reddish to dark purplish brown becoming paler around centre, sometimes spotted on pale background on lobes with darker non-spotted centre; annulus 2.5–5.0 × 8–12 mm, ring-like, widening slightly towards base, covered with fine papillae < 0.5 mm long; lobes 10–15 mm long, 7–10 mm broad at base, ascending to spreading, convex above from lax longitudinal fold along midrib, ovate, acuminate, margins with vibratile clavate cilia 0.5–2.5 mm long. Corona 4.5–6.5 mm diam., reddish brown; outer lobes ± at mouth of tube and completely closing it; inner lobes < 1 mm long.

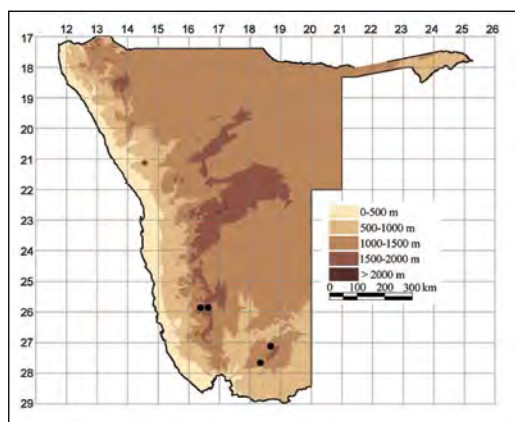


FIGURE 154.—Distribution of *Duvalia maculata*.

Habitat: Flats among trees usually in sandy soil, 1 000–1 300 m.

Flowering time: Nov.–Mar.

Distribution: Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zimbabwe. In Namibia from Windhoek north-eastwards. Figure 155.

Voucher: Giess 12590 (M, WIND).

Hoodia Sweet ex Decne.

Spiny non-rhizomatous succulent shrub to 2 m tall. Stems 0.05–2 m × 25–60 (–110) mm, 11- to 34-angled, erect (rarely prostrate), cylindrical, glabrous, grey-green to brown, tubercles tipped with a spine 3–12 mm long. Inflorescences glabrous, 1–30 per stem mainly towards apex, 1- to 12-flowered, sessile, pedicel 1–60 × 1–6 mm, spreading. Corolla 8–180 mm diam., rotate to campanulate, small and deeply lobed to large and plate-like; outside glabrous; inside without annulus, glabrous to finely hairy or papillate; tube 1–8 mm deep, 2.5–10.0 mm broad at mouth, cupular, often thickened around mouth; lobes spreading, convex above, without marginal cilia; gynostegial corona of 2 series of lobes partly intergrown, ± glabrous, 1–3 × 2.2–6.0 mm, sessile or raised on short stipe; outer lobes emarginate or bifid towards apex, erect, laterally fused with bases of inner lobes into small pouch or cup-like,

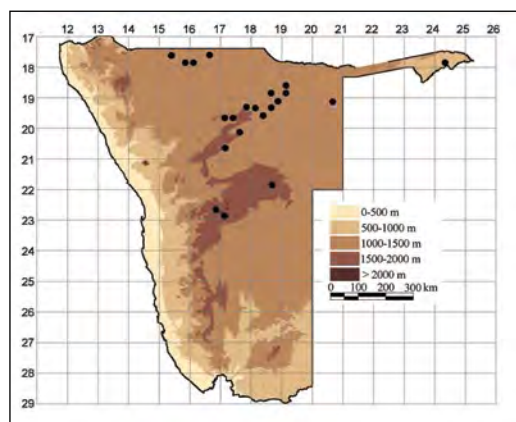


FIGURE 155.—Distribution of *Duvalia polita*.

dorsiventrally flattened; *inner lobes* adpressed to backs of anthers and mostly shorter than them, dorsiventrally flattened; *anthers* horizontal on top of style head, rectangular; *pollinium* D-shaped, with insertion-crest along outer edge.

Follicles paired, erect, terete-fusiform, slender, glabrous, smooth.

14 species, Angola, Botswana, Namibia, South Africa.

Key to species

- 1a. Pedicel 2–6 mm thick; flowers (20–)25–170 mm diam., never dark red-brown to purple-black, mostly saucer-shaped with broad flat to bowl-shaped united part (rarely funnel-shaped), with small tube just enclosing gynostegium, lobes much less than half as long as broad (excluding narrow tip) and shorter than breadth of united part of corolla outside corolla-tube 2.
- 1b. Pedicel 0.5–1.5 (–2.0) mm thick; flowers 8–20 mm diam., if larger (20–40 mm) then dark red-brown to purple-black, if saucer-like then without small tube enclosing gynostegium, lobes more than half as long as broad and much longer than breadth of united part of corolla outside tube 6.
- 2a. Corolla glabrous 3.
- 2b. Corolla covered with fine hair-like bristles 4.
- 3a. Corolla 20–55 mm diam., limb of outer corona adpressed to corolla just outside tube *H. juttae*
- 3b. Corolla (40–) 50–100 mm diam., outer corona just touching side of corolla tube near mouth, not adpressed to corolla outside tube *H. gordonii*
- 4a. Outer corona lobes not exceeding height of inner lobes *H. gordonii*
- 4b. Outer corona lobes exceeding height of inner lobes 5.
- 5a. Corolla funnel-shaped, usually yellow or orange; stems matt bluish green *H. parviflora*
- 5b. Corolla bowl-shaped to flat, brick-red to flesh-pink; stems grey-green to brownish green *H. currorii*
- 6a. Horns of outer corona lobes adherent laterally to dorsal part of inner lobes for entire length of outer lobes 7.
- 6b. Horns of outer corona lobes not adherent laterally to dorsal part of inner lobes for more than half of length of outer lobes 9.
- 7a. Corona 2.0–2.2 mm broad across top; corolla tube conical with sides of tube touching sides of gynostegium 8.
- 7b. Corona 3–4 mm broad across top; corolla tube saucer-shaped, sides of tube not touching sides of gynostegium *H. officinalis*
- 8a. Stems 22–28-angled; corolla 20–40 mm diam. *H. ruschii*
- 8b. Stems 12–14 (–16)-angled, corolla 11–15 mm diam. *H. triebneri*
- 9a. Stems usually sprawling, spines only present on young growth; pedicel 4–15 mm long, flowers never yellow inside *H. pedicellata*
- 9b. Stems erect with persistent spines; pedicel 2 mm long or shorter (if slightly longer then flowers bright yellow inside) 10.
- 10a. Corolla tube 2–4 mm deep and completely containing gynostegium (except sometimes for tips of outer corona lobes), united part of corolla funnel-shaped *H. alstonii*
- 10b. Corolla tube < 1 mm deep and containing only basal stipe of gynostegium, united part of corolla flat to slightly saucer-shaped *H. flava*

Hoodia alstonii (N.E.Br.) Plowes, *Asklepios* 56: 7 (1992). Type: from South Africa.

Many-stemmed often dense shrub to 1 × 0.5 m. *Stems* 0.1–1.0 × 40–80 mm, 20- to 22-angled, erect, whitish grey-green, tubercles tipped by a stout sharp pale brown spine 6–10 mm long. *Corolla* 10–18 mm diam., campanulate; inside bright yellow becoming whitish towards base, smooth; *tube* 2–3(–4) mm deep,

broadly conical; *lobes* (4–)6–8 × 4–5 mm, ovate-deltate, acute, spreading to ascending, convex above from reflexed margins. *Corona* 2 × 2.5–3.0 mm, raised on short stipe, pale yellow; *outer lobes* 1.0–1.5 mm long, erect, bifid at least to level of base of inner lobes into erect tapering obtuse lobules; *inner lobes* ± 0.5 mm long, adpressed to backs of anthers and usually exceeding them, oblong, obtuse. Figure 156.



FIGURE 156.—*Hoodia alstonii*, near Ai-Ais, PVB 7246.

Habitat: Stony slopes, 300–1 300 m.

Flowering time: Nov.–Apr.

Distribution: Namibia, South Africa. In Namibia in arid southwest from northeast of Lüderitz to near Ai-Ais. Figure 157.

Voucher: Dinter 8151 (BOL, WIND).

Hoodia currorii (Hook.) Decne. in DC., *Prodr.* 8: 665 (1844). Type: from Angola.

Hoodia macrantha Dinter, *Neue Pfl. Südw.-Afr.*: 35, fig. 52, 53 (1914). Type: Namibia, Onguati am Fusse der Erongoberge, Dinter 1648 (SAM, holo.).

Hoodia gibbosa Nel in A.C. White & B. Sloane, *Stap.*, ed. 2, 3: 1061 (1937). Type: Namibia, Sphinx,

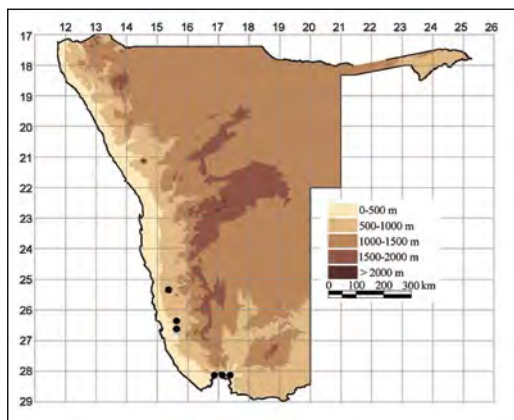


FIGURE 157.—Distribution of *Hoodia alstonii*.

± 70 miles east of Swakopmund, Boss sub *SUG* 6921 (NBG, holo.).

Hoodia montana Nel in A.C. White & B. Sloane, *Stap.*, ed. 2, 3: 1063 (1937). Type: Namibia, Brandberg, Nov. 1935, Nel sub *SUG* 6916 (missing).

Hoodia currorii var. *minor* R.A.Dyer, *Fl. Pl. Africa* 37: t. 1474 (1966). Type: Namibia, 26 miles northeast of Hentjies Bay, Hardy & De Winter 1508 (PRE, holo.).

Shrub 0.15–1.00 × 0.15–1.00 m. *Stems* 0.1–1.0 m × 40–60(–80) mm, 11- to 16(24)-angled, erect to ascending, pale grey- to brown-green, tubercles each tipped with spine 6–10 mm long. *Corolla* 40–180 mm diam., ± rotate, ± circular to shallowly 5-lobed; inside brick-red to flesh-pink or yellowish pink, with livid-shiny area around mouth and inside tube, with bristles 0.5–3.5 mm long each arising from a low papilla; *tube* 2.8–6.0 × 5–9 mm, cupular, pentagonal, with corolla thickened to



FIGURE 158.—*Hoodia currorii* subsp. *currorii*, near Orupembe, PVB 8063.

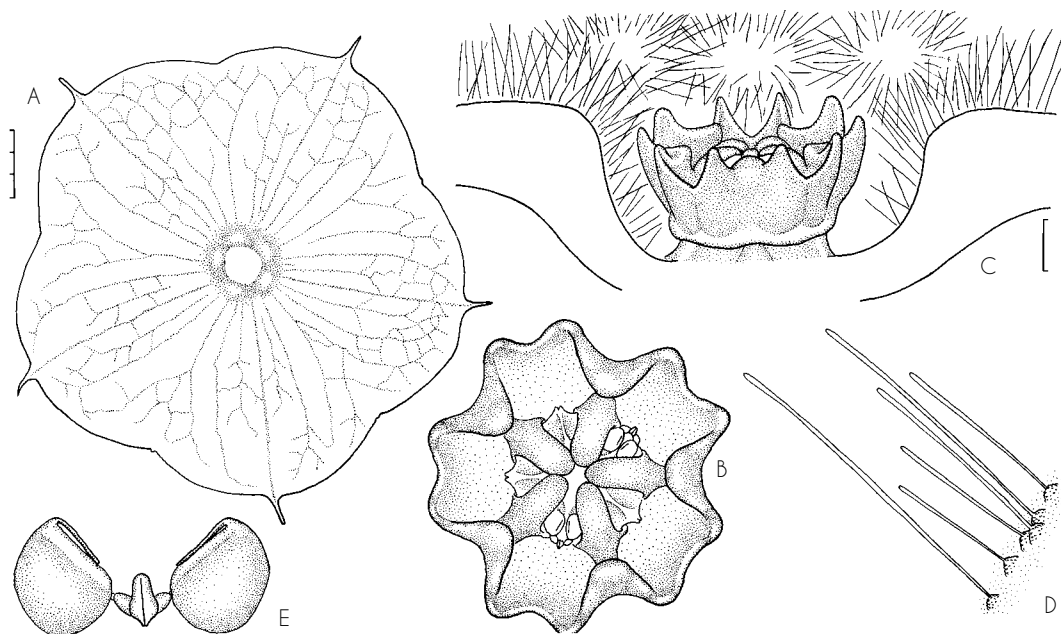


FIGURE 159.—*Hoodia currorii*, west of Kamanjab, Namibia, Bruyns 4060. A, face view of flower; B, face view of gynostegium; C, side view of centre of dissected flower; D, papillae inside corolla beyond mouth of tube; E, pollinarium. Scale bars: A, 15 mm; B, 1 mm (at A); C, 1 mm; D, 0.5 mm (at A); E, 0.25 mm (at A).

form mouth, containing whole of gynostegium; lobes 5–25 mm long (excluding narrow tip), 20–75 mm broad at base, broadly ovate to broadly deltate, abruptly narrowing into narrow subulate point 6–20 mm long, spreading. Corona 2–3 × 3.8–5.0 mm, ± sessile, deep red-purple or red-brown, shiny, well separated from sides of corolla tube; outer lobes erect, forming 5-lobed cup from slightly taller than style head to nearly twice as tall as style head, bifid for less than half of length into erect obtuse-truncate to deltoid teeth, fused laterally for most of length to bases of inner lobes; inner lobes ± 0.5 mm long, mostly exceeding anthers, ± rectangular, obtuse. Figures 158 & 159.

Habitat: Gravelly flats among trees and rocks to rocky slopes, 500–1 800 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Botswana, Namibia, South Africa, Zimbabwe. In Namibia from Usakos and Karibib northwards to Skeleton Coast. Figure 160.

Voucher: Giess 9417 (M, PRE, WIND).

Note: Of the two subspecies recognised (Bruyns 1993), only subsp. *currorii* occurs in Namibia.

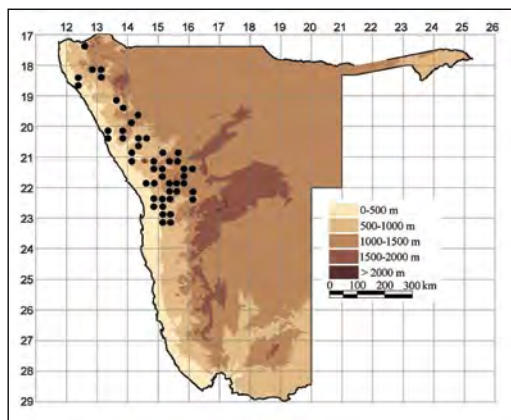


FIGURE 160.—Distribution of *Hoodia currorii*.

Hoodia flava (N.E.Br.) Plowes, *Asklepios* 56: 8 (1992). Type: from South Africa.

Shrub to 0.5 m tall but mostly much smaller. *Stems* 75–300 × 35–70 mm, 18- to 31-angled, erect, tubercles tipped with a weak brown spine 4–6 mm long. *Corolla* 10–15 mm diam., ± rotate, lobed to halfway; inside greenish yellow sometimes with brown tips to lobes or wholly brown, minutely papillate to smooth; *tube* < 1 mm deep, formed by distinct thickening around base of gynostegium; *lobes* 2.5–4.0 × 3.5–5.0 mm, broadly ovate-deltate, acuminate, spreading. *Corona* 2–3 × 5–6 mm, raised on short stipe, slightly translucent yellow; *outer lobes* 1.6–2.2 mm long, spreading, bifid below middle into dorsiventrally flattened linear obtuse lobules (those of adjacent lobes usually connivent); *inner lobes* 0.5–1.0 mm long, adpressed to backs of anthers and usually exceeding them, linear, obtuse, with narrow dorsal ridge near base joined to outer lobes.

Habitat: Gravelly flats under bushes or stony slopes, 800–1 300 m.

Flowering time: Nov.–Apr.

Distribution: Namibia, South Africa. In Namibia only recorded from eastern flank of Great Karas Mountains. Figure 161.

Voucher: Bruyns 3494 (BOL).

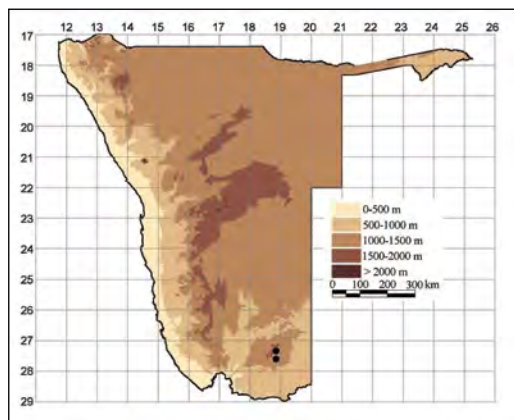


FIGURE 161.—Distribution of *Hoodia flava*.

Hoodia gordonii (Masson) Sweet ex Decne. in DC., *Prodr.* 8: 665 (1844). Type: from South Africa.

Hoodia husabensis Nel in A.C. White & B. Sloane, *Stap.* 3: 1069 (1937). Type: Namibia, Husab gorge, June 1935, *Boss sub* SUG 6920 (missing). Type: White & Sloane, *Stap.*, ed. 2, 3: fig. 1145 (lecto., Bruyns 1993).

Hoodia longispina Plowes, *Brit. Cact. Succ. J.* 11: 57 (1993). Type: Namibia, 4–5 km south of Witputz, Plowes 5321 (SRGH, holo.).

Shrub to 1.0 × 0.6 m. *Stems* 0.1–1.0 m × 25–50 mm, 11- to 17-angled, erect, grey-green to grey-brown, tubercles each tipped with a stiff spine 6–12 mm long. *Corolla* (40–)50–100 mm diam., ± rotate, ± circular to 5-lobed; inside flesh-coloured to deep purple-red usually with darker veins, smooth to with small conical papillae each tipped with a bristle up to 2.5 mm long; *tube* 1.0–1.5 × 4.5–6.0 mm, cupular, containing most of gynostegium, formed entirely by annular thickening near base in otherwise ± flat corolla; *lobes* to 15 mm long (excluding narrow tip), 50 mm broad, broadly ovate, abruptly narrowing to subulate point 3–6 mm long, spreading. *Corona* 1.5–2.0 × 4–6 mm, purple-black, raised on very short stipe, usually just touching side of tube at mouth; *outer lobes* erect, entire and truncate or emarginate to bifid to halfway into ascending obtuse lobules < 1 mm long, laterally fused for most of length to bases of inner lobes; *inner lobes* ± 1 mm long, adpressed to backs of anthers and



FIGURE 162.—*Hoodia gordonii*, north of Karasburg, PVB 3507.

slightly exceeding them, linear to $\pm$ square, obtuse to truncate, with broad dorsal ridge near base connected to outer lobes. Figure 162.

Habitat: Stony flats to slopes, 500–1 600 m.

Flowering time: Nov.–Apr.

Distribution: Namibia, South Africa. In Namibia widespread in southern half from slopes of Brandberg to near Rosh Pinah and Warmbad. Figure 163.

Voucher: Giess 9128 (M, PRE, WIND).

Hoodia juttae Dinter, *Neue Pfl. Südw.-Afr.*: 34, fig. 25 (1914). *Hoodia bainii* var. *juttae* (Dinter) H. Huber, *Mitt. Bot. Staatssamml. München* 4: 33 (1961). Type: Namibia, Klein Karas, J. Dinter 3203 (SAM, holo.; S, iso.).

Shrub to 0.3×0.5 m. Stems 60–300 $\times$ 30–50 mm, 15- to 17-angled, erect, grey-green, tubercles each tipped with a stiff spine 8–11 mm long. Corolla 20–55 mm diam., $\pm$ rotate, flat to very shallowly saucer-shaped, slightly 5-lobed; inside pale yellow-brown to dark flesh-pink with darker veins, smooth; tube 1 $\times$ 2.5–3.5 mm, cupular, formed by annular thickening near base in otherwise $\pm$ flat corolla; lobes 4–8 mm long (excluding narrow tip), 15–25 mm broad at base, broadly ovate obtuse, abruptly narrowing to subulate point 2–5 mm long, spreading. Corona $\pm 2 \times 3.0$ –4.5 mm, raised on short stipe,

dark purple-black; outer lobes $\pm 1.0 \times 1.5$ mm, erect then spreading so that tips touch corolla outside tube, transversely oblong to shortly bifid, truncate-emarginate to obtuse, laterally fused near base to bases of inner lobes; inner lobes ± 0.5 mm long, adpressed to backs of anthers and slightly exceeding them, linear to $\pm$ square, obtuse to truncate, with obtuse dorsal projection fused to outer lobes.

Habitat: Stony flats among shrubs, 1 200–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Namibia. From Klein Karas to Great Karas Mountains. Figure 164.

Voucher: Bruyns 3508 (BOL, WIND).

Hoodia officinalis (N.E.Br.) Plowes, *Asklepios* 56: 9 (1992). Type: from South Africa.

Trichocaulon pubiflorum Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 30: 192 (1932). Type: Namibia, Velloor, east of Warmbad, 29 Mar. 1924, Dinter (missing).

Hoodia officinalis* subsp. *delaetiana (Dinter) Bruyns, *Bot. Jahrb. Syst.* 115: 216 (1993). *Trichocaulon delaetianum* Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 19: 155 (1923). *H. delaetiana* (Dinter) Plowes, *Asklepios* 56: 8 (1992) as '*delaetii*'. Type: Namibia, Klinghardt Mountains, Dinter 4735 (missing).

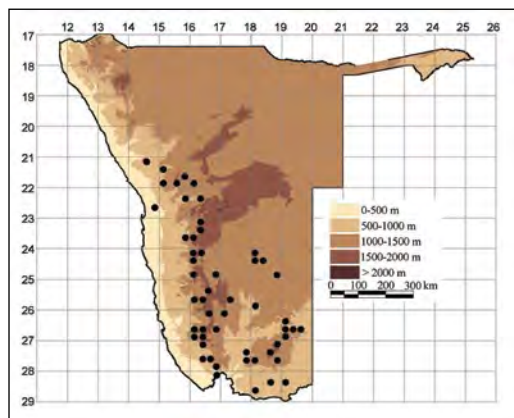


FIGURE 163.—Distribution of *Hoodia gordonii*.

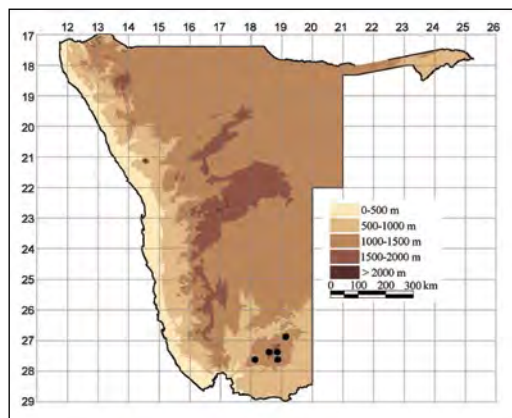


FIGURE 164.—Distribution of *Hoodia juttae*.

Neotype (Bruyns 1993): Namibia, Klinghardt Mountains, Merxmüller & Giess 32150 (WIND, neo.; duplicate in M).

Shrub to 0.3–0.4 m tall but mostly smaller. *Stems* 0.1–0.4 × 35–70 mm, (14-)17- to 23-angled, erect to sprawling, tubercles tipped with sharp brown spine 4–12 mm long. *Corolla* 10–20 mm diam., rotate to broadly campanulate; inside red-brown to yellow-brown often with paler tube, with dense to scattered small conical obtuse papillae (rarely smooth) each tipped with a fine bristle; *tube* 2–3 mm deep, saucer-shaped; *lobes* 3–6 × 3.5–7.0 mm, ovate-deltate, acuminate, ascending with recurved tips. *Corona* 1.5–2.0 × 3–4 mm, raised on very short stipe, yellow to dark red-brown; *outer lobes* ± 1 mm long, erect, bifid nearly to base into obtuse erect teeth, laterally fused to bases of inner lobes for most of length to form pouch; *inner lobes* < 0.5 mm long, adpressed to backs of and ± half as long as anthers, deltoid, obtuse, with broad obtuse dorsal projection near base joined laterally to outer lobes.

Habitat: Stony lower slopes of hills sometimes with wind-blown sand or in flats among *driedoring* (*Rhigozum trichotomum*) shrubs, 100–1 400 m.

Flowering time: Nov.–May.

Distribution: Namibia, South Africa. In Namibia widespread in arid south from south of Lüderitz to Great Karas Mountains and south of Windhoek. Both subsp. *officinalis* and subsp. *delaetiana* occur in Namibia, with the latter endemic to Namibia and the former widespread in the Nama Karoo Region of Namibia and South Africa. Figure 165.

Voucher: Merxmüller & Giess 32150 (WIND) for subsp. *delaetiana*; Bruyns 5621 (WIND) for subsp. *officinalis*.

Hoodia parviflora N.E.Br., Bull. Misc. Inform. 1895: 265 (1895). Type: from Angola.

Shrub 0.3–2.2 × 0.3–1.0 m. *Stems* 0.5–2.0 × 35–110 mm, 14- to 18-angled, erect, usually matt bluish green, tubercles each tipped with spine 6–10 mm long. *Corolla* 30–55 mm diam., funnel-shaped, shallowly 5-lobed; inside

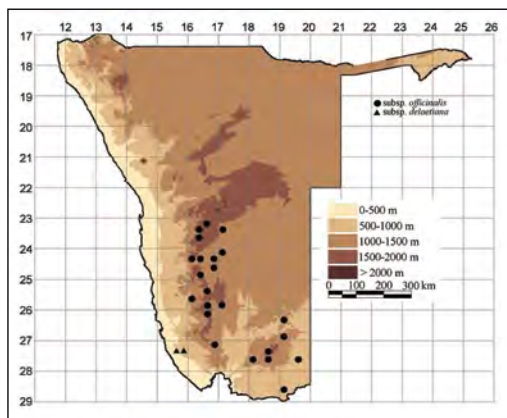


FIGURE 165.—Distribution of *Hoodia officinalis*.

yellow to brownish orange with darker veins, with low papillae each tipped with soft bristle to 3.5 mm long; *tube* 3–4 × ± 7 mm, cucular, with corolla thickened into 5 mounds at mouth; *lobes* ± 10 mm long (excluding narrow tip), 20–27 mm broad at base, broadly ovate, abruptly narrowing into subulate point 5–7 mm long, spreading. *Corona* 2.0–2.5 × 4.0–4.5 mm, raised on very short stipe, purple-black; *outer lobes* erect, bifid to half-way down into erect deltoid to truncate obtuse lobules up to 1 mm long, laterally fused at least in lower half to bases of inner lobes; *inner lobes* ± 0.5 mm long, shorter than anthers, rectangular to deltoid, ± obtuse, with low dorsal projection near base connecting to outer lobes.

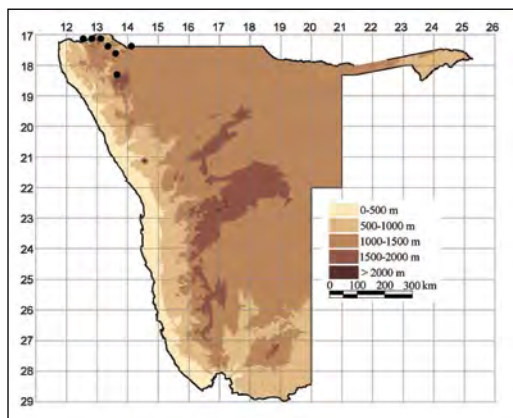
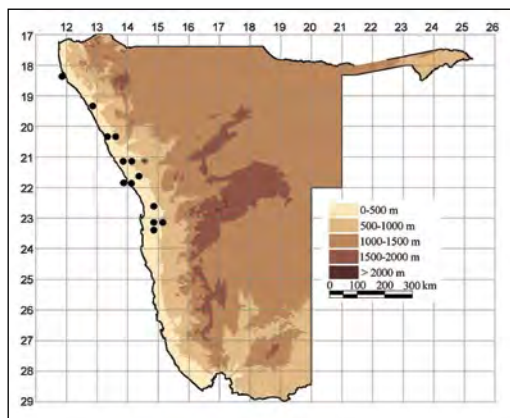
Habitat: Stony flats and slopes among *mopane* (*Colophospermum mopane*) trees and shrubs, 1 100–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Namibia. In Namibia mainly in higher parts of Kaokoveld from Kaoko Otavi northwards. Figure 166.

Voucher: Giess 8972 (M, PRE, WIND).

Hoodia pedicellata (Schinz) Plowes, Asklepios 56: 9 (1992). *Trichocaulon pedicellatum* Schinz., Verh. Bot. Vereins Prov. Brandenburg

FIGURE 166.—Distribution of *Hoodia parviflora*.FIGURE 167.—Distribution of *Hoodia pedicellata*.

30: 266 (1888). Type: Namibia, probably near Hope Mine, *Stapf* (K, holo.).

Sprawling succulent. *Stems* 100–500 × 25–50 mm, 11- to 20-angled, tubercles tipped by dark spine 1.5–3.0 mm long soon weathered off. *Corolla* rotate, 8–14 mm diam., lobed nearly to centre; inside maroon or light to dark purple-brown, smooth; *tube* < 1 mm long, formed by 5 thickened bulges in corolla just below lobes; *lobes* 3–6 × 2.5–3.0 mm, ovate-lanceolate, acuminate, ascending to spreading, convex inside from recurved margins. *Corona* 1.5–2.0 × 3.0–3.5 mm, raised on short stipe, purple-brown or yellow; *outer lobes* 0.7–1.5 mm long, spreading, bifid nearly right to base into widely diverging lobules; *inner lobes* ± 0.4–1.0 mm long, adpressed to backs of anthers, sometimes exceeding them, linear, obtuse, with narrow dorsal ridge near base joined to outer lobes.

Habitat: Low stony ridges often with much windblown sand, 100–300 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Namibia. In Namibia in coastal Namib from Swakopmund northwards to Cunene River. Figure 167.

Voucher: Giess 8015 (PRE, WIND).

Hoodia ruschii Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 30: 192 (1932). Type: Namibia, Tiras Mountains, *E.F.T. Rusch sub Dinter 7976* (B, holo.; BOL, G, PRE, S, Z, iso.).

Shrub to 0.5 × 0.5 m. *Stems* 0.1–0.5 × 40–60 mm, 22- to 28-angled, erect, brownish to grey-green, tubercles tipped by a stiff spine 6–8 mm long. *Corolla* 20–40 mm diam., broadly campanulate; inside red-brown, with conical obtuse papillae each tipped with a slender bristle; *tube* 6–8 × 8–10 mm, broadly conical, with corolla touching sides of gynostegium; *lobes* 8–14 × 9–14 mm, ovate-deltate, acuminate, spreading with slightly recurved tips, convex with margins folded back. *Corona* ± 1 × 2.0–2.2 mm, raised on short stipe, dark purple-black; *outer lobes* ± 0.5 mm long, erect, bifid nearly to base into erect obtuse lobules, laterally fused for whole length to bases of inner lobes and not exceeding them; *inner lobes* ± half as long as anthers, deltoid, obtuse, with narrow dorsal ridge near base joined to outer lobes.

Habitat: Rocky slopes, 1 200–1 600 m.

Flowering time: Nov.–Apr.

Distribution: Namibia. Eastern slopes of Tiras Mountains. Figure 168.

Voucher: Bruyns 1475 (BOL).

Hoodia triebneri (Nel) Bruyns, *S. African J. Bot.* 59: 342 (1993), non Schuldt (1933). *Trichocaulon triebneri* Nel, *Kakteenkunde* 1935: 117 (1935). *Hoodia foetida* Plowes, *Asklepios* 56: 9 (1992). Type: Namibia, near Okandu, 120 km east of Swakopmund, W. *Triebner* sub *SUG* 6020 (BOL, holo.).

Shrub to 0.3×0.5 m. Stems $0.1\text{--}0.3$ m $\times$ 25–40 mm, 12- to 16-angled, erect, tubercles tipped with a hard pale spine 5–6 mm long. Corolla 11–15 mm diam., campanulate; inside blackish red-purple, with conical obtuse papillae each tipped with a spreading bristle; tube 3.5–4.0 mm long, conical, touching sides of gynostegium; lobes $3.0\text{--}4.5 \times 4\text{--}5$ mm, ovate-deltate, acuminate, spreading, convex above. Corona $\pm 1 \times 2.0\text{--}2.2$ mm, raised on short stipe, dark purple-black; outer lobes ± 0.5 mm long, erect, bifid nearly right to base into erect obtuse lobules, laterally fused for whole length to bases of inner lobes and not exceeding them; inner lobes adpressed to backs of and $\pm$ half as long as anthers, deltoid, obtuse, with narrow dorsal ridge near base joined to outer lobes.

Habitat: Sandy to gravelly flats among trees, 300–1 300 m.

Flowering time: Nov.–Apr.

Distribution: Namibia. Along Swakop River from Otjimbingwe to near Okahandja. Figure 169.

Voucher: Bruyns 3632 (BOL, K, PRE, S).

Huernia R.Br.

Spineless not rhizomatous succulent forming compact clumps or dense mats. Stems 10–200 $\times$ 5–25 mm, 4- to 6-angled, decumbent, glabrous, mostly grey-green sometimes mottled with purple, tuberculate, each tubercle with small persistent leaf-rudiment. Inflorescence glabrous, 1 per stem in lower half, 1- to 10-flowered, $\pm$ sessile, pedicel 10–30 $\times$ 1.0–2.5 mm, spreading. Corolla 10–70 mm diam., urceolate to campanulate to subrotate, shallowly lobed; outside glabrous, with raised longitudinal veins on lobes; inside sometimes reflexed and slightly thickened below bases of lobes into prominent annulus around mouth of

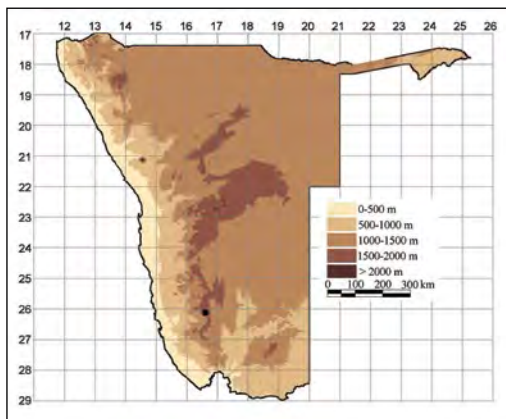


FIGURE 168.—Distribution of *Hoodia ruschii*.

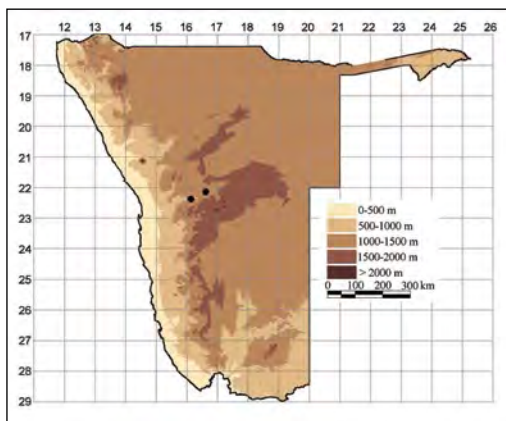


FIGURE 169.—Distribution of *Hoodia triebneri*.

tube, glabrous, papillate especially around mouth of tube to smooth; tube cupular to shallowly bowl-shaped; lobes 6–18 $\times$ 4–17 mm, spreading to reflexed, deltate, usually concave above, margins eciliate; gynostegial corona of 2 series of lobes well separated from each other, glabrous, $\pm$ sessile, 3–9 $\times$ 3.5–8.0 mm; outer lobes rectangular to fused into spreading disc, spreading on base of tube; inner lobes adpressed to backs of anthers, mostly exceeding them and meeting in centre, dorsiventrally flattened towards base, at base with rounded spreading transverse dorsal ridge; anthers horizontal on top of style head, rectangular; pollinium ellipsoidal, with insertion-

crest along outer edge. *Follicles* paired, erect, terete-fusiform, slender, glabrous, smooth.

52 species, Africa and Arabia.

Key to species

- 1a. Inner corona lobes much exceeding anthers; corolla tubular-campanulate, usually much longer than broad **H. levyi**
- 1b. Inner corona lobes usually shorter than anthers (rarely slightly exceeding them); corolla nearly rotate to shallowly campanulate, usually much shorter than broad **2.**
- 2a. Corolla globose-urceolate, inside without papillae; inner corona lobes uniformly swelling towards base and without transverse dorsal projection **H. urceolata**
- 2b. Corolla not globose-urceolate, inside finely to coarsely papillate; inner corona lobes not uniformly turgid, with variably prominent rounded transverse dorsal projection **3.**
- 3a. Inner corona lobes with dorsal projection exceeding length of lobes **H. verekeri**
- 3b. Inner corona lobes with dorsal projection present only as small transverse swelling **4.**
- 4a. Corolla slightly thickened and strongly reflexed around mouth of tube to form prominent annulus .. **5.**
- 4b. Corolla without any annular swelling around mouth of tube **6.**
- 5a. Corolla lobes with broad transverse markings **H. zebrina**
- 5b. Corolla lobes distinctly spotted, if unmarked then annulus pale cream **H. plowesii**
- 6a. Inside of corolla cream to white, variably spotted or lined with maroon **H. hallii**
- 6b. Inside of corolla deep maroon-black (rarely green) above, changing abruptly to contrasting white circular area in lower half of tube **H. oculata**

Huernia hallii E. & B.M.Lamb, *Natl. Cact. & Succ. J.* 13: 57 (1958). *Huernia namaquensis* subsp. *hallii* (E. & B.M.Lamb) Bruyns, *Cact. & Succ. J. Gr. Brit.* 44: 86 (1982). Type: Namibia, near Grünau, *H. Hall* sub NBG 511/55 (NBG, holo.).

Dwarf densely mat-forming succulent to 30–300 mm diam. *Stems* 10–25 × 6–10 mm, 4- to 5-angled, decumbent, tubercles abruptly narrowing to acute tooth. *Corolla* 25–38 mm diam., rotate to campanulate; inside cream, spotted and

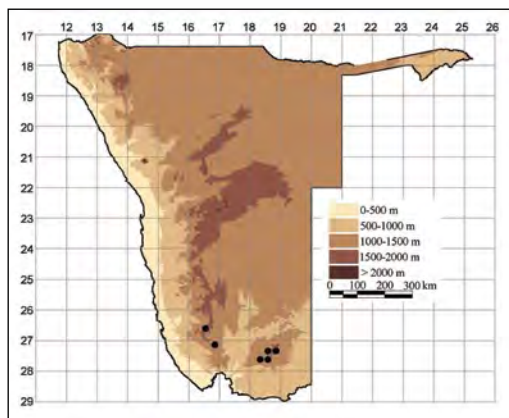


FIGURE 170.—Distribution of *Huernia hallii*.

irregularly ± concentrically lined with maroon to pink, with low conical papillae at most 0.25 mm long often with minute apical bristle; *tube* 3–5 × 5–7 mm, shortly cupular and somewhat constricted at mouth; *lobes* ± 5–8 × 7–10 mm, deltate, acute to slightly acuminate, erect to spreading. *Corolla* 3.5–4.0 × 3.5–5.0 mm, yellow to maroon, sessile; *outer lobes* spreading on base of tube and fused to it towards base, subquadrate, emarginate to deeply bifid; *inner lobes* 0.5–1.0 mm long, adpressed to backs of anthers then sometimes slightly ascending and connivent, dorsiventrally flattened with slight dorsal gibbosity at base, tapering gradually to ± terete and bristly apex.

Habitat: In crevices between rocks under small bushes, 1 000–1 800 m.

Flowering time: Nov.–May.

Distribution: Namibia. From near Aus to Great Karas Mountains. Figure 170.

Voucher: Bruyns 3529 (BOL, WIND).

Huernia levyi Oberm., *Fl. Pl. South Africa* 16: t. 616 (1936). Type: from Zimbabwe.

Dwarf loosely clump-forming succulent to 300 mm diam. *Stems* 40–100 × 8–15 mm, erect, 4- to 5-angled, tubercles abruptly tapering into short tooth. *Corolla* 25–40 × 20–25 mm, tubu-

lar-campanulate; inside with maroon spots on cream above changing to dark maroon in lower half of tube, with prominent papillae usually tipped with a bristle; *tube* 22–35 mm deep, widening gradually towards mouth; *lobes* 5–8 × 12–15 mm, deltate, shortly acuminate, spreading, slightly concave. *Corona* 4–5 × 5 mm, dark maroon, without basal stipe; *outer lobes* indistinct and fused into disc; *inner lobes* 3.0–3.5 mm long, adpressed to backs of anthers then connivent-erect above and exceeding them, below dorsiventrally flattened, with inflated dorsal gibbosity at base, beyond anthers rising to bristly obtuse and somewhat clavate apex.

Habitat: Among rocks and trees, ± 900 m.

Flowering time: Nov.–Feb.

Distribution: Botswana, Namibia, Zambia, Zimbabwe. From Namibia only known from a single collection from Impalela Island in the Zambezi River. Figure 171.

Voucher: Killick & Leistner 3403 (PRE).

Huernia oculata Hook.f., *Bot. Mag.* 108: t. 6658 (1882). Type: Namibia, Damaraland, Een (K, holo.).

Huernia rogersii R.A.Dyer, *Rec. Albany Mus.* 3: 468 (1927). Type: Namibia, Omaruru, F.A. Rogers (missing).

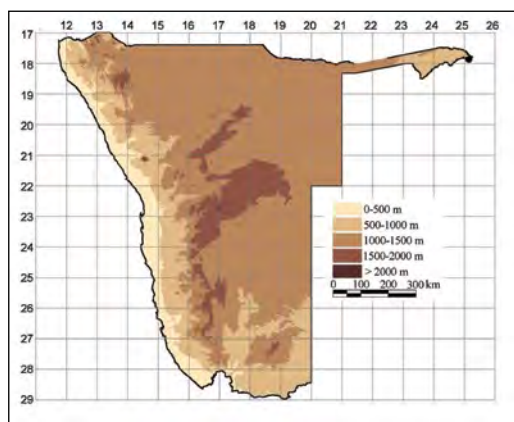


FIGURE 171.—Distribution of *Huernia lewyi*.

Dwarf clump-forming succulent to 300 mm diam. *Stems* 20–150 × 8–15 mm, erect, 5-angled, tubercles tapering into slender tooth. *Corolla* 5–7 × 18–24 mm, shallowly bowl-shaped; inside white abruptly changing at middle of tube to deep maroon-black (rarely green) above, with minute papillae usually tipped with small bristle; *tube* ± 4–5 mm deep, bowl-shaped; *lobes* 4 × 7–9 mm, broadly deltate, shortly acuminate, spreading, slightly concave. *Corona* 3.5 × 3.5–4.5 mm, buff to white speckled with maroon, very slightly raised above base of corolla; *outer lobes* ± 0.5 mm long, descending to surface of corolla, ± semicircular-emarginate in outline; *inner lobes* ± 2 mm long, adpressed to backs of anthers and exceeding them slightly, dorsiventrally flattened, with transverse dorsal gibbosity ± 1.25 mm wide at base, beyond anthers rising slightly to small bristly obtuse pale apex. Figures 172 & 173.

Habitat: Loamy flats under bushes and in crevices between rocks, 100–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Namibia. In Namibia from north of Okahandja to Skeleton coast and to near Grootfontein. Figure 174.

Voucher: Leistner & al. 28 (K, MO, PRE).



FIGURE 172.—*Huernia oculata*, near Grootfontein, PVB 10315.

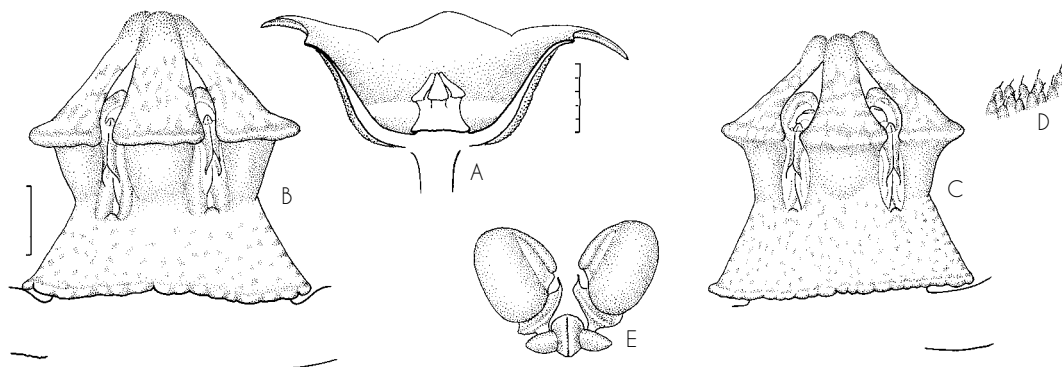


FIGURE 173.—*Huernia oculata*, A, B, Angola, Downs s.n.; C–E, Kaokoveld, Namibia, Bruyns 8034. A, side view of dissected flower; B, C, side view of gynostegium; D, papillae inside corolla in mouth of tube; E, pollinarium. Scale bars: A, 5 mm; B, C, 1 mm (at B); D, 0.5 mm (at B); E, 0.25 mm (at B).

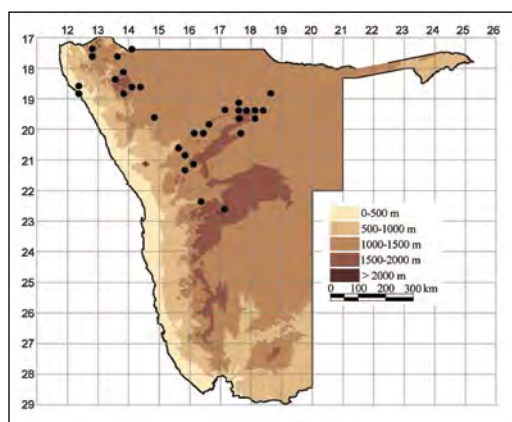


FIGURE 174.—Distribution of *Huernia oculata*.

Huernia plowesii L.C.Leach, *Excelsa Taxon*. Ser. 4: 134 (1988). Type: Namibia, Tiras Mountains, Plowes 6761 (NMG, holo.; PRE, iso.).

Dwarf densely mat-forming succulent to 300 mm diam. *Stems* 10–20(–40) × 8–15 mm, 4-angled, erect, tubercles tapering to small acute tooth. *Corolla* 25–40 mm diam., rotate; inside cream coarsely speckled with red or maroon on lobes, more densely on raised slightly shiny annulus, with minute papillae each with shortly acute apical bristle, mouth of tube with stiff fine to slightly clavate dark maroon bristles 1–3 mm long; *tube* 4–5 × 6–8 mm, cupular, strongly pentagonal, mouth formed by raised annulus

(annulus only slightly thickened and forced upwards by strong reflexion of mouth below bases of lobes); *lobes* 8–10 × 15–17 mm, ± deltate, acute, spreading to reflexed. *Corona* ± 3 × 2.5–4.0 mm, sessile, maroon; *outer lobes* 0.5–1.0 mm long, spreading but not fused to base of tube, subquadrate, shortly and obtusely bilobed; *inner lobes* 0.7–1.0 mm long, maroon to orange, adpressed to backs of anthers, shorter than to exceeding them, tapering from broad transverse dorsal gibbosity to small bristly acute apex.

Habitat: Stony slopes and flats under small bushes and in crevices between rocks, 1 000–1 800 m.

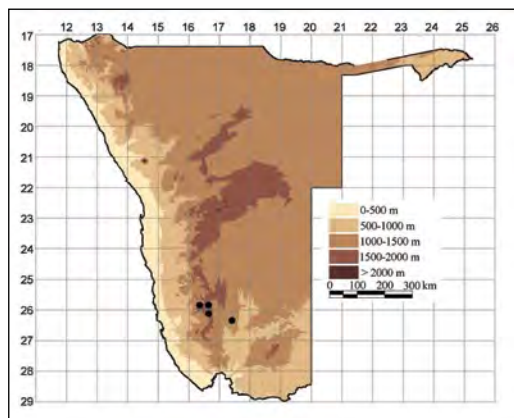
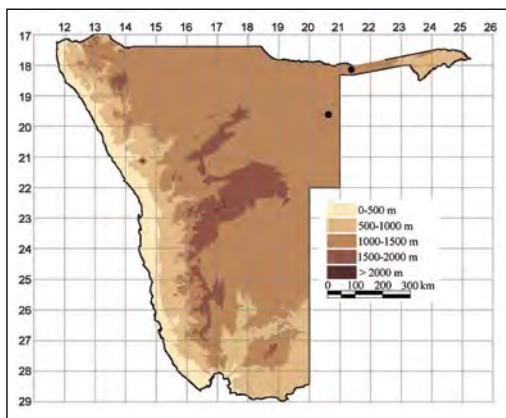
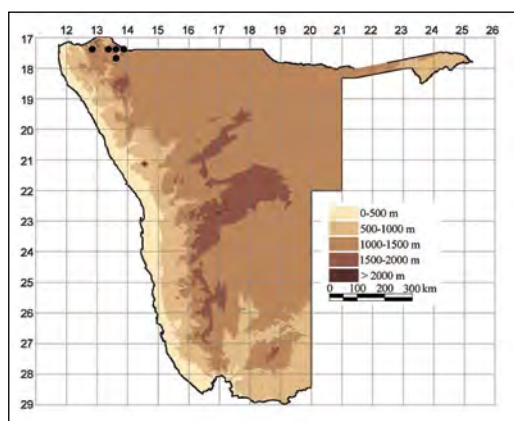
Flowering time: Nov.–Apr.

Distribution: Namibia. Tiras Mountains, west of Helmeringhausen. Figure 175.

Voucher: Bruyns 5731 (WIND).

Huernia urceolata L.C.Leach, *Fl. Pl. Africa* 39: t. 1550 (1969). Type: from Angola.

Small clump-forming succulent 100–500 mm diam. *Stems* 20–150 × 15–25 mm, erect, 5-angled, tubercles tapering into acuminate tooth. *Corolla* 9–12 × 10–14 mm, globose-urceolate, nodding; inside deep velvety purple-red on lobes to broad ring of white below middle of tube and deep maroon around corona, smooth; *tube*

FIGURE 175.—Distribution of *Huernia plowesii*.FIGURE 177.—Distribution of *Huernia verekeri*.FIGURE 176.—Distribution of *Huernia urceolata*.

8–12 mm deep, constricted towards mouth, not pentagonal; lobes 4–5 × 4–7 mm, narrowly delatate, narrowly acute, spreading, slightly concave. Corona ± 3 × 5 mm, deep red with blackish rim on outer lobes, slightly raised above base of corolla; outer lobes < 1 mm long, descending so that edges of disc touch base of corolla tube, fused into obtusely pentagonal disc around gynostegium; inner lobes < 1 mm long, adpressed to backs of anthers but not exceeding them, ± ovate, very fleshy and swollen dorsally behind base.

Habitat: Gravelly flats and stony slopes under bushes and between rocks, 1 000–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Namibia. In Namibia in higher parts of Kaokoveld. Figure 176.

Voucher: Bruyns 5581 (WIND).

Huernia verekeri Stent, *Bull. Misc. Inform.* 1933: 145 (1933). Type: from Zimbabwe.

Small clump-forming succulent to 500 mm diam. Stems 30–100 × 6–12 mm, decumbent, 6-angled, tubercles tapering into slender acuminate soft tooth. Corolla 35–45 mm diam., rotate; inside cream on lobes becoming maroon in tube changing to white towards base, with low papillae each tipped with a fine spike-like bristle; tube 2–3 mm deep, shallowly bowl-shaped, obscurely pentagonal; lobes 12–16 × ± 5 mm, narrowly lanceolate, attenuate, spreading, convex above. Corona 2.5 × 3–4 mm, ± sessile; outer lobes forming obscurely pentagonal to almost perfectly circular disc, cream; inner lobes ± 0.3 mm long, adpressed to backs of anthers but not exceeding them, with very enlarged spreading to ascending obtuse dorsal gibbosity 0.5–0.7 mm long at base, tapering to narrowly obtuse bristly apex.

Habitat: Sandy flats under trees, 1 100–1 300 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Botswana, Malawi, Mozambique, Namibia, Zambia, Zimbabwe. In Namibia mainly from Rundu and Tsumkwe eastwards. Figure 177.

Voucher: Bruyns 2318 (NBG).

Note: Of the three subspecies recognised (Bruyns 2005), only subsp. *verekeri* occurs in Namibia.

Huernia zebrina N.E.Br., *Fl. Cap.* 4 (1): 921 (1909). Type: from South Africa.

Mat-forming succulent to 500 mm diam. *Stems* 15–120 × 8–20 mm, 4- to 5-angled, erect to decumbent, tubercles narrowing abruptly into slender tooth. *Corolla* 35–45(–50) mm diam., rotate; inside cream irregularly lined with red to maroon on lobes changing to ± circular dots on shiny annulus, with minute spike-like papillae on lobes but without bristles and papillae in tube; *tube* 6–7 × 6–8 mm, cupular, mouth formed by raised annulus (annulus only slightly thickened and forced upwards by strong reflexion below bases of lobes); *lobes* 10–15 × 15–20 mm, deltate, shortly acuminate, spreading. *Corona* 3.5–4.0 × 5.0–6.5 mm, sessile, red to maroon with cream to yellow margins; *outer lobes* 1.5–2.0 mm long, spreading but not fused to base of tube, subquadrate, deeply to shallowly bilobed into obtuse to truncate lobules; *inner lobes* 0.7–1.0 mm long, adpressed to backs of anthers, shorter than to slightly exceeding them, tapering from broad transverse dorsal gibbosity to narrowly obtuse smooth apex. Figure 178.

Habitat: Gravelly flats under small bushes and between rocks, 1 000–1 500 m.

Flowering time: Nov.–Apr.

Distribution: Botswana, Mozambique, Namibia, South Africa, Swaziland, Zimbabwe. In Namibia around the eastern foot of the Great Karas Mountains and also recorded from the foot of the Waterberg. Figure 179.

Voucher: Bruyns 3533 (BOL, WIND).

Note: Of the two subspecies recognised (Bruyns 2005), only subsp. *zebrina* occurs in Namibia.



FIGURE 178.—*Huernia zebrina* subsp. *zebrina*, Great Karas Mountains, PVB 3533

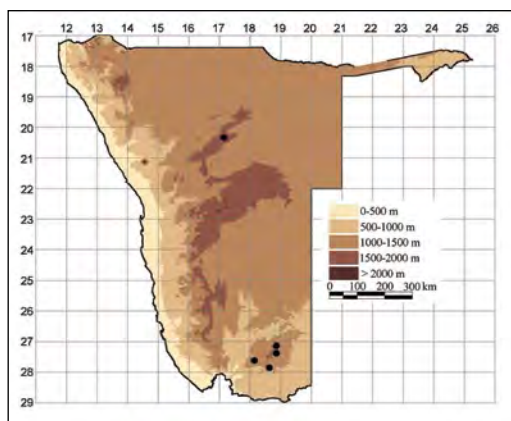


FIGURE 179.—Distribution of *Huernia zebrina*.

Both *Huernia thuretii* F.Cels and *H. volkartii* Peitsch. ex Werderm. are reputed to occur in Namibia (Leach 1988). For *H. volkartii*, Leach listed two specimens in PRE, both without precise locality and he considered that it was 'extremely doubtful' that either originated from Namibia. For *H. thuretii*, only a photograph exists of a collection Giess 12411 from Nabibis in the Tiras Mountains, southern Namibia (Leach 1988) and this may have come from a cultivated plant. As discussed in Bruyns (2005), the natural occurrence of this species in Namibia is doubtful.

Larryleachia Plowes

Spineless non-rhizomatous succulent with 1 to few stems. *Stems* 30–200 × 20–65 mm, obscurely 12- to 19-angled, erect, cylindrical clavate to nearly spherical, glabrous, smooth, grey-green, tuberculate, each tubercle with small slightly flattened persistent leaf-rudiment < 1 mm long usually sunken into depression near apex. *Inflorescences* glabrous, to 30 or more per stem towards apex, 1- to 6-flowered, sessile, pedicel 0.5–2.0 × ± 1 mm, spreading. *Corolla* 5–16 mm diam., shallowly campanulate, rotate or with strongly reflexed lobes, deeply lobed; outside glabrous; inside mostly without annulus, glabrous, smooth to papillate; *tube* 0.5–3.0 mm deep, bowl-shaped; *lobes* 2–6 × 2.0–5.5 mm, spreading, ovate-deltate to lanceolate, convex above from reflexed margins, margins eciliate; *gynostegial corona* of 2 series of lobes partly intergrown, glabrous, ± sessile, 1.5–3.0 × 2–6 mm; *outer lobes* emarginate to deeply bifid, erect; *inner lobes* dorsiventrally flattened, adpressed to backs of anthers, sometimes exceeding them and rising in centre in small column, with dorsal process in series with outer lobules; *anthers* horizontal on top of style head, rectangular; *pollinium* D-shaped, with insertion-crest along outer edge. *Follicles* paired, erect to spreading against stems, terete-fusiform, glabrous, smooth.

5 species, Namibia, South Africa.

Key to species

- 1a. Corolla lobes strongly reflexed and pressed against stem, margins folded back; papillae on inner surface each tipped with horizontally spreading cylindrical obtuse bristle **L. perlata**
- 1b. Corolla not as above; papillae if present without apical bristle or apical bristle erect and very minute **2.**
- 2a. Flowers entirely without papillae inside; inner corona mostly lacking dorsal projection **L. marlothii**
- 2b. Flowers papillate inside, at least in mouth of corolla tube; inner corona with conspicuous dorsal projection confluent with horns of outer lobes **3.**
- 3a. Inner corona lobes either horizontally adpressed to anthers and scarcely exceeding them, or just meeting in centre but not rising in column in centre **L. tirasmontana**
- 3b. Inner corona lobes meeting in centre and there rising into column taller than height of outer corona lobes **L. picta**

Larryleachia marlothii (N.E.Br.) Plowes, *Excelsa* 17: 7 (1996). Type: from South Africa.

Trichocaulon dinteri A.Berger, *Stap. u. Klein.*: 30 (1910). *Leachia dinteri* (A.Berger) Plowes, *Asklepios* 56: 12 (1992). *Leachiella dinteri* (A.Berger) Plowes, *Asklepios* 57: 16 (1992). *Larryleachia dinteri* (A.Berger) Plowes, *Excelsa* 17: 5 (1996). *Hoodia dinteri* (A.Berger) Halda, *Acta Mus. Richnov. Sect. Natur.* 5: 31 (1998). Type: Namibia, Kalkhügel in der Namib 82 km östlich Swakopmund, *Dinter* 3136a (SAM, lecto., designated here).

Trichocaulon keetmanshoopense Dinter, *Neue Pfl. Südw.-Afr.*: 57 (1914). Type: Namibia, zwischen Keetmanshoop und Aroab auf Karooschiefer in der Rhigozum-Steppe, Jan. 1910, *Dinter* 3258 (missing).

Trichocaulon sinus-lüderitzii Dinter, *Neue Pfl. Südw.-Afr.*: 59 (1914). Type: Namibia, auf Strandfelsen, nördlich von Lüderitzbucht, zuerst 1897 wieder Jan. 1910 gesammelt, *Dinter* 3163 (missing).

Dwarf succulent with 3–30 stems. *Stems* 30–150 × 20–55(–65) mm, erect to spreading, clavate. *Corolla* 8–16 mm diam., campanulate to ± rotate; inside mottled with red to dark red-brown on cream background, sometimes nearly uniformly dark purple-brown, smooth; *tube* 0.5–3.0 mm deep, shallowly saucer-like to cupular; *lobes* 2–5 × 3–5 mm, broadly ovate-deltate, acute, spreading, margins slightly to not recurved. *Corona* 2–3 × 3.5–4.5 mm, sessile, irregularly spotted and lined with pink to maroon on cream; *outer lobes* 1.5–2.0 mm long, ascending, bifid to below middle into slender sometimes nearly terete widely divergent spreading to ascending lobules, laterally fused towards base with inner lobes to form pouch; *inner lobes* 1.5–2.0 mm long, adpressed to backs of anthers and exceeding them then rising in column in centre sometimes diverging at tips, linear, obtuse, occasionally with small obtuse dorsal projection near base in series with outer lobes. Figure 180.

Habitat: Gravelly flats under small bushes, often with windblown sand, 50–1 200 m.

Flowering time: Nov.–May.

Distribution: Namibia, South Africa. In Namibia along Namib from near Orupembe to near Oranjemund, also eastwards in south to Great Karas Mountains and Warmbad. Figure 181.

Voucher: Giess & al. 6883 (WIND).

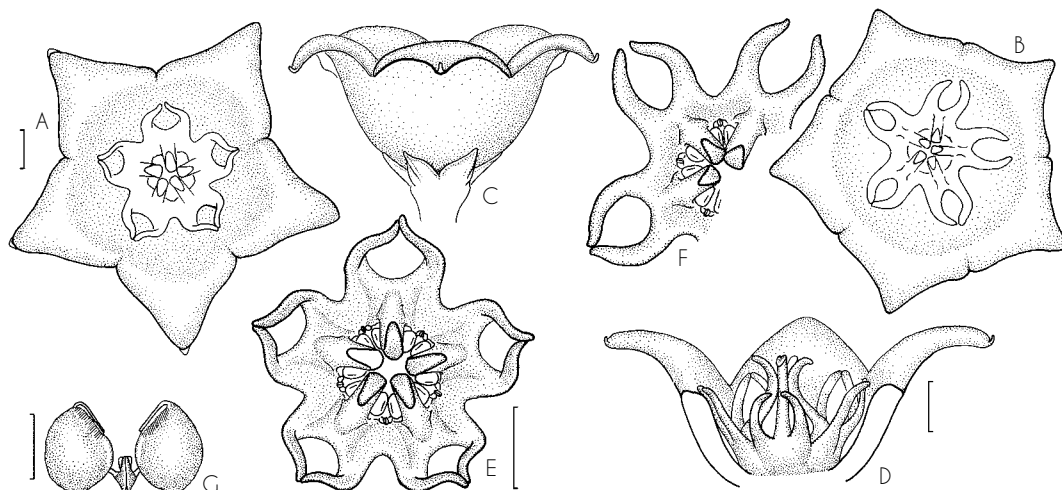


FIGURE 180.—*Larryleachia marlothii*, A, D, E, G, west of Torra Bay, Namibia, Russell 39; B, C, F, near Brandberg West, Namibia, Van Rensburg s.n. A, B, face view of flower; C, side view of flower; D, side view of dissected flower; E, F, face view of gynostegium; G, pollinarium. Scale bars: A–C, 1 mm (at A); D, 1 mm; E, F, 1 mm (at E); G, 0.25 mm.

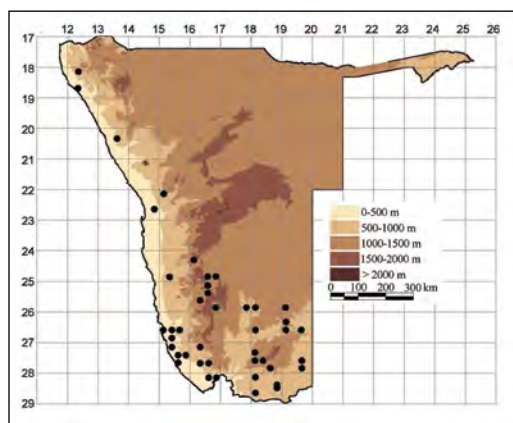


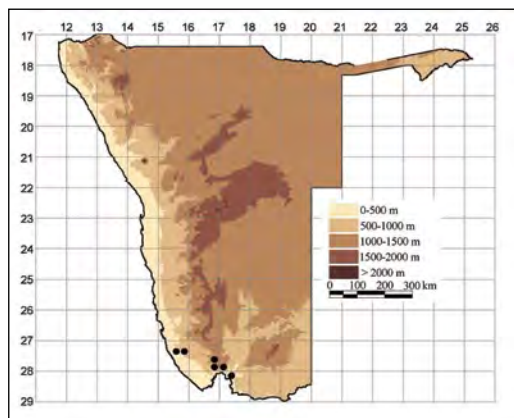
FIGURE 181.—Distribution of *Larryleachia marlothii*.

Note: There is no evidence that Berger saw the specimen *Dinter* 3136a (SAM) and so this is designated as the lectotype.

Larryleachia perlata (Dinter) Plowes, *Excelsa* 17: 9 (1996). *Trichocaulon perlatum* Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 19: 155 (1923). *Leachia perlata* (Dinter) Plowes, *Asklepios* 56: 14 (1992). *Leachiella perla-*

ta (Dinter) Plowes, *Asklepios* 57: 16 (1992). *Laurania perlata* (Dinter) Bruyns, *S. African J. Bot.* 59: 342 (1993). *Hoodia perlata* (Dinter) Halda, *Acta Mus. Richnov. Sect. Natur.* 5: 32 (1998). Type: Klinghardt Mountains, Sept. 1922, *Dinter* (B, lecto., Bruyns 1993).

Succulent shrublet with 1–10 stems. *Stems* 50–300 × 25–60 mm, erect, cylindrical clavate. *Corolla* 5–10 mm diam., rotate; inside grey to greenish white to grey spotted with deep maroon to uniformly deep maroon, densely covered with obtuse conical papillae each tipped with a horizontally spreading cylindrical obtuse bristle; *tube* 1.0–1.5 mm deep, shallowly cupular; *lobes* 3.0–4.5 × 2.0–2.5 mm, narrowly ovate-deltate, acuminate, strongly reflexed and pressed against stem with bases raised into ‘annulus’ around mouth of tube, convex inside from strongly folded back margins. *Corona* ± 2.5 × 2.0–3.5 mm, irregularly red- to maroon-spotted on yellow to whitish, ± sessile; *outer lobes* ± 1 mm long, ascending, bifid to near middle into divergent spreading lobules or emarginate and truncate, laterally fused in lower half to bases of inner lobes to form pouch; *inner lobes* ± 0.5 mm long, adpressed to backs of anthers and sometimes exceeding them, deltoid to rectangular, acute to truncate or emarginate, with broad truncate

FIGURE 182.—Distribution of *Larryleachia perlata*.

nearly erect dorsal projection near base in series with outer lobes.

Habitat: Stony slopes under small bushes and between rocks, 200–1 600 m.

Flowering time: Nov.–Apr.

Distribution: Namibia, South Africa. In Namibia in the south from Klinghardt Mountains to Marinkas Quellen near Ai-Ais. Figure 182.

Voucher: Giess 12415 (WIND).

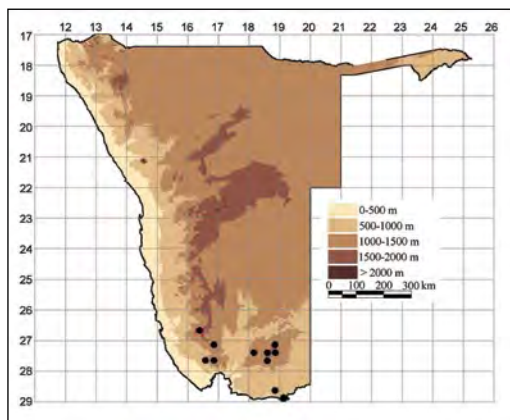
Larryleachia picta (N.E.Br.) Plowes, *Excelsa* 17: 9 (1996) Type: from South Africa.

Trichocaulon meloforme Marloth, *Trans. Roy. Soc. S. Afr.* 2: 239 (1912). *Leachia meloformis* (Marloth) Plowes, *Asklepios* 56: 12 (1992). *Leachiella meloformis* (Marloth) Plowes, *Asklepios* 57: 16 (1992). *Larryleachia meloformis* (Marloth) Plowes, *Excelsa* 17: 7 (1996). *Hoodia meloformis* (Marloth) Halda, *Acta Mus. Richnov. Sect. Natur.* 5: 32 (1998). Type: Namibia between granite boulders near Aus, 1 400 m, Marloth 4874 (PRE, holo.).

Trichocaulon engleri Dinter, *Neue Pfl. Südw.-Afr.*: 56 (1914). Type: Namibia, Us Tal, nord-östlich von Kanus, Engler 3083 = Dinter 3136 (SAM, holo.).

Dwarf succulent with 1–5 stems. *Stems* 30–200 × 20–60 mm, erect, clavate or ± spherical. *Corolla* 8–16 mm diam., shallowly campanulate; inside with purple to red spots on white to pale yellow, usually with dark patch on apex of lobes,

with dome-shaped papillae each often with short apical bristle; *tube* ± 2 mm deep, cupular; pentagonal with inward-pointing bulges opposite anthers; *lobes* 2–3 × 3–5 mm, ovate-deltate, acute, spreading with strongly reflexed tips, margins slightly recurved. *Corona* ± 2.5 × 5–6 mm, whitish spotted with purple-black, raised on very short stipe; *outer lobes* 1.5–2.5 mm long, spreading, bifid almost to base into widely divergent spreading lobules, laterally fused near base to inner lobes into shallow pouch; *inner lobes* 2.0–2.5 mm long, adpressed to backs of anthers and exceeding them then connivent-erect and rising into column in centre, linear, obtuse, with spreading narrowly conical dorsal projection ± 1.5 mm long near base arising inside but confluent with outer lobes. Figure 183.

FIGURE 183.—*Larryleachia picta*, Great Karas Mountains, PVB 5766.FIGURE 184.—Distribution of *Larryleachia picta*.

Habitat: Gravelly flats and slopes under small bushes, 800–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Namibia, South Africa. In Namibia in the south from Aus to Great Karas Mountains and near Onseepkans. Figure 184.

Voucher: Pearson 4358 (BOL).

Larryleachia tirasmontana (Plowes) Plowes, *Excelsa* 17: 15 (1996). *Leachiella tirasmontana* Plowes, *Brit. Cact. Succ. J.* 11: 58 (1993). *Hoodia tirasmontana* (Plowes) Halda, *Acta Mus. Richnov. Sect. Natur.* 5: 32 (1998). Type: Namibia, Tiras Mountains, Plowes 4306 (SRGH, holo.).

Lavrania picta subsp. *parvipunctata* Bruyns, *Bot. Jahrb. Syst.* 115: 256 (1993). Type: Namibia, Tiras Mountains, Heunis 6 (BOL, holo.).

Dwarf succulent mostly with 1 stem. *Stem* 30–180 × 20–50 mm, erect, clavate. *Corolla* 8–9 mm diam., shallowly campanulate; inside cream finely spotted with red and with dark red area near apex of each lobe, with dome-shaped papillae each with minute apical bristle; *tube* ± 2 mm deep, cupular, pentagonal; *lobes* 2 × 3 mm, ovate-deltate, acute, spreading, margins slightly recurved. *Corona* ± 2 mm tall, 4 mm broad, pale yellow spotted with red, raised on very short stipe; *outer lobes* ± 1.5 mm long, ascending, bifid almost to base into widely divergent terete to flattened lobules usually with recurved tips; *inner lobes* ± 2 mm long, adpressed to backs of anthers and exceeding them then connivent-ascending in centre and rising together for ± 0.5 mm or less, with spreading conical dorsal projection < 1 mm long.

Habitat: Gravelly flats and stony slopes under small bushes and between rocks, 1 000–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Namibia. Along margins of Namib from Tiras Mountains to Skeleton Coast. Figure 185.

Voucher: Bruyns 5702 (K, BOL).

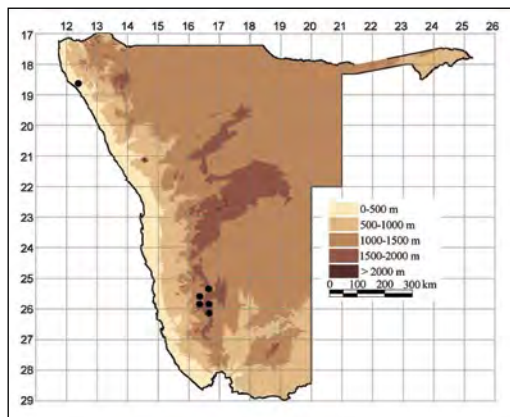


FIGURE 185.—Distribution of *Larryleachia tirasmontana*.

Lavrania Plowes

Spineless non-rhizomatous succulent shrub-let 3–100 stems. *Stems* 60–300 × 20–30 mm, obscurely 10- to 12-angled, erect, glabrous, cylindrical, grey-green, each tubercle tipped with minute conical leaf-rudiment. *Inflorescences* glabrous, 1–5 per stem mainly in lower half, 3- to 15-flowered, sessile, pedicel 2–12 × 1–2 mm, spreading. *Corolla* 13–16 mm diam., ± rotate; outside glabrous; inside spotted with red on yellow, without annulus, papillate; *tube* 1.0–1.5 mm deep, shallowly cup-shaped; *lobes* 3–4 × 6 mm, spreading, ovate-deltate, broadly acute, eciliate margins slightly folded back; *gynostegial corona* of 2 series of lobes partly intergrown, glabrous, sessile, ± 2 × 5 mm; *outer lobes* ascending, bifid to middle into ascending very obtuse lobes laterally fused for ± whole length to dorsal projection of inner lobe; *inner lobes* < 1 mm long, dorsiventrally flattened, adpressed to backs of and shorter than anthers; *anthers* horizontal on top of style head, rectangular; *pollinium* D-shaped, with insertion-crest along outer edge. *Follicles* paired, erect, slenderly terete-fusiform, glabrous, smooth.

1 species, Namibia.

Lavrania haagnerae Plowes, *Cact. Succ. J. (US)* 58: 123 (1986). *Hoodia haagnerae* (Plowes) Halda, *Acta Mus. Richnov. Sect. Natur.* 5: 33 (1998). Type: Namibia, east of Sesfontein,

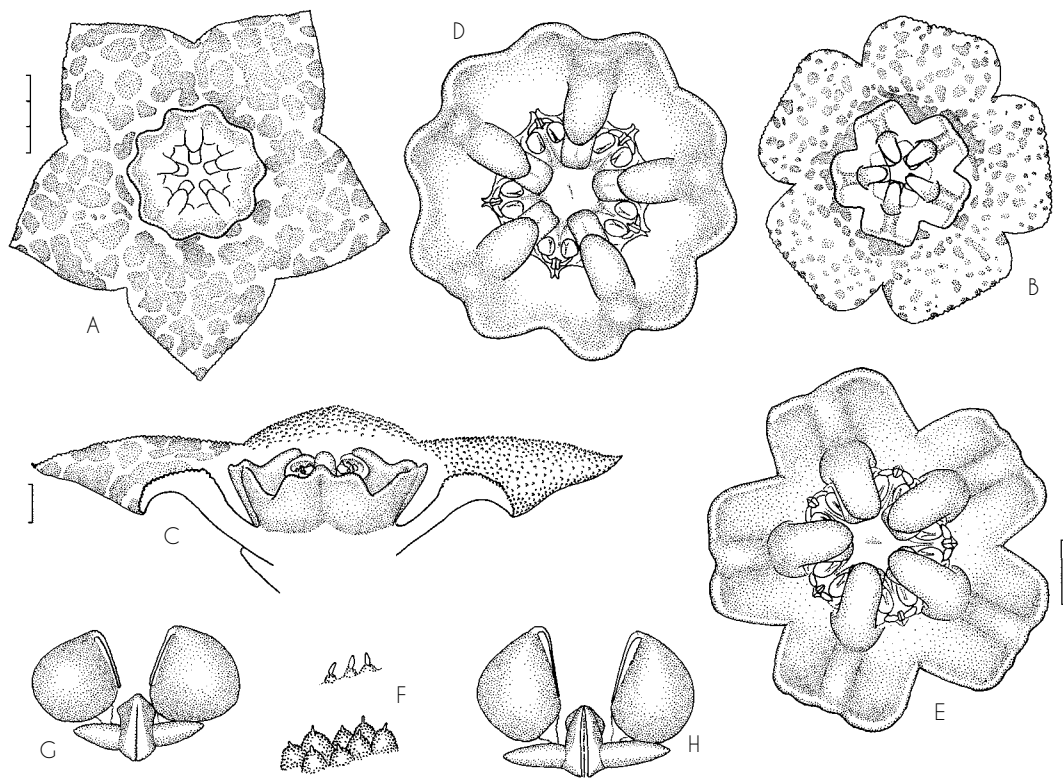


FIGURE 186.—*Lavrania haagnerae*, A, C, D, F, G, ?Khowarib Gorge, Namibia, *Haagner sub Plowes* 5046; B, E, H, near Sesfontein, Namibia, *Bruyns* 4069. A, B, face view of flower; C, side view of dissected flower; D, E, face view of gynostegium; F, papillae inside corolla beyond tube; G, H, pollinarium. Scale bars: A, B, 3 mm (at A); C, 1 mm; D, E, 1 mm (at E); F, 0.5 mm (at E); G, H, 0.25 mm (at E).



FIGURE 187.—*Lavrania haagnerae*, near Sesfontein, PVB 4069.

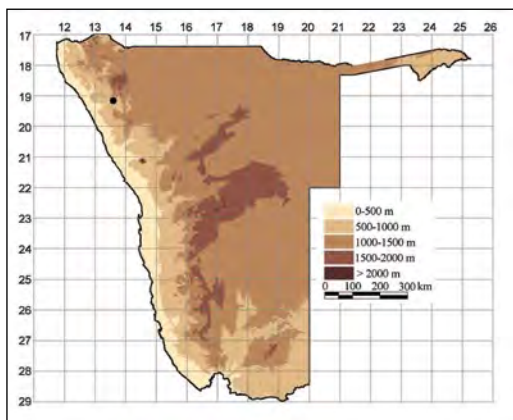


FIGURE 188.—Distribution of *Lavrania haagnerae*.

Haagner sub Plowes 5046 (PRE, holo.). Figures 186 & 187.

Habitat: Ledges on dolomitic cliffs, 800–850 m.

Flowering time: Nov.–Mar.

Distribution: Namibia. In Namibia only known in the dolomitic mountains east of Sesfontein. Figure 188.

Voucher: Bruyns 4069 (BOL).

Orbea Haw.

Spineless often rhizomatous succulent forming compact to diffuse clumps to 3 m diam. *Stems* 10–300 × 4–25 mm, 4-angled, decumbent to prostrate, glabrous, mottled with purple-brown on grey-green, tubercles each tipped with soft acute leaf-rudiment. *Inflorescences* glabrous, 1–3 per stem between base and apex, 1- to 40-flowered, peduncle rarely up to 15 mm long, pedicel 3–50 × 1.5–4.0 mm. *Corolla* 10–110 mm diam., rotate to campanulate, mostly deeply lobed; outside glabrous; inside sometimes with annulus around mouth of tube, often reticulately rugulose, smooth or papillae; *tube* to 10 mm deep, mostly shallowly bowl-shaped or ± absent; *lobes* 3–35 × 3–25 mm, deltate, acute, spreading, ± flat above, margins often with vibratile clavate cilia; *gynostegial corona* of 2 series of lobes partly intergrown, raised on stipe to 3 mm long, 3–7 × 4–12 mm; *outer lobes* often consisting of 5 discrete spreading to erect ± subquadrate lobes beneath the guide-rails often spreading around gynostegium behind anthers; *inner lobes* adpressed to backs of anthers, often exceeding them and connivent in column in centre, dorsiventrally flattened towards base, often with laterally flattened fin-like dorsal appendage; *anthers* horizontal on top of style head, rectangular to semicircular; *pollinium* ± D-shaped, with insertion-crest along outer edge. *Follicles* paired, 50–150 mm long, erect, terete-fusiform, slender, glabrous, smooth.

56 species (Bruyns 2002), Africa and tropical Arabia.

Key to species

- 1a. Inflorescence with (3–)4–40 flowers opening in quick succession to ± simultaneously 2.

- 1b. Inflorescence with 1–3 flowers opening in gradual succession 6.
 2a. Inner corona lobes not produced beyond anthers and not rising in centre (always dorsiventrally flattened), without any dorsal outgrowths **O. caudata**
 2b. Inner corona lobes produced much beyond anthers to become erect and often recurved (if not exceeding them then not dorsiventrally flattened), often with dorsal appendages 3.
 3a. Corolla white to cream with maroon to brown spots **O. albocastanea**
 3b. Corolla yellow to red or blackish, or spotted with yellow on maroon but not white to cream with dark spots 4.
 4a. Inner corona lobes at most equalling anthers, with terete to strongly laterally flattened recurved horn just behind apex (apex often present only as slight swelling beneath this horn) **O. lutea**
 4b. Inner corona lobes much exceeding anthers and dorsiventrally flattened to nearly terete beyond them 5.
 5a. Corolla 35–45 mm diam. **O. valida**
 5b. Corolla 55–110 mm diam. **O. huillensis**
 6a. Inflorescences usually several per stem arranged along sides of stem especially, towards apex 7.
 6b. Inflorescence 1 per stem near base **O. maculata**
 7a. Corolla 6–20 mm diam. **O. schweinfurthii**
 7b. Corolla 25–45 mm diam. **O. lugardii**

Orbea albocastanea (Marloth) Bruyns, *Aloe* 37: 73 (2001). *Stapelia albocastanea* Marloth, *Trans. Roy. Soc. S. Afr.* 3: 124 (1913). *Caralluma albocastanea* (Marloth) L.C.Leach, *J. S. African Bot.* 36: 174 (1970). *Orbeopsis albocastanea* (Marloth) L.C.Leach, *Excelsa Taxon. Ser.* 1: 65 (1978). Type: Namibia, Mal-tahöhe, Marloth 5110 (PRE, holo.).

Stapelia caroli-schmidtii Dinter & A.Berger, *Bot. Jahrb. Syst.* 50, Suppl.: 592 (1914). Type: Namibia, flats near Büllsport, Dinter 2105 (SAM, holo.).

Mat-forming, sometimes rhizomatous succulent to 500 mm diam. *Stems* 20–80 × 10–16 mm, obtusely 4-angled, stout, decumbent, often uniformly pale green, tubercles each tapering into conical tooth. *Inflorescence* 1 per stem near base, 3- to 30-flowered opening in succession, peduncle eventually 10 × 3–4 mm, pedicel 30–60 × 1.5–2.0 mm, usually spreading on ground. *Corolla* 18–30 mm diam., rotate,

deeply lobed; inside cream with purple-brown spots, without annulus, rugulose-papillate; tube $\pm 1.5 \times 4-7$ mm, shallowly cupular; lobes $6-12 \times 4-5$ mm, ovate-deltate, acute, spreading, convex above, with few spatulate marginal cilia. Corona $\pm 6 \times 8$ mm, $\pm$ sessile, brown and cream; outer lobes $2.0-2.5 \times 1.5-2.0$ mm, spreading, $\pm$ rectangular with deeply notched apex; inner lobes 4–5 mm long, adpressed to backs of anthers for half anthers' length then erect and $\pm$ recurved, laterally flattened, linear with obtuse apex, with spreading terete dorsal horn near base ± 2 mm long, fused laterally at base to outer series.

Habitat: Stony to gravelly flats under bushes, 1 000–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Namibia. From around Malatöhe and in Great Karas Mountains. Figure 189.

Voucher: Bruyns 3528 (BOL, WIND).

Orbea caudata (N.E.Br.) Bruyns, *Aloe* 37: 73 (2001). Type: from Malawi.

Orbea caudata* subsp. *rhodesiaca (L.C.Leach) Bruyns, *Aloe* 37: 73 (2001). Type: from Zimbabwe.

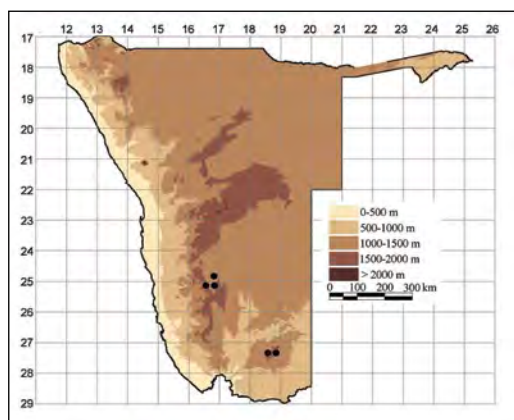


FIGURE 189.—Distribution of *Orbea albocastanea*.

Clump-forming non-rhizomatous succulent to 500 mm diam. Stems 40–150 $\times$ 6–11 mm, obtusely 4-angled, erect to decumbent, pale greenish grey to olive-green flecked with red-purple, tubercles each tapering into slender attenuate spreading tooth to 25 mm long. Inflorescence usually 1 per stem above middle, 3- to 7-flowered, opening $\pm$ simultaneously, sessile, pedicel 9–20 $\times$ 1.5–2.0 mm. Corolla 35–95 mm diam., rotate, very deeply lobed; inside yellow to greenish dotted with purple-brown to brick-red, without annulus, lightly rugulose becoming more coarse around middle of lobes, finely papillate; tube 1.5–2.0 mm deep, shallowly bowl-shaped; lobes 18–35 $\times$ 5–11 mm, with ovate base tapering to slender tip, spreading, convex from reflexed margins, with spatulate purple marginal cilia 1–4 mm long. Corona 3–4 $\times$ 6–8 mm, raised on stout stipe, purple-red with pale patches; outer lobes 1.5–2.0 mm long, subquadrate, slightly bifid into small obtuse to deltoid diverging lobules, ascending; inner lobes 1.0–1.5 $\times$ 0.7–1.0 mm, adpressed to backs of anthers and usually exceeding them to meet and overlap in centre, dorsiventrally flattened, $\pm$ rectangular, obtuse, slightly gibbous on rear and there fused laterally to outer lobes.

Habitat: Sandy raised areas under trees in seasonally wet areas, 1 100–1 200 m.

Flowering time: Nov.–Apr.

Distribution: Namibia to Tanzania.

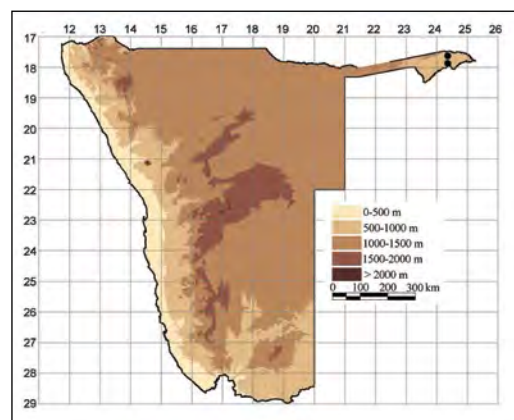


FIGURE 190.—Distribution of *Orbea caudata*.

Voucher: Bruyns 2338 (WIND).

Note: Of the two subspecies recognised (Bruyns 2002), only subsp. *rhodesiaca* occurs in Namibia, where it is only known in eastern Caprivi around Lake Liambezi. Figure 190.

Orbea huillensis (Hiern) Bruyns, *Aloe* 37: 74 (2001) Type: from Angola.

Orbea huillensis* subsp. *huillensis

Caralluma tsumebensis Oberm. in A.C. White & B. Sloane, *Stap.*, ed. 2, 3: 1163 (1937). *Orbeopsis tsumebensis* (Oberm.) L.C. Leach, *Excelsa Taxon*. Ser. 1: 68 (1978). Type: Namibia, cultivated specimen Tsumeb, *Nägelsbach sub Tvl Mus.* 32820 (PRE, holo.).

Orbea huillensis* subsp. *flava Bruyns, *Aloe* 37: 76 (2001). *Orbeopsis flava* (Bruyns) Plowes, *Asklepios* 118: 7 (2014). Type: Namibia, northeast of Grootfontein, *Bruyns* 5522 (BOL, holo.).

Clump-forming succulent 0.15–3.00 m diam. *Stems* 40–400 × 15–30 mm, prominently 4-angled, decumbent, grey-green, tubercles each a prominent deltoid acute tooth with 2 denticles near tip. *Inflorescences* 1–3 per stem mainly near base, 5- to 40-flowered opening ± simultaneously, on peduncle ± 15 × 5–10 mm thick, pedicels 10–45 × 2–3 mm. *Corolla* 55–110 mm diam., ± rotate, deeply lobed; inside maroon, dark purple or yellow, without annulus, papillate-

rugulose; *tube* 5–7 mm deep, cupular; *lobes* 20–45 × 5–9 mm, ovate-lanceolate, narrowly attenuate, spreading, convex above, sometimes with few maroon to white spatulate marginal cilia. *Corona* 3.5–4.5 × 5.5–8.0 mm, raised on stipe 1.0–1.5 mm long, deep purple-brown to orange; *outer lobes* 1.5–3.0 × 1.5–2.5 mm, spreading, oblong acute to truncate-dentate or deltoid, laterally fused towards base to sides of inner lobes; *inner lobes* 1.5–3.5 mm long, adpressed to backs of anthers then ascending and recurved, linear, ± dorsiventrally flattened, terete above, obtuse to slightly bifid apically, base swollen dorsally above outer lobes into rounded boss or series of spreading teeth. Figure 191.

Habitat: Sandy to loamy ground often between trees, 1 100–1 400 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Botswana, Namibia, Zambia, Zimbabwe. In Namibia in northeast from Grootfontein to Rundu.

Vouchers: *Bruyns* 10342 (BOL, K, M, UPS, WIND), for subsp. *flava*; *Strohbach* 1453 (WIND) for subsp. *huillensis*.

Note: Of the two subspecies recognised (Bruyns 2002), both occur in Namibia, with subsp. *flava* endemic to Namibia. Figure 192.



FIGURE 191.—*Orbea huillensis* subsp. *flava*, north of Grootfontein, PVB 10342.

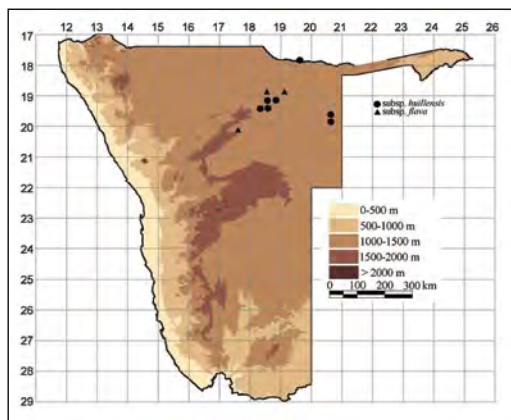


FIGURE 192.—Distribution of *Orbea huillensis*.

Orbea lugardii (N.E.Br.) Bruyns, *Aloe* 37: 75 (2001). Type: from Botswana.

Caralluma longicuspis N.E.Br., *Fl. Cap.* 4 (1): 884 (1909). Type: Namibia, sub *Pillans* 14 (BOL, holo.).

Small clump-forming rhizomatous succulent 60–500 mm diam. *Stems* 40–150 × 6–12 mm, obtusely 4-angled, erect above ground, pale green to silvery grey flecked with purple-brown, tubercles tapering into conical spreading acuminate tooth. *Inflorescences* 2–6 per stem in upper half,

1- to 3-flowered developing in succession, sessile, pedicel 3–6 × 1.0–1.5 mm. *Corolla* 30–45 mm diam., campanulate to rotate, very deeply and narrowly lobed; inside yellow-green, yellow, red, brown with red or brown centre, without annulus, not rugulose, finely papillate; *tube* 3–6 × 5–8 mm, bowl-shaped; *lobes* 18–25 × 3–4 mm, deltate towards base then slenderly acuminate, spreading, convex with minute marginal cilia. *Corona* ± 6 × 4.5–6.0 mm, raised on stipe < 0.5 mm long, red to purple-brown; *outer lobes* 1–2 mm long,

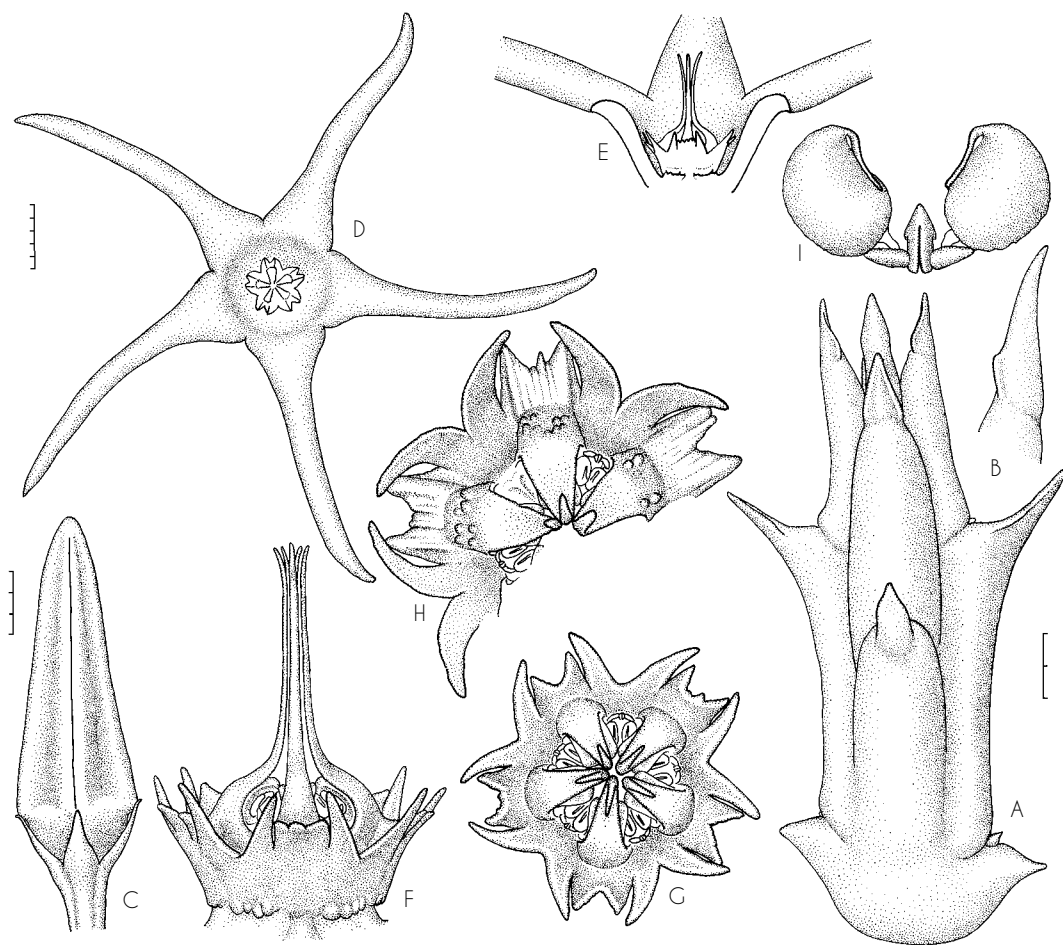


FIGURE 193.—*Orbea lugardii*, A, C–G, I, Tsumeb, Namibia, Bruyns 2328; B, H, Prieska, South Africa, Bruyns 3282. A, apex of stem; B, apex of tubercle; C, bud; D, face view of flower; E, side view of centre of dissected flower; F, side view of gynostegium; G, H, face view of gynostegium; I, pollinarium. Scale bars: A, 2 mm; B, F, G, H, 0.5 mm (at A); C, E, 3 mm (at C); D, 5 mm; I, 0.25 mm (at A).

ascending, bifid into narrow acute diverging lobules; *inner lobes* 4–5 mm long, adpressed to backs of anthers then connivent-erect in column, dorsiventrally flattened, linear above narrowly ovate base, with square emarginate spreading gibbosity laterally fused to and in series with outer lobes. Figure 193.

Habitat: Stony to sandy flat areas among bushes or trees, 1 000–1 500 m.

Flowering time: Nov.–Apr.

Distribution: Botswana, Namibia, South Africa. Very widespread in Namibia, except in winter-rainfall region in southwest. Figure 194.

Voucher: Giess 8630 (WIND).

***Orbea lutea* (N.E.Br.) Bruyns, *Aloe* 37: 75 (2001).** Type: from South Africa (lecto., Leach 1970).

***Orbea lutea* subsp. *vaga* (N.E.Br.) Bruyns, *Aloe* 37: 75 (2001).** *Stapelia vaga* N.E.Br., *Bull. Misc. Inform.* 1895: 265 (1895). *Caralluma vaga* (N.E.Br.) A.C.White & B.Sloane, *Stap.*, ed. 2, 1: 381 (1937). *Caralluma lutea* subsp. *vaga* (N.E.Br.) L.C.Leach, *J. S. African Bot.* 36: 169 (1970). *Orbeopsis lutea* subsp. *vaga* (N.E.Br.) L.C.Leach, *Excelsa Taxon. Ser.* 1: 65 (1978). *Orbeopsis vaga* (N.E.Br.) Plowes, *Asklepios* 118: 11 (2014). Type: Namibia, Ovamboland, Olukonda, *Schinz* 16 (K, holo.).

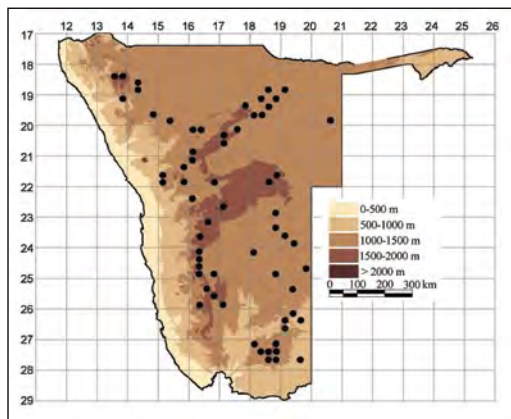


FIGURE 194.—Distribution of *Orbea lugardii*.

Caralluma nebrownii A.Berger, *Notizbl. Königl. Bot. Gart. Berlin* 4: 249 (1906). Type: Namibia, Barman, *Dinter* 1502 (K, iso.).

Caralluma brownii Dinter & A.Berger, *Deut. südwest. Afrik.*: 113 (1909). Type: unknown.

Caralluma pseudonebrownii Dinter, *Neue Pfl. Südwest-Afr.*: 17 (1914). *Caralluma nebrownii* var. *pseudonebrownii* (Dinter) A.C.White & B.Sloane, *Stap.*, ed. 2, 1: 377 (1937). *Orbeopsis pseudonebrownii* (Dinter) Plowes, *Asklepios* 118: 13 (2014). Type: Namibia, Keetmanshoop, *Dinter* 2598 (SAM, lecto., Leach 1970).

Caralluma hahnii Nel in A.C.White & B.Sloane, *Stap.*, ed. 2, 3: 1164 (1937). Type: Namibia, Ovamboland, Ondonga (Ondangua?), *Nel* sub *STE* 7364 (missing).

Caralluma nebrownii var. *discolor* Nel in A.C.White & B.Sloane, *Stap.*, ed. 2, 3: 1144 (1937). *Orbeopsis pseudonebrownii* var. *discolor* (Nel) Plowes, *Asklepios* 118: 14 (2014). Type: Namibia, Tsamap, *Rusch* sub *STE* 7366 (BOL, holo.).

Clump-forming succulent to ± 1 m diam. *Stems* 30–120 $\times$ 10–25 mm, obtusely 4-angled, decumbent, grey-green mottled with red-brown, tubercles each tapering into conical tooth. *In-florescence* 1 per stem in lower half, 3- to 30-flowered, opening $\pm$ simultaneously, $\pm$ sessile, pedicel 12–30 $\times$ 3–4 mm. *Corolla* 35–65 mm diam., rotate; inside red-brown to nearly black or rarely yellow, often mottled with yellow, without annulus, rugulose-papillate; *tube* ± 2 mm deep, shallowly cupular; *lobes* 18–35 $\times$ 6–15 mm, narrowly lanceolate, attenuate-acuminate, spreading, with clavate marginal cilia. *Corona* $\pm 6 \times 10$ mm, raised slightly on stipe < 1 mm long, red- to purple-brown or blackish sometimes with yellow margins; *outer lobes* $\pm 2 \times 3$ mm, subquadrate, nearly contiguous, apex truncate-emarginate to toothed; *inner lobes* 0.8–1.0 mm long, adpressed to backs of anthers for $\pm$ half anthers' length, somewhat dorsiventrally flattened towards base, with apex pressed to anthers, with erect $\pm$ recurved dorsal horn (2.5–3.0 mm long) behind apex usually with smaller slender horn behind it, without dorsal gibbosity near base.

Habitat: Sandy to loamy flat areas among low bushes or scattered trees, 1 100–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Botswana, Namibia, South Africa, Zimbabwe. In Namibia widespread

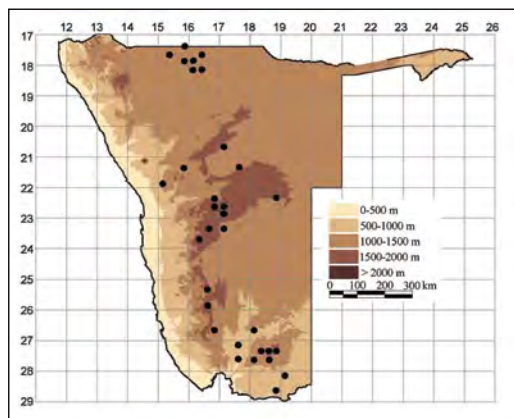


FIGURE 195.—Distribution of *Orbea lutea*.

from Ovamboland to arid south near Warmbad. Figure 195.

Voucher: De Winter & Giess 6880 (M, SRGH, WIND).

Note: Of the two subspecies recognised (Bruyns 2002), only subsp. *vaga* is found in Namibia.

The type has usually been cited as Schinz 2047 (K, holo.; Z, iso.). Leach (1970) mentioned that the specimen at Kew was unnumbered and that it was likely to be the same as Schinz 2047 (Z). Brown (1895) cited no number for the new species *Stapelia vaga*. The sheet at Kew has the number '16' on it and was annotated by N.E. Brown as 'Type'. Therefore, this is the holotype. There is no evidence that he saw any of the specimens at Z, where I was only able to find the specimens 'Onkumbi, Ovamboland, Sept. 1885, Schinz 2041' and 'Olukonda, 14 Oct. 1885, Schinz 2042'.

***Orbea maculata* (N.E.Br.) L.C.Leach, *Excelsa* Taxon. Ser. 1: 49 (1978).** Type: from Botswana.

***Orbea maculata* subsp. *kaokoensis* Bruyns, *Aloe* 37: 75 (2001).** *Orbea kaokoensis* (Bruyns) Plowes, *Bradleya* 31: 162 (2013). Type: Namibia, Kaokoveld, northwest of Opuwa, Bruyns 4083 (BOL, holo.). Figure 196.



FIGURE 196.—*Orbea maculata* subsp. *kaokoensis*, near Chitado, Angola, PVB 10354.

***Orbea maculata* subsp. *rangeana* (Dinter & A.Berger) Bruyns, *Aloe* 37: 76 (2001).** *Caralluma rangeana* Dinter & A.Berger, *Bot. Jahrb. Syst.* 50, Suppl.: 591 (1914), as '*rangei*', *Neue Pfl. Südw.-Afr.*: t. 50 (1914). *Orbea rangeana* (Dinter & A.Berger) L.C.Leach, *Excelsa Taxon. Ser. 1: 51 (1978)*. *Stapelia rangeana* (Dinter & A.Berger) P.V.Heath, *Calyx* 1: 16 (1992). Type: Namibia, Kuibis, Dinter 1226 (missing). Neotype (Bruyns 2005): Namibia, Kanus, April 1913, Dinter 2597a (SAM).

Piarranthus streyianus Nel, *Desert Pl. Life* 21: 99 (1949). Type: Namibia, Büllsport, Strey (missing). Type: *Desert Pl. Life* 21: upper fig. on page 100 (lecto., Bruyns 2002).

Caralluma maculata var. *brevidens* H.Huber, *Mitt. Bot. Staatssamml. München* 4: 33 (1961). Type: from Botswana.

Small rhizomatous succulent, forming clumps to 100 mm diam. connected by rhizomes. Stems 20–100 × 6–15 mm, prominently 4-angled,

erect above ground from horizontal rhizome to 500 mm long, grey-green flecked with purple-brown, tubercles each a prominent deltoid acute tooth. *Inflorescence* 1 per stem near base, 1- to 5-flowered developing in gradual succession, $\pm$ sessile, pedicel $25-50 \times \pm 2$ mm, horizontally spreading. *Corolla* 30–75 mm diam., rotate, very deeply lobed; inside pale greenish yellow to white transversely banded with red-purple to maroon, with small annulus, smooth to slightly papillate; *tube* 0.5–1.0 mm deep, formed by small annulus; *lobes* $12-32 \times 6-15$ mm, oblong, obtuse to subacute, spreading, convex from reflexed margins, with flattened white to purple marginal cilia 1.5–3.0 mm long. *Corona* $3.5-4.5 \times 4.5-7.0$ mm, dome-shaped, raised on stipe 1–2 mm long, yellow to orange or maroon; *outer lobes* disc-like around gynostegium, forming horizontal platform 0.5–2.0 mm wide below guide-rails with swollen $\pm$ rectangular ridge 1.5–2.0 mm long behind anthers meeting inner lobes; *inner lobes* < 1.0 mm long, adpressed to and $\pm$ exceeding backs of anthers, deltoid, subacute to truncate.

Habitat: Stony ground among trees or rocks, 100–1 700 m.

Flowering time: Nov.–Apr.

Distribution: Angola, Botswana, Namibia, South Africa, Zimbabwe. *Orbea maculata* is widespread in Namibia, mainly associated with the margins of the Namib Desert. Figure 197.

Vouchers: Bruyns 8036 (S, WIND) for subsp. *kaokoensis*; Bruyns 5720 (WIND) for subsp. *rangeana*.

Note: Of three subspecies recognised (Bruyns 2002), two occur in Namibia: subsp. *kaokoensis* occurs in the Kaokoveld, while subsp. *rangeana* has been recorded in the Namib Desert from near Orupembe to the Tiras Mountains and eastwards to the Great Karas Mountains. This subspecies is endemic to Namibia.

Orbea schweinfurthii (A.Berger) Bruyns, *Aloe* 37: 76 (2001). Type: from Zaïre.

Small diffusely mat-forming not rhizomatous succulent to 1 m diam. *Stems* $30-150 \times 4-12$ mm, obscurely 4-angled, prostrate in lower half then

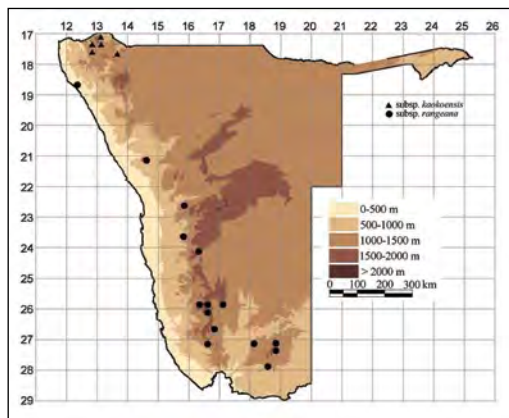


FIGURE 197.—Distribution of *Orbea maculata*.

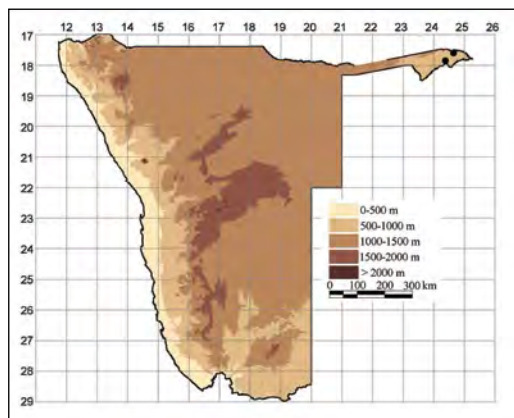
erect near apex, tubercle tapering into slender conical tooth. *Inflorescences* 1–4 per stem around apex, sessile, 1- to 3-flowered developing in gradual succession, pedicels $2-4 \times 1$ mm. *Corolla* 10–15 mm diam., rotate; inside yellow with maroon spots, not rugulose, papillate, with slight annular thickening; *tube* < 0.5 mm deep; *lobes* $3.0-3.5 \times 3$ mm, ovate-deltate, acute, spreading, lightly convex above from slightly reflexed eciliate margins. *Corona* $\pm 2 \times 7$ mm, raised on stipe ± 0.5 mm long, pale yellow to cream speckled with purple; *outer lobes* horizontally spreading and fused together laterally to form continuous flat pentagonal disc-like structure (with corners opposite anthers, 1.5 mm broad from bases of inner lobes) around gynostegium with many-toothed to entire margin, with broad groove beneath each guide-rail; *inner lobes* ± 0.5 mm long, adpressed to backs of anthers and about half as long as them, $\pm$ deltoid, usually with 1–4 short obtuse apical teeth, dorsiventrally flattened.

Habitat: Sandy raised patches under trees in seasonally wet areas, 1 100–1 200 m.

Flowering time: Nov.–Apr.

Distribution: Namibia to Uganda. In Namibia only known in eastern Caprivi around Lake Liambezi. Figure 198.

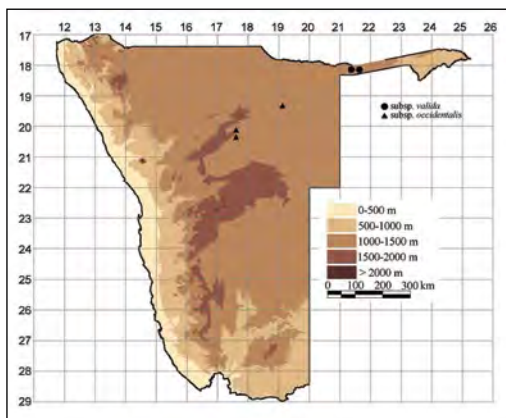
Voucher: Bruyns 2293 (NBG, WIND).

FIGURE 198.—Distribution of *Orbea schweinfurthii*.

Orbea valida (N.E.Br.) Bruyns, *Aloe* 37: 76 (2001) Type: from Botswana.

Orbea valida* subsp. *occidentalis Bruyns, *Aloe* 37: 76 (2001). *Orbeopsis occidentalis* (Bruyns) Plowes, *Asklepios* 118: 10 (2014). Type: from Botswana.

Clump-forming sometimes rhizomatous succulent 80–750 mm diam. *Stems* 40–200 × 15–25 mm, prominently 4-angled, decumbent, grey-green usually marbled with red-purple, tubercles each a prominent deltoid acute tooth with 2 denticles near tip. *Inflorescences* 1–3 per stem mainly near base, 5- to 40-flowered opening ± simultaneously, peduncle ± 15 × 5–10 mm, pedicels 10–45 × 2–3 mm. *Corolla* 35–45 mm diam., ± rotate, deeply lobed; inside deep maroon to pinkish red, without annulus, papillate-rugulose; *tube* 2–6 mm deep, cupular to shallowly cupular; *lobes* 15–20 × 5–9 mm, spreading, ovate-lanceolate, narrowly attenuate, convex above, with few maroon to white spatulate marginal cilia to 3 mm long. *Corona* 3.5–4.5 × 5.5–8.0 mm, raised on stipe 1.0–1.5 mm long, deep purple-brown; *outer lobes* 1.5–3.0 × 1.5–2.5 mm, spreading, oblong acute to truncate-dentate or deltoid, laterally fused towards base to sides of inner lobes; *inner lobes* 1.5–3.5 mm long, adpressed to backs of anthers then ascending and usually recurved, linear, ± dorsiventrally flattened, terete above, obtuse to slightly bifid apically, base swollen dorsally above outer lobes into rounded boss or series of spreading teeth.

FIGURE 199.—Distribution of *Orbea valida*.

Habitat: Sandy ground among trees, 1 100–1 300 m.

Flowering time: Nov.–Apr.

Distribution: Botswana, Namibia, Zimbabwe. In Namibia in northeast from east of Waterberg to Rundu. Figure 199.

Vouchers: Bruyns 10335 (BOL, E, S) for subsp. *occidentalis*; Giess 11371 (WIND) for subsp. *valida*.

Note: Both subspecies recognised (Bruyns 2002) occur in Namibia.

Orthanthera Wight

Erect non-succulent nearly glabrous shrub 0.5–1.0 m tall or extensively spreading roughly pubescent creeper to 5 m diam., sap clear. *Leaves* ovate, lanceolate or linear, sessile or on petioles 2–15 mm long, caducous to persistent, nearly glabrous to roughly pubescent. *Inflorescence* a nearly sessile or pedunculate fascicle next to leaf axil, finely to roughly pubescent. *Corolla* whitish, campanulate with slender tube, shortly pubescent outside, glabrous or pubescent within tube; *tube* 5–18 mm long, cylindrical and somewhat swollen at base; *lobes* 2.5–12.0 mm long, ovate-lanceolate to lanceolate, erect or spreading; gynostegial corona in 1 series of 5 spreading lobes behind anthers; *anthers* without apical appendage or with erect apical hairs; *pollinia* erect, with distinct hyaline insertion crest near tip; style

head extended into cylindrical sometimes apically bifid beak ± 1 mm long but hidden by anthers. *Follicles* solitary by abortion, pendulous, fusiform and beaked, $50\text{--}100 \times 10\text{--}25$ mm, smooth and glabrous to pubescent.

4 species, south tropical Africa, India, Nepal and Pakistan.

Key to species

- 1a. Erect, nearly glabrous shrub with leaves 1–2 mm broad; corolla with tube ca. 5 mm long, inside glabrous, lobes erect, 2.5–3 mm long ***O. albida***
- 1b. Procumbent creeper with roughly hairy stems, leaves and inflorescences, leaves 3–25 mm broad; corolla with tube 10–18 mm long, inside hairy in upper part, lobes widely spreading, 6–12 mm long ***O. jasminiflora***

Orthanthera albida Schinz, *Verh. Bot. Vereins Prov. Brandenburg* 30: 265 (1888). Type: Namibia, Karakoes, Schinz (Z, lecto., designated here).

Erect non-succulent nearly glabrous shrub 0.5–1.0 m tall. *Leaves* linear, $20\text{--}50 \times 1\text{--}2$ mm, sessile, caducous to persistent, nearly glabrous. *Inflorescence* a nearly sessile fascicle next to leaf axil, finely pubescent. *Corolla* grey-white, campanulate with slender tube, shortly pubescent outside, glabrous within tube; *tube* 4.5–6.0 mm long, cylindrical and slightly swollen at base; *lobes* 2.5–3.0 mm long, ovate-lanceolate, erect; *gynostegial corona* in 1 series of 5 spreading lobes behind anthers; *anthers* with erect apical hairs. *Follicles* solitary by abortion, pendulous, fusiform and beaked, $50\text{--}100 \times 10\text{--}25$ mm, smooth and glabrous, cream streaked with purple-brown. Figures 200 & 201.

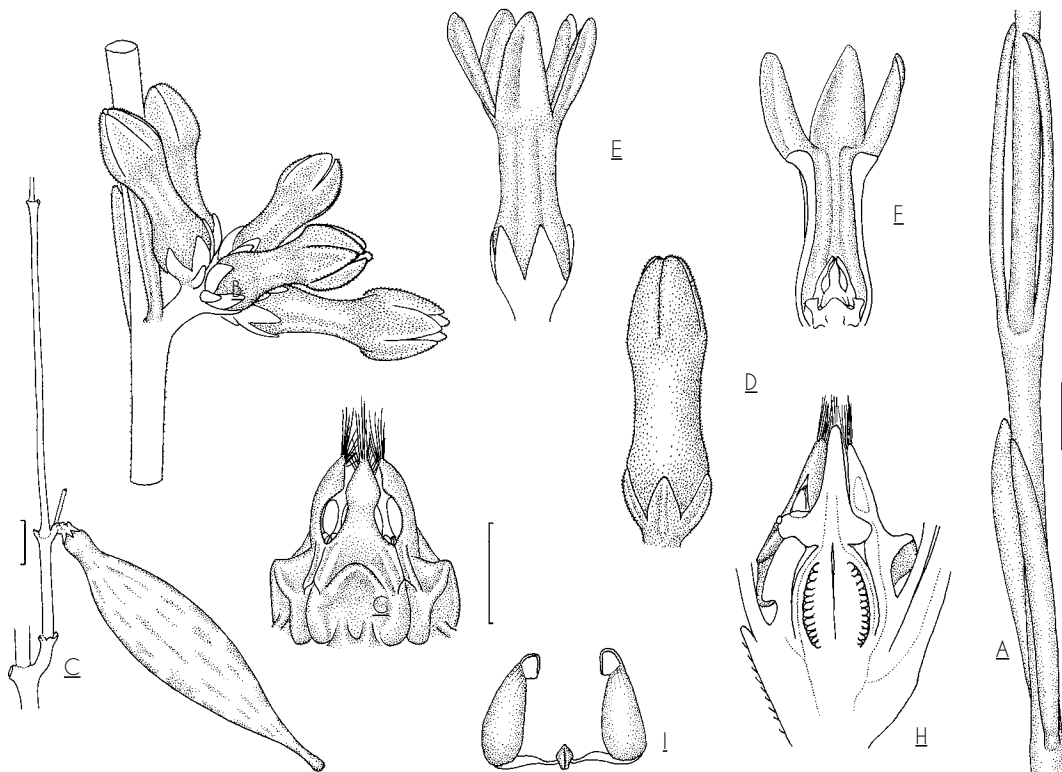


FIGURE 200.—*Orthanthera albida*, near Seeheim, Namibia, *Bruyns*. A–C, portion of plant (showing leaves, flowers and fruit respectively); D, bud; E, side view of flower; F, side view of dissected flower; G, side view of gynostegium; H, half-flower; I, pollinarium. Scale bars: A, B, 3 mm (at A); C, 10 mm; D–F, 2 mm (at A); G, H, 1 mm (at G); I, 0.25 mm (at A).



FIGURE 201.—*Orphanthera albida*, fruit, northwest of Keetmanshoop, PVB.

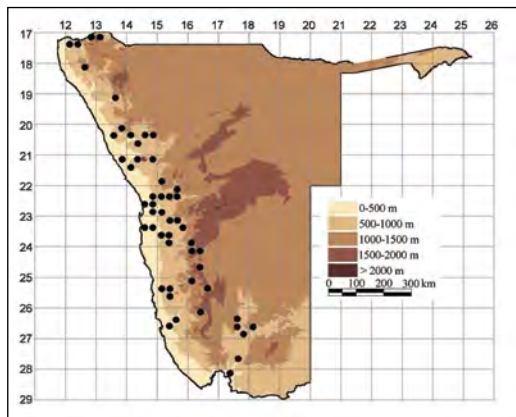


FIGURE 202.—Distribution of *Orphanthera albida*.

Habitat: Rocky slopes and gravelly plains, 20–1 100 m.

Flowering time: recorded throughout year.

Distribution: Angola, Namibia. In Namibia mainly in coastal Namib from Cunene River to Walvis Bay and south of this to Keetmanshoop and lower Fish River near Ai-Ais. Figure 202.

Voucher: De Winter & Leistner 5862 (K, WIND, Z).

***Orphanthera jasminiflora* (Decne.) Schinz, Verh. Bot. Vereins Prov. Brandenburg 30: 265 (1888). Type: from Botswana.**



FIGURE 203.—*Orphanthera jasminiflora*, southeast of Oshakati, PVB 4112.

Orphanthera browniana Schinz, Verh. Bot. Vereins Prov. Brandenburg 30: 264 (1888). Type: Namibia, Omulongo, Ovamboland, Schinz 144 (Z, holo.; K, iso.).

Extensively spreading roughly pubescent mostly prostrate creeper to 5 m diam. *Leaves* ovate or ovate-lanceolate to linear, 20–60 × 3–25 mm, with petiole 2–15 mm long, persistent, roughly pubescent. *Inflorescence* a pedunculate fascicle next to leaf axil, peduncles 8–40 mm long, finely to roughly pubescent. *Corolla* white, campanulate with slender tube, shortly pubescent outside, pubescent within tube; tube 10–18 mm long, cylindrical and distinctly swollen at base; lobes 6–12 mm long, lanceolate, widely spreading; gynostegial corona in 1 series of 5 spreading lobes behind anthers; *anthers* without apical appendage. *Follicles* solitary by abortion, pendulous, fusiform and beaked, slightly dorsiventrally flattened, 50–100 × 10–25 mm, smooth and pubescent. Figure 203.

Habitat: Sandy savanna, 1 000–1 500 m.

Flowering time: Nov.–Mar.

Distribution: Angola, Botswana, Namibia, South Africa, Zambia, Zimbabwe. In Namibia common on disturbed, white sands in Ovamboland and southwards to Windhoek and Aroab. Figure 204.

Voucher: Rodin 8910 (K, WIND).

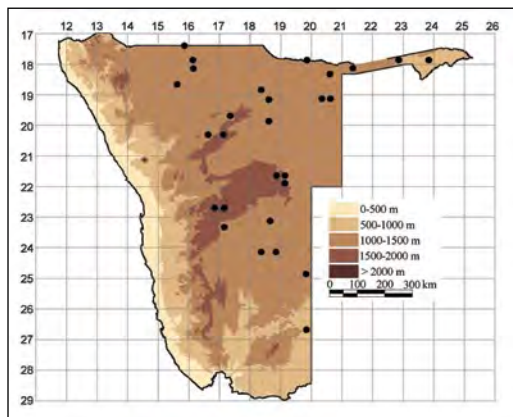


FIGURE 204.—Distribution of *Orphanthera jasminiflora*.

Piaranthus R.Br.

Dwarf spineless non-rhizomatous mat-forming succulent to 300 mm diam. *Stems* 10–150 × 8–20 mm, obtusely 4- to 5-angled, decumbent, glabrous, green to grey-green or reddish, sometimes mottled with purple, tuberculate, each tubercle tipped by small tooth-like leaf-rudiment. *Inflorescences* glabrous, 1–3 per stem towards apex, 1- to 5-flowered, on gradually lengthening knobbly peduncle 2–15 mm long, pedicel 2–25 × 1–2 mm, erect with flower facing upwards. *Corolla* 6–45 mm diam., rotate to campanulate, deeply lobed; outside glabrous; inside deep maroon to cream often mottled or striped with maroon, without annulus, finely papillate; *tube* to 4–7 × 5–10 mm, nearly absent to cupular; *lobes* 5–18 × 2–12 mm, spreading, lanceolate to narrowly ovate, acute, convex above with margins somewhat recurved, margins rarely ciliate; *gynostegial corona* of 2 series of lobes partly intergrown (outer series apparently absent), 2–13 × 2–7 mm, glabrous, ± sessile; *outer lobes* much reduced to rounded spreading ridge beneath guide-rail, often with ascending crest behind each inner lobe; *inner lobes* 1–10 mm long, dorsiventrally flattened, adpressed to backs of anthers below, sometimes erect above; *anthers* horizontal on top of style head, rectangular; *pollinium* ellipsoidal, with insertion-crest along outer edge. *Follicles* paired, erect, terete-fusiform, slender, 30–140 × 3–8 mm, glabrous, smooth.

7 species (Bruyns 2005), Botswana, Namibia, South Africa.

Key to species

- 1a. Corolla flat and without distinct tube . . . **P. cornutus**
- 1b. Corolla with distinct tube including gynostegium **P. decipiens**

Piaranthus cornutus N.E.Br., *Fl. Cap.* 4 (1): 1018 (1909). Type: from South Africa.

Piaranthus cornutus var. **cornutus**

Piaranthus nebrownii Dinter, *Neue Pfl. Südw.-Afr.*: 47 (1914). *Piaranthus pulcher* var. *nebrownii* (Dinter) A.C.White & B.Sloane, *Stap.*, ed. 2, 2: 797 (1937). Type: Namibia, Klein Karas, 9 Oct. 1913, J. Dinter sub Dinter 3248 (SAM, holo.).

Piaranthus cornutus var. **ruschii** (Nel) Bruyns, *Stap. Southern Africa & Madag.* 2: 365 (2005). *Piaranthus ruschii* Nel in A.C. White & B. Sloane, *Stap.*, ed. 2, 2: 813 (1937). Type: Namibia, Pockenbank, E. Rusch (missing). Type: White & Sloane, *Stap.*, ed. 2, 2: fig. 822 (lecto., Meve 1997).

Dwarf, tightly mat-forming succulent. *Stems* 10–60 mm long, ± globose, tubercles with deltoid leaf-rudiment 0.3–1.2 mm long. *Corolla* 15–28 mm diam., rotate, often with ascending lobes; inside white to yellow, usually with fine red to red-brown dots or transverse bands; *tube* ± absent; *lobes* 8–12 mm long, 3–5 mm broad at base, narrowly deltate, acuminate, ascending to spreading, rarely with few clavate vibratile marginal cilia up to 2 mm long. *Corona* 2.5–5.0 × 3.5–5.0 mm, sessile, yellow sometimes spotted with red-brown; *outer lobes* forming slightly to deeply rugulose-tuberculate crest to 0.8–1.5 mm broad behind inner lobes; *inner lobes* 1–2 mm long, adpressed to backs of anthers and exceeding them, usually steeply ascending towards centre. Figures 205 & 206.

Habitat: Gravelly flats under small bushes, 800–1 600 m.

Flowering time: Nov.–Apr.

Distribution: Namibia, South Africa. In Namibia in the south from Aus to Rosh Pinah, Great Karas Mountains and Warmbad. Figure 207.

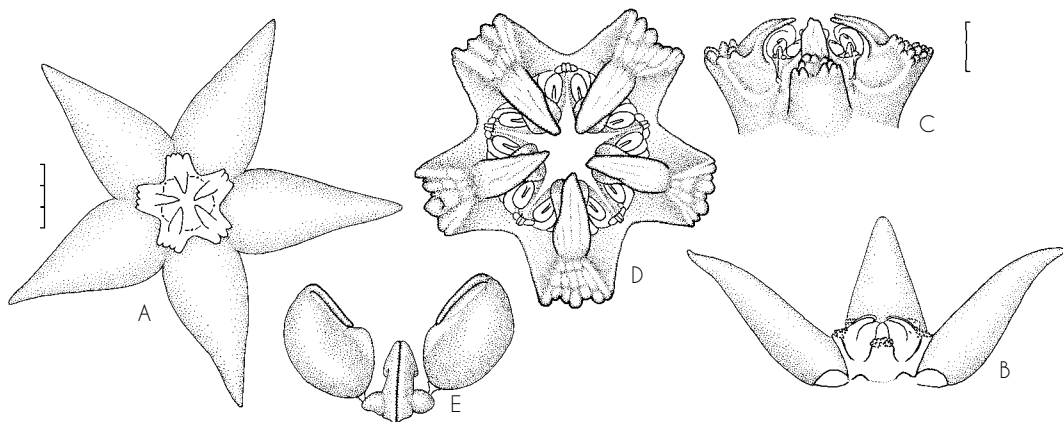


FIGURE 205.—*Piaranthus cornutus* var. *ruschii*, near Rosh Pinah, Namibia, Bruyns 3064. A, face view of flower; B, side view of dissected flower; C, side view of gynostegium; D, face view of gynostegium; E, pollinarium. Scale bars: A, B, 3 mm (at A); C, 1 mm; D, 1 mm (at A); E, 0.25 mm (at A).

Vouchers: Walter 235 (WIND) for var. *cornutus*; Hall sub NBG 784/62 (NBG) for var. *ruschii*.

Note: Both varieties recognised (Bruyns 2005) occur in Namibia.

Piaranthus decipiens (N.E.Br.) Bruyns, Syst. Bot. 24: 396 (1999). Type: from South Africa.

Small laxly mat-forming succulent. *Stems* 20–150 mm long, tubercles with narrowly deltoid caducous leaf-rudiment 3–6 mm long. *Corolla* 20–30 mm diam., shallowly campanulate; inside brown-red or brown sometimes finely

mottled with yellow; *tube* 4–10 × 7–10 mm, cupular, pentagonal; *lobes* 7–12 mm long, 6–8 mm broad at base, deltate-ovate, acute, ascending to recurved, with clavate purplish vibratile marginal cilia 1.5–2.2 mm long. *Corona* 7–10 × 6–7 mm, nearly sessile, purple to pink or pale brown; *outer lobes* < 1 mm long, spreading, forming shallow pouch joining 'bases' of inner lobes; *inner lobes* 3–6 mm long, initially incumbent on backs of anthers then erect and connivent above them.

Habitat: Sandy to loamy ground among bushes and trees in flats, 1 000–1 600 m.



FIGURE 206.—*Piaranthus cornutus* var. *cornutus*, west of Grünau, PVB 3650.

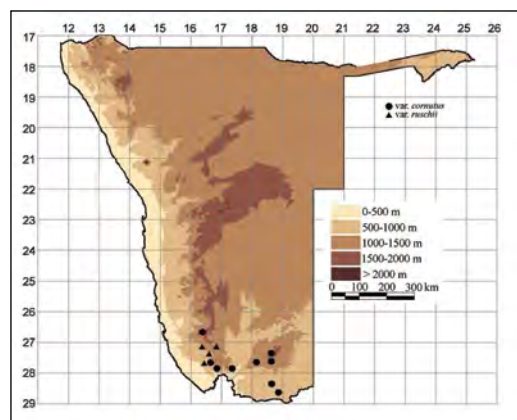


FIGURE 207.—Distribution of *Piaranthus cornutus*.

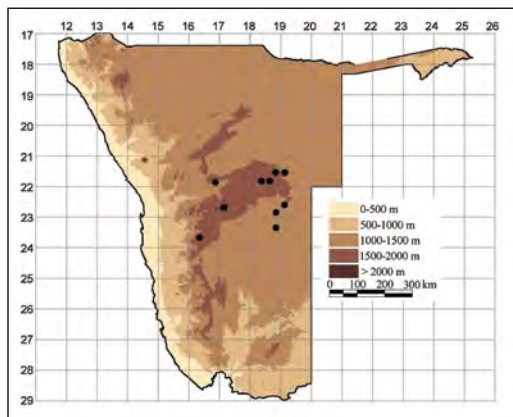


FIGURE 208.—Distribution of *Piaranthus decipiens*.

Flowering time: Nov.–Mar.

Distribution: Botswana, Namibia, South Africa. In Namibia in the central part from Nauchas to Gobabis. Figure 208.

Voucher: Giess 13917 (M, WIND).

Quaqua N.E.Br.

Often spiky non-rhizomatous shrub- to clump-forming succulent to 500 mm diam. *Stems* 50–500 × 15–40 mm, 4- to 5-angled, erect to spreading, hard, glabrous, grey- to purplish green, tubercles each tipped with a hardened conical tooth. *Inflorescences* glabrous, 1–20 per stem in upper part, often in vertical series in grooves on opposite sides of stem, 1- to 15-flowered, sessile; *pedicel* 1–8 × 0.5–2.0 mm. *Corolla* 7–25 mm diam., rotate to campanulate, mostly deeply lobed; outside glabrous; inside papillate to smooth, glabrous or with fine crinkled hairs; *tube* 0–5 mm deep, cupular; *lobes* 2–15 mm long, ovate-lanceolate to linear, acute, spreading, convex above, margins eciliate; *gynostegial corona* of 2 series of lobes partly intergrown, glabrous, often raised on short stipe, 1.5–4.5 mm diam.; *outer lobes* 0.5–2.0 mm long, bifid into small erect teeth between inner corona lobes laterally fused with bases of inner lobes, dorsiventrally flattened; *inner lobes* 0.3–2.0 mm long, adpressed to backs of anthers, sometimes exceeding them and rising in centre in small column, dorsiventrally flattened,

often with obtuse dorsal process near base nearly in series with outer lobes; *anthers* horizontal on top of style head, rectangular; *pollinium* ellipsoidal, with insertion-crest along outer edge. *Follicles* paired, erect, terete-fusiform, slender, glabrous, smooth.

19 species, mainly winter-rainfall parts of Namibia, South Africa.

Key to species

- 1a. Stems tapering to apex; corolla face lightly rugulose (not raised into discrete papillae), covered with fine crinkled hairs **Q. pruinosa**
- 1b. Stems not tapering; corolla face smooth or papillate, glabrous 2.
- 2a. Corolla uniformly cream or white within (sometimes suffused with pale pink) **Q. incarnata**
- 2b. Corolla lobes purple to dark purple or mottled with purple, brown or red 3.
- 3a. Corolla lobes longitudinally folded along middle so as to be keeled on upper surface; pedicel > 1.5 mm thick **Q. mammillaris**
- 3b. Corolla lobes not folded longitudinally (without keel); pedicel at most 1 mm thick **Q. acutiloba**

Quaqua acutiloba (N.E.Br.) Bruyns, Bradleya 1: 44 (1983). Type: from South Africa.

Clump-forming succulent 80–300 mm diam. *Stems* 40–150 × 15–20 mm, 4- to 5-angled, decumbent, green to brown, tubercles each tipped with sharp tooth. *Inflorescences* of 1–3 usually successively opening flowers, pedicel 1–2 × 1 mm. *Corolla* 8.5–13.5 mm diam., campanulate to rotate; inside purple-black or yellow-green to mottled with purple-black on yellow-green, glabrous and smooth; *tube* < 1.5 mm deep, shallowly V-shaped; *lobes* 3–6 × 2.5–3.5 mm, deltate, ascending to spreading. *Corona* 1.3–1.5 × 3.0–3.8 mm, dark maroon to red or yellow, sessile; *outer lobes* < 1 mm long, divided into 2 erect deltoid lobules; *inner lobes* ± 1 mm long, adpressed to backs of anthers and exceeding them but usually not meeting in centre, linear to deltoid, obtuse to emarginate, dorsiventrally flattened, with low obtuse dorsal projection near outer lobes.

Habitat: Stony ground among scattered low shrubs, 500–1 600 m.

Flowering time: Mar.–May.

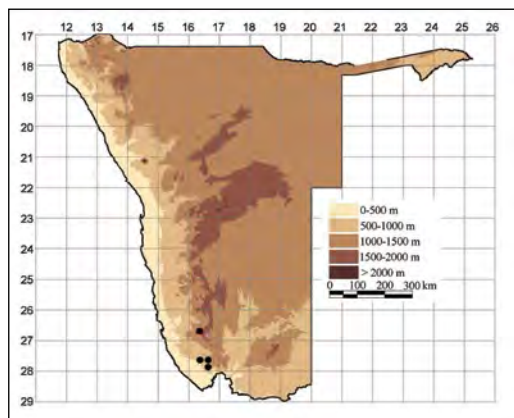


FIGURE 209.—Distribution of *Quaqua acutiloba*.

Distribution: Namibia, South Africa. In Namibia from Aus to north of Rosh Pinah. Figure 209.

Voucher: Bruyns 3174 (NBG).

***Quaqua incarnata* (L.f.) Bruyns, *Bradleya* 1: 39 (1983). Type: from South Africa.**

***Quaqua incarnata* subsp. *hottentotorum* (N.E.Br.) Bruyns, *Bot. Jahrb. Syst.* 121: 370 (1999). Type: from South Africa.**

Caralluma ausana Dinter & A.Berger, *Feddes Repert. Spec. Nov. Regni Veg.* 15: 354 (1918). Type: Namibia, near Aus, Dinter 1145 (missing). Neotype (Bruyns 1999): Namibia, Aus, Dinter 6210 (K, neo.; duplicates in BOL, SAM, Z).

Small clump-forming succulent 60–300 mm diam. *Stems* 50–300 × 12–32 mm, 4-angled, decumbent, greyish green to brown, tubercles each tipped by sharp tooth. *Inflorescences* of 3–10 ± simultaneously opening flowers, pedicel 1–3 × 0.5–1.0 mm. *Corolla* 7–25 mm diam., campanulate; inside cream to pale yellow, with stiff bristles in mouth of tube and around bases of lobes, otherwise smooth and glabrous; *tube* 1.0–2.5 mm deep, cupular; *lobes* 2–10 × 2.0–2.5 mm, ascending to spreading, narrowly delatate to lanceolate, longitudinally folded. *Corona* 1.0–1.6 × 2.0–2.3 mm, yellow, raised on short stipe; *outer lobes* ± 0.5 mm long, ascending to erect, shallowly bifid into erect deltoid teeth joined laterally to bases of inner lobes and so



FIGURE 210.—*Quaqua incarnata* subsp. *hottentotorum*, near Witpütz, PVB 7201.

forming pouch; *inner lobes* < 0.5 mm long, adpressed to and shorter than backs of anthers, ± deltoid to rectangular, obtuse to acute, dorsoventrally flattened, without dorsal projection. Figure 210.

Habitat: Stony often steep ground among scattered low shrubs, 600–1 600 m.

Flowering time: Mar.–May.

Distribution: Namibia, South Africa. In Namibia from Aus to south of Rosh Pinah. Figure 211.

Voucher: Bruyns 3210 (NBG).

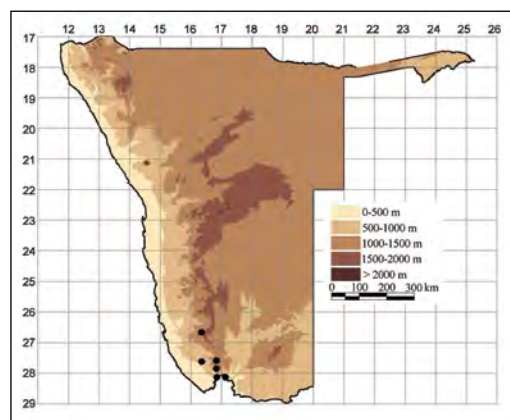


FIGURE 211.—Distribution of *Quaqua incarnata*.

Note: Of the three subspecies recognised (Bruyns 1999), only subsp. *hottentotorum* occurs in Namibia.

***Quaqua mammillaris* (L.) Bruyns, *Bradleya* 1: 63 (1983).** Type: from South Africa (lecto., Bruyns 1983).

Sarcophagophilus winklerianus Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 19: 156 (1923), as *Sarcophagophilus winkleri*. *Caralluma winkleriana* (Dinter) A.C.White & B.Sloane, *Stap.*, ed. 2, 1: 277 (1937), as *Caralluma winkleri*. Type: Namibia, Klinghardt Mountains, 1922, Dinter 4722 (PRE, holo.; WIND, iso.).

Sarcophagophilus armatus Dinter, *Feddes Repert. Spec. Nov. Regni Veg.*, Beih. 53: 107 (1928) non (N.E.Br.) Dinter (1928). Type: Namibia, Vahldorn, Dinter 5112 (PRE, lecto., Bruyns 1999; duplicates in BOL, SAM).

Succulent shrub to 600 mm diam., rooting from central stem only. Stems 120–500 × 15–40 mm, irregularly 4- to 5-angled, erect, green to brown, tubercles each tipped with sharp tooth. Inflorescences of 3–15 ± simultaneously opening flowers, pedicel 2–3 × 2 mm. Corolla 20–27 mm diam., campanulate; inside purple-

black on lobes, purple-black mottled on cream in tube, with conical bristle-tipped papillae around mouth of tube; tube 3–5 × ± 5 mm, cupular; lobes 10–20 × 4.5–7.0 mm, narrowly lanceolate, acuminate, erect to spreading, strongly longitudinally folded back down middle. Corona ± 3 × 4.0–4.5 mm, dark purple-brown, raised on short stipe; outer lobes 1.5–2.0 mm long, erect, bifid into erect deltoid teeth, laterally fused with bases of inner lobes to form deep pouch; inner lobes ± 1 mm long, adpressed to backs of anthers and exceeding them, connivent-erect into small column in centre, linear, obtuse, dorsiventrally flattened, with erect dorsal projection slightly in front of outer lobes. Figure 212.

Habitat: Stony ground among scattered low shrubs, 300–1 000 m.

Flowering time: Mar.–May.

Distribution: Namibia, South Africa. In Namibia from Klinghardt Mountains to southeast of Ai-Ais and southeast of Warmbad. Figure 213.

Voucher: Dinter 6537 (BOL, K).

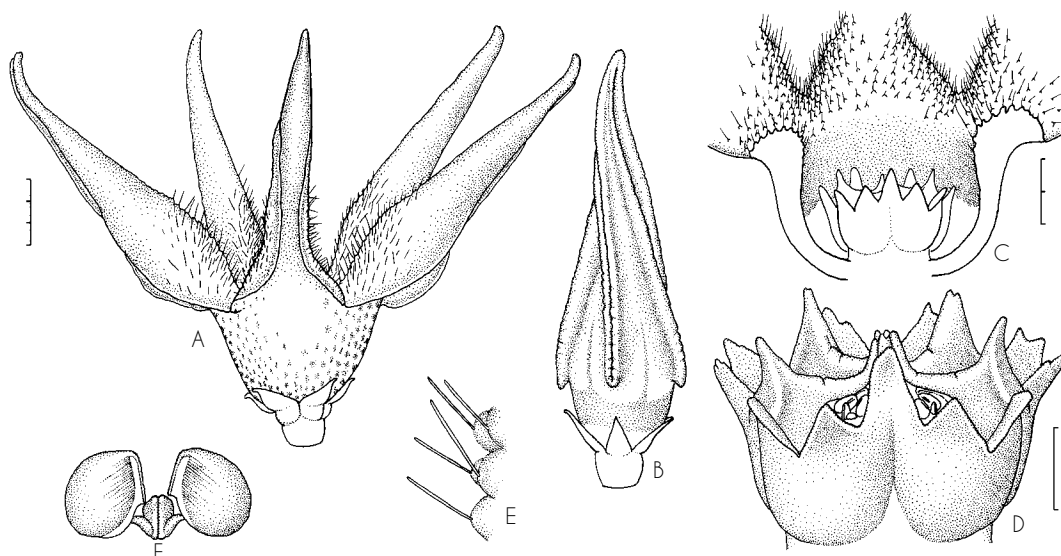
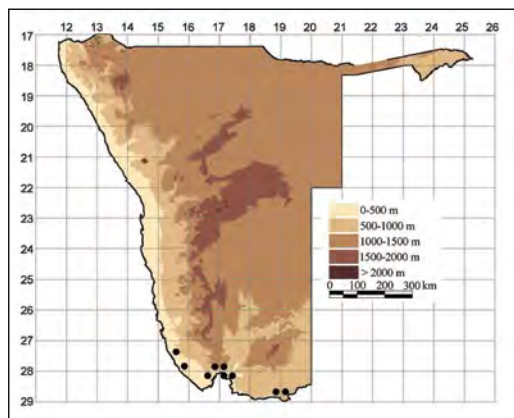
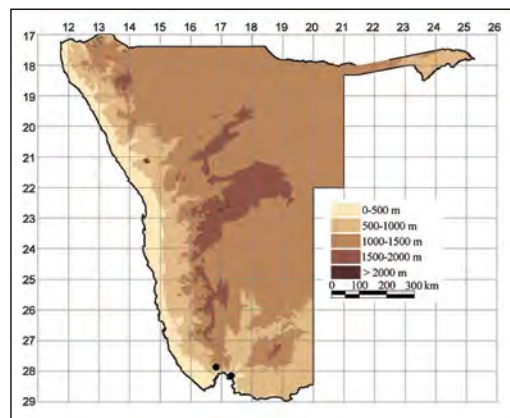


FIGURE 212.—*Quaqua mammillaris*, Little Karoo, South Africa, Bruyns 2616. A, side view of flower; B, bud; C, side view of centre of dissected flower; D, side view of gynostegium; E, papillae inside corolla in mouth of tube; F, pollinarium. Scale bars: A, B, 3 mm (at A); C, 2 mm; D, 1 mm; E, 0.5 mm (at A); F, 0.25 mm (at A).

FIGURE 213.—Distribution of *Quaqua mammillaris*.FIGURE 214.—Distribution of *Quaqua pruinosa*.

Quaqua pruinosa (Masson) Bruyns, *Bradleya* 1: 74 (1983). Type: from South Africa (lecto., Bruyns 1983).

Diffuse succulent shrub branching above ground from centrally rooted stem. *Stems* 100–500 × 10–15(–20) mm, 4-angled, erect then spreading horizontally and somewhat tapering towards apex, greyish green to almost black, tubercles very obscure, each with minute tooth. *Inflorescences* of 1–3 successively opening flowers; *pedicel* 2–8 × 0.5–1.0 mm. *Corolla* 7–13 mm diam., rotate; inside dark maroon, ± rugulose, with fine crinkled white hairs to 1 mm long; *tube* ± 0.5 mm long, shallow to ± absent; *lobes* 2–5 × 2.5–3.0 mm, deltate to ovate, acute, spreading. *Corona* 2 × 2.2–2.5 mm, black and reddish towards base, sessile; *outer lobes* < 0.5 mm long, shallowly bifid into small erect deltoid teeth; *inner lobes* < 1 mm long, adpressed to backs of anthers and exceeding them, linear to deltoid with notched to obtuse apex, dorsiventrally flattened, with short ridge-like dorsal projection near base.

Habitat: Stony ground among scattered low shrubs, 800–1 000 m.

Flowering time: Mar.–May.

Distribution: Namibia, South Africa. In Namibia from east of Rosh Pinah to southwest of Ai-Ais. Figure 214.

Voucher: Bruyns 3153 (NBG).

Stapelia L.

Spineless clump-forming succulent to 1 m diam. *Stems* 20–300 × 4–25 mm, 4-angled, erect to decumbent, pubescent, green sometimes mottled with purple, tubercles each with small erect deltoid-lanceolate caducous leaf-rudiment. *Inflorescences* pubescent, 1–3 per stem, from base to near apex, 1- to 5-flowered developing in gradual succession, ± sessile, pedicel 3–80 × 1.5–4.0 mm. *Corolla* 8–200 mm diam., rotate, deeply lobed; outside finely pubescent; inside transversely rugulose, usually hairy; *tube* < 5 mm long, usually pentagonal; *lobes* 8–100 × 5–35 mm, spreading, deltate or ovate to narrowly lanceolate, convex above, margins usually finely ciliate; *gynostegial corona* of 2 series of lobes intergrown only near bases, glabrous, raised on stipe 1–2 mm tall, 2.5–19.0 × 5–15 mm; *outer lobes* ascending, simple, channelled on upper surface; *inner lobes* adpressed to backs of anthers, exceeding them to meet in centre or connivent and then diverging, dorsiventrally flattened towards base, mostly with conspicuous laterally flattened dorsal appendage near base; *anthers* horizontal on top of style head, rectangular to obtriangular; *pollinium* D-shaped, with insertion-crest along outer edge. *Follicles* paired, erect, terete-fusiform, slender, pubescent, smooth.

27 species (Bruyns 2005), Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zimbabwe.

Key to species

- 1a. Inner corona lobes not exceeding 3.5 mm long, often shorter than or only slightly longer than anthers 2.
- 1b. Inner corona lobes more than 4 mm long, always much exceeding anthers 3.
- 2a. Pedicel at least 30 mm long (usually > 50 mm long), spreading with upturned apex holding flower facing upwards $\pm$ on ground **S. similis**
- 2b. Pedicel 10–30 mm long and spreading with flowers facing outwards from stems or to 50 mm long and erect with flower facing upwards **S. kwebensis**
- 3a. Corolla lobes with vibratile cilia along margins, mainly towards base **S. schinzii**
- 3b. Corolla lobes without vibratile cilia along margins 4.
- 4a. Inside of corolla with clavate hairs on united part below lobes **S. flavopurpurea**
- 4b. Inside of corolla with fine hairs or glabrous 5.
- 5a. Outer corona lobes narrowly deltoid; inner lobes with slender dorsal horn $\pm$ as broad as thick; flower < 50 mm diam. **S. pearsonii**
- 5b. Outer corona lobes $\pm$ parallel-sided with truncate to crenulate apex; inner lobes with broad dorsal horn much broader than thick; flower usually > 50 mm diam. **S. hirsuta**

Stapelia flavopurpurea Marloth, *Trans. S. African Philos. Soc.* 18: 48, t. 5, fig. 1 (1907). Type: from South Africa.

Stapelia fleckii A.Berger & Schltr., *Vierteljahrsschr. Naturf. Ges. Zürich* 53: 490 (1909). *Stapelia flavopurpurea* var. *fleckii* (A.Berger & Schltr.) A.C.White & B.Sloane, *Stap.*, ed. 2, 2: 495 (1937). *Gonostemon flavopurpureus* var. *fleckii* (A.Berger & Schltr.) P.V.Heath, *Calyx* 3: 8 (1993). Type: Namibia, Rehoboth, *Fleck 248a* (Z, lecto., Bruyns 2005).

Small clump-forming succulent to 200 mm diam. *Stems* 20–60 $\times$ 6–15 mm, decumbent, sandpapery-pubescent, green suffused with purple, leaf rudiments 1.0–1.5 mm long. *Inflorescences* 1–4 per stem near apex, 1- to 5-flowered, $\pm$ sessile, pedicel 15–30 $\times$ 1.5 mm, erect with flower facing upwards. *Corolla* 25–50 mm diam., rotate, deeply lobed; inside green, yellow, brown or pale red on lobes, in centre with translucent white to dark purple clavate hairs < 0.5 mm long; *tube* 1.5–2.0 $\times$ 5–8 mm, cupular; *lobes* 10–23 $\times$ 4–6 mm, narrowly ovate to lanceolate, acute, spreading, convex above, margins eciliate. *Corona* $\pm$ 9–10 $\times$ $\pm$ 10 mm, red-purple to white, raised on short stipe; *outer lobes*

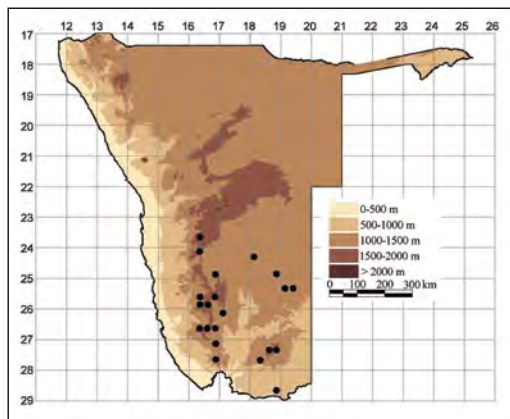


FIGURE 215.—Distribution of *Stapelia flavopurpurea*.

2–3 $\times$ 1.0–1.5 mm, steeply ascending, rectangular, truncate and prominently apiculate, deeply channelled; *inner lobes* 6–9 mm long, adpressed to backs of anthers then connivent-erect then recurved, dorsiventrally flattened at base, then becoming slender terete with slightly swollen apex, with ascending narrowly deltoid and laterally flattened dorsal wing 4–5 mm long.

Habitat: Stony ground under low shrubs, 800–1 700 m.

Flowering time: Mar.–May.

Distribution: Namibia, South Africa. In Namibia from Nauchas southwards to Witpütz and to Great Karas Mountains. Figure 215.

Voucher: Bruyns 5635 (WIND).

Stapelia hirsuta L., *Sp. Pl.* 1: 217 (1753). Type: from South Africa (lecto., Brown 1907–9: 939).

Stapelia hirsuta var. **gariensis** (Pillans) Bruyns, *Stap. Southern Africa & Madag.* 2: 464 (2005). Type: from South Africa.

Stapelia johani-laurani J.J.Halda, *Acta Mus. Richnov. Sect. Natur.* 5: 42 (1998). Type: Namibia, near Rosh Pinah, *Halda 9708416* (?).

Clump-forming succulent 80–500 mm diam. *Stems* 50–120 $\times$ 10–20 mm, decumbent, short-

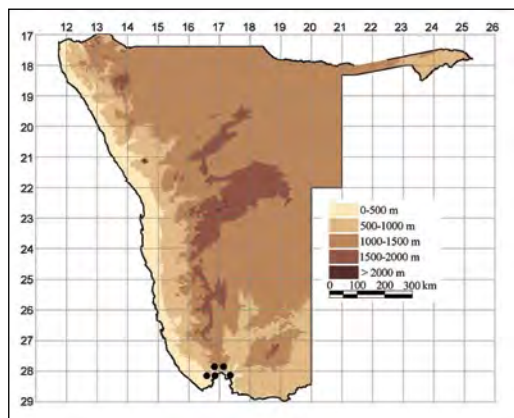


FIGURE 216.—Distribution of *Stapelia hirsuta*.

ly pubescent, green mottled with red, leaf-rudiments 1–2 mm long. *Inflorescence* pubescent, 1 per stem near base, 1- to 3-flowered, peduncle < 5 mm long, pedicel 20–100 × 2–4 mm, spreading with ascending apex. *Corolla* 50–140 mm diam., rotate, deeply lobed; inside purple-red, faintly transversely rugose, with fine purplish hairs towards centre; *tube* < 5 mm deep, shallowly bowl-shaped; *lobes* 25–55 × 8–35 mm, ovate-lanceolate, acute, spreading to reflexed. *Corona* 5–16 × 6–12 mm, purple-red, raised on stipe 1.0–1.5 mm tall; *outer lobes* 4–6 × ± 2 mm, spreading with recurved acute to toothed apex, linear to oblong, deeply channelled above; *inner lobes* 2.5–12.0 mm long, adpressed to backs of anthers then connivent-erect and strongly recurved, dorsiventrally flattened near base becoming laterally flattened above, with laterally flattened spreading deltoid to lanceolate dorsal wing in lower half.

Habitat: Stony or loamy ground among scattered low shrubs, 200–1 300 m.

Flowering time: Mar.–May.

Distribution: Namibia, South Africa. In Namibia from east of Rosh Pinah to southwest of Ai-Ais. Figure 216.

Voucher: Bruyns 3048 (BOL, WIND).

Note: of the five varieties recognised (Bruyns 2005), only var. *gariensis* is found in Namibia.

Stapelia kwebensis N.E.Br., *Fl. Trop. Afr.* 4 (1): 501 (1903). Type: from Botswana (lecto., Leach 1985).

Stapelia kwebensis var. *longipedicellata* A.Berger, *Stap. u. Klein.*: 318 (1910). *Stapelia longipedicellata* (A.Berger) N.E.Br., *Bull. Misc. Inform.* 1913: 303 (1913). *Gonostemon longipedicellatus* (A.Berger) P.V.Heath, *Calyx* 1: 19 (1992). Type: Namibia, near Olukonda, Sept. 1885, Schinz (Z, lecto., Bruyns 2005).

Small clump-forming succulent 50–500 mm diam. *Stems* 60–200 × 8–15 mm, erect to decumbent, shortly pubescent, grey-green with darker green to purple between angles, leaf-rudiments 2–7 mm long, lanceolate. *Inflorescences* 1–3 per stem at any height on stem, 1- to 6-flowered, peduncle 5–40 mm long, stout, pedicel 10–50 × 1.5 mm, ascending to spreading. *Corolla* 15–45 mm diam., ± rotate; inside purple- to red- to yellow-brown (or greenish), faintly to boldly transversely rugulose, glabrous, finely papillate; *tube* 3–5 × ± 5 mm, shallowly bowl-shaped to cupular, rarely slightly pentagonal; *lobes* 5–15 × 7–9 mm, ovate, acuminate, spreading, convex above. *Corona* ± 2.5–3.5 × ± 3.5 mm, purple-red to red, raised on stipe < 0.5 mm long; *outer lobes* ± 0.5 × 1.0–1.5 mm, spreading, ± rectangular, truncate to sometimes subacute; *inner lobes* 0.50–0.75 mm long, adpressed to backs of anthers and sometimes slightly exceeding them, dorsiventrally flattened, deltoid to lanceolate, acute, slightly swollen dorsally at base. Figures 217 & 218.



FIGURE 217.—*Stapelia kwebensis*, north of Grootfontein, PVB 5506.

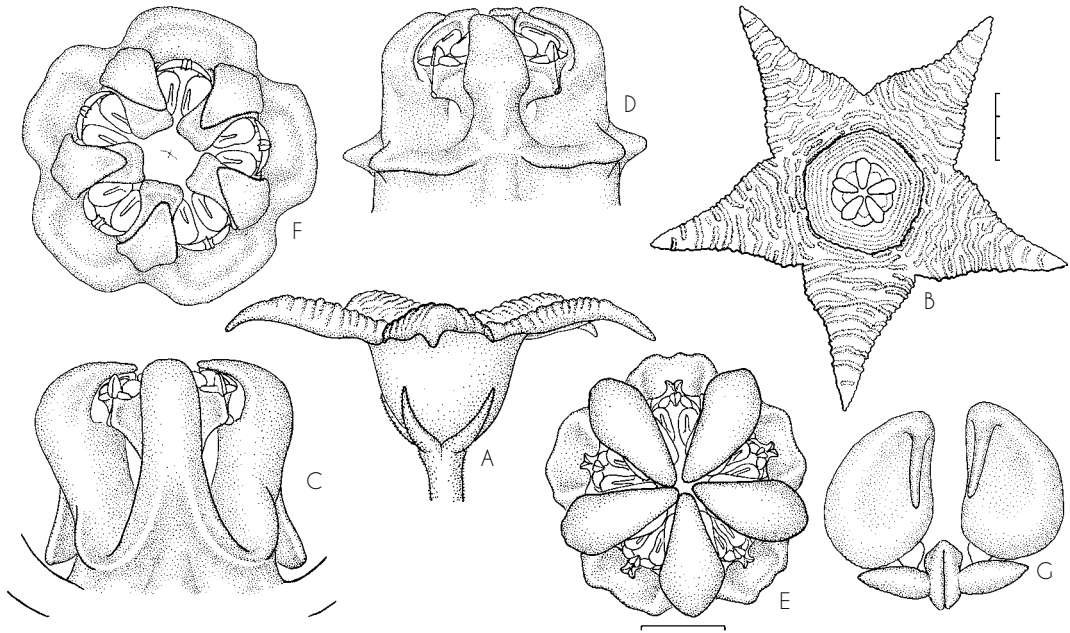


FIGURE 218.—*Stapelia kwebensis*, A, B, C, E, Goaseb Schlucht, Brandberg, Namibia, Bruyns 2355; D, F, near Aroab, Namibia, Bruyns 3574. A, side view of flower; B, face view of flower; C, D, side view of gynostegium; E, F, face view of gynostegium; G, pollinarium. Scale bars: A, B, 3 mm (at B); C–F, 1 mm (at E); G, 0.25 mm (at B).

Habitat: Stony or loamy to sandy ground among scattered low shrubs and trees, 800–1 700 m.

Flowering time: Mar.–May.

Distribution: Angola, Botswana, Mozambique, Namibia, South Africa, Zimbabwe. Widespread in Namibia except in very arid south and southwest. Figure 219.

Voucher: Leach & Cannell 15032 (M, PRE, WIND).

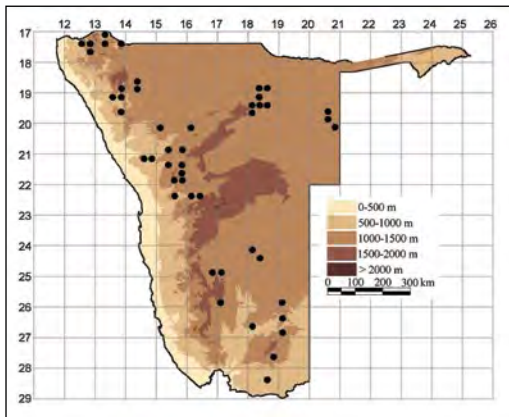


FIGURE 219.—Distribution of *Stapelia kwebensis*.

Stapelia pearsonii N.E.Br., *Bull. Misc. Inform.* 1913: 304 (1913). *Gonostemon pearsonii* (N.E.Br.) P.V.Heath, *Calyx* 1: 19 (1992). Type: Namibia, Great Karas Mountains, Pearson 8539 (K, holo.; BOL, PRE, iso.).

Small clump-forming succulent 40–150 mm diam. **Stems** 20–80 × 5–8 mm, erect, shortly pubescent, grey-green, with darker green and purple between angles, leaf-rudiments 0.5–1.0 mm long. **Inflorescence** pubescent, 1 per stem near base, 1- to 6-flowered, ± sessile, pedicel 30–40 × 1.5 mm, ascending with flower facing upwards. **Corolla** 35–50 mm diam., rotate, deeply lobed; inside pale yellow-brown to

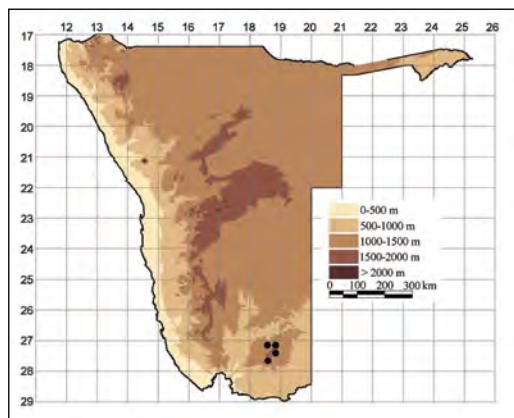


FIGURE 220.—Distribution of *Stapelia pearsonii*.

deep red-brown, finely transversely rugulose, glabrous; tube 1–3 × 4–6 mm, ± bowl-shaped; lobes 12–15 × 8 mm, narrowly ovate, acute, spreading, convex above, margins eciliate. Corona ± 6 × 8 mm, dark purple-brown to red and somewhat shiny, raised on stipe 1–2 mm long; outer lobes 3–4 × 1 mm, spreading, narrowly deltoid, obtuse, slightly channelled towards base; inner lobes 3–4 mm long, adpressed to backs of anthers then connivent-erect in column above style apex and recurved above, dorsiventrally flattened towards base becoming slender terete above, with slender acuminate spreading laterally flattened dorsal wing near base.

Habitat: Stony often steep ground among scattered low shrubs, 1 200–2 100 m.

Flowering time: Mar.–May.

Distribution: Namibia. Great Karas Mountains. Figure 220.

Voucher: Giess & Mueller 12410 (M, PRE, WIND).

Stapelia schinzii A.Berger & Schltr., *Vierteljahrsschr. Naturf. Ges. Zürich* 53: 491 (1909). *Gonostemon schinzii* (A.Berger & Schltr.) P.V.Heath, *Calyx* 1: 18 (1992). Type: Namibia, Hereroland, near Okomita, Dinter 450 (Z, holo.; PRE, iso., photo only).

Stapelia schinzii* var. *schinzii

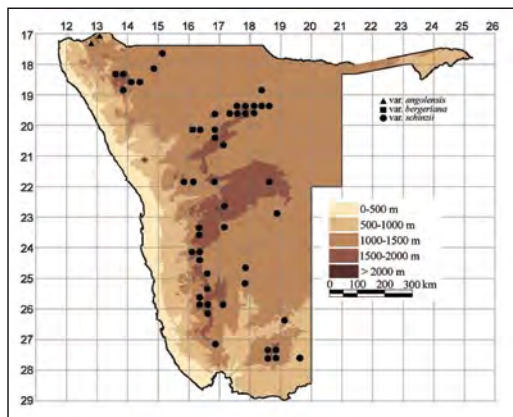
Stapelia schinzii* var. *angolensis Kers, *Bot. Notiser* 122: 176 (1969). Type: from Angola.

Stapelia schinzii* var. *bergeriana (Dinter) L.C.Leach, *Excelsa Taxon. Ser.* 3: 74 (1985). *S. bergeriana* Dinter, *Neue Pfl. Südw.-Afr.*: 51 (1914). *Gonostemon schinzii* var. *bergerianus* (Dinter) P.V.Heath, *Calyx* 1: 18 (1992). Type: Namibia, Dinter 2697 (SAM, lecto., Leach 1985).

Clump-forming succulent 0.15–1.00 m diam. Stems 30–100 × 5–20 mm, decumbent to ± creeping, ± glabrous, purple to green or grey mottled with purple, leaf-rudiments 1.5–6.0 mm long. Inflorescences shortly pubescent to ± glabrous, 1 per stem towards base, 1- to 3-flowered, peduncle to 10 mm long, pedicel 15–60 × 3–6 mm, spreading. Corolla 70–220 mm diam., rotate, deeply lobed; inside reddish purple to greenish yellow, finely and densely transversely rugulose (rarely shiny and smooth), glabrous; tube 2–4 mm deep; lobes 50–90 × 13–20 mm, ovate-acuminate to caudate, spreading, concave near base but convex above, margins at least in lower half with dense beard of vibratile purple clavate cilia 3–4 mm long. Corona ± 11–12 × ± 8–10 mm, dark purple-red, raised on stipe ± 1.5 mm tall; outer lobes 3–4 mm long, ascending and spreading, oblong to rectangular or deltoid, acute to apiculate, lightly channelled above; inner lobes 6–9 mm long, adpressed to backs of anthers then erect and divergent, dorsiventrally flattened below becoming concave or



FIGURE 221.—*Stapelia schinzii*, Kaoko Otavi, PVB 5570.

FIGURE 222.—Distribution of *Stapelia schinzii*.

terete above, lanceolate, acute, with broad laterally flattened ascending to erect ovate-acute to oblong and truncate or dorsal horn fused to and slightly shorter than lobe. Figure 221.

Habitat: Stony ground among scattered low shrubs, 800–1 700 m.

Flowering time: Mar.–May.

Distribution: Angola, Namibia. Widespread in Namibia except in southwest, south of Witpütz and in sandy eastern flank of the country. Figure 222.

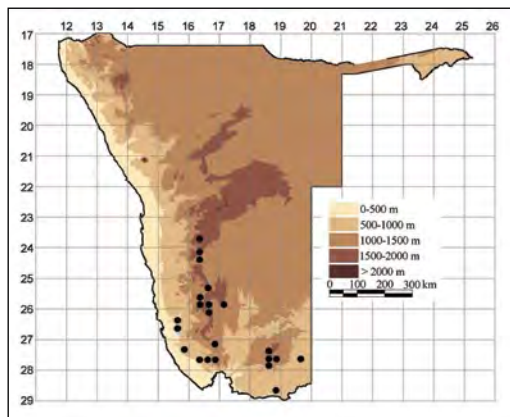
Vouchers: Bruyns 7999 (WIND) for var. *angolensis*; Bruyns 1998 (NBG) for var. *bergeriana*; Leach & Bayliss 13018 (K, NBG, PRE) for var. *schinzii*.

Note: All three varieties recognised (Leach 1985) occur in Namibia.

Stapelia similis N.E.Br., *Bull. Misc. Inform.* 1911: 358 (1911). Type: from South Africa.

Stapelia juttae Dinter, *Neue Pfl. Südw.-Afr.*: 53, t. 60 (1914). *Gonostemon similis* var. *juttae* (Dinter) P.V.Heath, *Calyx* 3: 9 (1993). Type: Namibia, Kanus, Engler sub Dinter 3252 (SAM, lecto., Bruyns 2005).

Stapelia portae-taurinae Dinter & A.Berger, *Bot. Jahrb. Syst.* 50, Suppl.: 592 (1914). *Gonostemon similis* var. *portae-taurinae* (Dinter & A.Berger) P.V.Heath, *Calyx* 3: 9 (1993). Type: Namibia, Büllsport, Dinter 2596 (SAM, holo.).

FIGURE 223.—Distribution of *Stapelia similis*.

Stapelia noachabibensis C.A.Lückh., 'S.A.G.' 28: 228 (1938). Type: Namibia, Noachebib, *E. Rusch sub Lückhoff* 257 (missing). Type: 'S.A.G.' 28: fig. (lecto., Bruyns 2005).

Small clump-forming succulent mostly < 150 mm diam. *Stems* 20–120(–150) × 5–12 mm, erect, shortly pubescent, pale green with purple between angles, leaf-rudiments 1.0–1.5 mm long. *Inflorescences* pubescent, usually 1 per stem near base, 1- to 6-flowered, peduncle to 20 mm long, *pedicel* 30–80 × 1.5–2.5 mm, spreading with up-turned apex. *Corolla* 15–28 mm diam., rotate to shallowly campanulate; inside yellow-brown to dark brown or almost black, coarsely transversely rugulose, glabrous; *tube* 1.5–4.0 × ± 6 mm, cupular; *lobes* 6–10 × 5–6 mm, ovate-deltate, acute to shortly acuminate, spreading, convex above, margins eciliate. *Corona* ± 3 × ± 3–5 mm, red-brown to black, raised on stipe < 1 mm long; *outer lobes* ± 1 × 2 mm, spreading below middle of tube, ± rectangular, truncate to rounded, somewhat channelled on upper surface towards base; *inner lobes* 1.0–1.5 mm long, adpressed to backs of anthers and ± equalling them, dorsiventrally flattened, deltoid, acute, sometimes with slight dorsal swelling near base.

Habitat: Stony ground among scattered low shrubs, 800–1 700 m.

Flowering time: Mar.–May.

Distribution: Angola, Namibia, South Africa. In Namibia from Naukluft southwards. Figure 223.

Voucher: Bruyns 5674 (WIND).

Note: *Stapelia olivacea* N.E.Br. is represented for Namibia by a single specimen (Leach 1985) of rather doubtful provenance and has been excluded from this account.

Stapelia remota R.A.Dyer was claimed to have been found in the valley west of the Baynes Mountains in northern Namibia. However, as discussed in Bruyns (2005), this species has not been relocated and may have been a hybrid of cultivation.

Stapeliopsis Pillans

Spineless clump-forming sometimes rhizomatous succulent to 300 mm diam. *Stems* 20–100 × 4–35 mm, 4-angled, decumbent or erect, finely papillate-pubescent, blue-green mottled with purple; *tubercles* tapering to small tooth. *Inflorescence* glabrous to minutely pubescent, 1 per stem near base, 1- to 6-flowered developing in gradual succession, peduncle knobby to 25 mm long, pedicel 2–10 mm long, elongating (with follicles) to 25 mm long, spreading then erect with flower facing upwards. *Corolla* 9–28 × 5–25 mm, ellipsoidal, shallowly lobed; outside glabrous and shiny to finely papillate; inside not rugulose, papillate, papillae with apical bristle to 2 mm long near base of corolla; *tube* 2–24 × 3–15 mm, with narrow mouth; *lobes* 2–16 × 2–7 mm, margins eciliate; *gynostegial corona* of 2 series of lobes wholly intergrown, raised on short stipe, 2.5–11.0 × 1.2–5.0 mm; *outer lobes* 1–11 mm long, fused into cup or cylinder; *inner lobes* 2–6 mm long, adpressed to backs of anthers near base, erect then connivent towards apices, laterally flattened, usually with conspicuous rounded-deltoid dorsal process around middle, *anthers* horizontal on top of style head, rectangular; *pollinium* ellipsoidal, with insertion-crest along outer edge. *Follicles* paired, erect, terete-fusiform, slender, glabrous, smooth.

8 species, Namibia, South Africa

Key to species

- 1a. Outside of corolla sparsely to densely papillate and dull; outer corona enclosing entire column **S. neronis**

- 1b. Outside of corolla glabrous and shiny; outer corona tube enclosing lower half of column, lobes bifid into small outward-pointing teeth

..... **S. urniflora**

Stapeliopsis neronis Pillans, *S. Afr. Garden. & Country Life* 18: 32 (1928). Type: from South Africa.

Small non-rhizomatous clump-forming succulent 100–300 mm diam. *Stems* 40–150 × 20–35 mm, decumbent, blue-green mottled with purple, minutely pubescent, tubercles each tapering abruptly to minute conical tooth. *Inflorescence* minutely pubescent, pedicel 5–10 × ± 2 mm. *Corolla* 17–28 × 11–16 mm diam., ellipsoidal; outside finely pubescent, deep purple; inside white on lobes and mouth of tube, deep purple below, papillate in tube only, each papilla with apical bristle to 1.25 mm long near base of tube; *tube* 12–24 × 13–15 mm to 1.0–1.5 mm broad at mouth, ellipsoidal; *lobes* 4–5 × ± 3 mm, narrowly deltate, acute, erect, convex above. *Corona* 7–11 × ± 5 mm, dark purple, raised on stipe ± 2 × 5–6 mm; *outer lobes* 7–11 mm tall, fused into erect cylinder ± 5 mm broad hiding rest of gynostegium, with 5 incurved obtuse flaps at mouth, outside finely setose towards base; *inner lobes* 4.5–6.0 mm long, linear, tapering to slender terete apex. Figure 224.

Habitat: Stony slopes among scattered low shrubs, 400–700 m.

Flowering time: Dec.–May.



FIGURE 224.—*Stapeliopsis neronis*, Sonberg, PVB 5207.

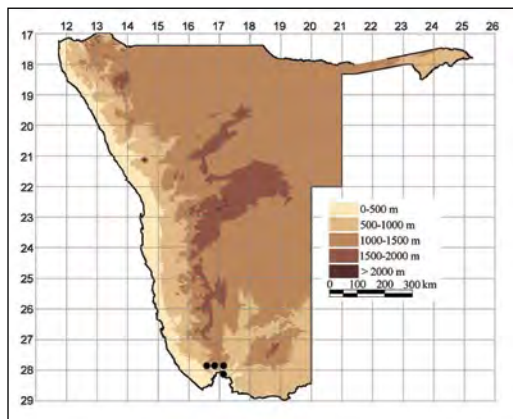


FIGURE 225.—Distribution of *Stapeliopsis neronis*.

Distribution: Namibia, South Africa. In Namibia from north of Rosh Pinah to near mouth of Fish River. Figure 225.

Voucher: Giess 13113 (M, PRE, WIND).

Stapeliopsis urniflora Lavranos, *J. S. African Bot.* 32: 195 (1966), as '*urnaeflora*'. Type: Namibia, Tiras Mountains, *Lofty-Eaton sub Lavranos 2536* (PRE, holo.).

Dwarf slightly rhizomatous clump-forming succulent to 150 mm diam. *Stems* 20–100 × 6–20 mm, decumbent, silvery green with dark green to purplish mottling, minutely papillate, tubercles tapering abruptly to minute conical tooth. *Inflorescence* glabrous, at level of surface of soil or beneath it, pedicel 5–8 × 1 mm thick. *Corolla* 9–18 × 5–11 mm, ovoid; outside glabrous, smooth, shiny purple-red; inside purple-red, papillate in tube only, each papilla with apical bristle to 2 mm long near base of tube; *tube* 6–16 × 8–10 mm to 2.0–2.5 mm broad at mouth, ovoid; *lobes* 2.0–3.5 × 2.0–2.5 mm, deltate, acute, erect to spreading. *Corona* ± 3 × 4.0–4.5 mm, purplish red to yellowish, raised on stipe ± 1.5 × 5–6 mm, glabrous; *outer lobes* 1.0–1.5 mm tall, fused into cylindrical to bowl-shaped tube 3 × 3.0–4.5 mm, with pairs of ± erect deltate lobules 0.5–0.7 mm long at mouth; *inner lobes* 2.0–2.3 mm long, erect then connivent at broadly obtuse apices, laterally flattened. Figure 226.

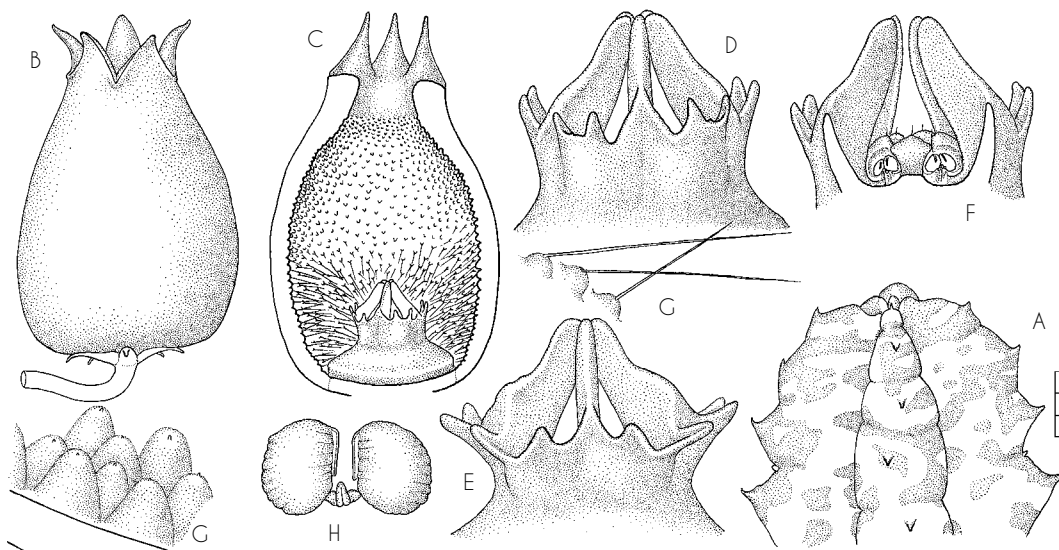


FIGURE 226.—*Stapeliopsis urniflora*, E, southwest of Helmeringhausen, Namibia, *Bruyns 5733*; rest, south of Helmeringhausen, Namibia, *Bruyns 1477*. A, apex of stem; B, side view of flower; C, side view of dissected flower; D, E, side view of gynostegium; F, side view of gynostegium with one inner and two outer corona lobes removed; G, papillae inside corolla: those with long apical seta from base of tube, those with very short apical seta from just above middle of tube; H, pollinarium. Scale bars: A–C, 3 mm (at A); D–F, 1 mm (at A); G, 0.5 mm (at A); H, 0.25 mm (at A).

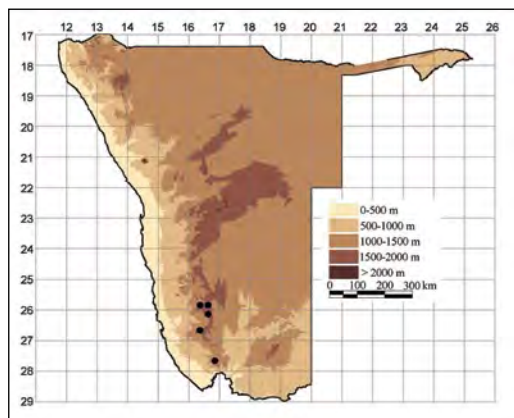


FIGURE 227.—Distribution of *Stapeliopsis urniflora*.

Habitat: Stony slopes among scattered low shrubs, 1 000–1 700 m.

Flowering time: Mar.–May.

Distribution: Namibia, South Africa. In Namibia from Tiras Mountains to near Witpütz. Figure 227.

Voucher: Bruyns 7190 (WIND).

Tavaresia Welw.

Spiny non-rhizomatous clump-forming succulent 50 mm–1 m diam. *Stems* 15–300 × 10–25 mm, 6- to 14-angled, glabrous, green to purplish, tuberculate, each tubercle tipped with 3 bristles. *Inflorescence* glabrous, 1 per stem near base of young stems, few-flowered, ± sessile, pedicel 5–15 × 1.5–2.0 mm. *Corolla* 25–150 × 20–80 mm, deeply tubular to campanulate; outside glabrous; inside with papillae each tipped with short bristle; *tube* 25–150 mm long, widening from base to mouth; *lobes* 12–25 × 8–20 mm, deltate, spreading, shortly acuminate, margins eciliate; *gynostegial corona* of 2 series of lobes partly intergrown, 9–18 × 5–8 mm; *outer lobes* fused towards base into tube ± half as high as broad, at mouth of this each lobe dividing into 2 erect filiform segments each tipped with pendulous knob; *inner lobes* ± 1.5 mm long, adpressed to backs of anthers, dorsiventrally flat-

tened; *anthers* descending towards centre of style head; *pollinium* D-shaped, with insertion-crest along outer edge. *Follicles* paired, erect, terete-fusiform, 60–150 × 8–10 mm, glabrous and smooth.

3 species, tropical and subtropical southern Africa, Angola, Zimbabwe.

Key to species

- 1a. Corolla tubular; tube circular in cross-section, with lobes much less than a quarter of the length of the tube **T. barklyi**
- 1b. Corolla campanulate; tube pentagonal in cross-section, with lobes more or less equalling the tube in length **T. thompsoniorum**

Tavaresia barklyi (Dyer) N.E.Br., *Fl. Trop. Afr.* 4 (1): 494 (1903) Type: from South Africa.

Decabelone grandiflora Dinter, *Deut. südwest. Afr.*: 113 (1909). *Tavaresia grandiflora* (Dinter) A. Berger, *Stap. u. Klein.*: 45 (1910). Type: Namibia, Aritsas, 19 Dec. 1908, Dinter 821 (SAM, lecto., Bruyns 2005).

Stems (8-)10- to 14-angled, each tubercle tipped with 3 bristles, central bristle horizontal, laterals slightly shorter and descending. *Corolla* 25–150 × 20–80 mm, funnel-shaped, shallowly lobed; inside with round to longitudinally elongated maroon spots on pale yellow; *tube* 25–150 mm long, widening to 25–45 mm at mouth, circular in cross-section; *lobes* 12–25 × 10–20 mm, concave above. *Corona* 9–18 × 5–8 mm; segments of *outer lobes* 10–12 mm long; *inner lobes* streaked with maroon on white. Figures 228 & 229.

Habitat: Stony slopes to sandy flats among rocks, trees and low bushes, 500–1 500 m.

Flowering time: Nov.–Mar.

Distribution: Angola, Botswana, Namibia, South Africa, Zimbabwe. Widespread in Namibia from Ovamboland to Gobabis and Karasburg. Figure 230.

Voucher: Merxmüller & Giess 1452 (M, WIND).

Tavaresia thompsoniorum Van Jaarsv. & R. Nagel, *Asklepios* 76: 9 (1999) 'as *Tavaresia thompsonii*'. Type: from Angola. (= X

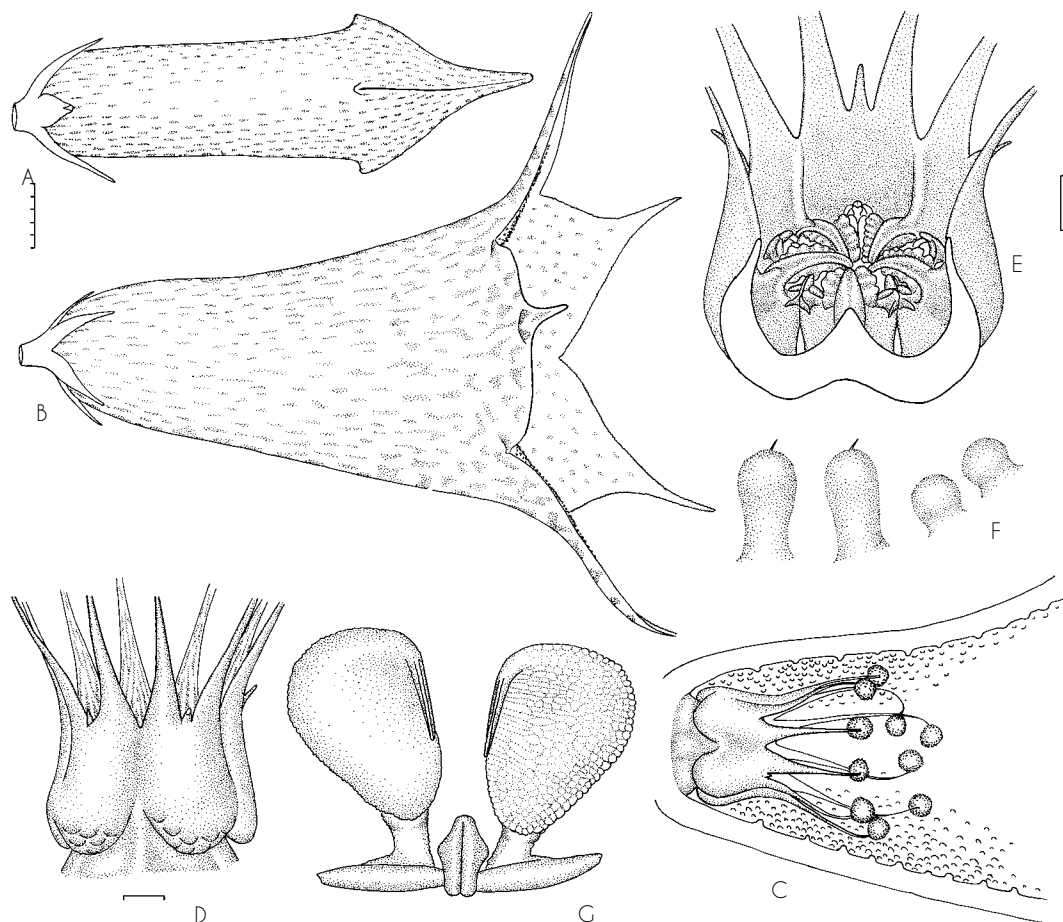


FIGURE 228.—*Tavaresia barklyi*, Victoria West, South Africa, Mullins 94. A, bud; B, side view of flower; C, side view of centre of dissected flower; D, side view of base of gynostegium; E, side view of dissected gynostegium; F, papillae inside corolla from base of tube; G, pollinarium. Scale bars: A, B, 5 mm (at A); C, 3 mm (at A); D, 1 mm; E, 1 mm; F, 0.5 mm (at A); G, 0.25 mm (at A).

Staparesia thompsoniorum (Van Jaarsveld & Nagel) G.D.Rowley).

Stems (8-)10- to 12-angled, each tubercle tipped with 3 bristles, central bristle horizontal, laterals about half the length and ascending. *Corolla* 20–30 × 40–60 mm, campanulate, lobed to at least half of length; inside maroon or often longitudinally flecked with cream; *tube* 20–30 mm long, widening to ± 15 mm at mouth, pentagonal in cross-section; *lobes* 12–20 × 8–15 mm, ovate-deltate, acuminate, convex above. Co-

rona 10–12 × 5–6 mm; segments of *outer lobes* ± 8 mm long; *inner lobes* maroon.

Habitat: Stony slopes or flats among scattered mopane (*Colophospermum mopane*) trees, 1 000 m.

Flowering time: Nov.–Mar.

Distribution: Angola, Namibia. In Namibia only known along Cunene River east of Epupa Falls. Figure 231.



FIGURE 229.—*Tavaresia barklyi*, south of Eenhana, PVB 10654.

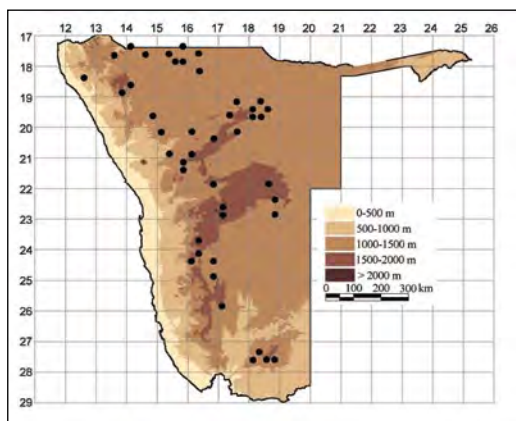


FIGURE 230.—Distribution of *Tavaresia barklyi*.

At one stage considered to be a hybrid (Rowley 2003), this species is actually fairly common in southwestern Angola and is known from a single collection from Namibia.

Voucher: Bruyns 5603a (BOL, E, MO).

Tridentea Haw.

Spineless clump-forming succulent 30–500 mm diam. Stems 30–150 × 8–20 mm, obtusely 4-angled, decumbent, glabrous, greyish green flecked with brown, tubercles each with spreading ± subulate caducous leaf-rudiment 1.5–

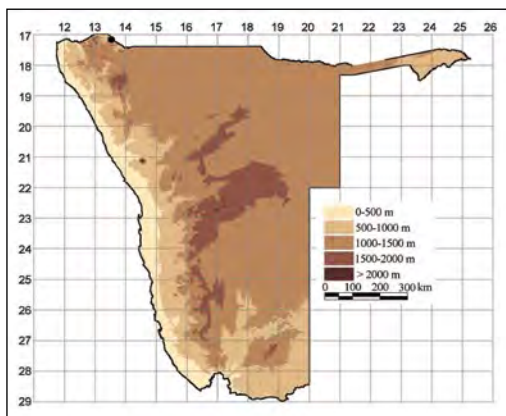


FIGURE 231.—Distribution of *Tavaresia thompsoniorum*.

12.0 mm long. Inflorescence glabrous, 1 per stem near base, 1- to 5-flowered developing in gradual succession, peduncle 5–100 mm long, pedicel 25–80 × ± 2 mm, spreading to ascending. Corolla 20–100 mm diam., ± rotate, usually deeply lobed; outside glabrous; inside smooth to rugose or papillate, papillae usually with apical bristle; tube usually shallow; lobes 8–35 × 6–30 mm, ovate-deltate, acute, spreading to recurved, slightly convex above, margins usually with vibratile cilia; gynostegial corona of 2 series of lobes slightly intergrown, raised on short stout pentagonal stipe, 3–10 × 4–15 mm; outer lobes 1–8 mm long, usually spreading, simple to trifid, dorsiventrally flattened and channelled down middle, laterally fused near base with inner lobes; inner lobes 1–10 mm long, adpressed to backs of anthers, usually rising in centre in small column, dorsiventrally flattened towards base, often with laterally flattened ± deltoid dorsal horn in lower half; anthers horizontal on top of style head, margins shrinking back to expose pollinia, rectangular; pollinium D-shaped, with insertion-crest along outer edge. Follicles paired, erect, terete-fusiform, glabrous, smooth.

8 species, Botswana, Namibia, South Africa.

Key to species

- 1a. Outer corona lobes trifid 2.
- 1b. Outer corona lobes bifid or simple **T. jucunda**
- 2a. Corolla inside bright yellow to greenish yellow, 20–30 mm diam.; lobes usually without marginal cilia **T. virescens**

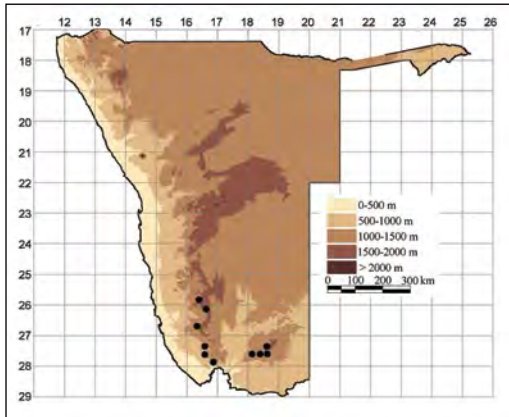


FIGURE 232.—Distribution of *Tridentea jucunda*.

- 2b. Corolla inside with maroon, brown or purple-black mottling on cream to pale yellow (or pale mottling on dark), 40–75 mm diam.; lobes with marginal cilia 3.
- 3a. Corolla lobes with margins folding upwards, pedicels 25–35 mm long, papillae on corolla ± without apical bristle **T. pachyrrhiza**
- 3b. Corolla lobes with margins not folding upwards, pedicels 50–130 mm long, papillae on corolla each tipped with a long bristle . . . **T. marientalensis**

Tridentea jucunda (N.E.Br.) L.C.Leach, *Trans. Rhod. Scient. Assoc.* 59: 3 (1978). Type: from South Africa (lecto., Leach 1980).

Stapelia dinteri A.Berger in Dinter, *Neue Pfl. Südw.-Afr.*: 51 (1914). *Tridentea jucunda* var. *dinteri* (A.Berger) L.C.Leach, *Excelsa Taxon. Ser.* 2: 34 (1980). Type: Namibia, Klein Karas, J. Dinter sub Dinter 3247 (SAM, holo.).

Stapelia ausana Dinter & A.Berger ex Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 23: 365 (1927). Type: Namibia, Aus, Dinter 1144 (SAM, lecto., Bruyns 2005).

Small succulent 60–150 mm diam. *Stems* 30–120 × 8–15 mm, leaf-rudiments 1.5–5.0 mm long. *Pedicels* 15–30 × 1–2 mm, erect to spreading. *Corolla* 20–35 mm diam., rotate to slightly cupular; inside cream with purple-brown to red-brown spots often with continuous dark border, sometimes faintly rugulose or with low papillae; *tube* 1–2 mm deep, cupular; *lobes* 6–10 × 6–10 mm, ovate-deltate, acute, spread-

ing to recurved, sometimes with marginal cilia. *Corolla* ± 5–7 × 5–7 mm, purple-brown, raised on short stipe; *outer lobes* ± 2.5–3.0 × 1 mm, ascending, narrowly deltoid, acute to broadly obtuse, slightly channelled on inner surface; *inner lobes* 3–5 mm long, connivent then ascending in narrow column and often recurved, terete and slender above, obtuse, sometimes with small dorsal gibbosity to laterally flattened horn near base.

Habitat: Gravelly flats among scattered low shrubs, 1 000–1 700 m.

Flowering time: Dec.–Mar.

Distribution: Namibia, South Africa. In Namibia from Tiras Mountains to near Witpütz and around Great Karas Mountains. Figure 232.

Voucher: Bruyns 3908 (BOL).

Tridentea marientalensis (Nel) L.C.Leach, *Trans. Rhod. Scient. Assoc.* 59: 3 (1978). *Stapelia marientalensis* Nel, *Kakteenkunde* 1935: 118 (1935). Type: Namibia, Haruchas, *Berger sub STE 7044* (missing). Neotype (Leach 1980): Namibia, Haruchas, *Leistner 1819* (PRE, neo.; duplicate in KMG).

Tridentea marientalensis* subsp. *marientalensis

Stapelia auobensis Nel in A.C.White & B.Sloane, *Stap.*, ed. 2, 2: 472 (1937). Type: Namibia, Auob River, *Triebner sub STE 2106* (missing). Type: White & Sloane, *Stap.*, ed. 2, 2: fig. 411 (lecto., Bruyns 2005).

Tridentea marientalensis* subsp. *albopilosa (Giess) L.C.Leach, *Excelsa Taxon. Ser.* 2: 22 (1980). *Stapelia albopilosa* Giess, *Mitt. Bot. Staatssaml. München* 11: 349 (1974). Type: Namibia, Tiras Mountains, Nabibis, *Giess 10262* (WIND, holo; M, PRE, iso).

Clump-forming succulent to 500 mm diam. *Stems* 50–150 × 10–15 mm, leaf-rudiments 5–12 mm long. *Inflorescence* with spreading peduncle 5–100 × 4–7 mm, pedicel 50–130 mm long, often spreading with upturned apex. *Corolla* ± 50–75 mm diam., rotate to slightly campanulate; inside cream to pale yellow often speckled with brownish maroon towards centre becoming brownish to pinkish maroon towards tips, densely papillate towards centre, papillae

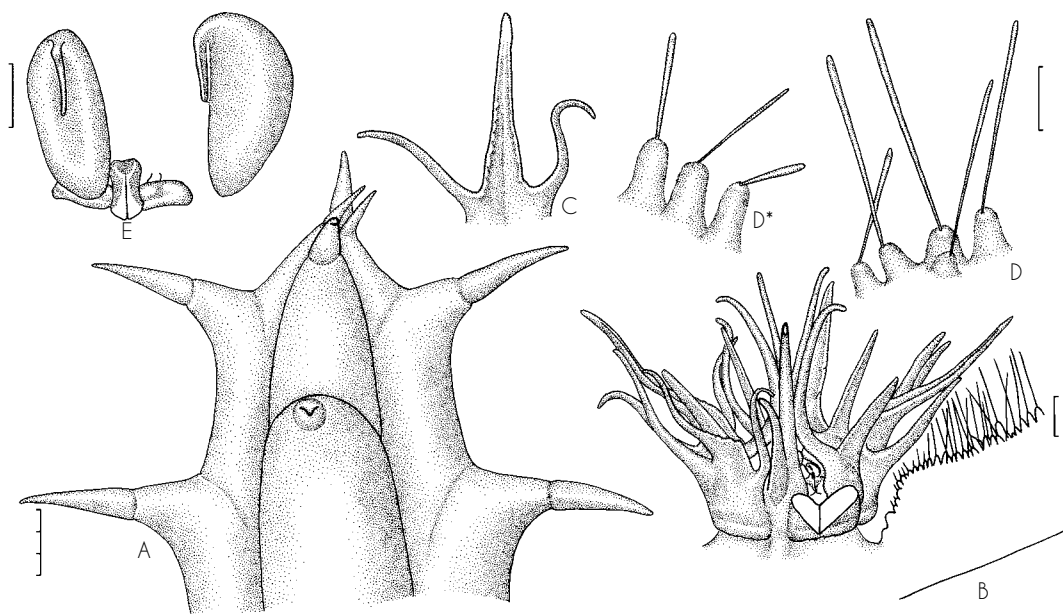


FIGURE 233.—*Tridentea marientalensis*, A–E, Tiras, Namibia, Bruyns 4220; D*, southwest of Maltahöhe, Namibia, Bruyns 4169. A, apex of stem; B, side view of centre of dissected flower, gynostegium with one outer corona lobe removed; C, face view of outer corona lobe; D, papillae inside corolla; E, pollinarium (one pollinium broken off). Scale bars: A, 3 mm; B, C, 1 mm (at B); D, 0.5 mm; E, 0.25 mm.

each with white apical bristle up to 2 mm long; tube shallowly conical; lobes 18–25 × 12.5 mm, ovate, acute, spreading to strongly reflexed, margins with vibratile cilia to 5 mm long. Corona ± 7 × 10–12 mm, pale yellow spotted with brown, raised on short stipe; outer lobes ± 6 × 1.5–2.0 mm, ascending, deeply trifid; central lobule ± 5 mm long, narrowly deltoid, acute to truncate or bifid, slightly channelled above; lateral lobules 3.0–3.5 mm long, slender, often diverging; inner lobes 3.5–5.0 mm long, connivent becoming recurved above, terete above, obtuse, near base with ascending laterally flattened ± narrowly deltoid dorsal horn 1.0–2.5 × 0.5–0.6 mm. Figures 233 & 234.

Habitat: Gravelly or sandy flats among scattered shrubs, often *Rhigozum trichotomum*, 1 000–1 700 m.

Flowering time: Dec.–Mar.

Distribution: Botswana, Namibia, South Africa. In Namibia from near Maltahöhe to Tiras

Mountains and Mariental to Great Karas Mountains and southeast of Warmbad. Both subspecies recognised occur in Namibia, with subsp. *albipilosa* endemic to Namibia. Figure 235.

Vouchers: Bruyns 5685 (PRE, WIND) for subsp. *albipilosa*; Calitz & Sheuyange 83 (WIND) for subsp. *marientalensis*.



FIGURE 234.—*Tridentea marientalensis* subsp. *albipilosa*, near Maltahöhe, PVB 5685.

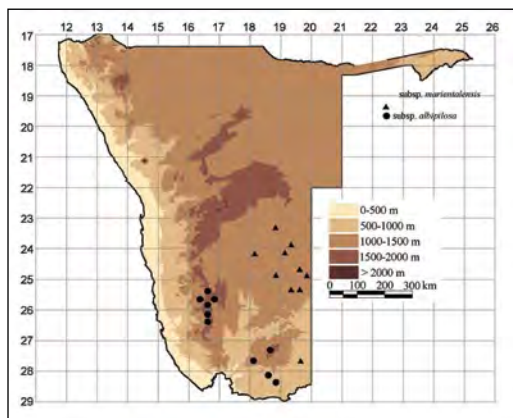


FIGURE 235.—Distribution of *Tridentea marientalensis*.

Tridentea pachyrrhiza (Dinter) L.C.Leach, *Excelsa Taxon. Ser. 2*: 14 (1980). *Stapelia pachyrrhiza* Dinter, *Feddes Repert. Spec. Nov. Regni Veg.* 19: 154 (1923). Type: Namibia, Buntveldschuhplato, Dinter 4721 (missing). Neotype (Leach 1980): Namibia, Buchu-berge, Dinter 6491 (SAM, neo.; duplicates in BOL, G, GRA, KMG, M, PRE).

Densely clump-forming succulent 60–200 mm diam. Stems 30–60 × 10–15 mm, greyish green, leaf-rudiments 1–2 mm long. Inflorescence on peduncle 5–40 mm long, pedicel 25–35 × 3–5 mm, ascending. Corolla 40–75 mm

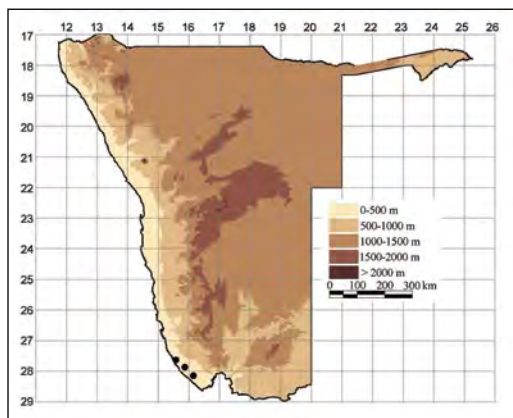


FIGURE 236.—Distribution of *Tridentea pachyrrhiza*.

diam.; inside brown to purple-black irregularly mottled with yellowish, rugulose, with dome-shaped to ± cylindrical obtuse papillae fused into ridges, each with a darker apical spot (but no bristle); tube shallowly conical; lobes 20–25 × 20–25 mm, ovate-deltate, acute, spreading to reflexed, slightly convex, with crenulate erect fleshy margins bearing vibratile cilia to 3.5 mm long. Corona ± 7 × 13–15 mm, yellow mottled with purple, raised on short stipe; outer lobes 4–5 × 2.0–2.2 mm, ascending, trifid; central lobule ± 4 mm long, narrowly deltoid, ± acute, slightly channelled above; lateral lobules 0.5–2.5 mm long, deltoid, widely diverging; inner lobes 5–6 mm long, connivent becoming recurved above, terete above, obtuse, near base with ascending laterally flattened dorsal horn 0.7–2.5 × 0.5–1.0 mm.

Habitat: Stony flats among scattered low shrubs, often covered partly with windborne sand, 50–300 m.

Flowering time: May–Jun.

Distribution: Namibia, South Africa. In Namibia from Buntveldschuh to south of Buchu-berg in coastal Namib. Figure 236.

Voucher: Williamson & Brooke 2743 (K, PRE).

Tridentea virescens (N.E.Br.) L.C.Leach, *Trans. Rhod. Scient. Assoc.* 59: 3 (1978). Type: from South Africa.

Stapelia aurea Dinter, *Feddes Repert. Spec. Nov. Regni Veg., Beih.* 53: 53 (1928). Type: Namibia, Eendorn, Dinter 5115 (BOL, holo.; G, PRE, SAM, iso).

Small succulent to 0.5 m diam. Stems 30–150 × 8–15 mm, grey-green flecked with purple-brown; leaf-rudiments 6–10 mm long. Inflorescence on erect peduncle 5–45 mm long, pedicels 15–80 × 1.5–2.5 mm, erect. Corolla 20–30 mm diam., ± rotate, deeply lobed; inside yellow to greenish yellow, densely papillate-rugose, papillae fused into irregular ridges and longitudinal rows on lobes, each papilla with minute apical bristle; tube shallowly conical; lobes ± 8–12 × 7–8 mm, ovate, acute, spreading, convex above from strongly reflexed margins, rarely with white cilia. Corona ± 6 × 9 mm, bright yellow, raised on short stipe; outer lobes

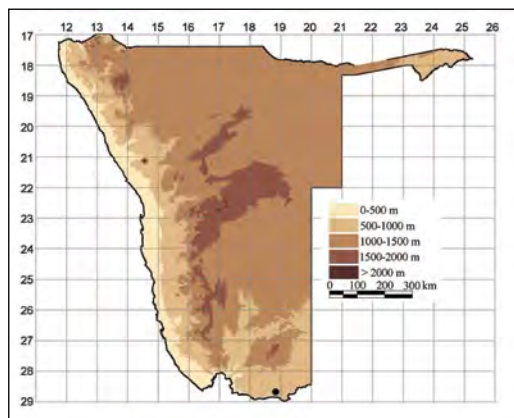


FIGURE 237.—Distribution of *Tridentea virescens*.

2.5–3.0 × ± 2 mm, ascending, deeply trifid; central lobule nearly 2 mm long, ± deltoid, acute to dentate, channelled towards base above; lateral lobules ± 1 mm long, ± deltoid, diverging; *inner lobes* 3–4 mm long, connivent becoming recurved above, terete above, obtuse, near base with ascending laterally flattened ± deltoid dorsal horn 0.5–2.0 mm long.

Habitat: Gravelly flats among scattered low shrubs, 800–900 m.

Flowering time: Dec.–Mar.

Distribution: Namibia, South Africa. In Namibia only known from single collection by Dinter from southeast of Warmbad. Figure 237.

Voucher: Dinter 5115 (BOL, G, PRE, SAM).

Tromotriche Haw.

Spineless clump-forming rarely rhizomatous succulent 50–300 mm diam. *Stems* 40–120 × 8–20 mm, very obtusely 4-angled, decumbent to erect, glabrous with matt surface, green flecked with purple, tubercles rounded and without apical tooth. *Inflorescences* glabrous, 1–3 per stem, arising between apex and base, 1- to 2-flowered developing in gradual succession, peduncle 1–50 mm long, pedicel 10–190 × 1.5–4.0 mm, spreading to ascending. *Corolla* 15–70 mm diam., rotate to shallowly campanulate, deeply lobed;

outside glabrous; inside glabrous, without annulus, often reticulately to transversely rugose, with small papillae in tube and around its mouth; *tube* shallowly conical; *lobes* 5–30 × 5–16 mm, ovate-deltate, acute, ascending to spreading, convex above, margins usually ciliate; *gynostegial corona* of 2 series of lobes mostly slightly intergrown, raised on short stipe, 3–10 × 4–11 mm; *outer lobes* 1.0–3.5 mm long, ascending to spreading, dorsiventrally flattened and usually channelled down middle, fused to inner lobes at base only or fused laterally to them to form cup beneath guide-rails; *inner lobes* 0.7–6.0 mm long, adpressed to backs of anthers, often much exceeding them in column in centre, dorsiventrally flattened towards base, often cylindrical or clavate above, mostly with laterally flattened deltoid to clavate dorsal horn in lower half; *anthers* horizontal on top of style head, margins shrinking back to expose pollinia, rectangular; *pollinium* D-shaped, with insertion-crest along outer edge. *Follicles* paired, erect, terete-fusiform, glabrous, smooth.

8 species, Namibia, South Africa.

Key to species

- 1a. Inner corona lobes and their dorsal horns both nearly equal in length and both prominently clavate **2.**
- 1b. Inner corona lobes at most slightly thickened above and without dorsal horn **3.**
- 2a. Corolla rotate; tube ± 2 mm long **T. pedunculata**
- 2b. Corolla rotate-campanulate; tube 8–10 mm long **T. ruschiana**
- 3a. Inner corona lobes seldom exceeding anthers, without clavate tips **T. umdausensis**
- 3b. Inner corona lobes much exceeding anthers, produced above them and slightly thickened towards tips **T. aperta**

Tromotriche aperta (Masson) Bruyns, *S. African J. Bot.* 61: 208 (1995). Type: from South Africa.

Small compact clump-forming succulent to 200 mm diam. *Stems* 30–100 × 6–15 mm, erect. *Inflorescences* 1–2 per stem mainly near base, peduncle to 5 mm long, pedicel 60–140 × 2–3 mm, mostly prostrate with upturned apex. *Corolla* 30–40 mm diam., shallowly campanulate; inside white on rugosities with red-brown between

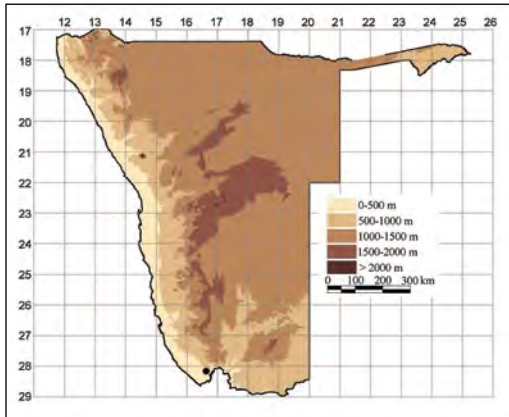


FIGURE 238.—Distribution of *Tromotriche aperta*.

them then usually uniformly beige or brown or red-brown towards tips of lobes, reticulately rugulose; *tube* 5–8 mm deep, cupular; *lobes* 12–25 × 7–10 mm, narrowly ovate to deltate, acute, ascending to spreading, convex above, eciliate. *Corona* ± 6 × 5 mm broad, yellow-brown to red or blackish, raised on short stipe; *outer lobes* ± 1 mm long, closely pressed to sides of tube, laterally fused to inner lobes to form pouch between them, with crenulate-dentate margin; *inner lobes* 3–4 mm long, adpressed to backs of anthers then connivent-erect in small column, dorsiventrally flattened becoming slightly clavate-tuberculate towards apex, with irregularly tuberculate dorsal crest near base confluent with outer lobes.

Habitat: Stony flats among scattered low shrubs, 300–500 m.

Flowering time: Dec.–Jun.

Distribution: Namibia, South Africa. In Namibia only known west of Rosh Pinah near Obib Mountains. Figure 238.

Voucher: Giess 13809 (M, PRE).

Tromotriche pedunculata (Masson) Bruyns, *S. African J. Bot.* 61: 208 (1995). Type: from South Africa.

Tromotriche pedunculata* subsp. *longipes (C.A.Lückh.) Bruyns, *Stap. Southern Afr. & Madag.* 2: 559 (2005). *Stapelia longipes*

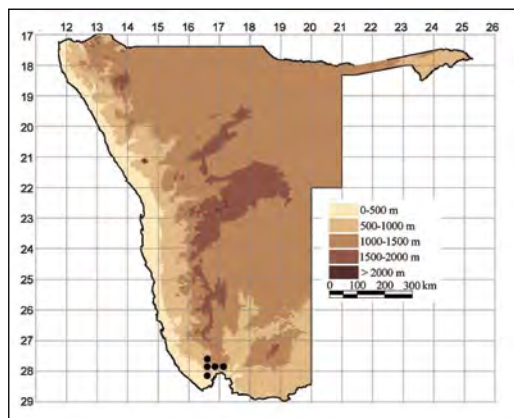
C.A.Lückh., *S. Afr. Garden. & Country Life* 24: 245 (1934). *Tridentea longipes* (C.A.Lückh.) L.C.Leach, *Excelsa Taxon. Ser.* 2: 43 (1980). *Tromotriche longipes* (C.A.Lückh.) Bruyns, *S. African J. Bot.* 61: 208 (1995). Type: Namibia, Witpütz, *E. J. Rusch sub Lückhoff* 194 (missing). Neotype (Leach 1980): *E. J. Rusch sub BOL* 31684 (BOL).

Compact clump-forming succulent to 300 mm diam. *Stems* 40–100 × 10–15 mm, erect to decumbent. *Inflorescences* 1–2 per stem arising near base, peduncle 5–10 mm long, pedicel 30–190 × 1.5–4.0 mm, erect to prostrate with upturned apex. *Corolla* 30–70 mm diam., rotate, deeply lobed; inside maroon on upper two-thirds of lobes, below whitish finely flecked with maroon, obscurely longitudinally rugulose towards tips of lobes, finely reticulately rugulose around gynostegium; *tube* ± 2 mm deep; *lobes* 17–30 × 11–16 mm, narrowly ovate, acute, spreading, with dark purple marginal cilia to 2.5 mm long near base. *Corona* ± 7 × 10–11 mm, mostly shiny purplish black, raised on short stipe; *outer lobes* ± 2 mm long, ascending, ± rectangular, with truncate to subacute apex, channelled above; *inner lobes* 5–6 mm long, adpressed to backs of anthers in lower half of anthers, then erect and connivent, diverging towards apices, dorsiventrally flattened then swelling to clavate irregularly and acutely tuberculate or rugulose apex, with nearly identical ascending then recurving clavate dorsal horn. Figure 239.

Habitat: Gravelly flats among scattered low shrubs, 300–900 m.



FIGURE 239.—*Tromotriche pedunculata* subsp. *longipes*, Namuskluft, near Rosh Pinah, PVB.

FIGURE 240.—Distribution of *Tromotriche pedunculata*.

Flowering time: Dec.–Jun.

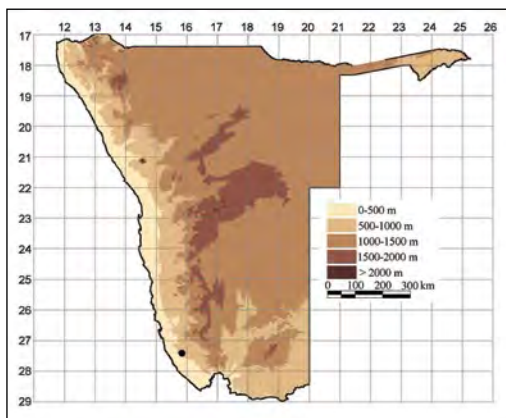
Distribution: Namibia, South Africa. In Namibia known from Witpütz to near mouth of Fish River. Figure 240.

Voucher: Hardy & De Winter 1356 (PRE).

Note: Of the two subspecies recognised (Bruyns 2005), only subsp. *longipes* occurs in Namibia.

Tromotriche ruschiana (Dinter) Bruyns, S. African J. Bot. 61: 208 (1995). *Stapelia ruschiana* Dinter, Feddes Repert. Spec. Nov. Regni Veg. 19: 177 (1923). *Tridentea ruschiana* (Dinter) L.C. Leach, Trans. Rhod. Scient. Assoc. 59: 4 (1978). Type: Namibia, Klinghardt Mountains, Dinter 3963 (missing). Neotype (Leach 1980): Klinghardt Mountains, Plowes 4988 (PRE).

Usually compact clump-forming succulent to 300 mm diam. *Stems* 40–200 × 6–20 mm, erect to spreading. *Inflorescences* 1–2 per stem towards base, peduncle 5–40 × 6 mm, pedicels 40–60 × 2–4 mm, spreading with upturned apex. *Corolla* 30–50 mm diam., shallowly campanulate; inside red-brown to dark maroon on lobes to white on rugosities with dark red between them in lower third of lobes and tube, rugulose; *tube* 8–10 × 10–12 mm, cupular; *lobes* 14–25 × 6–10 mm, spreading, convex above, with dark purple marginal cilia 1.5–3.0 mm long. *Corona* ± 6–8 × 8 mm, shiny

FIGURE 241.—Distribution of *Tromotriche ruschiana*.

purplish black, raised on short stipe; *outer lobes* 2–3 × 1.5 mm, ascending, ± rectangular, crenulate towards obtuse to acute apex, channelled above; *inner lobes* ± 5 mm long, adpressed to backs of anthers then erect and slightly connivent, diverging towards apices, dorsiventrally flattened then swelling to clavate obscurely tuberculate apex, with nearly identical ascending then recurving clavate dorsal horn arising near base.

Habitat: Among stones around bases of hills with windblown sand, 200–500 m.

Flowering time: Dec.–Jun.

Distribution: Namibia. Known around the Klinghardt Mountains only. Figure 241.

Voucher: Bruyns 7900 (K).

Tromotriche umdausensis (Nel) Bruyns, S. African J. Bot. 61: 207 (1995). Type: from South Africa.

Compact clump-forming succulent to 200 mm diam. *Stems* 30–100 × 6–15 mm, erect. *Inflorescences* 1–3 arising randomly on stem, peduncle to 5 mm long, pedicel 20–40 × 2 mm, ascending then horizontal at apex. *Corolla* 15–30 mm diam., campanulate; inside in tube usually red to brown reticulately to radially marked with white to yellow, lobes uniformly yellow to red-brown or brown to faintly reticulately mottled, rugulose; *tube* 5–8 × 10–12 mm, cupular; *lobes* 9–12 × 5–10 mm, ovate, acute, ascending to spreading, convex

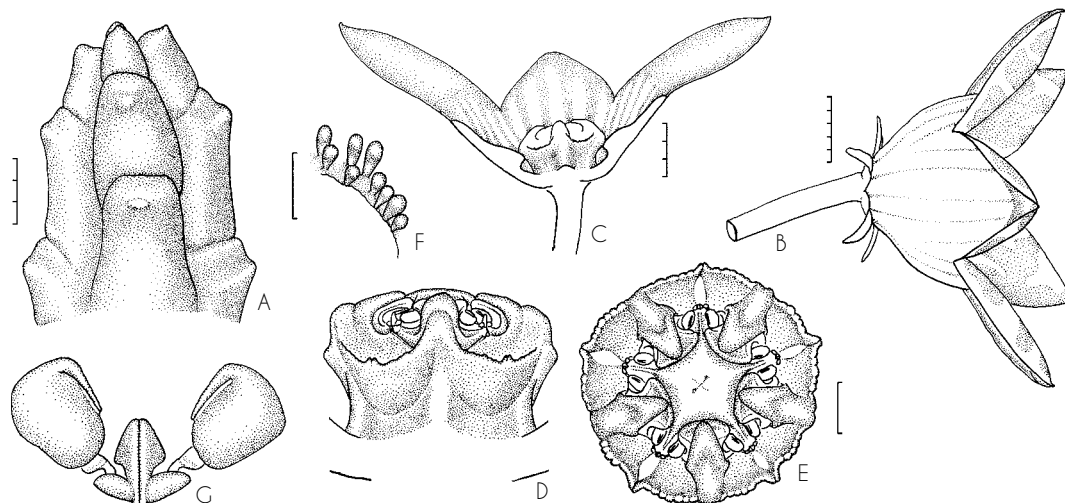


FIGURE 242.—*Tromotriche umdausensis*, C, northeast of Kamieskroon, South Africa, Bruyns 6346; A, B, D–G, north of Steinkopf, South Africa, Bruyns 1337. A, apex of stem; B, side view of flower; C, side view of centre of dissected flower; D, side view of gynostegium; E, face view of gynostegium; F, papillae inside corolla around annulus; G, pollinarium. Scale bars: A, 3 mm; B, 5 mm; C, 3 mm; D, E, 1 mm (at E); F, 0.5 mm; G, 0.25 mm (at F).

above, eciliate. *Corona* $\pm 3 \times 5$ mm, purple-black to pale brown, raised on short stipe; *outer lobes* ± 1 mm long, ascending, fused to bases of inner lobes to form pouch between them, with crenulate-dentate margin; *inner lobes* 0.7–1.0 mm long, adpressed to backs of anthers and seldom exceeding them, dorsiventrally flattened, deltoid, obtuse, with obtuse dorsal gibbosity near base in series with and fused to outer lobes. Figure 242.

Habitat: Gravelly flats among scattered low shrubs, 800–1 000 m.

Flowering time: Dec.–Jun.

Distribution: Namibia, South Africa. In Namibia known from only a single collection from southeast of Warmbad. Figure 243.

Voucher: Bayer 13 (PRE).

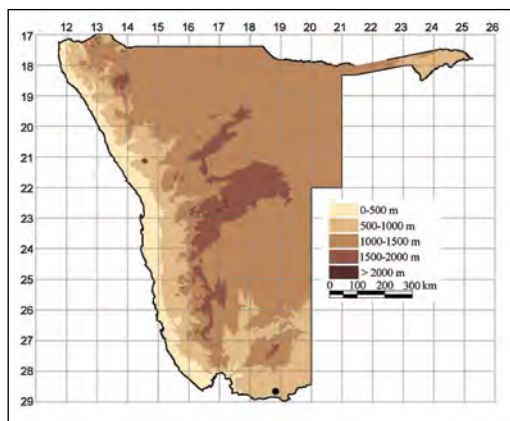
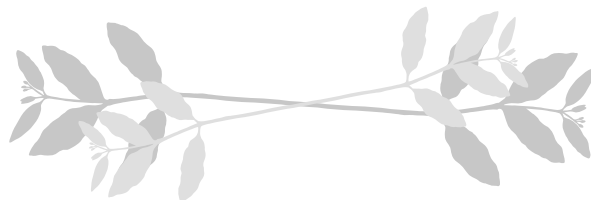
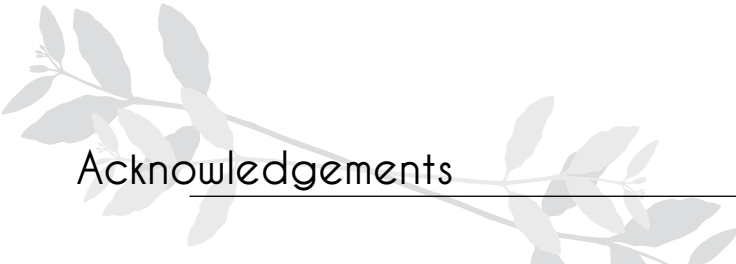


FIGURE 243.—Distribution of *Tromotriche umdausensis*.



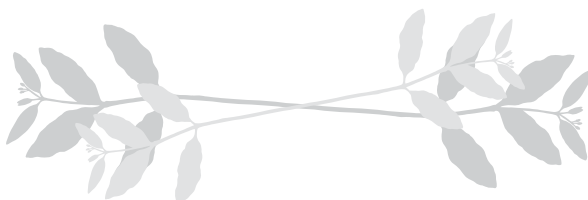


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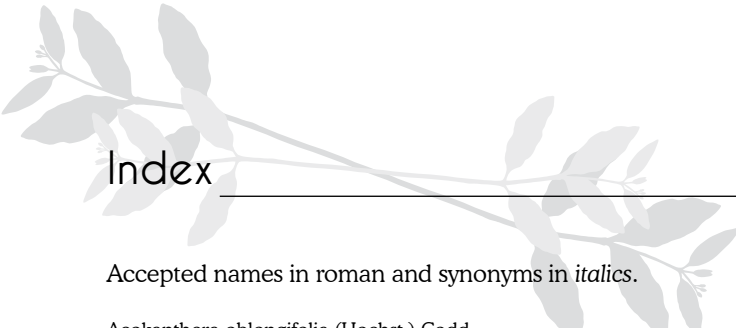




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Index

Accepted names in roman and synonyms in *italics*.

Acokanthera oblongifolia (Hochst.) Codd	4
Adenium Roem. & Schult.	6, 13, 14
A. boehmianum Schinz	14, 15
A. obesum subsp. <i>boehmianum</i> (Schinz) Rowley	15
A. oleifolium Stapf	15, 16
Aloe corallina I. Verd.	29
Apocynoideae Burnett	1, 5, 8, 9, 13
Arduina bispinosa L.	10
Asclepiadeae (R.Br.) Duby	5, 30, 39
Asclepiadoideae R.Br. ex Burnett.	1, 5, 6, 8, 9, 29
Asclepias L.	40
A. aurea (Schltr.) Schltr.	40
A. buchenaviana Schinz	49
A. filiformis var. <i>buchenaviana</i> (Schinz) N.E.Br.	49
A. randii S.Moore	40–42
Aspidoglossum E.Mey.	61, 62
A. biflorum E.Mey.	62
A. carinatum Schltr.	62
A. erubescens (Schltr.) Bullock	62
A. masaicum (N.E.Br.) Kupicha	64
Australluma Plowes	70, 71
A. peschii (Nel) Plowes.	71, 72
Azima pubescens Suess.	11
Baissea A.DC.	13
B. wulfhorstii Schinz	14
Baisseeae M.E.Endress	5, 8, 13
Baynesia Bruyns	70, 72
B. lophophora Bruyns.	72, 73
Blepharanthra dinteri Schltr.	75
Blepharanthra edulis Schltr.	75
Brachystelma R.Br. ex Sims	5, 6, 70, 73
B. amottii Baker	74, 75
B. blepharanthra H.Huber	70, 74, 75
B. circinatum E.Mey.	74, 76
B. codonanthum Bruyns.	5, 74, 76, 77
B. cupulatum R.A.Dyer	74, 76–78
B. dinteri (Schltr.) E.Phillips.	75
B. dinteri Schltr.	74, 77, 78
B. discoideum R.A.Dyer	74, 78, 79
B. grossartii Dinter	74
B. gymnopodium (Schltr.) Bruyns.	70, 74, 79
B. mafekingense N.E.Br.	74, 79, 80
B. pruinatum Bruyns	74, 80
B. recurvatum Bruyns.	74, 80, 81
B. schinzii (K.Schum.) N.E.Br.	74, 81

<i>B. schultzei</i> (Schltr.) Bruyns	70, 74, 81, 82
<i>B. stenophyllum</i> (Schltr.) R.A.Dyer	74, 82, 83
<i>Caralluma albocastanea</i> (Marloth) L.C.Leach	115
<i>C. ausana</i> Dinter & A.Berger	128
<i>C. brownii</i> Dinter & A.Berger	119
<i>C. hahnii</i> Nel	119
<i>C. longicuspis</i> N.E.Br.	118
<i>C. lutea</i> subsp. <i>vaga</i> (N.E.Br.) L.C.Leach	119
<i>C. maculata</i> var. <i>brevidentis</i> H.Huber	120
<i>C. nebrowii</i> A.Berger	119
<i>C. nebrowii</i> var. <i>discolor</i> Nel	119
<i>C. nebrowii</i> var. <i>pseudonebrowii</i> (Dinter) A.C.White & B.Sloane	119
<i>C. peschii</i> Nel	71
<i>C. pseudonebrowii</i> Dinter	119
<i>C. rangeana</i> Dinter & A.Berger	120
<i>C. tsumebensis</i> Oberm.	117
<i>C. vaga</i> (N.E.Br.) A.C.White & B.Sloane	119
<i>C. winkleriana</i> (Dinter) A.C.White & B.Sloane	129
<i>Carissa</i> L.	6, 9, 10
<i>C. bispinosa</i> (L.) Merxm.	10
<i>C. dinteri</i> Markgr.	10
<i>C. edulis</i> Vahl	11
<i>C. pilosa</i> Schinz	11
<i>C. spinarum</i> L.	6, 10–12
<i>Carisseae</i> Dumort.	5, 10
<i>Catharanthus roseus</i> (L.) G.Don.	4
<i>Ceropegia</i> L.	5, 6, 70, 82
<i>C. aberrans</i> Schltr.	93
<i>C. acacietorum</i> Schltr. ex Dinter	91
<i>C. ampliata</i> E.Mey.	94
<i>C. apiculata</i> Schltr.	87
<i>C. boerhaavifolia</i> Schinz	91
<i>C. bonafouxii</i> K.Schum.	89
<i>C. boussingaultifolia</i> Dinter	89
<i>C. carnosa</i> E.Mey.	84
<i>C. crassifolia</i> Schltr.	84, 85
<i>C. cynanchioides</i> Schltr.	84
<i>C. dinteri</i> Schltr.	83, 85, 86
<i>C. filiformis</i> (Burch.) Schltr.	83–86
<i>C. floribunda</i> N.E.Br.	83, 86, 87
<i>C. gymnopoda</i> Schltr.	79
<i>C. lugardiae</i> N.E.Br.	84, 87–89
<i>C. mafekingensis</i> (N.E.Br.) R.A.Dyer	79
<i>C. meyeri</i> Decne.	83, 87, 89
<i>C. multiflora</i> Baker	83, 89, 90
<i>C. nilotica</i> Kotschy	84, 89, 90
<i>C. occidentalis</i> R.A.Dyer	83, 90, 91
<i>C. pachystelma</i> Schltr.	83, 91
<i>C. paricyma</i> N.E.Br.	83, 91, 92
<i>C. purpurascens</i> K.Schum.	83, 92
<i>C. pygmaea</i> Schinz	79
<i>C. racemosa</i> N.E.Br.	84
<i>C. schinziana</i> Bullock	91
<i>C. stenantha</i> K.Schum.	84, 92, 93
<i>C. stenoloba</i> Hochst. ex Chiov.	83, 93
<i>C. stenoloba</i> var. <i>australis</i> H.Huber	93
<i>C. tuberculata</i> Dinter	84
<i>Ceropegieae</i> Decne. ex Orb.	1, 5, 6, 30, 69

<i>Chlorocyathus</i> Oliv.	23
<i>C. monteiroae</i> Oliv.	26
<i>Colophospermum mopane</i> (J.Kirk ex Benth.) J.Kirk ex J.Léonard	32, 102, 139
<i>Cordylogyne argillicola</i> Dinter	61
<i>C. globosa</i> E.Mey.	61
<i>Crassula</i> L.	2, 3
<i>Craterostemma schinzii</i> K.Schum.	81
<i>Crotalaria</i> L.	3
<i>Cryptolepis</i> R.Br.	20
<i>C. arenicola</i> Schltr. ex Dinter	21
<i>C. decidua</i> (Planch. ex Benth.) N.E.Br.	21
<i>C. oblongifolia</i> (Meisn.) Schltr.	21, 22
<i>Cryptostegia grandiflora</i> R.Br.	4, 20
<i>Curroria</i> Planch. ex Benth.	20
<i>C. decidua</i> Planch. ex Benth.	21
<i>Cynanchum</i> L.	39, 42
<i>C. gerrardii</i> (Harv.) Liede	42, 43
<i>C. meyeri</i> (Decne.) Schltr.	42–44
<i>C. orangeanum</i> (Schltr.) N.E.Br.	42, 44, 45
<i>C. pearsonianum</i> Liede & Meve	42, 44, 46, 47
<i>C. pearsonii</i> N.E.Br.	43
<i>C. schistoglossum</i> Schltr.	42, 45, 47
<i>C. viminale</i> (L.) Bassi ex L.	6, 11, 42, 45, 47, 48
<i>Cyperus</i> L.	3
<i>Decabelone grandiflora</i> Dinter	138
<i>Diplorhynchus</i> Welw. ex Ficalho & Hiern	10, 12
<i>D. condylocarpon</i> (Müll.Arg.) Pichon	12, 13
<i>Duvalia</i> Haw.	6, 70, 94
<i>D. caespitosa</i> (Masson) Haw.	94, 95
<i>D. caespitosa</i> subsp. <i>pubescens</i> (N.E.Br.) Bruyns	94
<i>D. maculata</i> N.E.Br.	94–96
<i>D. minuta</i> Nel	94
<i>D. polita</i> N.E.Br.	94–96
<i>Ectadium</i> E.Mey.	20, 22
<i>E. latifolium</i> (Schinz) N.E.Br.	23
<i>E. rotundifolium</i> (H.Huber) Venter & Kotze	22
<i>E. virgatum</i> E.Mey.	22, 23
<i>E. virgatum</i> var. <i>latifolium</i> Schinz.	23
<i>E. virgatum</i> var. <i>rotundifolium</i> H.Huber	22
<i>Eragrostis</i> Wolf	3
<i>Euphorbia</i> L.	2, 3
<i>E. eduardoi</i> L.C.Leach	29
<i>E. viminalis</i> L.	48
<i>Fockea</i> Endl.	30
<i>F. angustifolia</i> K.Schum.	30–32
<i>F. comaru</i> (E.Mey.) N.E.Br.	30–32
<i>F. dammarana</i> Schltr.	30
<i>F. multiflora</i> K.Schum.	30, 32, 33
<i>F. sinuata</i> (E.Mey.) Druce	30, 33, 34
<i>Fockeeae</i> H.Kunze, Meve & Liede.	5, 30
<i>Gomphocarpus</i> R.Br.	40, 48
<i>G. cancellatus</i> (Burm.f.) Bruyns	48, 49
<i>G. filiformis</i> (E.Mey.) D.Dietr.	48, 49
<i>G. fruticosus</i> (L.) W.T.Aiton.	48–50
<i>G. semiamplectens</i> K.Schum.	48, 50
<i>G. tomentosus</i> Burch.	48, 51
<i>Gonostemon flavopurpureus</i> var. <i>fleckii</i> (A.Berger & Schltr.) P.V.Heath.	131
<i>G. longipedicellatus</i> (A.Berger) P.V.Heath.	132

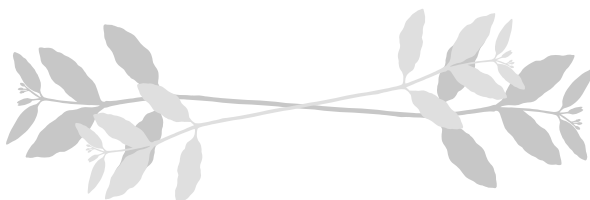
<i>G. pearsonii</i> (N.E.Br.) P.V.Heath	133
<i>G. schinzii</i> (A.Berger & Schltr.) P.V.Heath	134
<i>G. schinzii</i> var. <i>bergerianus</i> (Dinter) P.V.Heath	134
<i>G. similis</i> var. <i>juttae</i> (Dinter) P.V.Heath	135
<i>G. similis</i> var. <i>portae-aurinae</i> (Dinter & A.Berger) P.V.Heath	135
<i>Gymnema</i> R.Br.	34
<i>G. sylvestre</i> (Retz.) R.Br. ex Schult.	6, 11, 34, 35
<i>Hermannia</i> L.	3
<i>Hoodia</i> Sweet ex Decne.	70, 96
<i>H. alstonii</i> (N.E.Br.) Plowes	97, 98
<i>H. bainii</i> var. <i>juttae</i> (Dinter) H. Huber	101
<i>H. currorii</i> (Hook.) Decne.	97–99
<i>H. currorii</i> var. <i>minor</i> R.A.Dyer	98
<i>H. delaetiana</i> (Dinter) Plowes	101
<i>H. dinteri</i> (A.Berger) Halda	110
<i>H. flava</i> (N.E.Br.) Plowes	97, 100
<i>H. foetida</i> Plowes	104
<i>H. gibbosa</i> Nel.	98
<i>H. gordonii</i> (Masson) Sweet ex Decne.	97, 100, 101
<i>H. haagnerae</i> (Plowes) Halda	113
<i>H. husabensis</i> Nel	100
<i>H. juttae</i> Dinter	5, 97, 101
<i>H. longispina</i> Plowes	100
<i>H. macrantha</i> Dinter	98
<i>H. meloformis</i> (Marloth) Halda	112
<i>H. montana</i> Nel.	98
<i>H. officinalis</i> (N.E.Br.) Plowes	97, 101, 102
<i>H. officinalis</i> subsp. <i>delaetiana</i> (Dinter) Bruyns	101, 102
<i>H. parviflora</i> N.E.Br.	97, 102, 103
<i>H. pedicellata</i> (Schinz) Plowes	97, 102, 103
<i>H. perlata</i> (Dinter) Halda	111
<i>H. ruschii</i> Dinter	97, 103, 104
<i>H. tirasmontana</i> (Plowes) Halda	113
<i>H. triebneri</i> (Nel) Bruyns	97, 104
<i>Huernia</i> R.Br.	6, 70, 104
<i>H. hallii</i> E. & B.M.Lamb	105
<i>H. levyi</i> Oberm.	105, 106
<i>H. namaquensis</i> subsp. <i>hallii</i> (E. & B.M.Lamb) Bruyns	105
<i>H. oculata</i> Hook.f.	70, 105–107
<i>H. plowesii</i> L.C.Leach	105, 107, 108
<i>H. rogersii</i> R.A.Dyer	106
<i>H. thuretii</i> F.Cels	109
<i>H. urceolata</i> L.C.Leach	105, 107, 108
<i>H. verekeri</i> Stent	105, 108
<i>H. volkartii</i> Peitsch. ex Werderm.	109
<i>H. zebrina</i> N.E.Br.	105, 109
<i>Indigofera</i> L.	3
<i>Ipomoea</i> L.	3
<i>Jamesbrittenia</i> Kuntze	3
<i>Kinpetalum schultzei</i> Schltr.	81
<i>Larryleachia</i> Plowes	70, 110
<i>L. dinteri</i> (A.Berger) Plowes	110
<i>L. marlothii</i> (N.E.Br.) Plowes	110, 111
<i>L. meloformis</i> (Marloth) Plowes	112
<i>L. perlata</i> (Dinter) Plowes	110–112
<i>L. picta</i> (N.E.Br.) Plowes	110, 112
<i>L. tirasmontana</i> (Plowes) Plowes	110, 113
<i>Lavrana</i> Plowes	70, 113

<i>L. haagnerae</i> Plowes	113, 114
<i>L. perlata</i> (Dinter) Bruyns	111
<i>L. picta</i> subsp. <i>parvipunctata</i> Bruyns	113
<i>Leachia dinteri</i> (A.Berger) Plowes	110
<i>L. meloformis</i> (Marloth) Plowes	112
<i>L. perlata</i> (Dinter) Plowes	111
<i>Leachiella dinteri</i> (A.Berger) Plowes	110
<i>L. meloformis</i> (Marloth) Plowes	112
<i>L. perlata</i> (Dinter) Plowes	111
<i>L. tirasmontana</i> Plowes	113
Malouetieae Müll.Arg.	5, 13, 18
Marsdenia R.Br.	34, 35
<i>M. macrantha</i> (Klotzsch) Schltr.	35–37
<i>M. sylvestre</i> (Retz.) P.I.Forst.	34
Marsdenieae Benth.	5, 30, 34
Melodineae G.Don	5, 10, 12
Microloma R.Br.	39, 51
<i>M. armatum</i> (Thunb.) Schltr. ex Gilg & Benedict	52, 53, 57
<i>M. calycinum</i> E.Mey.	52–54
<i>M. dinteri</i> Schltr.	52
<i>M. hereroense</i> Wanntorp	52–54
<i>M. incanum</i> Decne.	52, 54, 55
<i>M. incanum</i> var. <i>glabra</i> L.Bol.	55
<i>M. lanatum</i> Wanntorp	57
<i>M. longitubum</i> Schltr.	52, 54, 56
<i>M. penicillatum</i> Schltr.	52, 55, 56
<i>M. poicilanthum</i> H.Huber	52, 56, 57
<i>M. rotkuppense</i> N.E.Br.	56
<i>M. spinosum</i> N.E.Br.	52
<i>M. spinosum</i> subsp. <i>dinteri</i> (Schltr.) Wanntorp	52
<i>M. spinosum</i> subsp. <i>velutinum</i> Wanntorp	52
Miraglossum Kupicha	61
Nerieae Baill.	5, 13, 14
Orbea Haw.	6, 71, 115
<i>O. albocastanea</i> (Marloth) Bruyns	5, 115, 116
<i>O. caudata</i> (N.E.Br.) Bruyns	115, 116
<i>O. caudata</i> subsp. <i>rhodesiaca</i> (L.C.Leach) Bruyns	116
<i>O. huillensis</i> (Hiern) Bruyns	115, 117
<i>O. huillensis</i> subsp. <i>flava</i> Bruyns	117
<i>O. huillensis</i> subsp. <i>huillensis</i>	117
<i>O. kaokoensis</i> (Bruyns) Plowes	120
<i>O. lugardii</i> (N.E.Br.) Bruyns	115, 118, 119
<i>O. lutea</i> (N.E.Br.) Bruyns	115, 119, 120
<i>O. lutea</i> subsp. <i>vaga</i> (N.E.Br.) Bruyns	119
<i>O. maculata</i> (N.E.Br.) L.C.Leach	115, 120, 121
<i>O. maculata</i> subsp. <i>kaokoensis</i> Bruyns	120, 121
<i>O. maculata</i> subsp. <i>rangeana</i> (Dinter & A.Berger) Bruyns	120, 121
<i>O. rangeana</i> (Dinter & A.Berger) L.C.Leach	120
<i>O. schweinfurthii</i> (A.Berger) Bruyns	115, 121, 122
<i>O. valida</i> (N.E.Br.) Bruyns	115, 122
<i>O. valida</i> subsp. <i>occidentalis</i> Bruyns	122
<i>O. valida</i> subsp. <i>valida</i>	122
<i>Orbeopsis albocastanea</i> (Marloth) L.C.Leach	115
<i>O. flava</i> (Bruyns) Plowes	117
<i>O. lutea</i> subsp. <i>vaga</i> (N.E.Br.) L.C.Leach	119
<i>O. occidentalis</i> (Bruyns) Plowes	122
<i>O. pseudonebrownii</i> (Dinter) Plowes	119
<i>O. pseudonebrownii</i> var. <i>discolor</i> (Nel) Plowes	119

<i>O. tsumebensis</i> (Oberm.) L.C.Leach.	117
<i>O. vaga</i> (N.E.Br.) Plowes	119
<i>Orthanthera</i> Wight.	70, 122
<i>O. albida</i> Schinz.	123, 124
<i>O. browniana</i> Schinz.	124
<i>O. jasminiflora</i> (Decne.) Schinz.	123–125
<i>Pachycarpus</i> E.Mey.	40, 57
<i>P. lineolatus</i> (Decne.) Bullock.	57, 58
<i>Pachypodium</i> Lindl.	13, 18
<i>P. giganteum</i> Engl.	18
<i>P. lealii</i> Welw.	18, 19
<i>P. namaquanum</i> (Wyley ex Harv.) Welw.	18–20
<i>Pentarrhinum</i> E.Mey.	39, 58
<i>P. abyssinicum</i> Decne.	59
<i>P. insipidum</i> E.Mey.	59
<i>Pergularia</i> L.	39, 60
<i>P. daemia</i> (Forssk.) Chiov.	59, 60
<i>Periglossum</i> Decne.	39, 60
<i>P. mackenii</i> Harv.	60, 61
<i>Periploca graeca</i> L.	4, 29
<i>Periplocoideae</i> R.Br. ex Endl.	1, 5, 8, 9, 20
<i>Piaranthus</i> R.Br.	70, 125
<i>P. cornutus</i> N.E.Br.	125
<i>P. cornutus</i> var. <i>cornutus</i>	125, 126
<i>P. cornutus</i> var. <i>ruschii</i> (Nel) Bruyns	125, 126
<i>P. decipiens</i> (N.E.Br.) Bruyns	125–127
<i>P. nebrownii</i> Dinter	125
<i>P. pulcher</i> var. <i>nebrownii</i> (Dinter) A.C.White & B.Sloane	125
<i>P. streyianus</i> Nel	120
<i>P. ruschii</i> Nel	125
<i>Quaqua</i> N.E.Br.	70, 127
<i>Q. acutiloba</i> (N.E.Br.) Bruyns	127, 128
<i>Q. incarnata</i> (L.f.) Bruyns	127, 128
<i>Q. incarnata</i> subsp. <i>hottentotorum</i> (N.E.Br.) Bruyns.	128
<i>Q. mammillaris</i> (L.) Bruyns.	127, 129, 130
<i>Q. pruinosa</i> (Masson) Bruyns	127, 130
<i>Raphionacme</i> Harv.	20, 23
<i>R. burkei</i> N.E.Br.	28
<i>R. dinteri</i> Schltr. ex Schinz.	28
<i>R. haeneliae</i> Venter & R.L.Verh.	24
<i>R. inconspicua</i> H.Huber.	24–26
<i>R. lanceolata</i> Schinz.	24, 26
<i>R. monteiroae</i> (Oliv.) N.E.Br.	24, 26, 27
<i>R. namibiana</i> Venter & R.L.Verh.	5, 24, 27
<i>R. velutina</i> Schltr.	24, 28
<i>Rauvolfioideae</i> Kostel.	1, 5, 8–10, 12
<i>Rhigozum trichotomum</i> Burch.	33, 75, 102, 142
<i>Rhyssolobium</i> E.Mey.	34, 35
<i>R. dumosum</i> E.Mey.	37
<i>Salsola</i> L.	3, 33
<i>Sarcophagophilus armatus</i> Dinter.	129
<i>S. winklerianus</i> Dinter.	129
<i>Sarcostemma</i> R.Br.	42
<i>S. pearsonii</i> N.E.Br.	44
<i>S. viminale</i> (L.) R.Br.	45
<i>Schizoglossum</i> E.Mey.	39, 61
<i>S. baumii</i> Schltr.	64
<i>S. biflorum</i> (E.Mey.) Schltr.	62, 64

<i>S. capense</i> (Schltr.) H. Huber	61–64
<i>S. carinatum</i> Schltr.	62
<i>S. masaicum</i> N.E.Br.	62, 64
<i>S. pentheri</i> Schltr.	62
<i>S. periglossoides</i> Schltr.	65
<i>S. saccatum</i> Bruyns.	61, 64, 65
<i>Schizostephanus</i> Hochst.	39, 65
<i>S. gossweileri</i> (S. Moore) Liede.	65–67
<i>Secamone</i> R.Br.	29
<i>S. punctulata</i> Decne.	29
<i>Secamonoideae</i> Endl.	1, 5, 8, 9, 29
<i>Siphonostelma stenophyllum</i> Schltr.	82
<i>Sphaerocodon</i> Benth.	30, 39, 66
<i>S. melananthus</i> N.E.Br.	67
<i>Stapelia</i> L.	70, 130
<i>S. albopilosa</i> Giess	141
<i>S. albocastanea</i> Marloth	115
<i>S. auobensis</i> Nel	141
<i>S. aurea</i> Dinter	143
<i>S. ausana</i> Dinter & A. Berger ex Dinter	141
<i>S. bergeriana</i> Dinter	134
<i>S. caroli-schmidtii</i> Dinter & A. Berger	115
<i>S. dinteri</i> A. Berger	141
<i>S. flavopurpurea</i> Marloth	131
<i>S. flavopurpurea</i> var. <i>fleckii</i> (A. Berger & Schltr.) A.C. White & B. Sloane	131
<i>S. fleckii</i> A. Berger & Schltr.	131
<i>S. hirsuta</i> L.	131, 132
<i>S. hirsuta</i> var. <i>gariepensis</i> (Pillans) Bruyns.	131, 132
<i>S. johni-laurani</i> J.J. Halda	131
<i>S. juttiae</i> Dinter	135
<i>S. kwebensis</i> N.E.Br.	131–133
<i>S. kwebensis</i> var. <i>longipedicellata</i> A. Berger	132
<i>S. longipedicellata</i> (A. Berger) N.E.Br.	132
<i>S. longipes</i> C.A. Lückh.	145
<i>S. marientalensis</i> Nel	141
<i>S. noachabibensis</i> C.A. Lückh.	135
<i>S. olivacea</i> N.E.Br.	136
<i>S. pachyrrhiza</i> Dinter	143
<i>S. pearsonii</i> N.E.Br.	5, 131, 133, 134
<i>S. portae-taurinae</i> Dinter & A. Berger	135
<i>S. rangeana</i> (Dinter & A. Berger) P.V. Heath	120
<i>S. remota</i> R.A. Dyer	136
<i>S. ruschiana</i> Dinter	146
<i>S. schinzii</i> A. Berger & Schltr.	131, 134, 135
<i>S. schinzii</i> var. <i>angolensis</i> Kers.	134, 135
<i>S. schinzii</i> var. <i>bergeriana</i> (Dinter) L.C. Leach	134, 135
<i>S. schinzii</i> var. <i>schinzii</i>	134, 135
<i>S. similis</i> N.E.Br.	131, 135
<i>S. vaga</i> N.E.Br.	119, 120
<i>Stapeliopsis</i> Pillans	70, 136
<i>S. neronis</i> Pillans	136, 137
<i>S. urniflora</i> Lavranos	136–138
<i>Stenostelma</i> Schltr.	61
<i>S. capense</i> Schltr.	61, 62
<i>Stigmatorhynchus</i> Schltr.	6, 34, 37
<i>S. hereroensis</i> Schltr.	38, 39
<i>Strophanthus</i> DC.	13, 14, 16
<i>S. amboensis</i> (Schinz) Engl. & Pax.	16, 17

<i>S. kombe</i> Oliv.	16, 17
<i>S. petersianus</i> var. <i>amboensis</i> Schinz	16
<i>Tacazea</i> Decne.	20, 28
<i>T. apiculata</i> Oliv.	28, 29
<i>Tavaresia</i> Welw.	70, 138
<i>T. barklyi</i> (Dyer) N.E.Br.	138–140
<i>T. grandiflora</i> (Dinter) A.Berger	138
<i>T. thompsoniorum</i> Van Jaarsv. & R.Nagel	138, 140
<i>Tenaris schultzei</i> (Schltr.) E.Phill.	81
<i>Tribulocarpus dimorphanthus</i> (Pax) S.Moore	6
<i>Trichocaulon delaetianum</i> Dinter	101
<i>T. dinteri</i> A.Berger	110
<i>T. engleri</i> Dinter.	112
<i>T. keetmanshoopense</i> Dinter	110
<i>T. meloforme</i> Marloth	112
<i>T. pedicellatum</i> Schinz.	102
<i>T. perlatum</i> Dinter.	111
<i>T. pubiflorum</i> Dinter	101
<i>T. sinus-lüderitzii</i> Dinter.	110
<i>T. triebneri</i> Nel.	104
<i>Tridentea</i> Haw.	70, 140
<i>T. jucunda</i> (N.E.Br.) L.C.Leach.	140, 141
<i>T. jucunda</i> var. <i>dinteri</i> (A.Berger) L.C.Leach	141
<i>T. longipes</i> (C.A.Lückh.) L.C.Leach	145
<i>T. marientalensis</i> (Nel) L.C.Leach	141–143
<i>T. marientalensis</i> subsp. <i>albipilosa</i> (Giess) L.C.Leach	141, 142
<i>T. marientalensis</i> subsp. <i>marientalensis</i>	141, 142
<i>T. pachyrrhiza</i> (Dinter) L.C.Leach	141, 143
<i>T. ruschiana</i> (Dinter) L.C.Leach	146
<i>T. virescens</i> (N.E.Br.) L.C.Leach.	140, 143, 144
<i>Tromotriche</i> Haw.	70, 144
<i>T. aperta</i> (Masson) Bruyns	144, 145
<i>T. longipes</i> (C.A.Lückh.) Bruyns	145
<i>T. pedunculata</i> (Masson) Bruyns	144–146
<i>T. pedunculata</i> subsp. <i>longipes</i> (C.A.Lückh.) Bruyns	145, 146
<i>T. ruschiana</i> (Dinter) Bruyns.	144, 146
<i>T. umdausensis</i> (Nel) Bruyns	144, 146, 147
<i>Turnera</i> L.	6
<i>Tylophora</i> R.Br.	6, 30, 39, 67
<i>T. fleckii</i> (Schltr.) N.E.Br	7, 67–69
<i>Tylophoropsis fleckii</i> Schltr.	67
<i>X Staparesia thompsoniorum</i> (Van Jaarsveld & Nagel) G.D.Rowley	138
<i>Xysmalobium</i> R.Br.	39, 69
<i>X. undulatum</i> (L.) Aiton f.	69
<i>Zygophyllum</i> L.	33



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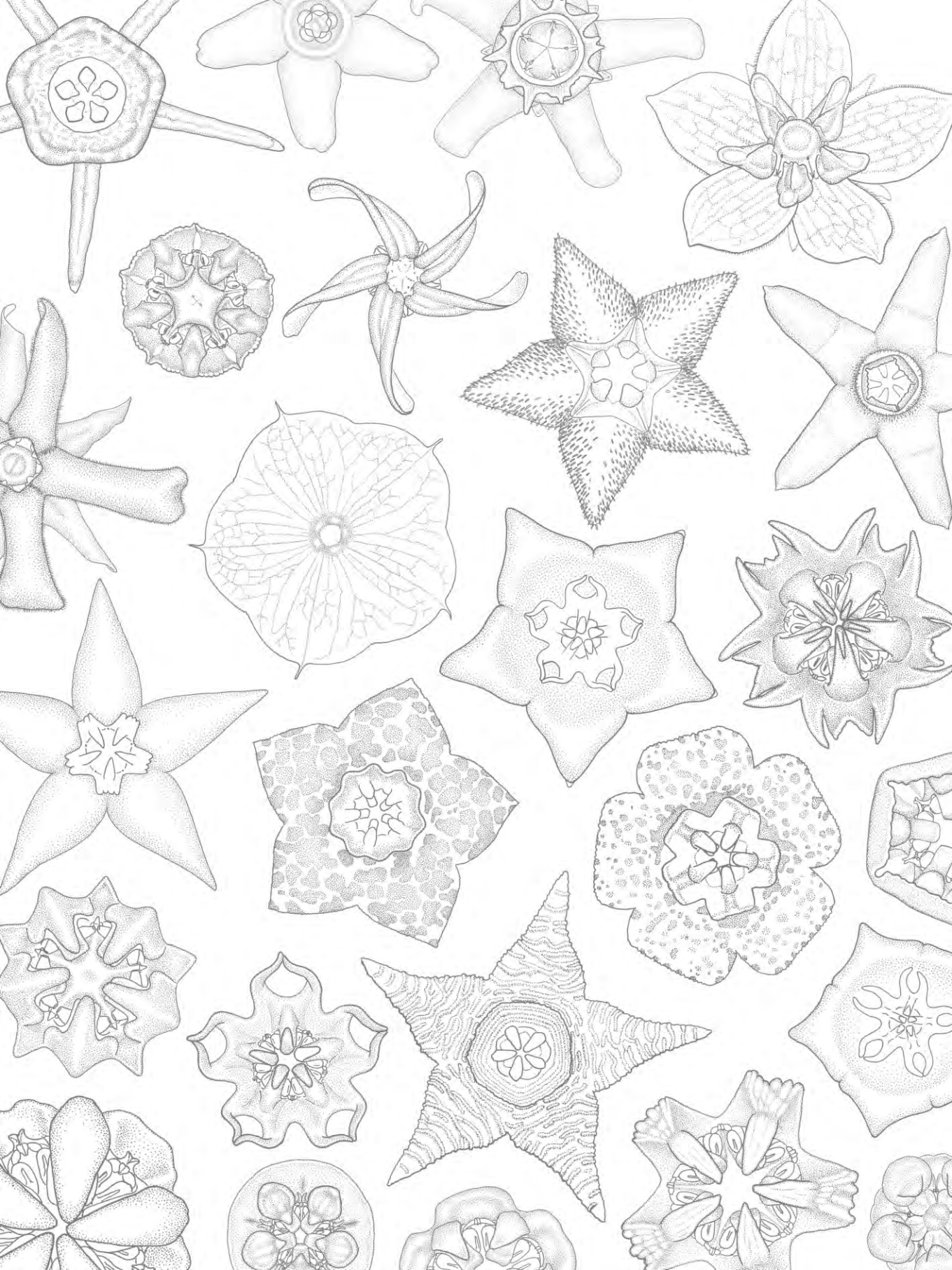
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The Flora of Namibia is dominated by the families Poaceae, Asteraceae and Fabaceae. Here, an account of the Apocynaceae, the seventh largest family in Namibia, is presented. A total of 153 species belonging to 46 genera are recorded as occurring naturally for the country and 19 of these species are endemic to Namibia, with two endemic genera. More than half of these 153 species belong to the tribe Ceropegieae, with the highly succulent group, the stapeliads, represented by 58 species. It is shown that the family is most diverse in the extreme south of the country, in the Rosh Pinah and in the Karasburg districts. The distribution of each species is mapped and, for many genera, one species is illustrated with line drawings. Lectotypes are selected for several species.

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