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A BRIEF SURVEY OF SCROPHULARIACEAE–SELAGINEAE

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Scrophulariaceae–Selagineae is briefly surveyed. *Selago* L. *sensu stricto* and *Cromidon* Compton are re-defined, and a new genus, *Chenopodiopsis* Hilliard, is established. The generic position of 16 species enumerated by Rolfe (in Fl. Cap. 5(1), 1901) under *Selago* section *Euselago* is clarified. *Cromidon* comprises 12 species; 6 are newly described, 6 have been transferred from *Polycarena*, *Selago* or *Walafrida*. *Chenopodiopsis* comprises 3 species, 2 transferred from *Selago*, 1 newly described.

During the course of a revision of Scrophulariaceae–Manuleae two species described in *Polycarena*, namely *P. intertexta* Benth. and *P. plantaginis* Benth., proved to be congeneric with *Cromidon corrigioloides* (Rolfe) Compton. Also, *Selago decumbens* Thunb. is clearly conspecific with *Polycarena intertexta*, and several more species described in *Selago* are in fact members of *Phyllopodium* (they are enumerated below) while *P. rudolphii* Hiern is *Selago humilis* Rolfe (*Selago* sect. *Spurieae*). A critical examination of *Selago* became imperative and, for reasons that will become apparent, this led in turn to a survey of the whole of Selagineae.

To segregate *Cromidon* from *Selago*, Compton used the adnation of the bract to the calyx and the 4-lobed corolla, but these characters are quite inadequate because the true selagos have the bract adnate to the calyx and the syntypes of *S. corrigioloides* (which Compton did not see) both have 5-lobed corollas. *Selago* itself is at present heterogeneous; once *Selago* is clearly defined, the segregation of *Cromidon* is simple.

Differences in indumentum and in the structure of the seeds having proved so useful in Manuleae, it was logical to examine the same characters in Selagineae. The results were startling. Two apparently fundamentally different types of hair occur on the stems, leaves, bracts and calyx in Selagineae: one type has ordinary thin walls, the other delicately sculptured walls (Fig. 1). Hairs with sculptured walls have not been observed in Manuleae (other than the clavate hairs inside the corolla) and appear only in certain genera of Selagineae. Members of Selagineae are characterized by their one-seeded cocci (the fruit in Manuleae is a few- to many-seeded capsule). The walls of the cocci may be either bone hard or thin, smooth or variously sculptured or patterned; a hard-walled coccus contains a more or less fusiform seed (it can become somewhat distorted or angled by pressure), a thin-walled one a compressed seed, ellipsoid in outline, ± falcate in transverse section. The form of the coccus and its seed is constant within a genus. See Figs 2 and 3.

Rolfe (in *Fl. Cap.* 5(1), 1901) recognized three sections in *Selago*: Section *Euselago* (section *Selago* under the modern Code), Section *Ericoideae* Rolfe and Section *Spurieae* Rolfe. Section *Spurieae* (type *S. spuria* L.) stands right apart from the other two: the leaves are opposite, there are no brachyblasts, the corolla tube is cylindric (not infundibuliform), the corolla limb has at least the posticous lip bearded and may have an orange patch there, the cocci are soft-walled, the seeds compressed, and the hairs have ordinary thin walls, characters mostly foreign to *Selago* (see Table 1). Section

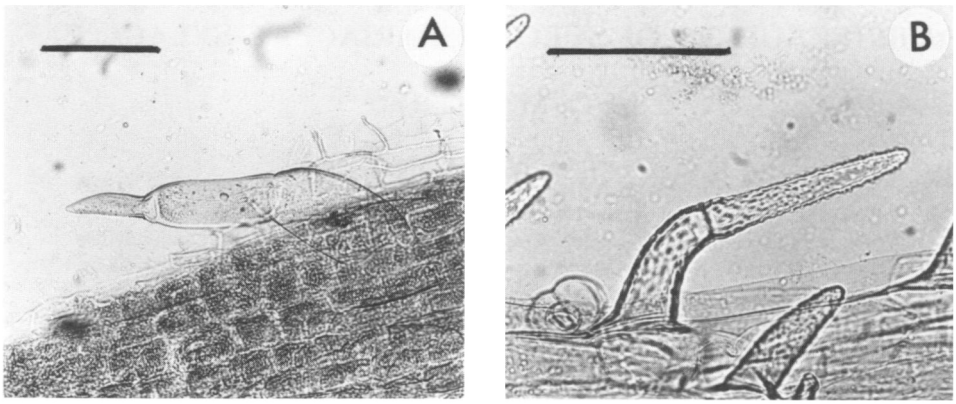


FIG. 1. Hairs on stems of: A, *Chenopodiopsis hirta* (*Esterhuysen* 18942), cells thin-walled; B, *Selago tephrodes* (*Esterhuysen* 3479), cells with sculptured walls. Scale bars = 0.1mm.

Ericoideae (type *S. fruticosa* L.) differs from Section *Selago* in having the bract free or very nearly so from the calyx and it lacks brachyblasts; its status needs further investigation. We are concerned here with Section *Selago*, typified by *S. corymbosa* L.

Section *Selago* is not homogeneous: transfers to other genera are listed below, the numbers being from Rolfe's sequence in Flora Capensis.

49–53, *Selago natalensis* and its allies, have been removed to *Tetraselago* Junell (Junell, 1961; Hilliard & Burtt, 1977); the fruit is a 4-seeded loculicidal capsule and the genus is in the affinity of *Strobilopsis* Hilliard & Burtt and *Glumicalyx* Oliver (both Manuleae).

70, *Selago rustii* Rolfe, is *Phyllopodium rustii* (Rolfe) Hilliard.

76, *Selago nutans* Rolfe, is *Glumicalyx nutans* (Rolfe) Hilliard & Burtt.

77, *Selago elegans* Choisy, is *Phyllopodium elegans* (Choisy) Hilliard.

78, *Selago heterophylla* Rolfe, belongs in Section *Spurieae* (and is a later homonym of *S. heterophylla* Thunb.).

79, *S. herbacea* Choisy, has yet to be placed (type not seen) but it possibly belongs in Manuleae.

80, *S. cephalophora* Thunb., became *Polycarena cephalophora* (Thunb.) Levyns but is misplaced in that genus. I have not yet made a decision on the generic placement of this species and its close ally, 81, *Selago phyllopodioides* Schltr. (which is homotypic with *Polycarena selaginoides* Hiern): they either belong in *Phyllopodium* or, together with *P. pumilum* Benth. and *Polycarena hispidula* Thell., constitute an undescribed genus.

82, *Selago hirta* L.f., is congeneric with *S. chenopodioides* Diels (1942) and both are here transferred to *Chenopodiopsis* Hilliard.

83, *Selago hamulosa* E. Mey., becomes *Cromidon hamulosum* (E. Mey.) Hilliard.

84, *Selago decumbens* Thunb., becomes *Cromidon decumbens* (Thunb.) Hilliard.

85, *Selago corrigioloides* Rolfe, is *Cromidon corrigioloides* (Rolfe) Compton.

Nos. 86–94 constitute Section *Spurieae*.

Nos. 95–112 constitute Section *Ericoideae*.

Selago cordata Thunb. was referred by Rolfe (*Fl. Cap.* 5(1): 163, sub *S. decumbens*) to *Phyllopodium heterophyllum* (L.f.) Benth., but it has been maintained as *P. cordatum* (Thunb.) Hilliard.

A survey of species described in *Walafrida* showed *W. minuta* Rolfe and *W. pusilla* Roessler to be misplaced in that genus; they belong in *Cromidon*.

The species listed above fall into two categories: those that are simply misplaced in Selagineae and have been removed to various genera of Manuleae, and those that belong in Selagineae but are misplaced in *Selago* and *Walafrida*. This second group of species have in common opposite leaves and annual habit (though two or three species are perennial); both these characters are foreign to *Selago sensu stricto* and *Walafrida*.

Selago sensu stricto is a genus of perennial herbs or shrublets with leaves usually alternate, very rarely opposite, brachyblasts rarely absent, hairs with delicately sculptured walls, bract adnate to the 5-lobed calyx, corolla limb bilabiate, 5-lobed, posticous lip 2-lobed, anticous lip 3-lobed, posticous lip glabrous and without a yellow/orange patch, stamens 4, cocci hard-walled, more or less rugose, seeds ± fusiform.

Cromidon is a genus of annual or perennial herbs with opposite leaves (they may become alternate towards the apex of the stem), brachyblasts wanting, hairs with delicately sculptured walls, the bract adnate to the 3–5-lobed calyx, corolla limb bilabiate, 4- or 5-lobed, posticous lip 1- or 2-lobed, it, and sometimes the anticous lip as well, bearded with minute clavate hairs, posticous lip often with a yellow/orange patch, stamens 4, cocci soft-walled, smooth or rarely slightly rugose, seeds ellipsoid in outline, compressed.

Twelve species are recognized here, the material having been found scattered under *Cromidon*, *Selago*, *Walafrida*, *Polycarena* and *Phyllopodium*, or unplaced at the end of Scrophulariaceae and Selagineae, though Miss Esterhuysen early recognized that there is more than one species of *Cromidon*. The flowers of these genera bear a strong resemblance to one another, which is indicative of the close relationship between Manuleae and Selagineae, a topic to be discussed fully at a later date.

Chenopodiopsis is also a genus of annual herbs with opposite leaves (they may become alternate upwards), brachyblasts wanting, hairs without sculptured walls, the bract adnate to the 5-lobed calyx, corolla limb 4- or 5-lobed, posticous lip 4-lobed, anticous lip 1-lobed, minute or wanting, the posticous lip bearded or not and without a yellow/orange patch, stamens 2 or 4, cocci hard-walled, rugose, seeds ± fusiform.

Three species are recognized, two originally described in *Selago*, one new; the differences between *Selago* and *Chenopodiopsis* are set out in the diagnoses above,

Table 1. Some important characters of members of Scrophulariaceae–Selagineae

	External Hairs: sculptured S thin-walled T	Habit: annual A perennial P	Leaves: opposite O alternate A opp. → alt. OA	Bract: adnate A free F	Calyx: no. of lobes	Corolla: no. of lobes	Posticous lip: bearded B glabrous G	Orange patch: present + absent −	No. of stamens:	No. of cocci:	Cocci walls: hard H soft S	Seeds: fusiform F compressed C
Selago												
Sect. Ericoideae	S	P	A	F	5	5	G	−	4	2	H	F
Selago												
Sect. Selago	S	P	A or rarely O	A	5	5	G	−	4	2*	H	F
Walafrida	S	P	A	A	3	5	G	−	4	2	H	F
Globulariopsis	S	P	O	F	5	5	G	−	4	1	not seen	
Cromidon	S	A or P	O or OA	A	3–5	4 or 5	B	+ −	4	2	S	C
Microdon	S	P	A	A	5	5	G	+ −	4	1	not seen	
Agathelpis	S	P	A	A	5	5	G	−	2	1	not seen	
Gosela	S	P	A	F	5	5	G	−	4 or 2**	1	H	F
Selago												
Sect. Spurieae	T	A or P	O or OA	A	5	5	B	+	4	2	S	C
Hebenstretia	T	A or P	OA	A	1	4	B or G	+ −	4	2 (occ. 1)	H	F
Chenopodiopsis	T	A	OA	A	5	4 or 5	B or G	−	4 or 2	2	H	F
Dischisma	T	A or P	O or OA	F	2	4	B or G	−	4	2	H	F

*_Selago tephrodes_ E. Mey. and allies excluded: they have the bract free from the calyx and one coccus aborted; they may not belong in the genus.

**_Gosela_ is described as having 2 stamens and 2 staminodes. However, of the 20 sheets seen, 15 had 4 fully fertile stamens, the anticous anthers much smaller than the posticous, rarely one of the anticous anthers further reduced but still producing pollen (these 15 sheets from the Cedarberg and nearby: 3218BD, 3219 AA, AC, CA, CB, 3319AC). In the other 5 sheets (from Ceres div., 3219 CA, 3319 AA) the anticous stamens were completely aborted.

and they are summarized in Table 1. The relationship of *Chenopodiopsis* lies, not with *Selago*, but with *Hebenstretia*: all three species have a corolla similar to that characteristic of *Hebenstretia*, the cocci have a similar median longitudinal groove on the dorsal face, and the hairs are without sculptured walls; they differ in the calyx: 5-lobed in *Chenopodiopsis*, glumaceous in *Hebenstretia* (Fig. 4).

Table 1 summarizes the principal characters that distinguish the genera and other groups within Selagineae. It cannot be too strongly emphasized that the taxonomy of Selagineae needs much more investigation and the table merely reflects the *status quo*.

The Genus Cromidon

The calyx in *Cromidon* is usually 5-lobed; in *C. pusillum* it is always 3-lobed, in *C. minutum* it is often 3-lobed, but the anticous lobes may be retuse or toothed, while in *C. varicalyx*, in any one inflorescence, it may be 5-lobed, 3-lobed, or show various degrees of toothing of the anticous lobes. Because of their 3-lobed calyx, *C. pusillum* and *C. micranthum* were originally described under *Walafrida*, but in *Walafrida* the bract is adnate the whole length of the calyx tube (not halfway or less as in *Cromidon*), the leaves are alternate, the posticous lip of the corolla is never bearded, the cocci are hard-walled, and the seeds are fusiform. It is easy to open a thin-walled coccus with a dissecting needle; a hard-walled one calls for a scalpel and considerable pressure.

The corolla limb may be 4- or 5-lobed, usually one state or the other being characteristic of a species. In those species with a 4-lobed limb, the posticous lip may be entire or retuse. However, under *C. corrigioloides*, which normally has a 5-lobed limb, I have included a specimen in which the posticous lip may be entire, retuse or shortly bilobed; the limb is smaller than usual for *C. corrigioloides* and the flowers appear to be autogamous. Reduction in the size of the limb seems often to accompany autogamy (a common state in some genera of Manuleae, where cleistogamy also occurs), but the corolla tube and the calyx retain their normal dimensions.

Autogamy seems to occur in three more species of *Cromidon*, *C. confusum*, *C. microechinos* and *C. minutum*, all three of which have very small flowers. In the first two species, there is no reduction in the size of the limb to indicate autogamy; instead, selfing is suggested by the abnormally short stigma, often bent over at the tip, and the only partial exsertion of the anthers. In *C. minutum*, however, the only specimen seen with short stigma and shortly exserted, very small, anthers also showed reduction in the size of the limb.

One collection of *C. decumbens* has gynodioecious flowers: the very long and far-exserted stigmas immediately caught the eye, and, though there was scarcely any reduction in the size of the limb, the limb was only 4-lobed. The anthers looked normal, though rather small for the species, but proved to be devoid of pollen and not to dehisce—the cells lacked any endothecial thickenings.

The discrimination of the species depends principally on differences in indumentum as well as on details of bract, calyx and corolla, all of which are very small, so care is needed to distinguish them.

Cromidon Compton, Trans. Roy. Soc. S. Afr. 19: 308 (1931).

Small annual or perennial herbs, stems often prostrate or decumbent, leafy, sometimes with axillary leaf tufts (incipient branches). *Leaves* opposite, bases often connate, sometimes becoming alternate upwards. *Inflorescence* a raceme, pedicels short and flowers usually crowded into ± globose heads or short spikes, these often corymbosely or paniculately arranged. *Bract* adnate to pedicel and up to half the calyx tube. *Calyx* obliquely 3- or 5-lobed, persistent. *Corolla* membranous, persistent, tube funnel-shaped, glabrous, limb bilabiate, 4- or 5-lobed, posticous lip (and sometimes the other lobes) bearded with minute clavate hairs, often with a yellow/orange patch there extending down the throat. *Stamens* 4, didynamous, filaments decurrent down tube, anthers unilocular, exserted. *Stigma* lingulate with 2 marginal bands of stigmatic papillae. *Style* filiform. *Ovary* elliptic-oblong in outline, base slightly oblique with a small adnate nectariferous gland on the shorter side, bilocular, one pendulous ovule in each loculus. *Fruit* a pair of soft-walled cocci, convex on outer face and there either smooth or slightly rugose, concave on inner. *Seed* ± elliptic in outline, convex on one face, ± plane on other, amber-coloured, smooth.

Type species: *Cromidon corrigioloides* (Rolfe) Compton.

Distribution of genus: South Africa and Namibia, the species concentrated in the western and central Cape, one extending into the Orange Free State.

Key to the Species

1. Corolla limb 5-lobed ____ 2
\+ Corolla limb 4-lobed (the posticous lip is sometimes retuse, but never clearly bilobed) ____ 7
2. Both surfaces of leaves and bracts hairy; twiggy perennial herbs, hairs on stems often patent, sometimes ± retrorse ____ 3
\+ Leaves glabrous except for a few hairs on lower margins and lower dorsal surface, bracts hairy on the lower margins, dorsal surface either glabrous or with retrorse hairs on the lower part; annual herbs, hairs on stems retrorse ____ 4
3. Plant robust, main stems 2–3mm in diam., individual heads of flowers arranged in loose corymbs, corolla limb c. 2.8–4mm across lateral lobes, anthers 0.4–0.5mm long ____ **1. C. decumbens**
\+ Plant delicate, main stems 0.5–1.5mm in diam., flowers in small terminal racemes not further aggregated, corolla limb c. 1.6–3mm across lateral lobes, anthers 0.2–0.25mm long ____ **2. C. dregei**
4. Bracts densely pubescent on the lower part of the dorsal surface ____ 5
\+ Bracts either glabrous on the dorsal surface (hairs present on *margins*) or with a few scattered hairs near the base ____ 6
5. Bracts broadly elliptic or spathulate, hairs up to 0.5–1mm long, calyx with anticous lip 1.3–1.8mm long, corolla tube 2–3mm long, anticous corolla lobe 1.6–2.4mm long; heads of flowers either

solitary or few in loose panicles or corymbs ____ **5. C. plantaginis**

\+ Bracts lanceolate, hairs up to 0.2–0.4mm long, calyx with anticous lip 0.5–0.75mm long, corolla tube 2.8–4mm long, anticous corolla lobe 2–3.2mm long; heads of flowers many, crowded in panicles ____ **6. C. austerum**

6. Lowermost bracts 4–5 × 1.8–3.2mm, calyx 2.5–3mm long, either 5- or 3-lobed, or with various degrees of development of lobes, corolla tube 2.75–3.2mm long, corolla limb 4.5–6mm across lateral lobes (c. 2.5mm in autogamous flowers), heads of flowers either solitary or in loose corymbs ____ **7. C. varicalyx**

\+ Lowermost bracts 2.5–4 × 0.6–2mm, calyx 1.8–2.5mm long, 5-lobed, corolla tube 1.5–2.5mm long, corolla limb (2–)3–4mm across lateral lobes, heads of flowers many in congested panicles ____ **8. C. corrigioloides**

7. Stigma far exserted from corolla and immediately noticeable; flowers all female with no pollen in anthers ____ **1. C. decumbens**

\+ Stigma shortly exserted, anthers containing pollen ____ 8

8. Hairs on stems patent ____ 9

\+ Hairs on stems retrorse, or sometimes stems ± glabrous ____ 10

9. Plant profusely branched, very leafy, flowers in tiny racemes terminating leafy twiglets; calyx 1.6–2.5mm long, 5-lobed ____ **3. C. gracile**

\+ Plant moderately branched, moderately leafy, flowers in small globose heads terminating nude or nearly nude twiglets; calyx c. 1.3mm long, 3-lobed ____ **4. C. pusillum**

10. Bracts and calyx hirsute with patent hairs up to 0.25–0.4mm long ____ **11. C. microechinos**

\+ Bracts either glabrous (except for hairs on margins) or with retrorse hairs on lower part of dorsal surface ____ 11

11. Bracts with retrorse hairs on lower backs, calyx pubescent all over, hairs up to 0.25mm long ____ 12

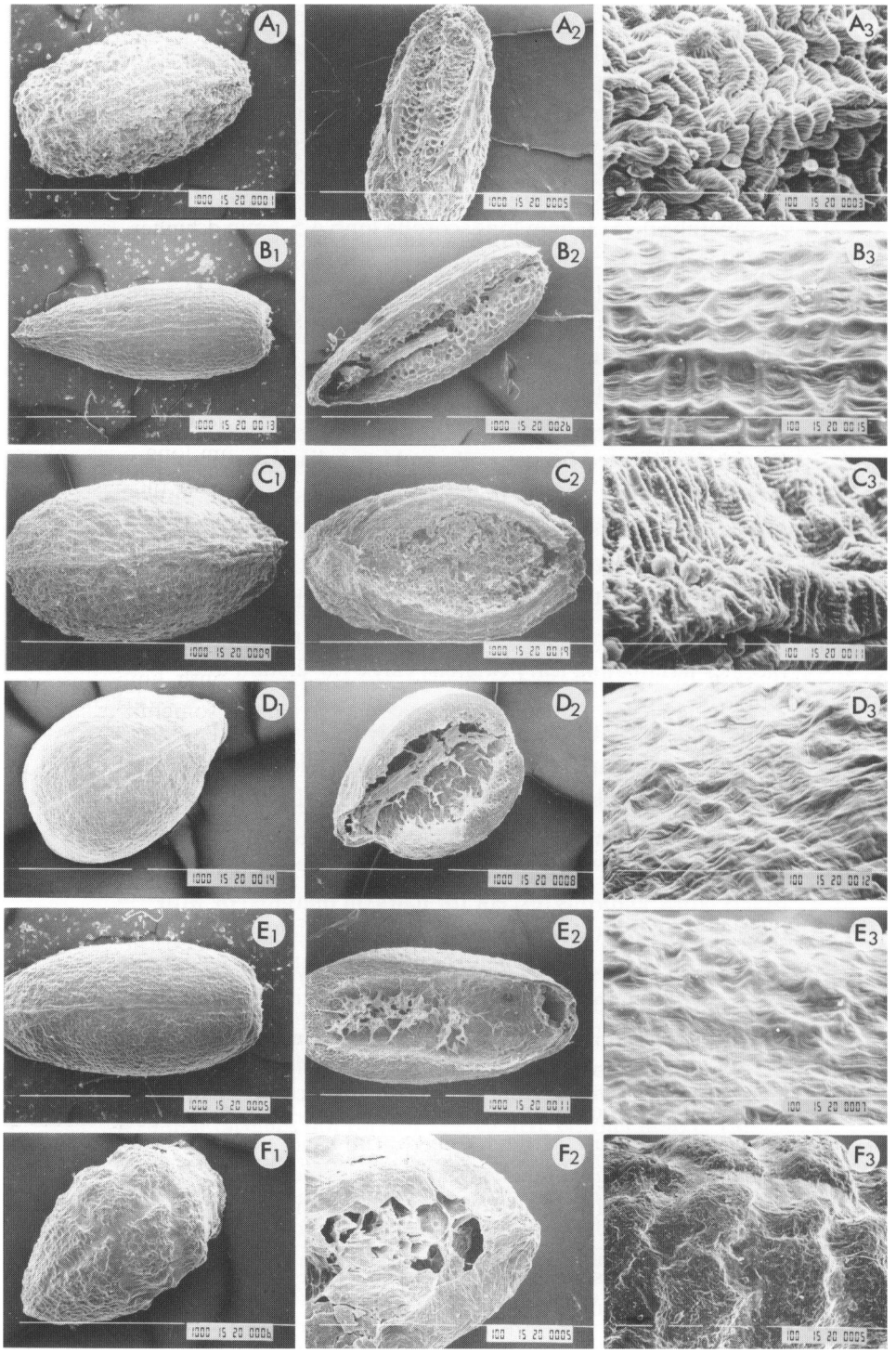
\+ Bracts either glabrous or with hairs on lower margins, calyx glabrous except for hairs on margins of lobes ____ 13

12. Stem well branched from the base and above, flowers in congested heads up to 10mm long in fruit ____ **9. C. confusum**

\+ Stem very sparingly branched, flowers in somewhat lax narrow spikes c. 10–30mm long in both flower and fruit ____ **10. C. hamulosum**

13. Lowermost bracts c. 1.7–2 × 0.7–1mm, calyx often 3-lobed, 1–1.3mm long, corolla tube 1–1.2mm long ____ **12. C. minutum**

\+ Lowermost bracts c. 3.5 × 2mm, calyx 5-lobed, 2–2.5mm long, corolla tube 2mm long ____ **8. C. corrigioloides**


A1
A2
A3
B1
B2
B3
C1
C2
C3
D1
D2
D3
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E3
F1
F2
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1. Cromidon decumbens (Thunb.) Hilliard, **comb. nov.**

Type: C.B.S., *Thunberg* (sheet no. 13879, UPS; iso. BM, S).

Syn.: *Selago decumbens* Thunb., Prodr. Pl. Cap. 100 (1800) & Fl. Cap. ed. Schultes 465 (1823); Rolfe, Fl. Cap. 5(1): 162 (1901), p.p.

Polycarena intertexta Benth. in Hook., Comp. Bot. Mag. 1: 372 (1836) & in A.DC., Prodr. 10: 352 (1846). Type: C.B.S., *Masson* s.n. (BM).

Bushy perennial herb, aromatic, well branched from the base and higher, stems 60-400mm long, main ones up to 2–3mm in diam., sprawling, pubescent with patent to retrorse acute hairs up to 0.3–1mm long, minutely glandular-puberulous as well, leafy, often with axillary leaf tufts. *Leaves*: blade of primary leaves 3–10 × 3–9mm, ovate abruptly contracted into a broad flat petiolar part 2.5–10mm long, roughly as long as the blade, margins with 2–4(–5) pairs of small acute teeth, both surfaces pubescent with acute hairs up to 0.3–0.8mm long, minutely glandular-puberulous as well. *Flowers* occasionally gynodioecious, usually in crowded heads up to 10mm long, these often forming small terminal corymbs, occasionally the heads laxer with the lowermost few flowers distant. *Bracts* (lowermost) 2.5–8(–9) × 1–3(–4)mm, either leaf-like or spathulate, entire, hairy as the leaves, adnate to pedicel and up to half the calyx tube (0.5–1mm). *Pedicels* up to 1mm long. *Calyx* 2–2.7mm long, 5-lobed, anticous lip 1–1.25mm long, lobes acute, lobes of posticous lip similar but smaller, hairy all over, hairs acute, up to 0.3–0.6mm long, minutely glandular-puberulous as well. *Corolla* tube 2–3.5mm long, broadly funnel-shaped, c. 1–1.5mm across mouth, limb bilabiate, 2.8–4mm across the lateral lobes, normally 5-lobed, posticous lip sometimes entire in female flowers, posticous lip 0.75–1.8 × 1.2–2mm, lobes c. 0.5–1 × 0.5–0.8mm, minutely bearded, hairs up to 0.1mm long, anticous lobe 1–2 × 0.75–1.4mm, all lobes white. *Stamens* 4, all exserted, anthers 0.4–0.5mm long. *Stigma* c. 2.5–3mm long, slightly exserted, longer and far exserted in female flowers. *Style* c. 0.2–1mm long. *Ovary* 0.7–1 × 0.4–0.6mm. *Cocci* c. 2 × 1–1.3mm. *Seeds* c. 1.2 × 0.6mm.

Citations:

CAPE. Calvinia div., 3119 BD, Akkerendam, Hantamsberg, c. 4600ft, 14 xi 1955, *Acocks* 18624 (K, PRE); 3120 CC, between Calvinia and Middelpos, 13 x 1983, *Goldblatt* 7092 (PRE, STE); 22km east of Middelpos towards De Hoop, 28 x 1983, *Snijman* 767 (K, NBG, PRE, S). Sutherland div., 3220 BC, farm Uitkyk, 1500m, x 1920, *Marloth* 9745 (PRE); c. 60km east of Sutherland, Gifkop, 5700ft, 22 ix 1985, *Moffett* 3759 (PRE, STE); 3221 AD, between Sutherland and Fraserburg, Aarfontein, 5150ft, 21 ix 1985, *Moffett* 3703 (STE). Beaufort West div., c. 3122 CC, Nieuweveldbergen, 3000–4000ft, 1836, *Drège* 3135 b (K); 3222 AB, Karoo National Park, Mountain View, 6000ft, 3 i 1985, *Shearing* 887 (PRE); *ibidem*, 3222 AD, Torinkies, 2088m, 30 x 1984, *Bengis* 314 (PRE). Ceres div., 3319 BA, NW of Karoopoort, Baviaansberg, 5800–6000ft, 4 xi 1962, *Esterhuysen* 29832 (BOL, K, PRE); *ibidem*, 5000ft, 2 i 1942, *Compton* 12900 (NBG). Laingsburg div., 3320 BA, Witteberg, south of Bantams, c. 4500ft, 4 xi 1963, *Esterhuysen* 30490 (BOL, K, NBG, PRE).

FIG. 2. SEMs of cocci: 1, dorsal surface (scale bars = 1mm); 2, ventral surface (scale bars = 1mm except F_2 = 0.1mm); 3, dorsal surface (scale bars = 0.1mm). A, *Selago corymbosa*; B, *Selago spuria*; C, *Selago fruticosa*; D, *Cromidon corrigioloides*; E, *Cromidon decumbens*; F, *Chenopodiopsis hirta*. (A from *Dümmer* 682; B, *Rodin* 3120; C, *Schlechter* 10362; D, *Acocks* 23898; E, *Goldblatt* 7092; F, *Levyns* 1227)

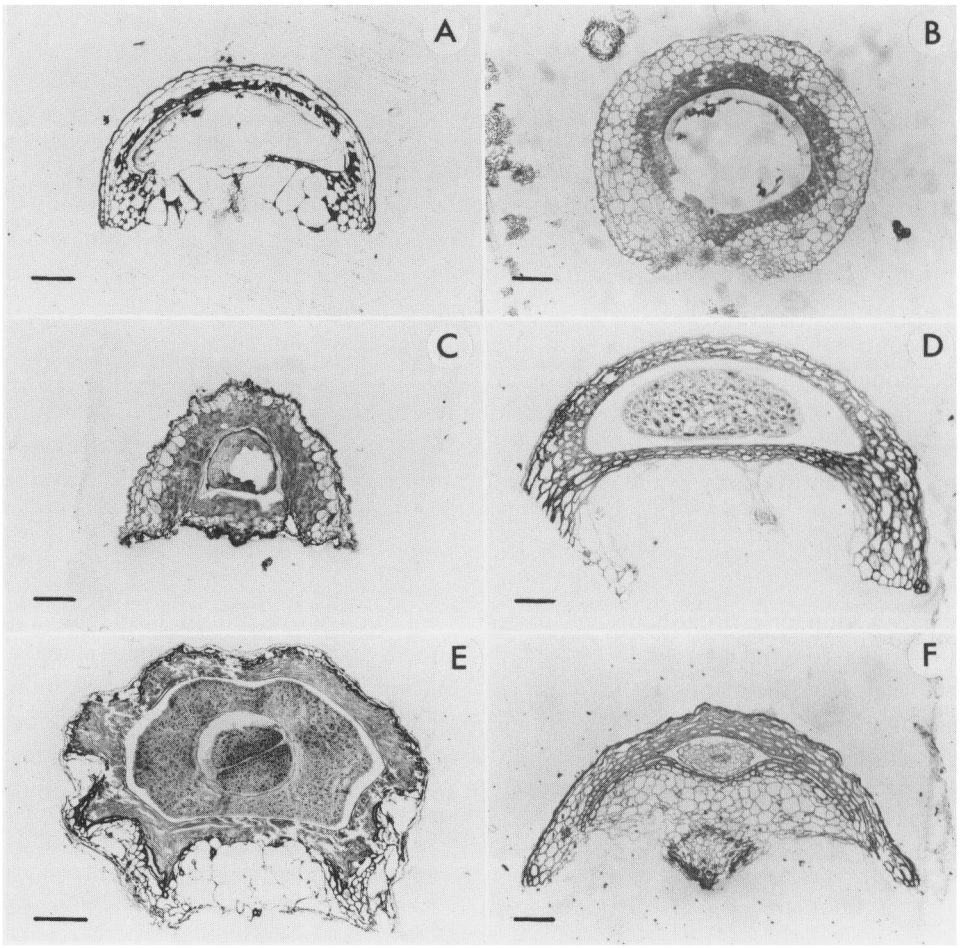

FIG. 3. Transverse sections of cocci. A, *Selago spuria* (*Rodin* 3120); B, *Selago fruticosa* (*Schlechter* 10362); C, *Selago corymbosa* (*Dümmer* 682); D, *Cromidon corrigioloides* (*Acocks* 23898); E, *Chenopodiopsis hirta* (*Levyns* 1227); F, *Cromidon decumbens* (*Goldblatt* 7092). Scale bars = 0.1mm.

Neither Thunberg's collection of *Selago decumbens* nor Masson's collection of *Polycarena intertexta* is localized, but they almost certainly came from the Roggeveld, where the two men travelled together. Their collections are identical, and are precisely matched by modern collections from the Roggeveld, the long acute patent hairs on the stems being a notable feature. Some specimens now included in the species have the hairs slightly shorter and somewhat retrorse (e.g. *Marloth* 9745), but they accord well in all other details.

Cromidon decumbens appears to be confined to the mountains of the south central Cape, from the Hantam Mountains at Calvinia south to the mountains around Ceres and west to the Witteberg in Laingsburg division and the Nieuweveld Mountains near Beaufort West. It grows under rock overhangs and in the shelter of rocks at the foot of cliffs and on screes, flowering between September and January. The flowers on *Snijman* 767 are all female, with far-exserted stigmas; although the anthers appear to be fully developed, they contain no pollen and there are no endothecial thickenings. The specimens (4 sheets) all seem to have come from the same plant.

2. Cromidon dregei Hilliard, **sp. nov.** a *C. decumbente* (Thunb.) Hilliard ramis filiformibus (principalibus 0.5–1mm diam. tantum, nec 2–3mm), foliis tenuioribus, pedicellis infimis usque ad 0.3mm longis (nec 1mm) et floribus plerumque minoribus calyce 1.8–2.2mm longo (nec 2–2.7mm), corollae limbo 1.6–3mm trans lobos laterales (nec 2.8–4mm), labio postico 0.5–0.8mm longo (nec 0.75–1.8mm), lobo antico 0.75–1mm longo (nec 1–2mm) distinguitur. A *C. gracili* Hilliard marginibus foliorum paribus 3–5 dentium parvorum praeditis (nec integris vel paribus 1–2 dentium grossorum), racemis fructescentibus plus minusve densis (nec manifeste laxis), pedicellis infimis usque ad 0.3mm longis (nec 1mm), corollae limbo 5-lobo (nec 4-lobo) differt.

Twiggy perennial herb, crown woody, up to c. 10mm in diam., stems many, up to c. 120mm long, profusely branched, sprawling, main branches c. 0.5–1.5mm in diam., branchlets filiform, pubescent with patent acute hairs up to 0.2–0.3mm long, minutely glandular-puberulous as well, leafy, often with axillary leaf tufts (incipient branches). *Leaves*: blade of primary leaves 2–7 × 2–5mm, abruptly contracted to a petiolar part 2–4mm long (about equalling to roughly half as long as blade), margins with (2–)3–5 pairs of small acute teeth, both surfaces pubescent with acute hairs up to 0.2–0.3mm long, minutely glandular-puberulous as well. *Flowers* in small terminal capitate racemes up to c. 5mm long, sometimes elongating to c. 12mm and becoming somewhat lax. *Bracts* adnate to pedicel and lower part of calyx tube (0.4–0.75mm), lowermost 3.5–7 × 1.1–2.5mm, leaflike, hairy as the leaves. *Pedicels* up to c. 0.3mm long. *Calyx* 1.8–2.2mm long, 5-lobed, anticous lip 0.8–1mm long, lobes acute, posticous lobes similar but smaller, hairy all over, hairs acute, up to 0.2–0.25mm long, minutely glandular-puberulous as well. *Corolla* tube 2–2.5mm long, funnel-shaped, c. 1mm across mouth, limb bilabiate, 1.6–3mm across lateral lobes, 5-lobed, posticous lip 0.5–0.8 × 0.8mm, minutely bearded, hairs less than 0.1mm, posticous lobes c. 0.3 × 0.3mm, anticous lobe 0.75–1 × 0.4–0.7mm, all lobes white or cream. *Stamens* 4, all exserted, anthers 0.2–0.25mm long. *Stigma* 1.3–1.8mm long, shortly exserted. *Style*

0.4–1mm long. *Ovary* 0.6–0.8 × 0.3–0.5mm. *Cocci* c. 1.5–1.6 × 0.8mm. *Seeds* c. 1 × 0.5mm.

Type: Cape, Namaqualand, 3018 AC, Roodeberg und Ezelskop, 4000–5000 Fuss, November, *Drège* (holo. K; iso. BM, E, S, SAM, W), distributed as *Selago cordata* Thunb. c.

Citations:

> CAPE. Namaqualand, 3017 BB, Sneeuwkop, 11 xii 1910, *Pearson & Pillans* 5816 (BOL, K). Khamiesberg, 3018 AC, Welkom, 4000ft, 16 x 1954, *Esterhuysen* 23703 (BOL, K, PRE); *ibidem*, Elliottsberg, 30 ix 1911, *Crompton* 7739 (BOL, K).

Cromidon dregei is known only from the Khamiesberg (Ezelskop and Roodeberg being two peaks in the range) and Sneeuwkop, about 20km NW of the northern end of the Khamiesberg. Like its allies, *C. decumbens* and *C. gracile*, it grows under overhanging rocks between c. 1200 and 1600m above sea level, and flowers between October and December. Like *C. gracile* it is a delicate-looking plant with filiform branches, but is easily distinguished by its leaves with smaller and more numerous teeth; also, the posticous lip is bilobed (entire in *C. gracile*). *Cromidon decumbens* is more robust than the other two species, having stouter stems, thicker leaves, and mostly larger flowers.

3. Cromidon gracile Hilliard, **sp. nov.** a *C. decumbente* (Thunb.) Hilliard caulibus filiformibus (usque ad 1mm diam., nec 2–3mm), foliis integris vel paribus 1–2 dentium grossorum (nec paribus 2–5 dentium parvorum), racemis demum laxissimis (nec plerumque densis manentibus), floribus plerumque minoribus corollae tubo 1.5–2.25mm longo (nec 2–3.5mm), labio postico 0.4–1mm longo semper integro vel levissime retuso (nec 0.75–1.8mm longo lobis 0.5–1mm longis) distinguitur.

Twiggy herb, annual or possibly perennial, profusely branched, stems c. 50–150mm long, filiform, up to c. 1mm in diam., sprawling, sometimes forming small mats, pubescent with patent acute hairs up to 0.3–0.5mm long, minutely glandular-puberulous as well, leafy, often with axillary leaf tufts (incipient branches). *Leaves*: blade of primary leaves 2.5–9 × 1.5–4mm, elliptic tapering into a broad flat petiolar part 0.5–0.75mm long (mostly roughly half as long as blade), margins entire or with 1 or 2 pairs of coarse teeth, both surfaces pubescent with acute hairs up to 0.2–0.4mm long, minutely glandular as well. *Flowers* in small terminal racemes, crowded at first, becoming very lax, up to c. 30mm long. *Bracts* adnate to pedicel and lower part of calyx tube (0.5–0.75mm), lowermost c. 2.7–6 × 0.4–2.5mm, leaf-like, hairy as the leaves. *Pedicels* up to 1mm long. *Calyx* 1.6–2.5mm long, 5-lobed, anticous lip 0.8–1.5mm long, lobes acute, posticous lobes similar but smaller, hairy all over, hairs acute, up to 0.25–0.4mm long, minutely glandular-puberulous as well. *Corolla* tube 1.5–2.25mm long, broadly funnel-shaped, c. 0.8–1.5mm across mouth, limb bilabiate, 1.3–3mm across lateral lobes, 4-lobed, posticous lip 0.4–1 × 0.5–1mm, entire or slightly retuse, minutely bearded, hairs less than 0.1mm long, anticous lobe 0.6–1.5 × 0.3–1mm, all lobes white, orange patch at base of posticous lip and running down back of tube. *Stamens* 4, all exserted, anthers 0.15–0.3mm long. *Stigma* 1.2–1.7mm

long, shortly exserted. *Style* 0.8–1.5mm long. *Ovary* 0.6–0.7 × 0.5–0.6mm. *Cocci* 1.6–1.8 × 1.2–1.5mm. *Seeds* 1–1.3 × 0.75–1mm.

Type: Cape, Ceres—Worcester division, 3319 DA, Hex River Mts, Roodeberg, 7000ft, 27 xii 1952, *Esterhuysen* 20912 (holo. BOL; iso. K, NBG, PRE, S, UPS, W).

Citations:

> CAPE. Worcester div., 3319 BC, Matroosberg, 7350ft, 19 i 1959, *Esterhuysen* 28143 (BOL, K, PRE). Ladismith div., 3321 BD, Toverkop, 6500ft, 22 iv 1951, *Esterhuysen* 18517 (BOL, NBG); *ibidem*, 6500–6800ft, 15 xii 1956, *Esterhuysen* 26798 (BOL, PRE, STE). Prince Albert div., 3321 AD, Seven Weeks Poort Mts, S side of Ridge Peak, 2100m, 27 xii 1928, *Andreae* 1224 (PRE).

Cromidon gracile is possibly confined to the mountains of the southern Cape, where it has been recorded from the Hex River Mountains and the Little and Great Swartberg. It grows at high altitudes, c. 2000–2200m above sea level, in the shelter of overhanging rocks along cliff faces, flowering between December and April.

Cromidon gracile is allied to both *C. decumbens* and *C. dregei*; it is easily distinguished from both by its leaves, entire or with a few coarse teeth (not with several pairs of small teeth). It is a much more delicate-looking plant than *C. decumbens*, with mostly smaller flowers arranged in laxer racemes. All the specimens seen had originally been placed under *Polycarena*.

4. Cromidon pusillum (Roessler) Hilliard, **comb. nov.**

Type: Namibia, Grootfontein distr., 1918 AB, Sus, 8 vii 1937, *Schoenfelder* in herb. Dinter 7686 (holo. M (n.v.); iso. BOL, BM, K, PRE).

Syn.: *Walafrida pusilla* Roessler, Mitt. Bot. Staatssaml. München 5: 690 (1965) & Prodr. Fl. S.W. Afr. fam. 127: 7 (1967).

Annual herb, stems c. 30–100mm long, up to 1mm in diam., primary stem erect, soon branching from the base and higher, branches decumbent or ascending, pubescent with acute patent hairs up to 0.4–0.6mm long, minutely glandular as well, moderately leafy, each leaf subtending a branch. *Leaves* c. 2.3–20 × 0.9–5mm, elliptic tapering into a petiolar part accounting for ± half the total length of the lower leaves, shorter upwards, acute or subacute, margins entire or with 1 or 2 pairs of rather obscure teeth, both surfaces hairy, hairs up to 0.3–0.6mm long. *Flowers* crowded in globose heads c. 5mm in diam., elongating to 10–15mm in fruit, solitary at the tips of the branchlets, these forming very loose panicles in well grown plants. *Bracts* adnate to calyx for 0.2–0.3mm, lowermost 1.5–3 × 0.3–0.8mm, spathulate, pubescent with acute hairs up to 0.25–0.3mm long. *Pedicels* up to 0.5mm long. *Calyx* c. 1.3mm long, 3-lobed, anticous lobes c. 1.1–1.2 × 0.4–0.5mm, entire, ± acute, posticous lobe much smaller, hairy all over, hairs up to 0.25–0.3mm long. *Corolla* tube 1.4–1.5mm long, broadly funnel-shaped, c. 0.8–1mm across mouth, limb c. 1.8–2.5mm across lateral lobes, 4-lobed, posticous lip 0.7–1 × 0.7–1mm, anticous lobe 0.7–1 × 0.6–0.7mm, all lobes tinged pink or mauve in bud, opening white, posticous lip well bearded. *Stamens* 4, all well exserted, anthers 0.1–0.3mm long. *Stigma* 0.4–0.8mm long, exserted. *Style* 0.6–0.9mm long. *Ovary* c. 0.4–0.5 × 0.3–0.4mm. *Cocci* c. 0.8 × 0.7mm, rugulose. *Seeds* c. 0.4 × 0.4mm.

Citations:

NAMIBIA. Okavango area, 1920 DC, W of Gautscha Pan, 23 viii 1955, *Story* 5286 (K); Nama Pan, 8 viii 1955, *Story* 5149 (K, PRE).

Cromidon pusillum has been recorded only from northern Namibia, in Grootfontein and Okavango divisions, but it should be sought across the border in Botswana. It grows in damp ground around the margins of pans and waterholes, flowering in July and August. It seems to be the only species of *Cromidon* in which the calyx is constantly 3-lobed.

5. Cromidon plantaginis (L.f.) Hilliard, **comb. nov.**

Type: C.B.S., Thunberg (LINN 787.11, iso. sheet 14377 herb. Thunberg, UPS).

Syn.: *Manulea plantaginis* L.f., Suppl. 286 (1782).
M. plantaginea Thunb., Prodr. 101 (1800) & Fl. Cap. ed. Schultes 469 (1823), nom. illegit.
Polycarena plantaginea Benth. in Hook., Comp. Bot. Mag. 1: 372 (1836) & in A.DC., Prodr. 10: 352 (1846), as to name only, excluding specimen cited.

Annual herb, stems several from the base, c. 20–150mm long, up to 1–1.3mm in diam., probably prostrate or decumbent, simple to loosely branched, pubescent with ± retrorse acute hairs up to 0.4–0.5mm long, remotely leafy. *Leaves* few, mostly radical, blade of radical leaves c. 4–16 × 2.5–8mm, ovate to elliptic tapering into a broad flat petiolar part 4–16mm long (roughly equalling the blade in length), margins entire; cauline leaves similar but petiole not so pronounced, c. 5–18 × 1.5–3.5mm, margins entire or rarely with 2 or 3 obscure teeth, all leaves glabrous except for sparse acute hairs up to c. 0.3mm long on lower margins and sometimes on back of petiolar part. *Flowers* in congested heads c. 5–15mm long, solitary or a few ± corymbosely or paniculately arranged at the tips of the branches. *Bracts* adnate to calyx tube for 0.75–1.5mm, lowermost 4–8 × 1.8–2.8mm, broadly elliptic or spathulate, obtuse to subacute, entire, pubescent on the inner face, hirsute on the margins and lower backs, hairs up to 0.5–1mm long, more or less spreading, upper part of backs glabrous. *Pedicels* minute. *Calyx* 2.5–3mm long, 5-lobed, anticous lip 1.3–1.8mm long, lobes acute or subacute, lobes of posticous lip similar but smaller, hairy all over, hairs up to 0.3–0.6mm long. *Corolla* tube 2–3mm long, broadly funnel-shaped, c. 1.25–2mm across mouth, limb bilabiate, 3.5–4.5mm across lateral lobes, 5-lobed, posticous lip 1.3–1.6 × 1.3–1.8mm, posticous lobes 0.5–1.3 × 0.6–0.8mm, bearded, hairs up to 0.15mm long, sometimes extending to the other 4 lobes, anticous lobe 1.6–2.4 × 1–1.25mm, all lobes white. *Stamens* 4, all exserted, anthers 0.3–0.5mm long. *Stigma* 2–2.5mm long, shortly exserted. *Style* 0.2–0.8mm long, minutely hairy. *Ovary* c. 0.8–1 × 0.4–0.6mm. *Cocci* c. 1.8 × 1.2mm. *Seeds* c. 1 × 0.8mm.

Citations:

CAPE. Sutherland div., 3220 BC, 8 miles south of Sutherland, 24 viii 1953, *Acocks* 16928 (PRE). Clanwilliam div., 3219 CB, South Cedarbergen, east side of Sneeuwberg, 4000ft, 11 x 1946, *Esterhuysen* 13089 (BOL, PRE). Ceres div., 3219 DC, Swartruggens, Stom-

piesfontein, 4000ft, 19 xi 1961, *Esterhuysen* 29345 (BOL, K, S). Ceres div., 3319 AB, Cold Bokkeveld, 7 miles beyond Gydouw Pass, x 1928, *Hutchinson* 1060 (BOL, K).

Bentham (1836) took up the illegitimate name *Manulea plantaginea* Thunb. as *Polycarena plantaginea* Benth., but applied it to the wrong plant; Bentham's plant is now *Phyllopodium anomalum* Hilliard. Thunberg's name is homotypic with *Manulea plantaginis* L.f., and the plant proves to be a species of *Cromidon*. Thunberg's material is not localized, but the species appears to be confined to a small area of the south western Cape, on the high ground from Sutherland west to the south Cedarberg and south to the Cold Bokkeveld near Ceres, an area through which Thunberg travelled.

Ecological information is scanty, but the plants have been recorded as growing 'in sand on plateau', 'Mountain Roggeveld of plateau' and 'shale band', flowering between August and November.

It can be confused with *C. austerum*; see under that species.

6. Cromidon austerum Hilliard, **sp. nov.** a *C. plantaginis* (L.f.) Hilliard inflorescentiis e capitulis parvis multis in paniculas aggregatis (nec e capitulis paucis in paniculas laxas vel corymbos dispositis), bracteis lanceolatis (nec late ellipticis vel spatulatis) dorso basin versus dense pubescentibus pilis valde retrorsis usque ad 0.2–0.4mm longis (nec ibidem hirsutis pilis ad 0.5–1mm longis), calycis lobo antico 0.5–0.75mm (nec 1.3–1.8mm), corolla paulo majore (tubo 2.8–4mm nec 2–3mm, lobo antico 2–3.2mm nec 1.6–2.4mm), labio postico macula flava/aurantiaca in sicco visibili notato (nec macula colorata haud visibili) distinguitur. A *C. corrigioloide* (Rolfe) Compton bracteis plerumque majoribus (infimis 3.5–6mm longis, nec 2.5–4mm), lanceolatis (nec spatulatis) dorso basin versus dense pubescentibus (nec glabris vel fere glabris), corollae tubo 2.8–4mm (nec 1.5–2.5mm), lobis posticis 1–1.7mm longis (nec 0.5–0.75mm), lobo antico 2–3.2mm longo (nec 1.5–2mm) differt.

Annual herb, stems c. 20–180mm long, up to 1.2–2mm in diam., primary stem erect, soon branching above and from the base, branches decumbent or ascending, pubescent with ± acute retrorse hairs up to 0.2mm long, moderately leafy, leaves all subtending a branch or a leaf tuft (incipient branch). *Leaves* c. 3–23 × 0.8–5mm, elliptic tapering to a petiolar part accounting for up to half the total length in lowermost leaves, rapidly shorter upwards, margins entire or with 1–2 pairs of teeth, hairs up to 0.2–0.3mm long confined to lower back and margins, minutely glandular as well. *Flowers* in congested heads c. 5–10mm long, elongating in fruit up to 30mm, terminating all the branchlets, the whole forming very flowery panicles. *Bracts* adnate to calyx for 1–1.5mm, lowermost 3.5–6 × 1–2mm, lanceolate, ± acute, entire, sparsely pubescent on inner face, lower backs densely pubescent with retrorse hairs up to 0.2–0.4mm long, some patent hairs on margins. *Pedicels* very minute. *Calyx* 1.6–2.8mm long, 5-lobed, anticous lip 0.5–0.75mm long, lobes obtuse to subacute, posticous lobe much smaller, acute, ± hairy all over, hairs up to 0.2–0.4mm long. *Corolla* tube 2.8–4mm long, funnel-shaped, c. 1–1.7mm across mouth, limb 3.6–5mm across lateral lobes, 5-lobed, posticous lip 1.3–2.4 × 1.6–2.4mm, posticous lobes 1–1.7 × 0.7–1.2mm, anticous lobe 2–3.2 × 0.7–1.7mm, all lobes white sometimes tinged with

mauve, orange patch at base of posticous lip and in back of throat, bearded there with hairs less than 0.1mm long. *Stamens* 4, all exserted, anthers 0.4–0.5mm long. *Stigma* 2–3.6mm long, exserted. *Style* 0.3–1.5mm long. *Ovary* 0.6–1 × 0.3–0.5mm. *Cocci* c. 2.5 × 1.2–1.5mm. *Seeds* c. 1.8 × 1mm.
Type: Cape, 3119 BD, near Calvinia, 1 ix 1986, *Batten* 749 (holo. E).
Citations:

> CAPE. Calvinia div., 3119 AD, Voor Hantam, Driefontein, 950m, 5 ix 1926, *Marloth* 12813 (PRE); 3119 BC, c. 30 miles N by W of Calvinia, c. 3000ft, 26 ix 1955, *Leistner* 475 (PRE); 25 miles N by W of Calvinia, Kareekom, c. 3000ft, 25 ix 1955, *Leistner* 474 (PRE); 22 miles N of Calvinia, 26 ix 1952, *Johnson* 584 (NBG). 3119 BD, Ekerdam, 26 ix 1947, *Taylor* 2786 (NBG). 3119 DA, Kareeboomfontein, 4 ix 1974, *Hanekom* 2386 (K, PRE); SW of Calvinia, Plaatberg farm, c. 3500ft, 11 xi 1955, *Acocks* 18603 (PRE). Victoria West, 3123 AC, x 1929, *Thode* A1937 (PRE).

Cromidon austerum has been collected mainly within a 50km radius of Calvinia, but there is one record from much further east, at Victoria West. The plants grow in austere karroid vegetation, on both flats and stony ridges, between c. 900 and 1065m above sea level, flowering in September and well on into fruit by mid November. It is allied to *C. corrigioloides*: they have similar inflorescences, and the corollas always have a yellow/orange patch at the base of the posticous lip, but the bracts of *C. austerum* are lanceolate and densely pubescent on the lower backs, the hairs retrorse, while the bracts of *C. corrigioloides* are spathulate and glabrous or very nearly so on the backs (there are hairs on the margins), and the flowers of *C. austerum* are somewhat larger than those of *C. corrigioloides*. It can be distinguished from *C. plantaginis* by its profusion of heads arranged in panicles, by its lanceolate (not spathulate) bracts partly clad in retrorse (not spreading) hairs, calyx with a shorter anticous lip, and a somewhat larger corolla. Also, *C. plantaginis* appears to lack an orange patch at the base of the posticous lip.

7. Cromidon varicalyx Hilliard, **sp. nov.** a *C. corrigioloide* (Rolfe) Compton capitulis florum ± corymbosim dispositis (nec paniculatis), bracteis saepe majoribus 4–5 × 1.8–3.2mm (nec 2.5–4 × 0.6–2mm), calyce 2.5–3mm longo (nec 1.8–2.5mm), vel 3- vel 5-lobo (nec semper 5-lobo), corollae tubo 2.75–3.2mm longo (nec 1.5–2.5mm) differt. A *C. austero* inflorescentia ± corymbosa (nec paniculata), bracteis oblongis vel spatulatis (nec lanceolatis), dorso glabris vel fere glabris (nec dorso basin versus pilis retrorsis dense pubescentibus) distinguitur.

Annual herb, stems c. 10–140mm long, up to 1–1.5mm in diam., primary stem erect, soon branching from the base and above, branches decumbent or ascending, pubescent with ± acute retrorse hairs up to 0.2–0.4mm long, moderately leafy, leaves all subtending a branch or a leaf tuft (incipient branch). *Leaves* 5–20 × 2–5.5mm, elliptic tapering to a petiolar part accounting for up to half the total length in the lowermost leaves, rapidly shorter upwards, margins entire or with 1–3 pairs of teeth, hairs up to 0.2–0.5mm long confined to lower margins and dorsal midline, minutely glandular as well. *Flowers* occasionally autogamous and then with a reduced limb, in congested heads c. 5–10mm long, corymbosely arranged at the tips of the branchlets.

Bracts adnate to calyx for 0.5–1mm, lowermost 4–5 × 1.8–3.2mm, oblong, broadly elliptic or spathulate, entire or occasionally with 1 or 2 teeth, sparsely pubescent on inner face, otherwise a few hairs 0.2–0.4mm long confined to lower margins, or sometimes a few on the lower dorsal surface. *Pedicels* very minute. *Calyx* 2.5–3mm long, often 5-lobed, but showing degrees of reduction to 3 lobes in a single inflorescence, anticous lip 0.5–1mm long, but c. 1.6mm when calyx 3-lobed, lobes ± obtuse to acute, posticous lobe narrower, acute, hairy all over, hairs up to 0.2–0.5mm long. *Corolla* 2.75–3.2mm long, funnel-shaped, c. 1.2–2mm across mouth, limb (2.5)4.5–6mm across lateral lobes, 5-lobed, posticous lip (1)1.5–2.2 × (1.2)1.6–2.6mm, posticous lobes (0.5)0.7–1.5 × (0.5)0.7–1.2mm, anticous lobe (1.1–)2.2–3 × (0.7–)1.1–1.7mm, all lobes white with a yellow/orange patch normally present at base of anticous lip, bearded there, hairs less than 0.1mm long. *Stamens* 4, normally exserted, anthers (0.2)0.5mm long. *Stigma* (0.5)2.8–3mm long, normally exserted. *Style* (1.5)0.3–0.8mm long. *Ovary* c. 0.8–1 × 0.4–0.7mm. *Cocci* c. 2 × 1mm (only immature ones seen).

Type: Cape, Calvinia div., 3119 AC, SE of Nieuwoudtville, Glen Lyon farm, 2000ft, 11 ix 1974, *Mauve & Oliver* 35 (holo. STE, iso. PRE).

Citations:

> CAPE. Calvinia div., 3119 AC, 4 miles out of Nieuwoudtville on Loeriesfontein road, ix 1930, *Lavis* sub BOL 20677 (BOL). Sutherland div., 3220 BC, Geelhoek, c. 5500ft, 21 ix 1953, *Acocks* 17183 (PRE); 3220 DB, 20 miles S of Sutherland, Theronsrust, c. 5300ft, 18 x 1954, *Acocks* 17806 (PRE). Worcester div., 3319 DB, between Rooihoogte Pass and Matroosberg station, 3800ft, 16 ix 1974, *Mauve & Oliver* 195 (PRE, STE).

Cromidon varicalyx has been recorded from the environs of Nieuwoudtville south-east to the Roggeveld, then in the mountains east of Worcester, between c. 600 and 1600m above sea level. It grows on sandy, clayey or stony flats and flowers in September and October.

The type collection as well as *Mauve & Oliver* 195 from the mountains near Worcester show variation in the lobing of the calyx; both 5-lobed and 3-lobed calyces occur in a single head, as well as varying degrees of lobing of the anticous lip. Most of the plants under *Mauve & Oliver* 195 have flowers with a greatly reduced corolla limb, abnormally small anthers scarcely exserted from the corolla, and an abnormally short stigma, sometimes curved back at the tip, all features indicative of autogamy (measurements in parentheses in description).

The species has been confused with *C. corrigioloides*, from which it differs in its mostly larger bracts, calyx and corolla, and in the disposition of the capitate inflorescences, few and more or less corymbosely arranged, in contrast to the many heads disposed in panicles that is characteristic of *C. corrigioloides*. This arrangement of the heads will also distinguish *C. varicalyx* from *C. austerum*, which differs further in the shape and indumentum of its bracts. These two species appear to occupy similar terrain, whereas *C. corrigioloides* grows in damp or marshy ground.

8. Cromidon corrigioloides (Rolfe) Compton, Trans. Roy. Soc. S. Afr. 19: 308 (1931), excl. descript. and specimen cited.

Lectotype (chosen here): Cape, Middle Roggeveld, 3220 BD, between Jackals Fountain and Kuilenberg, 8 viii 1811, *Burchell* 1335 (K, isolecto. PRE).

Syn.: *Selago corrigioloides* Rolfe, Fl. Cap. 5(1): 163 (1901).

Annual herb, stems few to many from the base, c. 10–150mm long, up to 1mm in diam., prostrate or decumbent, initially simple, soon producing short lateral branches from near the base upwards to form a narrow panicle, pubescent with acute retrorse hairs up to 0.1–0.2mm long, moderately leafy, each leaf subtending a branch. *Leaves*: radical leaves in 1 or 2 pairs, mostly shed at flowering and few seen, blade c. 6–7 × 3mm, elliptic, tapering into a broad flat petiolar part equalling or longer than the blade; cauline leaves similar but the petiolar part rapidly shortening upwards, 2.25–16 × 1.2–3mm, spathulate, obtuse or subacute, margins entire or with 1 or 2 pairs of small teeth, whole leaf glabrous or with a few hairs particularly on margins of petiolar part, these up to c. 0.2mm long. *Flowers* in congested heads c. 5–10mm long, terminating all the branchlets and the main stems, thus forming many-headed panicles. *Bracts* adnate to calyx tube 0.5–1mm, lowermost 2.5–4 × 0.6–2mm, spathulate, often narrowed to the apex but obtuse, glabrous except for a few hairs on inner face and hairs c. 0.1–0.4mm long on lower margins and sometimes scattered on lower back. *Pedicels* up to c. 0.5mm long. *Calyx* 1.8–2.5mm long, 5-lobed, anticous lip 0.7–1mm long, lobes acute, lobes of posticous lip similar but smaller, more or less hairy all over, hairs acute, up to 0.1–0.4mm long, particularly on margins. *Corolla* tube 1.5–2.5mm long, broadly funnel-shaped, c. 1.2–1.7mm across mouth, limb bilabiate, 3–4mm across lateral lobes, 5-lobed, posticous lip 1.2–1.5 × 1.2–1.7mm, posticous lobes c. 0.5–0.75 × 0.6mm, anticous lobe 1.5–2 × 0.75–1.2mm, all lobes white or creamy-white, violet outside in bud, colour fading as the limb expands, bright orange patch at base of posticous lip and halfway down back of tube, bearded there. *Stamens* 4, all exserted, anthers 0.3–0.5mm long. *Stigma* 1.7–2.5mm long, exserted. *Style* c. 0.3–0.5mm long. *Ovary* c. 0.8–1 × 0.5–0.8mm. *Cocci* 1.5–2 × 1–1.5mm. *Seeds* c. 1 × 0.7mm.

Citations:

CAPE. Williston div., 3120 BD, outside Williston, 20 vii 1967, *Acocks* 7053 (PRE). Sutherland div., between Sutherland (3220 BC) and Middlepost (3120 CC), 9 x 1928, *Hutchinson* 714 (K). Fraserburg div., 3221 AA, Stinkfontein, viii 1811, *Burchell* 1396 (K, syntype). Britstown div., 3023 DA, Bloubosput, c. 4300ft, 27 x 1954, *Acocks* 17835 (PRE). Victoria West div., 3123 AC, Victoria West, 23 vii 1961, *Rauh* 3273 (PRE). Graaff Reinet div., 3124 CD, Sneeuwbergen, Zuureplaats, 4000ft, *Drège* (BM, E, K, S, W). Middelburg div., 3124 BC, Westaway, c. 4700ft, 7 ix 1967, *Acocks* 23898 (K, PRE, STE); 3125 BC, Conway Farm, 2 vii 1899, *Gilfillan* 2990 (PRE).

ORANGE FREE STATE. Fauresmith distr., 2925 CD, Dirk Hertog's Farm, c. 4600ft, 2 ix 1925, *Smith* 476 (PRE); *ibidem*, *Pole Evans* 1852 (PRE).

Cromidon corrigioloides is widely distributed from the Middle Roggeveld east to Middelburg and north east to the southern part of the Orange Free State, but I have seen few collections. The two collectors who made ecological notes both recorded the plants as growing in marshy ground while another recorded 'below reservoir', which implies dampness. Flowering takes place between July and October.

The Drège collection cited above was distributed as *Selago cordata* Thunb. a, and was cited by Rolfe (in Fl. Cap. 5(1): 163, 1901) as *S. decumbens*. I have placed it as *Cromidon corrigioloides* despite the bracts being hairier than usual in that species. According to Rolfe, the plants were collected in dry river channels.

Thompson 1802 (PRE, STE) is much more puzzling: stems, leaves and bracts are very nearly glabrous and the corolla limb is smaller than usual in *C. corrigioloides* (2–2.5mm across), the posticous lip may be entire or shortly lobed (lobes c. 0.25 × 0.25mm), the anthers are only 0.25mm long, and the stigma only c. 0.4mm and more or less included. The plants are all tiny (c. 10–35mm tall) and may be no more than an autogamous form of *C. corrigioloides*. However, Miss Thompson recorded 'sandy shaly flat area on sheet rock', a doubtful sort of habitat for *C. corrigioloides*. *Cromidon corrigioloides* grows in the same general area as Miss Thompson's plant, which was collected between Qaggafontein and Uitkyk, north west of Sutherland; field observations are needed.

The species has been much confused with *C. confusum*, the epithet drawing attention to the fact; see under that species (below).

9. Cromidon confusum Hilliard, **sp. nov.** a *C. corrigioloide* (Rolfe) Compton bracteis dorso basin versus pubescentibus (nec glabris vel fere glabris), floribus multo minoribus (corollae tubo 1mm longo, nec 1.5–2.5mm), corollae limbo 4-lobo (nec 5-lobo), labio postico 0.4–0.7mm longo integro vel paulo retuso (nec 1.2–1.5mm longo, manifeste bilobo), anthera 0.1–0.2mm longa (nec 0.3–0.5mm) distinguitur.

Annual herb, stem branched from the base and above, 5–100mm long, up to 0.5–1mm in diam., branches decumbent or prostrate, all producing short lateral branchlets to form narrow panicles, pubescent with ± acute retrorse hairs up to 0.1–0.2mm long, moderately leafy, each leaf subtending a branch. *Leaves* c. 4–17 × 1.5–3mm, elliptic tapering into a broad flat petiolar part accounting for half the total length in the lower leaves, shorter upwards, margins entire or sometimes with a pair of obscure teeth, lower margins with a few hairs up to 0.2mm long, otherwise glabrous. *Flowers* in congested heads c. 3–10mm long, terminating all the branchlets and the main stems. *Bracts* adnate to the calyx tube for c. 0.5–1mm, lowermost c. 2–5 × 1–1.75mm, spathulate, obtuse to subacute, pubescent on the lower margins and lower backs, hairs up to 0.1–0.3mm long, ± retrorse, rarely hairs few. *Pedicels* up to 0.5mm long. *Calyx* 1.5–2mm long, 5-lobed, anticous lip 0.5–0.7mm long, lobes subacute, lobes of posticous lip smaller and much narrower, hairy all over, the longest hairs (to 0.2mm) on the margins. *Corolla* tube 1mm long, broadly funnel-shaped, c. 0.6–0.8mm across mouth, limb c. 1.2–1.5mm across lateral lobes, 4-lobed, posticous lip 0.4–0.7 × 0.3–0.6mm, entire or slightly retuse, anticous lobe 0.6–1.2 × 0.3–0.6mm, all lobes white, posticous lip minutely bearded. *Stamens* 4, all exserted, anthers 0.1–0.2mm long. *Stigma* 0.6–1mm long, either curved round the anthers or exserted. *Style* c. 0.1mm long. *Ovary* 0.6–0.8 × 0.4–0.6mm. *Cocci* 1.3–1.6 × 1–2.5mm. *Seeds* 0.8–1 × 0.6–0.8mm.

Type: Cape, Calvinia div., [3119 C?], Vogelstruis Vlakte, 26 vii 1941, *Esterhuysen* 5330 (holo. BOL, iso. K).

Citations:

CAPE. Namaqualand, 2917 DA, Spektakel, 25 viii 1941, *Esterhuysen* 5872 (BOL); 2917 DB, Concordia, 3300ft, 19 ix 1897, *Schlechter* 11314 (BOL, PRE); Springbok, 27 viii 1941, *Esterhuysen* 6001 (BOL); 2917 DD, Mesklip, 24 viii 1941, *Esterhuysen* 5958 (BOL, K, PRE). Vanrhynsdorp div., 3118 BC, Varscherivier, 140m, 5 viii 1977, *le Roux* 2096 (STE). Calvinia div., 3119 DC, between Elands Vlei and De Bos, 21 viii 1954, *Barker* 8294 (NBG). 3219 BA, Stompiesfontein, 26 vii 1941, *Esterhuysen* s.n. (BOL). Vogelstruis Vlakte, 26 vii 1941, *Compton* 11171 (NBG). Carnarvon div., 3022 CC, Carnarvon, ix 1925, *Henrici* 30 (PRE). Fraserburg div., c. 4300ft, 22 viii 1953, *Acocks* 16903 (PRE). Laingsburg div., 3320 BA, Whitehill, 2500ft, 8 viii 1927, *Compton* 3264 (BOL, K); *ibidem*, 9 ix 1935, Compton 5629 (NBG); foot of Witteberg, 3000ft, 5 viii 1923, *Compton* 2571 (BOL).

Compton was misled in being told that the plant he collected at the foot of the Witteberg (*Compton* 2571) and cited as *Cromidon corrigioloides* is an exact match of the syntypes of that name; it differs in its smaller flowers with a 4-lobed limb; also, the bracts in most specimens of *C. confusum* are densely pubescent on the lower half of the backs, whereas those of *C. corrigioloides* are glabrous or at most have some scattered hairs on the lower back. They also have different ecological preferences (below).

It is likely that the flowers of *C. confusum* are sometimes autogamous: the stigma can be curled back and in contact with the anthers, but in many specimens, including the type, the stigma is exserted and the flowers are probably outcrossing. The species has a wide distribution, having been collected in Namaqualand around Springbok, near Van Rhynsdorp and Calvinia, near Carnarvon and Fraserburg and at Whitehill, at the foot of the Witteberg near Matjiesfontein, west of Laingsburg, between c. 140 and 1300m above sea level. The plants have been recorded 'on sandy flats', 'on hard stony flats', and 'in well drained soil', flowering and fruiting between July and September. In contrast, plants of *C. corrigioloides* favour damp or marshy ground.

10. Cromidon hamulosum (E. Mey.) Hilliard, **comb. nov.**

Type: Cape, Namaqualand, c. 2917 D, Haazenkraalsrivier, 2000–2500ft, August, *Drège* s.n. (holo. B†; iso. E, K).

Syn.: *Selago hamulosa* E. Mey., Comm. 257 (1838); Rolfe in Fl. Cap. 5(1): 162 (1901).

Annual herb c. 55–110mm tall, stems solitary, erect, with a pair of ascending branches midway, with 1 or 2 more pairs developing later, pubescent with retrorse hairs up to 0.15–0.2mm long, sparsely leafy (a radical pair and one subtending each branch). *Leaves* c. 4.5–20 × 1–3mm, elliptic tapering into a petiolar part accounting for up to half the total length, rapidly shorter upwards, margins entire or with 1 or 2 pairs of obscure teeth, glabrous except for a few tiny recurved hairs on lower margins. *Flowers* many in somewhat lax narrow spikes c. 10–30mm long, terminating the branchlets and thus producing a loose panicle. *Bracts* adnate to calyx for c. 0.75–1mm, lowermost 4–5(–8.5) × 1–1.2mm, lanceolate, obtuse, tip recurved, entire, minutely pubescent particularly on lower part of dorsal surface, hairs minute, recurved. *Pedicels* wanting.

Calyx c. 2mm long, anticous lip c. 0.4mm long, scarcely divided, a few hairs up to 0.25mm long on margins otherwise densely pubescent all over with minute retrorse hairs. *Corolla* about equalling calyx, tube c. 1.2mm long, 1mm across mouth, limb 4-lobed, regular, lobes probably erect, posticous lip c. 0.5 × 0.7mm, entire or minutely retuse, minutely and sparsely bearded, anticous lobe c. 0.5 × 0.5mm, corolla probably white. *Stamens* 4, reaching top of corolla, anthers 0.1mm long. *Stigma* c. 0.5mm long, curled back on anthers or exserted. *Style* c. 0.7mm long. *Ovary* c. 0.7 × 0.4mm. *Cocci* c. 2 × 1.1mm. *Seeds* c. 1.2 × 0.7mm.

Cromidon hamulosum is known only from the type collection from northern Namaqualand: Drège's locality, Haazenkraalsrivier, has not been precisely localized. The plants are less well branched and more erect than most species of *Cromidon*; however, the affinity of *C. hamulosum* lies with *C. confusum* (indumentum, calyx and corolla similar), and in general facies it resembles *C. microechinos*.

11. Cromidon microechinos Hilliard, **sp. nov.** a *C. confuso* Hilliard bracteis pilis patentibus 0.25–0.4mm longis omnino indutis (nec pilis retrorsis 0.1–0.3mm longis in marginibus et dorso basin verso tantum), calyce pilis patentibus ad 0.25–0.4mm longis hirsuto (nec pilis longissimis ad 0.2mm longis in marginibus loborum pubescente), corollae limbo paulo minore (labio postico 0.25–0.5mm longo, nec 0.4–0.7mm, lobo antico 0.3–0.6mm longo, nec 0.6–1.2mm) differt. A *C. decumbente* (Thunb.) Hilliard, cujus bracteis et calyce similibus, foliis integris vel fere integris (nec manifeste dentatis) et floribus multo minoribus (corollae tubo 1–1.25mm longo, nec 2–3.5mm, limbo 1–1.2mm diam., nec 2.8–4mm), corollae limbo 4-lobo (nec 5-lobo) distinguitur.

Annual herb, stems c. 4–150mm long, up to 0.5–1.3mm in diam., prostrate or decumbent, simple to well branched, pubescent with ± acute retrorse hairs 0.1–0.2mm long, moderately leafy, each leaf subtending a branch. *Leaves* 2–17 × 0.7–4mm, elliptic tapering into a broad flat petiolar part accounting for half the total length in the lower leaves, shorter upwards, margins entire or occasionally with 1 or 2 pairs of obscure teeth, hairy all over upper surface and margins, hairs sparser on backs, up to 0.25–0.4mm long. *Flowers* crowded in narrow oblong heads c. 3–25mm long, in well grown specimens these further arranged in narrow panicles. *Bracts* adnate to the calyx tube for 0.5–1mm, lowermost 2.2–4 × 0.7–1mm, spathulate, subacute, hirsute, hairs patent, up to 0.25–0.4mm long. *Pedicels* up to 0.5mm long. *Calyx* 1.4–2mm long, 5-lobed, anticous lip 0.5–0.8mm long, lobes broadly deltoid, acute, lobes of posticous lip narrower, hirsute, hairs patent, up to 0.25–0.4mm long. *Corolla* tube 1–1.25mm long, broadly funnel-shaped, c. 0.6–1mm across mouth, limb c. 1–1.2mm across lateral lobes, 4-lobed, posticuous lip 0.25–0.5 × 0.25–0.4mm, entire, anticous lobe 0.3–0.6 × 0.25–0.3mm, all lobes white or creamy-white, posticous lip bearded. *Stamens* 4, shortly exserted, anthers c. 0.1mm long. *Stigma* 0.6–0.8mm long, either shortly exserted or curled back on the anthers. *Style* c. 0.1–0.2mm. *Ovary* 0.4–0.6 × 0.3–0.4mm. *Cocci* 1.2–1.5 × 0.8–1mm. *Seeds* c. 0.8–0.9 × 0.6–0.7mm.

Type: Cape, Ceres div., 3219 CD, Bokkeveld Sneeuwkop, c. 4000ft, 16 x 1983, *Esterhuysen* 36130 (holo. E; iso. BOL, K, PRE).

Citations:

CAPE. Namaqualand, 3018 CA, Khamiesberg, Welkom, 4000ft, 16 x 1954, *Esterhuysen* 23702 (BOL, K, PRE). Clanwilliam div., 3219 AC, Cedarberg, Tafelberg, 4000ft, 17 x 1978, *Esterhuysen* 35073 (BOL); *ibidem*, 7 x 1946, *Esterhuysen* 13036 (BOL, NBG, PRE); 3219 AD, Cedarberg, between Wolfberg Cracks and The Arch, 10 x 1976, *Esterhuysen* 34399 (BOL). Worcester div., 3319 DA, Keeromsberg, c. 5500ft, 2 xi 1974, *Esterhuysen* 33677 (BOL); 3319 BA, NW of Karoopoort, Baviaansberg, 4800–5500ft, 4 xi 1962, *Esterhuysen* 29856 (BOL, PRE, S); *ibidem*, *Esterhuysen* 29856a (BOL); Karoopoort, north end of poort, 16 ix 1971, *Esterhuysen* 32649 (BOL); 3320 BB, Tweedside, 1300m, x 1921, *Marloth* 10825 (PRE); 3320 AA, near Touws River, Bonteberg, 15 ix 1971, *Esterhuysen* 32639a (BOL). Montagu div., 3319 DB, Eendracht, 23 ix 1946, *Walgate* sub BOL 23455 (BOL); *ibidem*, 3500ft, 23 ix 1946, *Levyns* 7983 (BOL). Laingsburg div., Witteberg south of Bantams, 4500ft, 4 xi 1963, *Esterhuysen* 30489 (BOL); 3320 BC, top of Witteberg, 1470m, 29 ix 1983, *Hartley & Moffett* 3613 (J); *ibidem*, 29 ix 1983, *van Zyl* 3565 (STE). Oudtshoorn div., 3322 AC, Swartberg, Botha's Hoek area, 6000ft, 30 ix 1971, *Oliver* 3566 (STE).

Cromidon microechinos is widely distributed over the mountains of the western and southern Cape, from the Khamiesberg south to the mountains around Worcester, thence east to the Swartberg, between c. 1200 and 1800m above sea level. It grows on bare sand or stony soil in damp pockets among rocks or between shrubs, flowering between September and November.

The tiny calyx, spiky with long patent hairs, looks absurdly like a miniature hedgehog, which suggested the trivial name. The patent hairs all over the calyx and bract at once distinguish *C. microechinos* from *C. confusum* in which the hairs on the backs of the bracts are retrorse and confined to the lower part and the margins. Although the two species are partly sympatric, *C. microechinos* possibly grows mostly at higher altitudes than *C. confusum*.

12. Cromidon minutum (Rolfe) Hilliard, **comb. nov.**

Lectotype (chosen here): Cape, Prieska div., 2923 CC, Ongers River at Rushy Station, 18 v 1812, *Burchell* 2125 (K).

Syn.: *Walafrida minuta* Rolfe, Fl. Cap. 5(1): 129 (1901); Roessler, Prodr. Fl. S.W. Afr. fam. 127: 6 (1967).

Annual herb, stem c. 30–120mm long, up to 2mm in diam., prostrate or decumbent, branching from the base and above, sparsely pubescent with ± retrorse hairs up to c. 0.2mm long, very minutely glandular as well especially on upper parts, moderately leafy, each leaf subtending a branch. *Leaves* 1.5–14 × 0.8–3mm, elliptic tapering into a petiolar part accounting for at least half the total leaf length, the uppermost leaves ± spathulate, margins entire, a few acute hairs up to 0.25–0.3mm long on lower margins, otherwise glabrous. *Flowers* crowded in globose heads elongating slightly in fruit, c. 2–10mm long, terminating each branchlet, these paniculately arranged. *Bracts* adnate to calyx for 0.3–0.4mm, lowermost c. 1.7–2 × 0.7–1mm, spathulate, obtuse, glabrous except for a few hairs up to 0.2mm long on lower margins. *Pedicels* minute. *Calyx* 1–1.3mm long, often 3-lobed, sometimes 5-lobed, anticous lip 0.6–1 × 0.6–0.8mm, entire, retuse or bilobed, lobes c. 0.2mm long, posticous lobe much smaller, narrower, acute, hairs up to 0.2mm long, almost or quite confined to margins. *Corolla*

tube 1–1.2mm long, broadly funnel-shaped, 0.8–1mm across mouth, limb c. 1–2.5mm across lateral lobes, 4-lobed, posticous lip (0.3–)0.7–1 × (0.4–)0.7–1mm, entire or very slightly retuse, anticous lobe (0.4–)0.8–1 × (0.3–)0.6–0.7mm, pale mauve opening white, posticous lip well bearded. *Stamens* 4, all exserted, anthers 0.1–0.4mm long. *Stigma* (0.2–)0.6–0.7mm long, shortly exserted. *Style* 0.6–0.8mm long. *Ovary* 0.3–0.6 × 0.2–0.4mm. *Cocci* 1–1.2 × 0.6–0.7mm, smooth or slightly rugose. *Seeds* 0.8–1 × 0.4–0.6mm.

Citations:

> NAMIBIA. Warmbad distr., c. 2718 B, Great Karas, Groendoorn to Zwartkop, 10 vi 1931, *Örtendahl* 386 (BOL).
> CAPE. Kenhardt div., 2920 DB, De Hoek, 31 miles WSW of Kenhardt, 3000ft, 15 v 1961, *Leistner* 2361 (K, PRE); *ibidem*, *Schlieben* 8862 (K). Carnarvon div., 3022 CC, Carnarvon, ix 1925, *Henrici* 22 (PRE). Williston div., 3120 AB, Rietkolk Oos, c. 3000ft, 26 i 1943, *Acocks* 9620 (K, PRE).

Cromidon minutum has been recorded from southern Namibia (Lüderitz-Sud and Warmbad districts) south into the arid northern Cape as far east as the environs of Prieska; the most westerly record was made near Williston; one of the two syntypes (*Meyer* s.n., not in K, and probably destroyed in the Berlin fire) was said to have come from the Hantam Mountains further to the west, but the presence of *C. minutum* around Calvinia needs confirmation.

The plants grow in moist depressions, possibly flowering after rain. Leistner recorded 'sweetly scented', which suggests outcrossing, and the exserted anthers and stigma support this. However, the measurements of corolla lobes and stigma given in parentheses in the formal description are from *Örtendahl* 386, where the small limb, small anthers and very short stigma suggest autogamy.

The Genus Chenopodiopsis

In 1942, Diels described *Selago chenopodioides*, basing his name on *Schlechter* 10847, a very odd little annual some duplicates of which Schlechter had distributed as '*Chenopodiopsis capensis* Schltr. n. sp.' The corolla, which has a 4-lobed posticous lip and no anticous lip, looks just like that of a species of *Hebenstretia* (Fig. 4a, b), and the cocci are remarkably like those of several species of that genus although they are much smaller and do not exhibit heterocarpy, a common though not constant feature of *Hebenstretia*. Diels remarked that his new species is allied to *Selago hirta* L.f.; in *S. hirta*, the corolla limb has the same 4-lobed posticous lip as *S. chenopodioides*, but a tiny anticous lobe is also present. This is so in *Chenopodiopsis retrorsa* as well (Fig. 4c). These three species appear to be much more closely related to *Hebenstretia* than to *Selago*; they differ from *Hebenstretia* in little other than the 5-lobed calyx, while *Selago* stands apart by virtue of its usually alternate leaves, hairs with sculptured walls, posticous lip of the corolla 2-lobed, anticous lip 3-lobed, posticous lip always glabrous, and cocci without a median longitudinal dorsal groove. The name *Chenopodiopsis* has been validated to accommodate them.

Chenopodiopsis retrorsa has 4 stamens; in *C. hirta* they are usually reduced to 2—

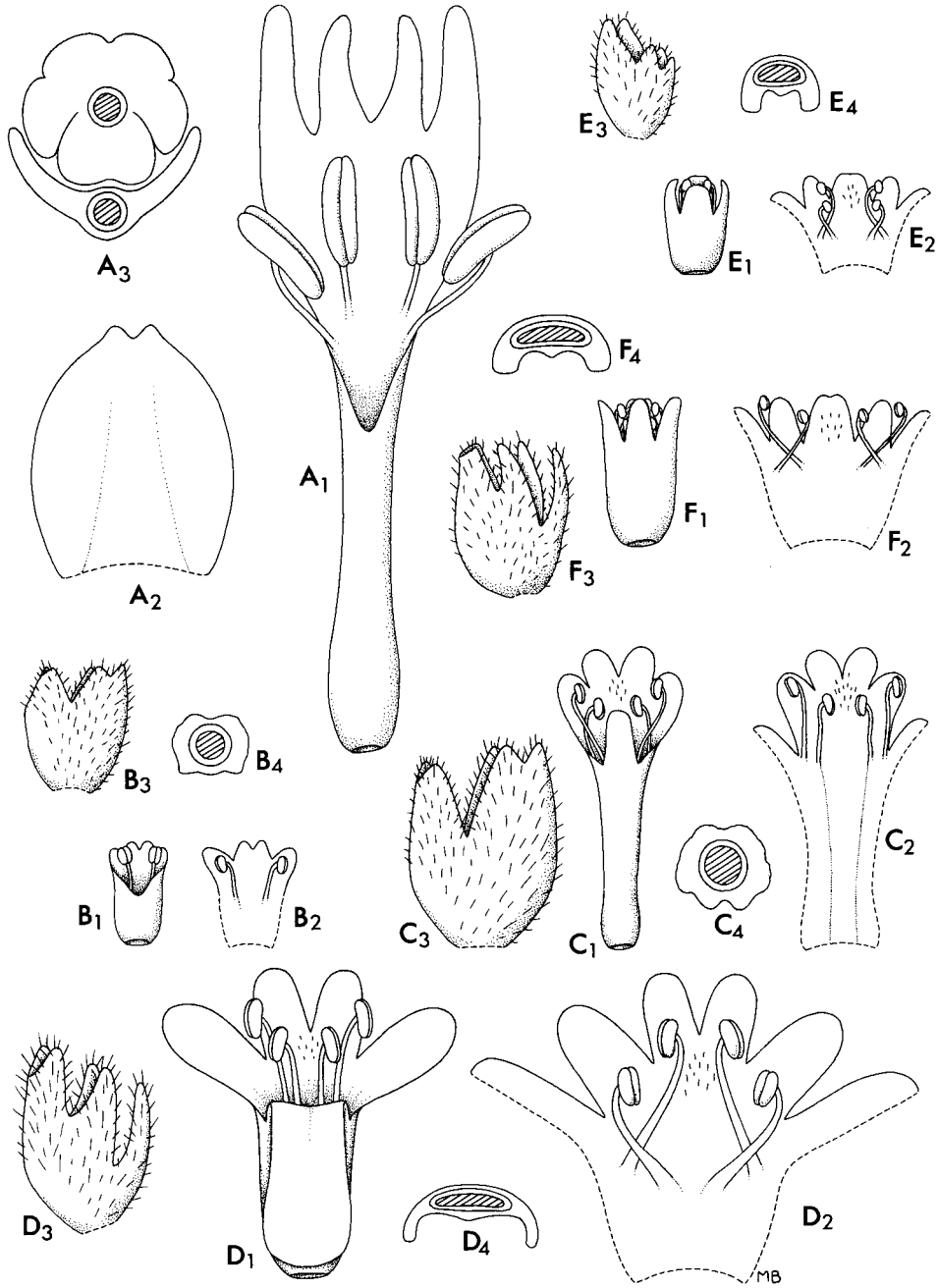

FIG. 4. A. *Hebenstretia dura* (*Hilliard & Burtt* 16400): A_1, corolla; A_2, calyx; A_3, T.S. pair of cocci. B. *Chenopodiopsis chenopodioides* (*Esterhuysen* 5797): B_1, corolla; B_2, corolla opened out; B_3, calyx; B_4, T.S. coccus. C. *Chenopodiopsis retrorsa* (*Esterhuysen* 18942): C_1, corolla; C_2, corolla opened out; C_3, calyx; C_4, T.S. coccus. D. *Cromidon corrigioloides* (*Acocks* 23898): D_1, corolla; D_2, corolla opened out; D_3, calyx; D_4, T.S. coccus. E. *Cromidon confusum* (*Esterhuysen* 5330): E_1, corolla; E_2, corolla opened out; E_3, calyx; E_4, T.S. coccus. F. *Cromidon hamulosum* (*Drège* s.n.): F_1, corolla; F_2, corolla opened out; F_3, calyx; F_4, T.S. coccus. All drawings × 12.

only rarely are the posticous pair of stamens present, with much reduced anthers, or showing other abnormalities (e.g. no filament, the anther arising from the margin of the corolla lobe). In *C. chenopodioides* there are only 2 stamens (the anticous pair). This species also has the smallest flowers (with the anticous lip wanting) and they appear always to be autogamous; autogamy also seems to be common in both *C. hirta* and *C. retrorsa*.

Chenopodiopsis Hilliard, **gen. nov.** ab *Hebenstretia* L. calyce 5-dentato (nec glumaceo) et a *Selagine* L. foliis saltem in parte caulis inferiore oppositis (nec alternis), pilis parietibus haud sculptis corollae labio postico 4-lobo in floribus minutissimis exceptis barbato (nec 2-lobo numquam barbato), labio antico vel lobo unico minuto vel absente (nec 3-lobo), coccis sulco mediano dorsali longitudinali notatis (nec sine sulco) distinguitur.

Small annual herbs, stems erect, decumbent or ascending. *Leaves* opposite, bases often connate, sometimes becoming alternate upwards. *Inflorescence* a single narrow spike, or several forming a panicle. *Bract* adnate to part of calyx tube. *Calyx* 5-lobed, the anticous lip sometimes only very shallowly divided, persistent. *Corolla* tube cylindric or funnel shaped, limb 4- or 5-lobed, posticous lip 4-lobed, anticous lip 1-lobed, minute, or lobe wanting, posticous lip sometimes bearded with minute clavate hairs. *Stamens* 4 didynamous, or 2 (the anticous pair), filaments shortly decurrent on the corolla tube, anthers unilocular, ± exserted. *Stigma* lingulate with 2 marginal bands of stigmatic papillae, malformed when flowers autogamous. *Style* filiform. *Ovary* elliptic-oblong in outline, base oblique, nectariferous gland annular but more strongly developed on one side, bilocular, one pendulous ovule in each loculus. *Fruit* a pair of hard-walled cocci, convex on outer face with a median longitudinal groove, rugose on either side of groove, ± plane on inner face. *Seed* ± fusiform, either smooth or transversely rugose.

Type species: *Chenopodiopsis retrorsa* Hilliard.

Distribution of genus: South Africa, Namaqualand and south western Cape.

Key to the Species

1. Hairs on stem retrorse, stamens 4 ——— **1. C. retrorsa**
\+ Hairs on stems patent, stamens normally 2 ——— 2
2. Spikes c.(20–)35–120mm long in fruit, dense, arranged in virgate panicles, calyx hirsute, hairs up to 0.6–1mm long, corolla tube c.1.5mm long ——— **2. C. hirta**
\+ Spikes c.4–20mm long in fruit, rather lax, pinnately arranged in narrow leafy panicles, calyx pubescent, hairs up to 0.25mm long, corolla tube c.0.8mm long ——— **3. C. chenopodioides**

1. Chenopodiopsis retrorsa Hilliard, **sp. nov.** a *C. hirta* (L.f.) Hilliard caulibus pilis retrorsis (nec patentibus) indutis, foliis oblanceolatis (nec ovatis vel late lanceolatis)

1.2–5mm latis (nec 2–14mm) bracteis dorso basin versus pilis retrorsis ad 1–1.2mm longis hirsutis (nec pilis patentibus ad 0.6–1mm longis), calyce 2.5–3mm longo (nec 1.7–2mm), corollae tubo c. 2.25–2.5mm longo (nec c.1.5mm), staminibus 4 (nec 2 plerumque, raro pari postico evoluta denique staminodiali vel non) differt.

Annual herb c.80–150mm tall, primary stem erect, sparingly branched from the base and a little higher, branches decumbent, all pubescent with retrorse hairs up to c.0.5mm long, leafy. *Leaves*: blade of radical leaves up to c.15 × 5mm, oblanceolate tapering to a petiolar part c.15mm long, cauline leaves c.5–30 × 1.2–5mm, oblanceolate tapering to a short petiolar part, uppermost leaves ± oblong, sessile, margins serrulate, both surfaces glabrous or with a few hairs on the midrib and lower back. *Flowers* many crowded in long (c.10–40mm in fruit) narrow spikes, either solitary at the tip of the stem or with 1–3 shortly pedunculate spikes developing a short distance below it. *Bracts* adnate to calyx for c.1mm, lowermost c.5 × 1.8mm, lanceolate, acute, tips ± spreading, entire, dorsal surface hirsute on lower part, hairs up to 1–1.2mm long, strongly retrorse, hairs rapidly smaller upwards to tip of bract. Calyx c.2.5–3mm long, anticous lip 1.2–1.4mm long, hirsute, hairs up to 1mm long. *Corolla* tube c.2.25–2.5mm long, 0.8–1mm across mouth, limb 5-lobed, anticous lobe isolated, c.0.4–0.6 × 0.2–0.3mm, lateral lobes ascending and lying ± parallel to the posticous lobes to form the posticous lip, posticous lobes c.0.2–0.3 × 0.2–0.3mm, minutely bearded, corolla white. *Stamens* 4, shortly exserted, anthers 0.2mm long. *Stigma* 1.4–1.5mm long, sometimes curved at tip, sometimes minutely bifid, not or scarcely exserted. *Style* 1.4–1.5mm long. *Ovary* c.0.7 × 0.4mm. *Cocci* 2–2.5 × 1.2–1.5mm, grooved down back, irregularly rugose on either side of groove. *Seeds* (not fully mature) c.1.4 × 0.4mm.

Type: Cape, Caledon div., 3419 AB, Swartberg, above Caledon Wild Flower Garden, 10 x 1951, *Esterhuysen* 18942 (holo. BOL).

Chenopodiopsis retrorsa is known to me only from the type specimen which was found on the burnt lower slopes of a kloof above Caledon Wild Flower Garden. It is easily distinguished from *C. hirta* by the strongly retrorse hairs on the stem and bracts, by its narrower and differently shaped leaves, by its larger flowers, and four stamens: *C. hirta* normally has only 2 stamens though a flower may occasionally produce a posticous pair as well with reduced anthers or otherwise abnormal. There is a remarkable difference too in the cocci: those of *C. retrorsa* are irregularly wrinkled on the backs, while in *C. hirta* they are transversely ribbed on either side of the median groove. The spikes of *C. retrorsa* are shorter than those of *C. hirta* and are either solitary at the tips of the branches or a very few (1–3) spikes develop below the main one, each borne on a short nude peduncle; the spikes of *C. hirta* are sessile and arranged in virgate panicles.

2. Chenopodiopsis hirta (L.f.) Hilliard, **comb. nov.**

Type: Cape, Worcester div., 3319 AC, on hills at Roodezand, Aug., *Thunberg* (sheet 13891, herb. Thunb., UPS).

Syn.: *Selago hirta* L.f., Suppl. 285 (1782); Thunberg, Prodr. Pl. Cap.

100 (1800) & Fl. Cap. ed. Schultes 464 (1823); Rolfe, Fl. Cap. 5(1): 162 (1901).

Annual herb c.30–250mm tall, primary stem simple, soon branching above into several long narrow spikes, these sharply ascending, panicled, later sparingly branched from base, these branches decumbent, branching above as in the primary stem, stem hirsute, hairs patent, up to 0.5–1.5mm long, moderately leafy. *Leaves* c.5–40 × 2–14mm, ± ovate to broadly lanceolate tapering into a broad flat petiolar part accounting for up to c.1/3 the total leaf length, margins sharply serrate, hairy mainly on the margins and midline, hairs up to c.1mm long, minutely glandular as well. *Flowers* many, crowded in long (c.35–120mm in fruit) narrow spikes, eventually panicled. *Bracts* (lowermost) adnate to calyx for c.1–1.4mm, c.3.5–8 × 1.8–2mm, lanceolate, acute, tips often slightly recurved, entire, hirsute, hairs patent, up to 0.6–1mm long. *Calyx* 1.7–2mm long, anticous lip 0.5–0.8mm long, hirsute, hairs up to 0.5mm long. *Corolla* tube c.1.5mm long, 0.5–0.6mm across the mouth, limb 5-lobed, anticous lobe isolated, c.0.2–0.4 × 0.1–0.2mm, lateral lobes ascending and lying ± parallel to the posticous lobes to form the posticous lip, posticous lobes c.0.25–0.4 × 0.15–0.25mm, minutely bearded, corolla white. *Stamens* usually 2 only, anthers c.0.15–0.2mm long, shortly exserted, rarely the posticous pair developing, anthers reduced in size or abnormal. *Stigma* c.0.2–1mm long, either shortly exserted or bent over at the tip. *Style* c.0.6–1.5mm long. *Ovary* c.0.6 × 0.3mm. *Cocci* c.1.4–1.8 × 1–1.4mm, grooved down the back, transversely rugose in 2 bands on either side of groove. *Seeds* c.1 × 0.3mm, transversely rugose.

Citations:

CAPE. Van Rhynsdorp div., 3118 DC, Giftberg, 2500ft, 15 x 1953, *Esterhuysen* 22007 (K). Clanwilliam div., 3218 BA, Zeekoe Vlei, 1500ft, ix 1925, *Levyns* 1227 (BOL); 3218 DB, Piquenierskloof, 1700ft, 7 viii 1897, *Schlechter* 10704 (BOL, E, K, S). Ceres div., 3319 AC, Eland's Kloof, 3500ft, 25 ix 1936, *Levyns* 5786 (BOL); Tulbagh waterfall, 4 ix 1892, *Schlechter* 1401 (K); Ceres Road, 900ft, 11 xi 1896, *Schlechter* 9080 (K). 3318 DB, between Paarl and Pont, under 1000ft, Sept., *Drège* s.n. (K, S). Malmsbury div., 3318 BA, Hopefield, Moorreesburg, xi 1885, *Bachmann* 1152 (K). Cape Town div., 3318 DC, Cape Flats, Doornhoogde, *Ecklon & Zeyher* s.n. (S). Swellendam div., 3420 AA, Hassaquaskloof, *Zeyher* 3578 (K).

Chenopodiopsis hirta appears to be confined to the western and south western Cape from the Giftberg in Van Rhynsdorp division south to the Cape Flats and west to Swellendam division. It grows in moist sandy places up to c.1050m above sea level, flowering and fruiting between September and November. Schlechter's specimen collected in August is in very young bud.

The stigma may be abnormally short and curved over at the tip to come into contact with the anthers, so it seems likely that the flowers are sometimes autogamous.

The species can be confused with *C. retrorsa*; see under that species.

3. Chenopodiopsis chenopodioides (Diels) Hilliard, **comb. nov.**

Type: Cape, Clanwilliam div., 3219 AA, Lammkraal (sphalm. Lamkraal), 1000ft, 14 viii 1897, *Schlechter* 10847 (holo. B†; iso. BOL, E, PRE).

Syn.: *Selago chenopodioides* Diels in Notizbl. Bot. Gart. Berlin 15: 789 (1942).

Annual herb c.50–120mm tall, primary stem simple, later a pair of branches from the base, occasionally 1 or 2 more pairs a little higher up the stem, branches decumbent or ascending, pubescent with patent hairs up to c.0.4mm long, leafy throughout, a spike developing in the axil of each leaf. *Leaves* 5–25 × 1.4–7mm, up to half the length petiolar in lowermost pair of leaves, petioles shorter upwards, blade narrowly elliptic, subacute, margins serrulate, hairs up to 0.5mm long confined to margins and midline, minutely glandular as well. *Flowers* many, moderately crowded in narrow spikes 4–20mm long, the whole plant consisting of one to several narrow leafy panicles, the spikes pinnately arranged. *Bracts* adnate to calyx for c.1mm, lowermost 2–5 × 1–2mm, ± obovate in outline with a pair of relatively large teeth near the apex, pubescent all over backs, hairs patent, up to c.0.25mm long. *Calyx* c.1mm long, anticous lip 0.3–0.5mm long, entire, posticous lip minutely 3-toothed, hirsute with patent hairs up to 0.25–0.4mm long. *Corolla* tube c.0.8mm long, c.0.4mm across mouth, limb 4-lobed, anticous lobe aborted, lateral lobes ascending and lying ± parallel to posticous lobes, whole limb c.0.8 × 0.8mm, posticous lobes c.0.15–0.3 × 0.1–0.2mm, white, glabrous. *Stamens* 2, anthers c.0.15mm long, shortly exserted. *Stigma* 0.3–0.4mm long, curled back and often firmly attached to anthers. *Style* c.0.3–0.4mm long. *Ovary* c.0.4 × 0.3mm. *Cocci* 1.4 × 0.8mm, grooved down the back, irregularly rugose on either side of groove. *Seeds* 1 × 0.4mm, smooth.
Citation:

CAPE. Calvinia div., 3119 CC, Doornbosch, 29 viii 1941, *Esterhuysen* 5797 (BOL).

Schlechter's original collection of *C. chenopodioides* and that of Miss Esterhuysen were made only 10km apart, the farms Lamkraal and Doornbosch (Doringbos) lying along the road between Clanwilliam and Calvinia. There is no information on habitat, though Schlechter recorded 'on hills'.

The plant is easily recognized by its long narrow leafy panicles of pinnately arranged delicate spikes beaded by the fruits enclosed in the hirsute calyx. All the flowers appear to be autogamous, and probably pass very quickly into fruit.

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References

HILLIARD, O. M. & BURTT, B. L. (1977). Notes on some plants of southern Africa chiefly from Natal: VI. *Notes from the Royal Botanic Garden Edinburgh* 35: 175.

JUNELL, S. (1961). Ovarian morphology and taxonomical position of Selagineae. *Svensk Botanisk Tidskrift Bd* 55, H1: 168.