

Studies in the Ericoideae (Ericaceae). V. The genus *Coilostigma*

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Keywords: Cape Province, *Coilostigma*, Ericaceae, Ericoideae, morphology, phytogeography, pollination biology, taxonomy

ABSTRACT

A revision of the genus *Coilostigma* Klotzsch is presented which recognizes only two species, *C. zeyherianum* Klotzsch and *C. glabrum* Benth. The genus belongs to the Ericaceae — Ericoideae and is endemic in the southern and eastern Cape Province. Fundamental differences in the ovary complement have necessitated the recognition of two subgenera, *Coilostigma* and *Anomalosepala* E. G. H. Oliver. Aspects covered include history, morphology, phytogeography, pollination biology and taxonomy.

UITTREKSEL

Hierdie is 'n hersiening van die genus *Coilostigma* Klotzsch waarin net twee spesies, *C. zeyherianum* Klotzsch en *C. glabrum* Benth., erkenning geniet. Die genus behoort tot die Ericaceae — Ericoideae en is endemies in die suidelike en oostelike dele van die Kaapprovinsie. Basiese verskille van die vrugbeginsel-komplement noodsaak die erkenning van twee subgenera, *Coilostigma* en *Anomalosepala* E. G. H. Oliver. Aspekte wat bespreek word sluit in geskiedenis, morfologie, fitogeografie, bestuivingsbiologie en taksonomie.

HISTORICAL OUTLINE

The genus *Coilostigma* was described by Klotzsch (1838) in his major revision of the Ericoideae. He based it on his three new species, *C. tenuifolium*, *C. zeyherianum* and *C. dregeanum*, all from the eastern Cape Province, and all possessing an unequal calyx.

Bentham (1839), in his revision of the family for De Candolle's *Prodromus*, retained the genus but redefined it to incorporate his new species, *C. glabrum*, and Klotzsch's monotypic genus *Thamnum*, *T. puberulum*. He formed two sections within the genus, namely *Eucoilostigma* and *Thamnum*. The inclusion of the superficially similar *Thamnum puberulum* ignored the feature of the unequal calyx for *Coilostigma*. Bentham (1876) took a conservative view of the family in Bentham & Hooker's *Genera* and sunk both *Coilostigma* and *Thamnum* under the genus *Scyphogyne* Brongn. Drude (1897) followed Bentham's latter treatment of the genera.

In *Flora capensis*, Brown (1906) retained the circumscription of the genus as applied by Bentham (1839) but ignored the sectional subdivision. He removed the discordant *C. puberulum* to *Thoracosperma*. All these changes were retained by Phillips (1926) in the first edition of his *Genera*. Later, however (Phillips 1944), he proposed a completely different classification of the family in South Africa, implemented in the second edition of his *Genera* (Phillips 1951). He reduced the number of genera to only eight, including *Erica* L. This action in some cases placed totally unrelated genera together. He placed *Coilostigma* under *Salaxis* Salisb.

MORPHOLOGY

The plants of *Coilostigma* are typical ericoid woody shrublets with one species, *C. zeyherianum*, being single-stemmed and the other, *C. glabrum*, a multi-stemmed coppicing shrublet. Most of the other

vegetative characters are very similar in both species.

The bract is totally recaulescent in *C. zeyherianum* (Figure 4,1), only very rarely partially so, and forms part of the calyx as the large abaxial member in what is referred to as an unequally 4-lobed calyx. In *C. glabrum*, on the other hand, the bract is variable in position and with the calyx exhibits a remarkable diversity of form. It is variably recaulescent within any one inflorescence, with the lowest whorl of flowers having a partially recaulescent bract and the upper whorl a totally recaulescent bract. When the bract is partially recaulescent the calyx can be either:

- (1) 4-lobed with two normally sized lateral lobes (sepals) and very reduced ad- and abaxial lobes (sepals) (Figure 5,2), or
- (2) 4-lobed with two lateral lobes (sepals) and an adaxial lobe (sepal) and a larger less fused abaxial lobe (bract) (Figure 5,1), or
- (3) 3-lobed with two lateral lobes (sepals) and a slightly reduced adaxial (sepal) and no abaxial lobe (bract or sepal), or
- (4) 2-lobed with only two normally-sized lateral lobes (sepal), the ad- and abaxial lobes (bract and sepal/s) being absent.

As in all species of the Ericoideae with an unequal calyx the bracteoles are totally absent in all flowers. This is also the case where the bract is only partially recaulescent.

The pollen in both species occurs as single tricolporate grains with scabrate sculpturing in *C. zeyherianum* and no sculpturing in *C. glabrum* (Figure 1).

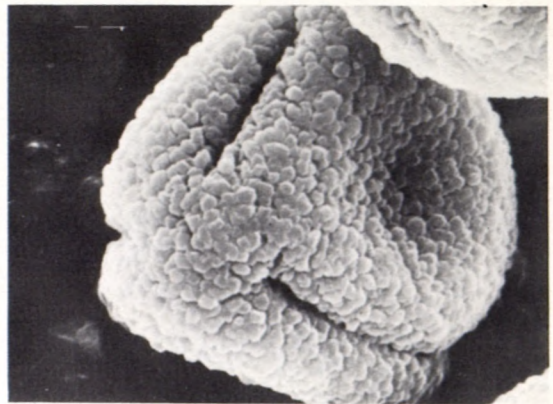
The ovary displays two distinct types. In *C. glabrum* it is 4-, rarely 3-locular, regular in shape and hairy with a single ovule in each locule. In *C. zeyherianum* the ovary is only 2-locular, flattened and glabrous.

As a result of ovary characters the fruit is very different in shape in the two species. In *C. glabrum* it

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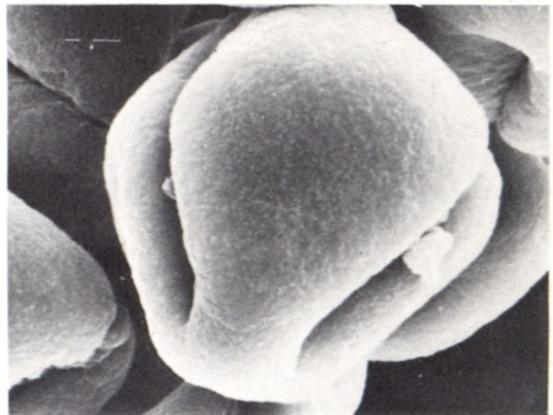


FIGURE 1. — Pollen of the species of *Coilstigma*. 1, *C. zeyherianum* (Oliver 7949); 2, *C. glabrum* (Oliver 8801). Scanning electron micrographs, left hand $\times 1000$, right hand $\times 3000$.

is regular or slightly irregular with usually only one of the developed seeds being fertile. In *C. zeyherianum* the fruit is mostly irregular due to the development of only one fertile seed and is only occasionally 2-seeded, and regularly complanate. In both species the seed is extremely difficult to remove from the fruit in the dry state. This indicates that the whole flower is shed as the propagule and must disintegrate or be wetted prior to germination.

The seeds are similar in both species and are typically ericoid in form, i.e. spherical with a hard reticulate testa (Figure 2). This type of seed is normally associated within the Ericoideae with a dehiscent capsule as in the genera *Erica* L., *Blaeria* L., *Philippia* Klotzsch and *Ericinella* Klotzsch. The indehiscent fruit and ericoid seed in this genus is shared with genera such as *Coccosperma* Klotzsch, *Thamnus* Klotzsch and *Platycalyx* N.E. Br. and can be regarded as a stage in the evolution of the indehiscent soft-seeded fruits found in the more 'advanced' genera within the subfamily.

GENERIC DELIMITATION AND RELATIONSHIPS

The genus *Coilstigma*, as recognized in this revision, is characterized by the possession of a totally recaulescent bract forming an unequally 4-lobed calyx, a 4-lobed corolla, four free stamens, bilobed anthers, single pollen grains, a 2-, 3- or 4-locular ovary with a single pendulous ovule in each locule, an indehiscent dry berry and seeds with a hard testa.

With this circumscription *Coilstigma* is somewhat isolated within the Ericoideae. The 2-locular 1-

seeded ovary of *C. zeyherianum* is a character found in a number of genera, namely *Grisebachia* Klotzsch, *Eremia* D. Don (*pro parte*), *Sympieza* Klotzsch, *Platycalyx*, *Simocheilus* Klotzsch, *Acrostemon* Klotzsch and *Arachnocalyx* Compton, all however with an equal calyx. Only in *Platycalyx* is there a possibility of a close relationship in that the fruiting stage is a similar dry berry with hard-walled seeds. In the other genera the evolutionary reduction has resulted in soft-walled seeds.

The 4-celled 1-seeded ovary in *C. glabrum* is a character which the subgenus *Anomalosepala* shares with *Philippia* and *Ericinella*, both of which have an unequal calyx and hard-walled seeds but with many seeds per locule in a dehiscent capsule. It is also shared with the equal-calyxed genera *Erica*, *Blaeria*, *Eremia* (*pro parte*) and *Thoracosperma* Klotzsch. The first two have numerous seeds per locule in a dehiscent capsule. *Eremia* has a very similar ovary and fruit but flowers totally different in appearance apart from the equal calyx. *Thoracosperma* on the other hand has rather similar looking flowers, especially in *T. puberulum* (cf. Historical Outline), but with a fruit that contains soft, thin-walled seeds.

There is therefore no clear-cut relationship for this genus within the subfamily. It has probably been derived from some *Erica*-*Blaeria*-*Philippia* ancestral stock. A detailed analysis of relationships and possible evolutionary paths will be published when the revision of all the 'minor' genera of the Ericoideae has been completed.

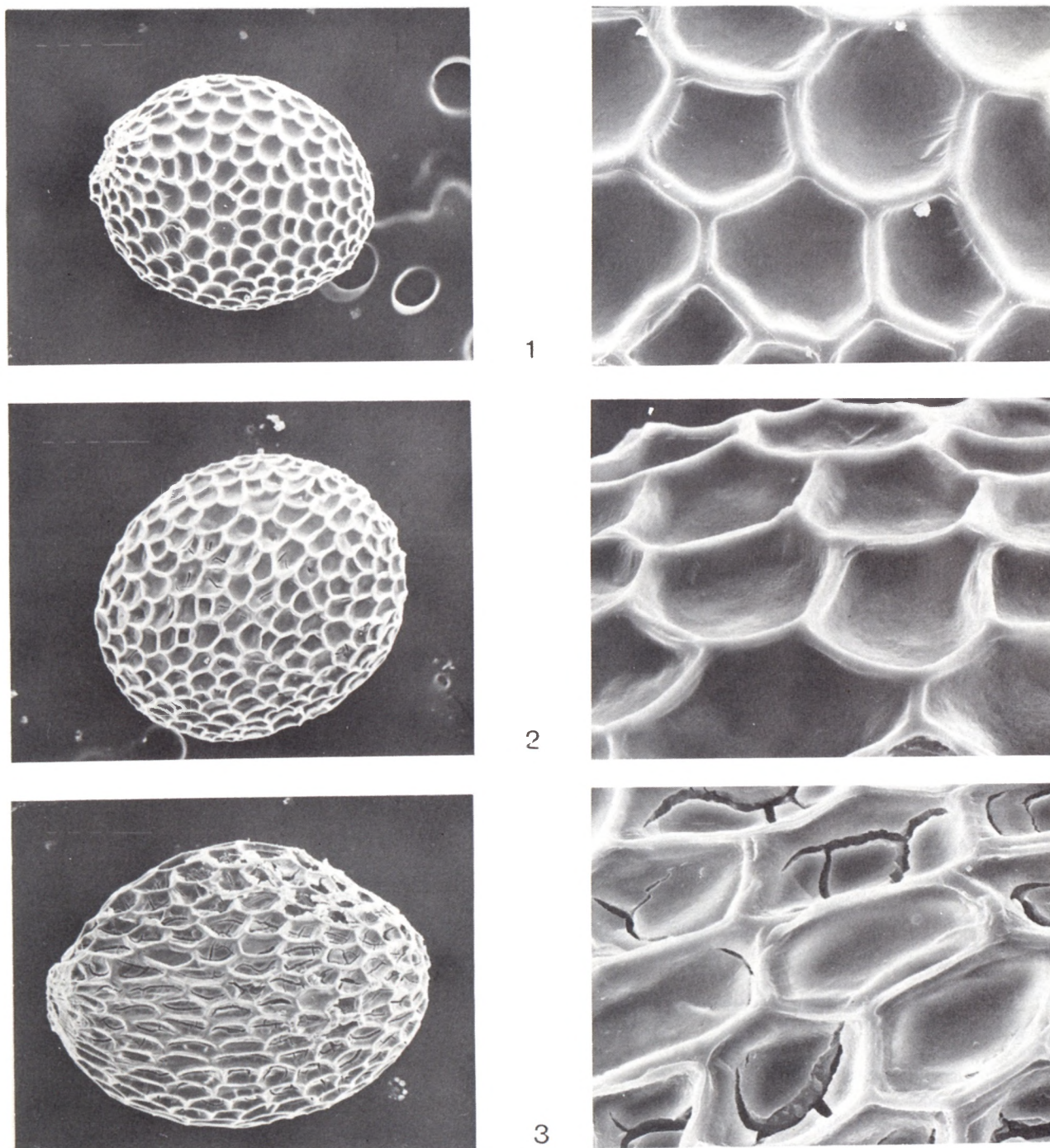


FIGURE 2. — Seeds of the species of *Coilostigma*. 1, *C. zeyherianum* var. *zeyherianum* (Oliver 7949); 2, *C. zeyherianum* var. *tenuifolium* (Oliver 7948); 3, *C. glabrum* (Oliver 8817). Scanning electron micrographs, left hand $\times 40$, right hand $\times 200$.

PHYTOGEOGRAPHY

The genus *Coilostigma* is endemic in the southern and eastern parts of the Cape Province (Figure 3) corresponding to the Langeberg and South Eastern Phytogeographical Centres proposed by Weimarck (1941). This falls within the limits of the Cape Floral Region (Weimarck 1941; Goldblatt 1978; Oliver *et al.* 1983). The extended distribution of *C. zeyherianum* further eastwards to areas near Alexandria and Grahamstown makes the genus the only endemic one in the Cape to extend beyond the strict limits of the Cape Floral Region as defined by Goldblatt (1978). The Grahamstown area can be regarded as a depauperate relictual extension of the Cape Flora proper (Bond & Goldblatt 1984).

The genus is one of only two in the Ericoideae in the Cape Floral Region with an eastern distribution, all the others having their main centres in the south-western Cape. The other eastern genus is the monotypic *Thamnus*. *Thoracosperma* is a southern genus only just represented in the south-western Cape by *T. puberulum*.

The disjunction between the distribution ranges of the two species (Figure 3), which is quite considerable in terms of Ericoideae in the Cape Floral Region, remains inexplicable. *C. glabrum* is very localized in one population on the northern drier slopes of the low range of hills just south of the Langeberg near Riversdale. Here it receives a fairly high annual rainfall of ± 800 mm which can be throughout the

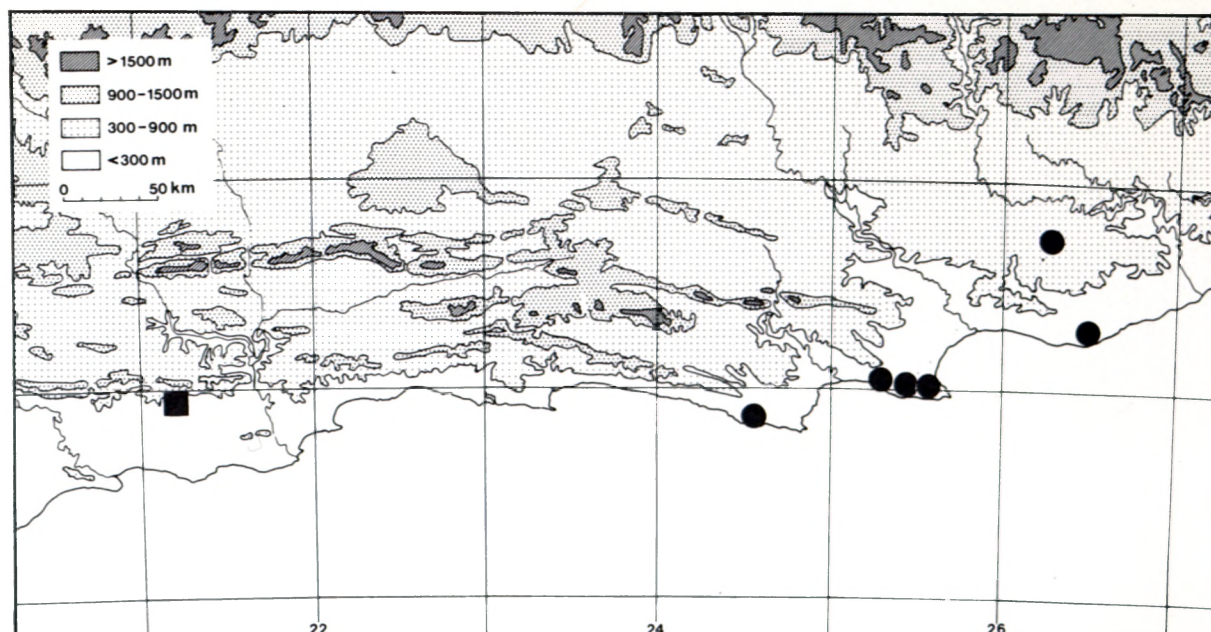


FIGURE 3. — Distribution of *C. glabrum*, ■; *C. zeyherianum*, ●.

year but is mainly in the winter months. *C. zeyherianum* is mainly concentrated on the coastal plains in the Humansdorp/Port Elizabeth area where it grows on sandy flats with an annual rainfall of 700–900 mm falling throughout the year. The outlying population on the coast near the mouth of the Boesmansrivier could well occur on sand as well as the inland population just east of Grahamstown because the latter area has flora with some coastal affinities (Jacot Guillarmod pers.comm.).

POLLINATION BIOLOGY

In the light of the findings of Rebelo, Siegfried and Oliver (1985) most of the floral features of the two species are consistent with the anemophilous syndrome: 1, the stigma is enlarged, subinfundibuliform to peltate; 2, the stamens are exserted (exserted stamens were, however, found to be more generally important in ornithophilous and entomophilous species within the subfamily); 3, the pollen grains are small, non-sticky and easily shed; 4, there is no sign of development of nectaries below the ovary, and 5, the corolla in *C. zeyherianum* is inconspicuous, pale yellow, soon turning brown. However, the corolla in *C. glabrum* is dark pink, a colour that could be expected to act as an attractant to insects.

This situation is similar to that existing in *Ericinella multiflora* Klotzsch in which the pollen could be the reward for any visiting insects attracted by the colour of the flowers.

It is surprising that the typically anemophilous genera, namely *Philippia*, *Salaxis*, *Coccosperma*, *Scyphogyne* Brongn. and *Nagelocarpus* Bullock all have an unequal calyx (totally recaulescent bract) but, in contrast to our genus, they have pollen grains in tetrads.

The occurrence of anemophily in the genus was verified in the field when small clouds of pollen were seen to be emitted from the plants when disturbed.

COILOSTIGMA

Coilostigma Klotzsch in Linnaea 12: 234 (1838); Benth.: 708 (1839); N.E. Br.: 327 (1906); E. G. H. Oliver: 437 (1975).

Salaxis sensu Phillips: 71 (1944), pro parte; Phillips: 561 (1951), pro parte.

TYPE: *C. zeyherianum* Klotzsch (lectotype chosen here).

Perennial woody shrublets, single- or multi-stemmed, up to 1 m tall. *Branches* lacking infrafoliar sterigmata or ridges. *Leaves* 3-nate, erect imbricate, ericoid, sulcate, linear. *Inflorescence* of 1–3, rarely 4, whorls of 3-nate small flowers at the ends of branches (mesoblasts) and lateral absolute or partial brachyblasts scattered along the mesoblasts, occasionally clustered towards the ends into compound heads; pedicel short, relative to the flower. *Bract* partially recaulescent and foliaceous in the lowest flowers to fully recaulescent in any one inflorescence or always fully recaulescent; bracteoles absent. *Calyx* unequally (2)3(4)-lobed excluding or including the totally recaulescent bract as the abaxial member, lateral lobes usually slightly larger, reduced abaxial sepal sometimes present, adaxial sepal sometimes reduced or absent, sepals $\frac{1}{8}$ – $\frac{1}{3}$ the length of the corolla. *Corolla* 4-lobed, tubular to narrowly ovoid to urceolate, glabrous or hirsute, pale yellow to white, or pink; lobes short, erect to slightly spreading. *Stamens* 4, free, exserted or included by abortion; filaments linear; anthers bilobed, muticous, dorsifixed near the base, thecae oblong, pore $\frac{1}{10}$ – $\frac{1}{4}$ the length of the theca; pollen grains single, tricolporate. *Ovary* 2(3)4-locular with a single pendulous ovule per locule, transversely broadly obovate, complanate or globose, glabrous or puberulous; style filiform, exserted; stigma broad, peltate to subinfundibuliform with 2(3) or 4 stigmatic processes. *Fruit* an indehiscent berry with a thin, rather dry, leathery pericarp, irregularly obovoid with only one seed developed from a 2-locular ovary or glob-

ose from a 4-locular ovary; seeds ovoid to spherical with a hard reticulate testa.

A genus of only two species, endemic in the southern and eastern Cape Province, southern Africa. The name is derived from the Greek *coilos* 'hollow' and stigma.

The two species exhibit distinct fundamental differences in ovary characters necessitating recognition at subgeneric level.

KEY TO THE SUBGENERA AND SPECIES

- Ovary 2- rarely 3-locular, glabrous Subgenus *Coilostigma*
 1. *C. zeyherianum*
 Ovary 4- rarely 3-locular, puberulous... Subgenus *Anomalosepala*
 2. *C. glabrum*

Subgenus *Coilostigma*

Coilostigma Klotzsch in Linnaea 12: 234 (1838); N.E. Br.: 327 (1906), pro parte; E. G. H. Oliver: 437 (1975).

Coilostigma sect. *Eucoilostigma* Benth.: 708 (1839).

Scyphogyne sect. *Coilostigma* Benth.: 594 (1876).

Type: *C. zeyherianum* Klotzsch.

Shrub single-stemmed; bract totally recaulescent; calyx unequally 4-lobed with the recaulescent bract as the abaxial lobe and 3 sepals; ovary 2-locular; fruit irregularly obovoid, complanate.

1. *Coilostigma zeyherianum* Klotzsch in Linnaea 12: 234 (1838); N.E. Br.: 328 (1905). Type: In montibus 'Van Stadensriviersberge' Ecklon & Zeyher s.n. (B†, BOL!, E!, K!, LD!, MEL!, P!, S!, UPS!, W!, Z!); idem as 296 (G!, MO!, W!). Lectotype (chosen here): Ecklon & Zeyher s.n. (BOL).

Erect, single-stemmed perennial shrub up to 1 m tall. Branches subflexuose, puberulous, without sterigmata, bark splitting irregularly with age. Leaves erect, imbricate, 1,5–3,0 mm long, linear acute to obtuse, rounded below, flat above, glabrous, edged with a few sessile glands and some hairs; petiole 0,5 mm long, appressed, glabrous, edged with sessile glands. Flowers 1–6(9)(12) at the ends of the branches (mesoblasts) and lateral brachyblasts scattered along the branches, occasionally clustered towards the ends of the branches; pedicel 0,3–0,6 mm long, glabrous or puberulous. Bract totally recaulescent as abaxial lobe of the calyx. Calyx unequally 4-lobed, joined at the base, large lobe abaxial, 0,7–2,0 mm long and foliaceous, $\pm \frac{1}{3}$ as long as to equal the length of the corolla, occasionally longer, other lobes 0,4–0,6 mm long, oblong to narrowly deltoid, the laterals slighter larger and the adaxial sometimes reduced, all glabrous to puberulous at the base and ciliate. Corolla 1,5–2,5 mm long, tubular to narrowly ovoid to urceolate, tangentially complanate in the fruiting stage, glabrous or hirsute, dirty pale yellow to brown; lobes erect or very slightly spreading, $\pm \frac{1}{8}$ the length of the tube. Stamens exserted or by abortion included; filaments 1,7–2,0 mm long, linear, glabrous; anthers 0,5–1,0 mm long, thecae oblong, dorsifixed near the base, muticous, sparsely strigulose, pore $\pm \frac{1}{10}$ the length of the theca. Ovary 2-locular, 0,5 $\times$ 0,6 mm, transversely broadly

obovate, complanate, glabrous; style filiform, $\pm$ 2,5 mm long, exserted; stigma 0,6 mm broad, peltate to subinfundibuliform with 2 stigmatic processes. Fruit irregularly obovoid, 0,7–0,8 mm long; seeds ovoid to spherical, 0,6–0,8 mm long/diam., reticulate, cells $\pm$ angular-circular, ridges straight. Figure 4.

A species forming erect shrublets, occurring on sandy plains near the coast from south of Humansdorp eastwards to Kenton-on-Sea flowering from January to December depending on the locality.

A taxon containing two distinct varieties which occur growing together in most populations.

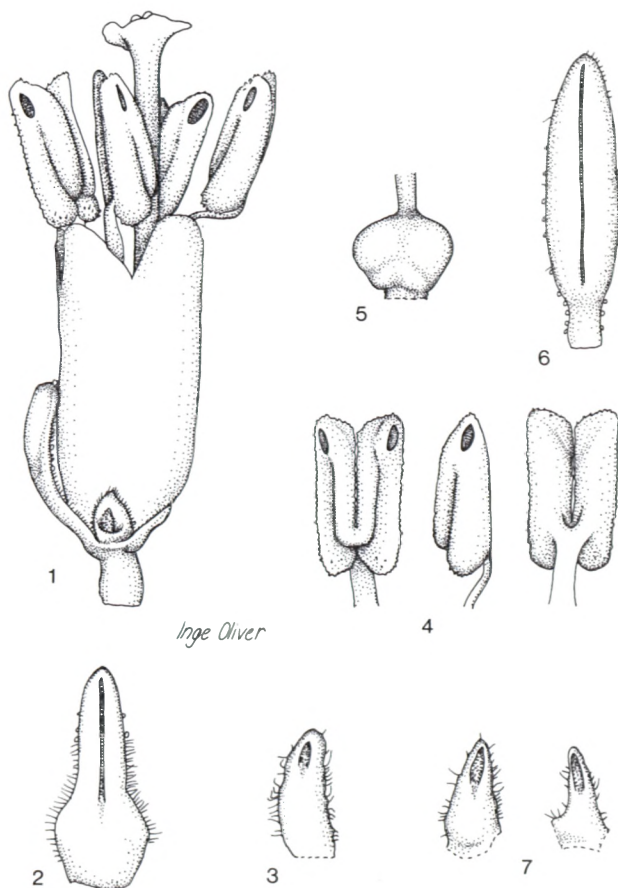


FIGURE 4. — *C. zeyherianum*. 1, flower; 2, bract (abaxial segment of the calyx); 3, lateral sepal; 4, anther, front, side and back views; 5, ovary; 6, leaf; all drawn $\times$ 25 from Oliver 7949 (STE); 7, sepals, lateral and adaxial; drawn $\times$ 25 from Ecklon & Zeyher s.n. (BOL).

KEY TO THE VARIETIES

- Flowers glabrous 1a. var. *zeyherianum*
 Flowers pubescent 1b. var. *tenuifolium*

1a. var. *zeyherianum*

Coilostigma zeyherianum Klotzsch: 234 (1838); N.E. Br.: 328 (1905). Lectotype (chosen here): Ecklon & Zeyher s.n. (BOL).

C. dregeanum Klotzsch: 235 (1838); N.E. Br.: 1127 (1909). Type: P.b.sp., Drège 7753 (B†, K, fragm.!; BOL, fragm.!); idem s.n. (G!, G-DC!).

Flower with completely glabrous corolla.

Vouchers: Oliver 7936 (GRA, NY, P, PRE, S, STE); 7946 (BM, BOL, E, K, NBG, MO, PRE, STE).

1b. var. *tenuifolium* (Klotzsch) E. G. H. Oliver, comb. et stat. nov. Types: In planitie inter 'Kraka-

kamma' et montes 'Vanstadensriviersberge', *Ecklon & Zeyher s.n.* (B†, E!, S!); idem as 294 (G!, GOET!, LD!, M!, MEL!, MO!, S!, W!, UPS!, Z!); in sylvis 'Olifantshoek' prope flumen 'Bosjesmansrivier', *Ecklon & Zeyher s.n.* (B†, BOL!). Lectotype (chosen here): *Ecklon & Zeyher s.n.* (S).

Flower with pubescent to hirsute corolla, otherwise as in the typical variety.

Vouchers: *Oliver* 7935 (GRA, NY, P, PRE, S, STE); 7945 (BM, BOL, E, K, NBG, MO, PRE, STE).

Klotzsch (1838) described three species, *C. tenuifolium*, *C. zeyherianum* and *C. dregeanum*, when he created the genus *Coilostigma*. These he based on differences in corolla hairiness, sepal shape and branch thickness. An examination of all subsequent collections has shown the sepal shape and branch characters to be continuously variable over the whole distribution range and therefore unreliable for taxonomic delimitation.

There is discontinuity in the indumentum of the corolla where material can easily be placed in glabrous or pubescent to hirsute groups. During field investigations of five widely separated populations in the Port Elizabeth to Humansdorp area, I found that both forms did occur together to a varying degree in each population and that no intermediates existed. I consider this type of discontinuity worthy of recognition at varietal level.

Even though the species is recorded as widespread on the flats it is today by no means common. Its habitat is being inundated by alien vegetation, in particular the Port Jackson Willow, *Acacia saligna* (Labill.) Wendl., or it is being destroyed by housing estates or farming practices. In the Port Elizabeth area plants are very difficult to find nowadays in places where they must have been abundant in the past. A small population could survive in the reserve alongside the railway line in Walmer.

The best populations I found occurred on the flats west of the mouth of the Slangrivier south-west of Humansdorp, but here the recently applied agricultural practice of bush-cutting for pasturage is decimating the species. Only on the outcrops of low stable dunes or in the dune slacks too small to manoeuvre in, does the species still manage to survive and form almost pure stands.

The populations near the mouth of the Boesmansrivier have undoubtedly disappeared as the sandy habitat is also ideal for farming in the area. Reported populations at Slaaikraal and Coldsprings west of Grahamstown could not be located. It seems unlikely that the species should occur so far inland, but Dr A. Jacot Guillarmod assures me that vegetation elements with coastal affinities do occur in that area.

Subgenus *Anomalosepala* E. G. H. Oliver, subgen. nov. a subgen. typico frutice caulibus multis, bractea perfecte vel partim recaulescenti, calyce inaequaliter (2)3(4)-lobato; ovario (3)4-loculari, fructu regulariter globoso differt.

Coilostigma sect. *Thamnium* (Klotzsch) Benth.: 708 (1839), pro parte.

Scyphogyne sect. *Thamnium* (Klotzsch) Benth.: 594 (1876), pro parte.

Coilostigma N.E. Br.: 327 (1906), pro parte; E. G. H. Oliver: 437 (1975), pro parte.

Type: *C. glabrum* Benth.

Shrub multi-stemmed; bract partially to totally recaulescent in any one inflorescence; calyx unequally (2)3(4)-lobed; ovary (3)4-locular; fruit globose, regular.

2. *Coilostigma glabrum* Benth. in De Candolle, *Prodromus* 7: 708 (1838); N.E. Br.: 328 (1905).

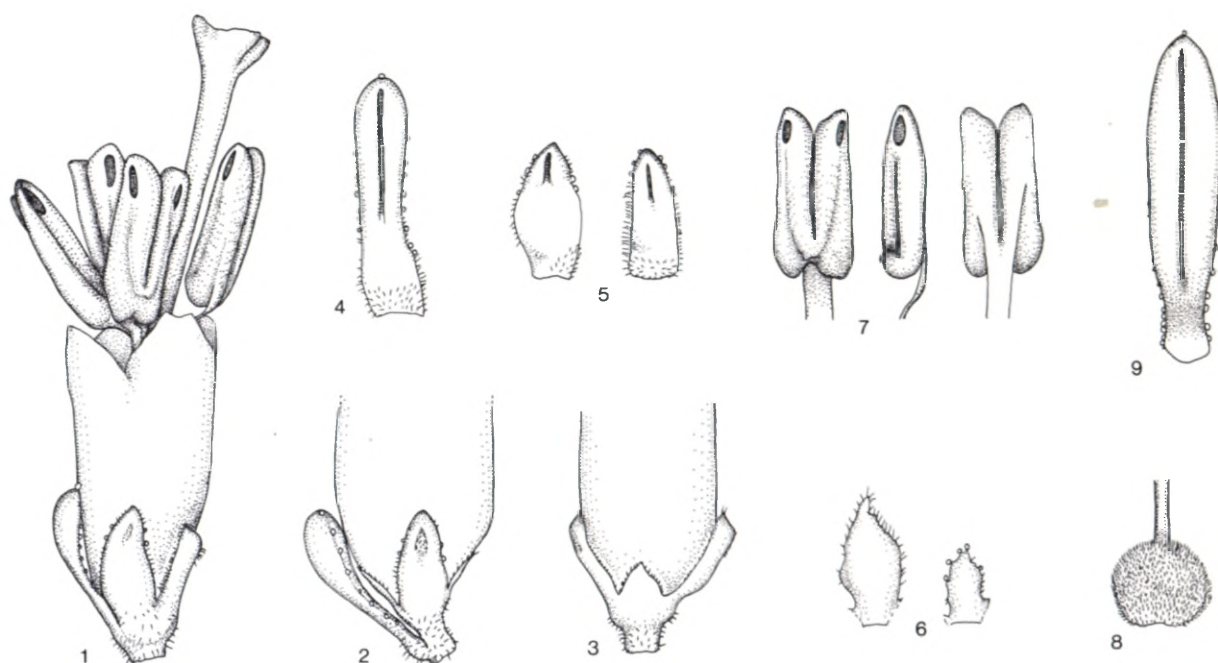


FIGURE 5. — *C. glabrum*. 1, flower; 2, lower part of flower showing partially recaulescent bract and very reduced ab- and adaxial sepals; 3, lower part of flower showing reduced adaxial sepal; 4, bract (abaxial segment of the calyx); 5, sepals, lateral and adaxial; 6, reduced adaxial sepals; 7, anther, front, side and back views; 8, ovary; 9, leaf. All drawn $\times 25$ from *Oliver* 8801 (STE).

Type: In Cape Colony, *Burchell 6875* (K, holo.!; BOL, fragm.).

Erect multi-stemmed shrublet up to 500 mm tall, stems arising from a woody rootstock. Branches straight, fastigiate, slender, sparsely and shortly puberulous, sterigmata absent; bark grey, splitting irregularly. Leaves erect, imbricate, 2.0–3.0 mm long, linear to linear-lanceolate, obtuse, sulcate, rounded below, flat above, glabrous, edged with a few sessile glands; petiole appressed, 0.4–0.6 mm long, ciliate with short hairs and sessile glands. Flowers 1–9 at the ends of branches (mesoblasts) and of lateral very short brachyblasts often crowded towards the ends of the branches or subverticillate; pedicel very short, 0.1–0.4 mm long, puberulous. Bract partially recaulescent, 0.9–1.2 mm long, subfoliaceous, oblong and basal in position in the lowest flowers in any one inflorescence to fully recaulescent, subequal and joined to the lateral calyx lobes in the upper flowers, glabrous, ciliate with short hairs and sessile glands. Calyx (2)3(4)-lobed slightly joined, all equal or the 2 laterals 0.7–0.9 mm long, narrowly ovate and the ad- and abaxial lobes variously reduced, 0.1–0.8 mm long, narrowly ovate to broadly deltoid or absent, all ciliate with short hairs and sometimes sessile glands, glabrous but puberulous at the base, the large lobes acute with slightly sulcate apex. Corolla 1.8–2.4 mm long, tubular to narrowly campanulate to narrowly ovoid, bulging out adaxially when the sepal is absent, glabrous, pale to dark pink, lobes erect to slightly spreading, $\pm \frac{1}{2}$ the length of the tube. Stamens exserted, occasionally included by abortion; filaments linear, 1.2 mm long, often subsigmoid just below the anther; anthers muticous rarely minutely decurrent-aristate, glabrous, oblong, occasionally cuneate; thecae oblong, obtuse, 0.8–1.2 mm long, dorsifixed near the base, occasionally prognathous at the base; pore $\pm \frac{1}{2}$ the length of the theca. Ovary 4(3)-locular with a single pendulous ovule in each locule, globose, 0.5 $\times$ 0.6 mm, densely puberulous; style exserted, filiform, 2.5–3.0 mm long, glabrous; stigma subinfundibuliform, 0.5 mm wide, glabrous. Fruit globose, 1.0 $\times$ 0.9 mm, puberulous; seeds broadly ellipsoid, $\pm$ 0.8–0.9 mm long, testa reticulate, cells $\pm$ elongate, ridges straight. Figure 5.

A species forming compact coppicing shrublets up to 500 mm tall; confined to a few silcrete hills near Garcia's Pass in the Riversdale area of the southern Cape Province and flowering from October to January.

This species was until recently only known from the type collection made in November 1814 by Burchell. The population, consisting of only 24 plants on the Kleinberg north-west of Riversdale, corresponds very closely to the more exact locality on Burchell's specimens 'between Kleine Vet River and foot of Langeberg'. The species appears to be very rare.

The row of hills forming the ridge just south of the Langeberg Mountains could well have additional populations of *C. glabrum* on it. However, the plants are rather inconspicuous and would seem to flower most profusely a year or two after a fire. Being copious resprouters the plants grow quickly and flower sooner than the surrounding reseeder and are then more conspicuous.

The species is remarkable in the whole subfamily for the degree of variability in the form and arrangement of the calyx. Even within a single inflorescence the calyx may vary considerably. In the genus *Sympieza* the calyx may vary from 2–4-lobed in a single inflorescence, but in that genus there is no partially to fully recaulescent bract to complicate the issue.

The above variability within the calyx is confined to *C. glabrum* and does not occur in the commoner and more widespread *C. zeyherianum*.

Vouchers: *Oliver 7548* (BOL, K, MO, NBG, PRE, S, STE); *8801* (BM, E, G, NY, P, PRE, S, STE, UPS, W).

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REFERENCES

- BENTHAM, G. 1839. Ericaceae. In A. P. De Candolle, *Prodromus systematis naturalis regni vegetabilis* 7: 580–733. Paris.
- BENTHAM, G. 1876. Ericaceae. In G. Bentham & J. D. Hooker, *Genera plantarum* 2: 577–604. Reeve, London.
- BOND, P. & GOLDBLATT, P. 1984. Plants of the Cape Flora, a descriptive catalogue. *Journal of South African Botany, Supplementary Volume* 13, pp. 455.
- BROWN, N. E. 1906. Ericaceae. In W. T. Thistleton-Dyer, *Flora capensis* 4,1: 337–418. Reeve, Ashford.
- DE CANDOLLE, A. P. 1838. *Prodromus systematis naturalis regni vegetabilis* 7. Paris.
- DRUDE, O. 1897. Ericoideae-Ericaceae. In H. G. A. Engler & K. A. E. Prantl, *Die Natürlichen Pflanzenfamilien* 4,1: 57–65. Engelmann, Leipzig.
- GOLDBLATT, P. 1978. An analysis of the flora of southern Africa: its characteristics, relationships and origins. *Annals of the Missouri Botanical Garden* 65: 369–436.
- KLOTZSCH, J. F. 1838. Ericaceum, genera et species. *Linnaea* 12: 211–247.
- OLIVER, E. G. H. 1975. Ericaceae. In R. A. Dyer, *The genera of southern African flowering plants* 1: 429–439. Botanical Research Institute, Pretoria.
- OLIVER, E. G. H., LINDER, H. P. & ROURKE, J. P. 1983. Geographical distribution of present-day Cape taxa and their phytogeographical significance. *Bothalia* 14: 427–440.
- PHILLIPS, E. 1926. *The genera of South African flowering plants*, 1st edn, 457–465. Division of Botany and Plant Pathology, Pretoria.
- PHILLIPS, E. 1944. Notes on the minor genera of the Ericaceae. *Journal of South African Botany* 10: 69–73.
- PHILLIPS, E. 1951. *The genera of South African flowering plants*, 2nd edn, 558–562. Division of Botany and Plant Pathology, Pretoria.
- REBELO, A. G., SIEGFRIED, W. R. & OLIVER, E. G. H. 1985. Pollination syndromes of *Erica* species in the south-western Cape. *South African Journal of Botany* 51: 270–280.
- WEIMARCK, H. 1941. Phytogeographical groups, centres and intervals within the Cape Flora. *Lunds Universitets Årsskrift* 37: 1–143.

SPECIMENS EXAMINED

Anderson 279 (1) GRA.

Batten s.n. (1) NBG; *Blake s.n.* (1) STE; *Bodkin sub Bolus 6693* (1) BOL, PRE; *H. Bolus 9803* (1) BOL, PRE; *L. Bolus in BOL 27094 & 27905* (1) BOL; *Burchell 6875* (2) BOL, K.

Drège 7753 (1) K, S; *s.n.* (1) G-DC.

Ecklon & Zeyher 294 (1) G, LD, M, MEL, MO, S, UPS, W, Z; 296 (1) G, MEL, MO, W; *s.n.* (1) BOL, E, GRA, MEL, K, P, PRE, S, W, Z.

Fourcade 2151 (1) BOL, K, NBG, STE; 2152 (1) BOL, K.

Long 301 (1) GRA, K, PRE; 302 (1) K, PRE; 303 (1) BOL, K; *Lynes* 99 (1) BM; *s.n.* (1) BM.

Mund s.n. (1) BOL.

Oliver 4492 (1) PRE, STE; 4494 (1) (STE); 7548 (2) BOL, K, MO, NBG, PRE, S, STE; 7935 & 7936 (1) GRA, NY, P, PRE, S, STE; 7939 (1) STE; 7940 (1) PRE, STE; 7942 (1) PRE, STE; 7943

(1) STE; 7945 & 7946 (1) PRE, STE; 7948 & 7949 (1) BM, BOL, E, K, NBG, MO, PRE, STE; 8801 (2) B, BM, E, G, MO, NY, P, PRE, S, STE, UPS, W; 8802 (2) STE; 8817 (2) PRE, STE.

Paterson 1145 (1) GRA, Z; 1156 (1) GRA; 2290 (1) Z; *Pole Evans* 18277 (1) PRE.

Rogers 28662 (1) GRA.

Sim 36 (1) BOL.

Trash 9 (1) GRA.

West 279 (1) BOL.

Zeyher 719 (1) BM, BOL, K, PRE; 3236 (1) GRA, MEL, P, PRE; 3321 (1) GRA, MEL, P, W; *s.n.* (1) BOL, K.