

Studies in the Ericoideae. III. The genus *Grisebachia*

E. G. H. OLIVER*

ABSTRACT

A revision of the genus *Grisebachia* Klotzsch in which eight species are recognized is presented. The genus belongs to the Ericaceae-Ericoideae and is endemic in the south-western part of the Cape Province. The work revealed a high degree of variability among the species, necessitating the reduction of seven species to infraspecific rank, seven species to synonymy and the rejection of one species as imperfectly known. One new species *G. secundiflora* E. G. H. Oliver is described.

RÉSUMÉ

ÉTUDES SUR LES ERICOIDEAE. III. LE GENRE GRISEBACHIA

On présente une révision du genre *Grisebachia* Klotzsch dans lequel huit espèces sont reconnues. Ce genre appartient aux Ericaceae-Ericoideae et est endémique dans le sud-ouest de la province du Cap. Le travail a mis en évidence un degré élevé de variabilité dans les espèces, ce qui a entraîné la réduction de sept espèces au rang infraspécifique; sept autres ont été mises en synonymie et une a dû être rejetée parce qu'imparfaitement connue. On décrit une nouvelle espèce, *G. secundiflora* E. G. H. Oliver.

HISTORICAL OUTLINE

When Klotzsch reclassified the subfamily Ericoideae in 1838, he described the genus *Grisebachia* consisting of eight species: *G. ciliaris* sensu Klotzsch, *G. hispida* Klotzsch, *G. involuta* Klotzsch, *G. zeyheriana* Klotzsch, *G. incana* (Bartl.) Klotzsch, *G. hirta* Klotzsch and *G. plumosa* Klotzsch. Of these, only *G. incana* and *G. plumosa* are retained in the present revision. Later in the same work he described *Eremia parviflora*, which is now recognized as a species of *Grisebachia*.

The following year Bentham (1839), when revising the whole family Ericaceae, retained *Grisebachia* but in an enlarged form. He upheld Klotzsch's eight species and added *G. dregeana* and *G. serrulata*, both of which have now been reduced to synonymy. He also included *Finkea* Klotzsch with two species, as a section. N. E. Brown (1906) correctly placed the latter in the genus *Acrostemon* of Klotzsch.

In 1876 Bentham again revised the family and included a further two of Klotzsch's genera, *Acrostemon* and *Comocephalus*, under *Grisebachia*. The genus was then divided up into three sections based on the shape of the corolla, the hairiness of the filaments and the ovary complement.

In Die Natürlichen Pflanzenfamilien Drude (1897) took a very conservative view of the Ericoideae and placed *Grisebachia* as defined by Bentham as one of four sections in the genus *Eremia* D. Don.

N. E. Brown (1906) in Flora Capensis changed the system of the earlier workers and adopted *Grisebachia* as originally construed by Klotzsch. He retained *Acrostemon* as a distinct genus and reduced *Comocephalus* and *Finkea* to synonymy under it. He retained all eight of Klotzsch's species and placed *Eremia parviflora* correctly in *Grisebachia*, but as *G. eremioides* which had been named by MacOwan in 1890. He also added ten of his own species of which only three are upheld as distinct species in the present revision, namely *G. rigida*, *G. nivenii* and *G. minutiflora*.

Phillips (1926) accepted Brown's work in its entirety in the first edition of his Genera. In 1944 he put forward his proposals for a reclassification of the family in South Africa for the second edition of his

Genera (1951). He presumably based his ideas on the very conservative views of Drude. He recircumscribed all of the genera and placed *Grisebachia* under *Eremia* together with seven other genera, some of which are quite unrelated.

The genus has been retained in Dyer's Genera (Oliver 1975) in the same form as adopted by N. E. Brown in Flora Capensis.

When the present revision was undertaken the genus *Grisebachia* consisted of 21 species. As a result of finding numerous variations and overlapping of characters the number of species has been reduced to seven. One new species, *G. secundiflora*, has been added.

MORPHOLOGY

In habit most of the species of *Grisebachia* are erect, often forming compact shrublets. *G. parviflora* is usually sparse and spreading among rocks and vegetation and *G. secundiflora* is compact but rather sprawling.

The branches of all species are never entirely glabrous. Most have pubescent to pilose or tomentose branches when young, sometimes with simple to plumose stout hairs intermingled. These may be gland-tipped.

The leaves are all typically ericoid with no open-backed forms and are mostly 3-nate. In *G. plumosa* subsp. *hispida* they are always 4-nate, while in subsp. *penteri* they can be occasionally 4-nate inbetween 3-nate. Most leaves are adpressed with one exception, *G. ciliaris* subsp. *multiglandulosa*, where they are recurved spreading. The indumentum of the leaves is very variable and disjunctions have been used for taxonomic division. Stout simple or plumose hairs may or may not be present on the leaves and may be confined to the margins or occur on the adaxial surface as well. In many cases these stout hairs may fall off and remain only as short stubs, which can easily be overlooked.

The flowers of all species are terminal either at the ends of the main branches or more often at the ends of short lateral branchlets. In *G. parviflora* these short branchlets may be aggregated together to form a loose pseudospike and in *G. secundiflora* the pseudospike is compacted and secund. The 3-bracteolate flowers are usually 4-12 in a head or as much as 36 in *G. minutiflora*.

* Botanical Research Institute, Department of Agricultural Technical Services, Private Bag X101, Pretoria, 0001.

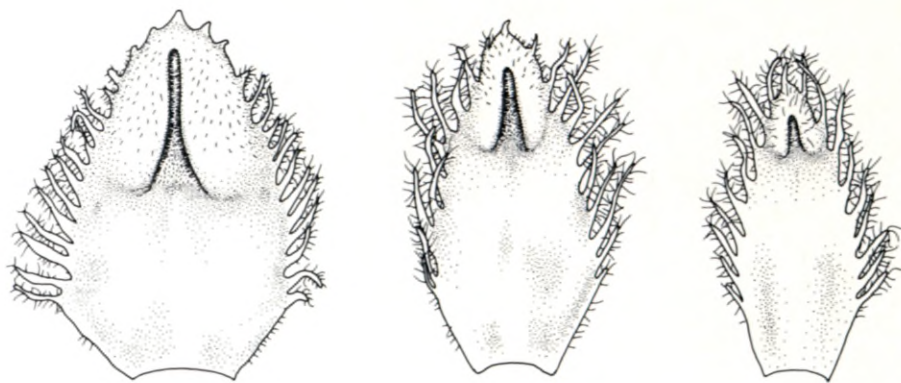


FIG. 1.—Variation in the size of the median bracteole from outer to inner flowers in a single inflorescence of *Grisebachia plumosa* subsp. *plumosa*. Drawn $\times 16$ from Thompson 791 (STE).

The bracteoles vary considerably in shape and size, particularly in *G. plumosa* and *G. ciliaris* where they are of taxonomic importance. The bracteoles may be equal to very unequal with the median bracteole being considerably enlarged with an expanded base. The variation also occurs within a single inflorescence where the bracteoles may be very unequal in the outer flowers to equal in the inner flowers (Fig. 1).

The calyx in all species is 4-lobed or 4-partite. In *G. ciliaris*, *G. incana*, *G. rigida* and *G. nivenii* the sepals are free or very slightly joined at the base, whereas in *G. plumosa*, *G. parviflora*, *G. minutiflora* and *G. secundiflora* they are joined for quarter to three quarters of their length. In all species the sepals are more or less equal. Sometimes the lateral pair may be slightly narrower than the ab- and adaxial pair. The indumentum of the calyx is very variable and is used as a taxonomic character. In most species there are some stout simple to plumose hairs on the margins of the sepals and sometimes also on the abaxial surface. These may be gland-tipped in different taxa or in the same taxon in the young stages.

The corolla is of two basic shapes in the genus. Five of the species, *G. ciliaris*, *G. plumosa*, *G. rigida*, *G. incana* and *G. nivenii*, have a corolla similar to that in the section *Cyatholoma* of the genus *Erica*. The corolla tube is more or less distinctly constricted in the middle with an ovoid or obovoid base and cyathiform upper portion including the large lobes. This is evident in the fresh state and in most of the species in the pressed material. But care must be taken with material of *G. ciliaris* subsp. *ciliaris* in which the small flowers easily lose this shape when pressed. Occasionally, when the constriction is not very marked, a campanulate shape occurs.

In the three remaining species, *G. parviflora*, *G. minutiflora* and *G. secundiflora*, the corolla has no distinct constriction. In the first two species it is usually funnel-shaped or obconic and in the third it is tubular or tubular with an inflated middle portion. In the majority of species especially those with the constricted corolla the corolla is pubescent to pilose in the middle region outside and also inside around the point of constriction.

The number of stamens in all specimens examined was constantly 4 and is important in the generic classification. The stamens are free and have pilose filaments.

The anthers are mostly manifest being arranged just above the constriction in the corolla. In *G. secundiflora* they are manifest to included. The majority of anthers are characteristically bipartite. In *G. secundiflora* there is a tendency for them to be bilobed. Awns are present in several species, but may

be absent in anthers of the same flower. This character, used in the past for specific recognition, is of no use taxonomically. The anthers are all dorsally attached with an expanded apex to the filament.

The pollen in all the material examined occurs as single grains, which are found in several of the other minor genera of the Ericoideae. The grains are tricolporate, the furrows being deeply channelled and almost as long as the cell. In shape the grains are mostly ellipsoid with flattened apices. In a few cases they are oblate as in *G. nivenii* and some forms of *G. plumosa* and *G. parviflora*. The sculpturing of the surface in the first six species is either scabrate or microscabrate with a tendency for the element rods to become fused at their distal ends to form tecta. In the last two species the fusion is complete giving an almost smooth appearance to the pollen surface (Fig. 2).

The ovary is mostly 2-celled with a single pendulous subapical ovule in each cell. Very occasionally 3-celled ovaries occur, notably in *G. parviflora* subsp. *pubescens*. In *G. secundiflora* the ovary is constantly slightly obliquely 1-celled.

Mature fruits that were found in a few species were hard-walled nuts with the walls often verrucose. They are apparently indehiscent and contain one or two very soft juicy seeds. Some fruits on *Levy's* 1367 (*G. ciliaris* subsp. *multiglandulosa*) collected in 1925 still contained soft juicy seeds.

As in most genera of the Ericoideae, the ovary in *Grisebachia* is seated on a nectariferous disc which, in some cases, is very conspicuous. This suggests that all the species are insect pollinated. On a few occasions it was noted in the field that plants were visited by bees.

The stigma varies from simple to capitellate, which is in accordance with the insect pollination.

DELIMITATION OF THE GENUS

As defined in the present revision the genus *Grisebachia* is characterized by having 3 bracteoles, 4 sepals, which are free or partly fused, a 4-lobed corolla, 4 free stamens with bipartite anthers and an ovary with 2, rarely 3 or 1, cells and a single ovule in each cell. The important characters are the stamen number and bipartite anthers.

The uniformity of the genus has until now been recorded as very constant. It has been relatively easy to assign material to the genus when identifying Ericaceae. The 2-celled ovary, 4 stamens and bipartite anthers served to be a distinctive combination of characters.

N. E. Brown recorded occasional 3-celled ovaries in *G. solivaga* and *G. nodiflora* both of which are

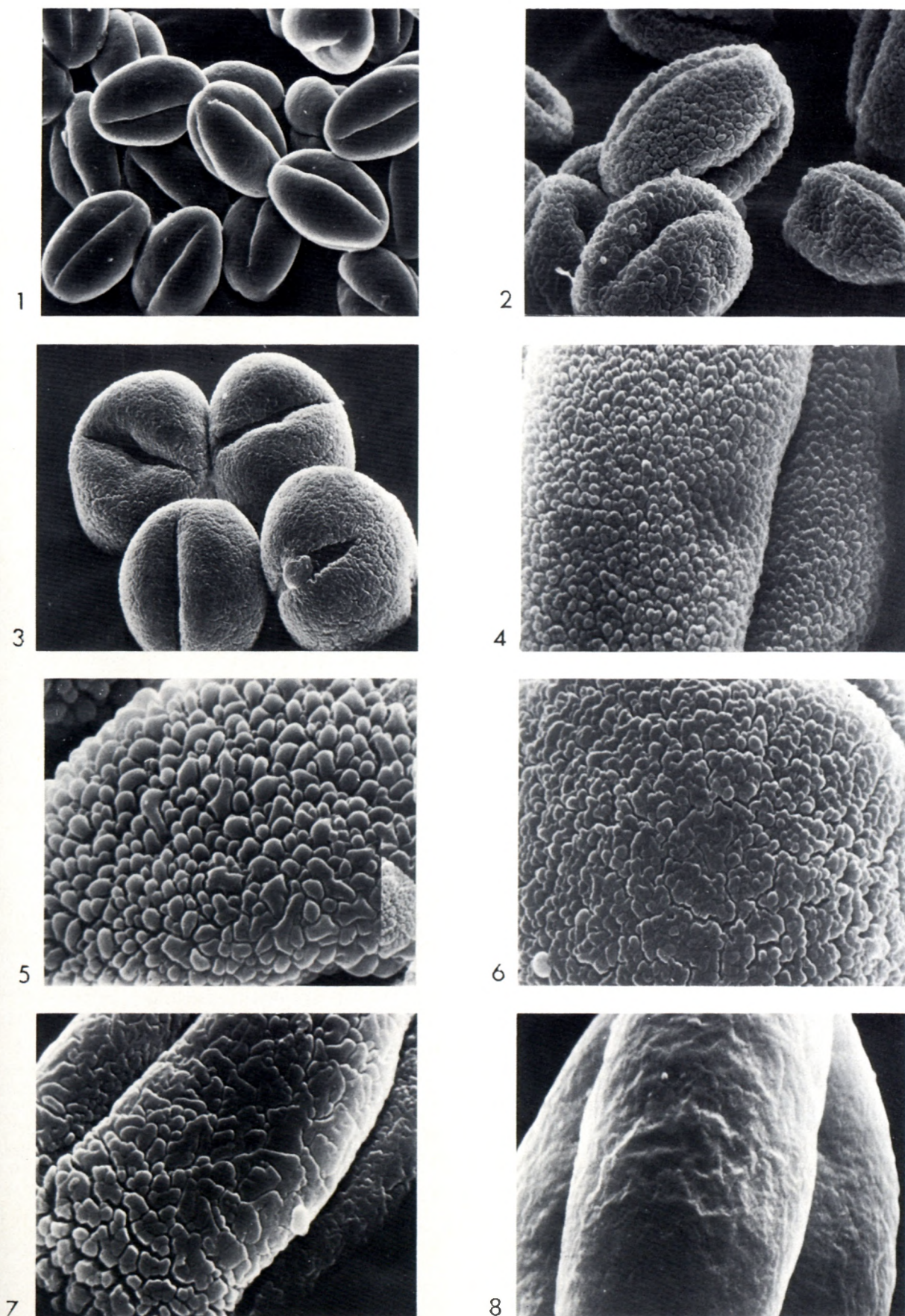


FIG. 2.—Pollen in the genus *Grisebachia*: scanning electron micrographs of pollen of various species showing the range of shapes and surface sculpturing. 1, *G. minutiflora*, $\times 1200$; 2, *G. incana*, $\times 1800$; 3, *G. plumosa* subsp. *plumosa*, $\times 1800$; 4–8, variations in surface sculpturing, all $\times 6000$; 4, microscabrate in *G. plumosa* subsp. *irrorata*; 5, scabrate in *G. rigida*; 6, microscabrate with tendency to form tecta in *G. plumosa* subsp. *plumosa*; 7, scabrate with areas large of tecta in *G. parviflora* subsp. *parviflora*; 8, smooth with complete coverage by tecta in *G. secundiflora* (cf. also surface in No. 1 above).

only known from the type collections. An examination of a few flowers did not confirm this and without investigating numerous flowers it was decided to accept Brown's observations. A number of flowers with 3-celled ovaries was, however, found in *G. parviflora* subsp. *pubescens*.

There are several genera in the Ericoideae which have 2-celled ovaries and 4 stamens, i.e. *Simocheilus*, *Acrostemon*, *Thoracosperma*, *Sympieza*, *Aniserica* and *Coilostigma*, but none of them has the distinctive bipartite anthers found in *Grisebachia*. They all have a different appearance from the rather uniform *Grisebachia*.

With the discovery of *G. secundiflora*, this uniformity was slightly changed. This species was difficult to place satisfactorily in any of the genera due to its 1-celled ovary. The species was clearly allied to some species of *Eremia* and *Grisebachia*, but could not be included in the former on the grounds of having only 4 stamens and in the latter for having a 1-celled ovary. As the genus *Eremia* has recently been emended (Oliver, 1976) to include ovary variations from 4-celled to 1-celled but with constantly 8 stamens, it was decided to place this new species under *Grisebachia* next to *G. parviflora* and emend that genus to include the 1-celled ovary rather than alter *Eremia* even further to include 4 stamens. The 1-celled ovary brought the species close to *Anomalanthus* and *Syndesmanthus*, neither of which it resembles.

The close similarity between *Grisebachia* and *Eremia* has been mentioned under that genus (Oliver, 1976). *G. parviflora* is superficially similar to *Eremia curvistyla* in flower form and habit. *G. secundiflora* looks very much like *Eremia totta* but, in both cases, the 4 stamens serve to distinguish them as species belonging to the two separate genera. The anthers of all species of *Eremia* except *E. curvistyla* are only bilobed and not distinctly bipartite as occurs in *Grisebachia*. In *Eremiella outeniquae* (Oliver, 1976) the anthers are also bipartite, but the rest of the floral characters are very different from *Grisebachia*.

Grisebachia and *Eremia* are sympatric to a great extent in the area from the Cedarberg to the Cold Bokkeveld. Undoubtedly they are very closely allied and have possibly evolved from some ancestral stock, which in turn arose from the genus *Erica* by reduction.

PHYTOGEOGRAPHY

The genus *Grisebachia* is endemic in the south-western and western parts (Fig. 3) of the Cape Province corresponding to the South-Western and North-Western Phytogeographical Centres proposed by Weimarck (1941). Most of the species occur on and west of the mountain complex of the Cedarberg, Cold Bokkeveld and Hex River and are mostly exclusive to their areas.

The commonest and most widespread species is *G. parviflora*, which occurs only on mountains from the northern Cedarberg southwards to the Villiersdorp area and eastwards to near Swellendam. It shares the central plateau of the Cold Bokkeveld with the geographically restricted species, *G. minutiflora* and *G. secundiflora*. These closely related taxa are ecologically vicarious. *G. minutiflora* is confined to sandy open flat areas.

G. ciliaris and its subspecies occur from the Nieuvoordtville plateau southwards along the east side of the Olifants River to the Porterville mountains and overlap slightly with *G. parviflora* in the northern

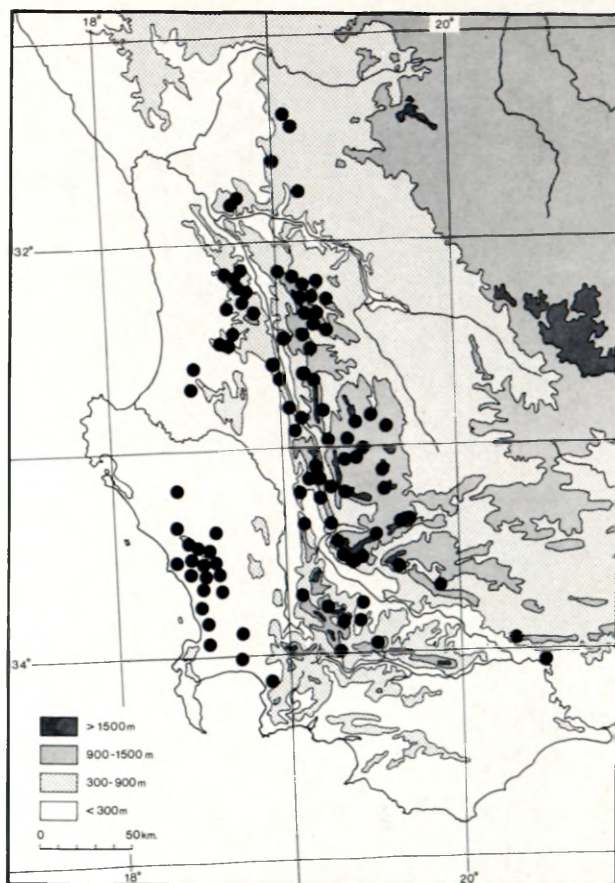


FIG. 3.—Distribution of the genus *Grisebachia*.

Cedarberg. *G. ciliaris* ssp. *ciliciflora* extends westward into the area of *G. plumosa* in Boekenberg and Lambertshoekberg. *G. plumosa* occupies the west side of the Olifants River from Clanwilliam southwards along the sandy coastal flats to the Mamre area.

Four closely related taxa are geographically vicarious. *G. ciliaris* is a northern species. *G. incana* occurs just south of the distribution range of *G. plumosa* from near Mamre to Sir Lowry's Pass. *G. rigida* is confined to the valley between Villiersdorp and Worcester and *G. nivenii* occurs isolated on the flats just south-east of Swellendam. In the same areas as the last two species there are records of *G. parviflora*, but these are from rocky higher altitude slopes.

With the exception of *G. parviflora*, which appears to be confined to rocky mountain slopes, all the species of *Grisebachia* are confined to sandy flats either on the coastal lowlands or inland on plateaux in the mountains. In many cases these sandy areas may be small and isolated and are usually alluvial being derived from rocks of the Table Mountain Series. This is very evident in the localities of *G. rigida*, *G. nivenii*, *G. minutiflora*, *G. secundiflora* and *G. ciliaris* subsp. *ciliaris*, subsp. *bolusii*, subsp. *ciliciflora* and subsp. *multiglandulosa*. The habitat of *G. ciliaris* subsp. *involuta* is not known, as details are not given on the three collections and I have not collected the subspecies, but it would probably fit the requirements.

On the lowlands of the west coast the sands are recent and alternate with the heavier clay soils of the Malmesbury beds. Here the species *G. plumosa* and

G. incana occur. The former is particularly widespread from Mamre to the Paleisheuvel area. In the north it is confined to sandy pockets in the mountains. The isolated localities of *G. incana* in the area from Mamre to Sir Lowry's Pass are ascribed to the occurrence of suitable sandy restionaceous sites. No species have been recorded from the extensive sands of the Cape Flats proper. This is probably due to the sand overlying extensive calcrete deposits.

The occurrence of *G. ciliaris* subsp. *ciliaris* on the escarpment at Niewoudtville in the extreme northernmost extension of more or less continuous fynbos is interesting. This feature is shared with only one other species in the minor genera, *Simocheilus klotzschianus* Benth. and a few species of *Erica*.

GRISEBACHIA

Grisebachia Klotzsch in Linnaea 12: 225 (1838); Benth. in DC., Prodr. 7: 700 (1839), pro parte; et in Benth. & Hook. f., Gen. Pl. 2: 592 (1876), pro parte; Drude in Pflanzenfam. 4, 1: 63 (1897), pro parte; N.E.Br. in Fl. Cap. 4, 1: 337 (1906); Phill., Gen. ed. 1, 461 (1926); E. G. H. Oliver in Dyer, Gen. 1: 433 (1975). Type species: *G. plumosa* Klotzsch.

Blaeria L.f. Suppl. 122 (1781), pro parte et auct. mult.

Erica Thunb., Prodr. 73 (1794), pro parte; Salisb. in Trans. Linn Soc. 6: 339 (1802), pro parte; Thunb., Fl. Cap. 364 (1823), pro parte.

Eremia Klotzsch in Linnaea 12: 498 (1838), pro parte; Phill. in JI S. Afr. Bot. 10: 70 (1944), pro parte; et Gen. ed. 2, 560 (1951), pro parte.

Perennial woody shrublets, erect up to 50 cm, rarely 1 m, or compact and spreading to prostrate and spreading. *Leaves* 3-nate, rarely 4-nate, erect imbricate to spreading and recurved, pubescent often with stout subplumose to plumose hairs on the margins and abaxial surface. *Flowers* in terminal heads usually on short lateral branchlets sometimes forming congested pseudo-spikes. *Bracteoles* 3, mostly approximate, small and inconspicuous, the median sometimes large, glabrous or pubescent often with stout subplumose to plumose hairs on the margins and abaxial surface. *Calyx* 4-partite or lobed, small to enlarged and conspicuous; segments equal sometimes the laterals slightly narrower, glabrous to pubescent to crisped pilose with few to numerous conspicuous stout simple to plumose hairs on the margins and abaxial surface, the hairs sometimes gland-tipped. *Corolla* 4-lobed mostly distinctly constricted about two-thirds of the way up with an ovoid to obovoid base and cyathiform top or sometimes obconical to tubular with no constriction, mostly pubescent to pilose in the middle region and on the inside around the constriction, mostly pink otherwise white. *Stamens* 4 free, mostly manifest, rarely included. *Anthers* mostly bipartite, rarely bilobed, muticous, occasionally aristate, scabrous, with large pores. *Pollen* grains single, tricolporate, mostly ellipsoid with flattened apices rarely oblate, surface scabrate to microscabrate with element rods free to fused. *Ovary* 2-celled with a single subapical pendulous ovule in each cell, rarely 3-celled, in one species obliquely 1-celled, with a distinct nectariferous disc. *Style* exserted. *Stigma* simple to capitellate. *Fruit* a hard apparently indehiscent nut.

Key to the species

Corolla with a distinct constriction in the middle:

Sepals joined for quarter to three-quarters their length.....1. *G. plumosa*

Sepals free or slightly joined at the base:

Cilia on the calyx as long as or mostly shorter than the width of the sepal:

Sepals less than 2,0×0,65 mm.....3. *G. incana*

Sepals more than 2,0×0,65 mm:

Leaves, when young, ciliate with short gland-tipped hairs.....4. *G. rigida*

Leaves, when young, ciliate with short plumose tufts.....5. *G. nivenii*

Cilia on the calyx longer than the width of the sepal.....2. *G. ciliaris*

Corolla obconical or tubular without a distinct constriction in the middle:

Inflorescence globose, 6-36-flowered, not arranged in a pseudospike.....7. *G. minutiflora*

Inflorescence 1-4-flowered on short lateral branchlets arranged in a pseudospike:

Leaves not ciliate.....6. *G. parviflora*

Leaves distinctly ciliate with stout plumose hairs.....8. *G. secundiflora*

1. **Grisebachia plumosa** Klotzsch in Linnaea 12: 226 (1838). Syntypes: Doornhoogde on the Cape Flats, Ecklon & Zeyher s.n. (B†); distributed as 268 (G!; MO!; S!; W!); Doornhoogde, Drège s.n. (B†). Lectotype: Ecklon & Zeyher 268 (MO).

Compact erect shrubs up to 0,5 m, rarely 1 m, high. *Branches* numerous erect pubescent to tomentose with longer stout hairs inbetween, sometimes gland-tipped, sometimes becoming glabrous and grey. *Leaves* 3- or 4-nate imbricate and adpressed to spreading recurved, up to 4 mm long, linear-oblong to ovate, acute to obtuse, glabrous or puberulous to tomentose and canopubescent when young and with short to long stout plumose or simple eglandular or glandular hairs on the margins only or also on the abaxial surface becoming glabrous on the abaxial surface and scabrid with the stout hairs falling off leaving short truncate stubs, rarely only crisped

pubescent without any stout hairs. *Flowers* (1) 6-12 (16)-nate in terminal erect or nodding heads; pedicels short, 0,5-1,5 mm long, puberulous sometimes with longer stouter hairs inbetween, sometimes gland-tipped; bracteoles median to adpressed, markedly unequal to subequal, the median from lanceolate to broadly ovate from an expanded base, 1,5-3,5×2,7 mm, the laterals usually smaller and narrower, mostly oblong-elliptic, all ciliate with short to long stout plumose to simple hairs which may be gland-tipped, with or without an even to sparse covering of similar shorter or equally sized hairs on the abaxial surface, sometimes just crisped pubescent. *Calyx* joined for one third to two thirds of its length, campanulate sometimes 4-angled at the base, pink, glabrous to pubescent with the lobes ciliate with short to long simple to markedly plumose stout to soft hairs which may be gland-tipped, occasionally with an even to sparse covering of similar shorter or

equally sized hairs on the abaxial surface; lobes narrowly to broadly deltoid, slightly sulcate at the apex. *Corolla* 4-lobed up to 4 mm long, very constricted half to two thirds the way up above an ovoid to obovoid base cyathiform above, often 4-angled the angles alternating with the calyx segments, pubescent to sparsely so in the middle region and pilose on the inside at the mouth or constriction; lobes broadly ovate to deltoid, obtuse erect to slightly spreading, glabrous or slightly pubescent down the centre outside. *Stamens* 4, free; filaments narrowly linear broadened at the point of attachment, pilose, white; anthers exserted or manifest, 0.5–1.3 mm long obovate, dorsally attached, scabrous, mucous or rarely minutely awned the awns occurring only in a few flowers or anthers; pore about half the length of the cell; pollen grains single. *Ovary* 2-celled, compressed, ovoid to oblate, obtuse to subacute smooth to verrucose rarely pilose at the apex otherwise glabrous, seated on a disc; style exserted; stigma small, subcapitate; fruit hard verrucose. Figs 5–8.

A species forming erect shrublets up to 0.5 m occurring on sandy coastal flats in the western Cape Province from Cape Town to Graafwater and on mountain slopes in the Clanwilliam area, flowering from June to September.

G. plumosa is characterized by the calyx being joined for one quarter to three-quarters of its length, the corolla-tube being distinctly constricted in the middle and the habit being erect.

In his treatment of the genus Brown recognized five species in the group with joined calyces, basing the separation on the form of the stout hairs on the calyx. The five species were *G. plumosa*, *G. hirta*, *G. pilifolia*, *G. pentheri* and *G. solivaga*. On the small amount of material available to him this classification was feasible. But since *Flora Capensis* numerous collections of these species have been made. An examination of all this material showed a degree of variation in the diagnostic characters sufficient to warrant the five species being regarded as one single complex of taxa with discontinuities occurring only in one character and with partial separation in other characters between the constituent taxa. The oldest name applicable to this complex is *G. plumosa* Klotzsch.

It was also found that variation in the number of leaves per whorl in some specimens of *G. pentheri* overlapped with the number in the very similar *G. hispida* which had been separated off from the rest of the species in the genus on this character. *G. hispida* therefore had to be included in the *G. plumosa* Complex.

The above six taxa were then examined as one complex group. It was found that the group could be divided into two form series on the position of the stout hairs on the leaves, one with the hairs only on the margins the other with the hairs also scattered on the abaxial surface. The first series contained *G. plumosa* and *G. solivaga*, the second contained *G. hispida*, *G. pentheri*, *G. pilifolia* and *G. hirta*.

In the first form series the variation in calyx hairs from the very plumose material of *G. plumosa* in the Mamre area to the almost simple-haired specimens in the Aurora area showed an overlap with the type and only collection of *G. solivaga* from just west of Clanwilliam. Material which had been named as *G. hirta* was found to constitute a distinct new taxon more closely allied to *G. plumosa* on the leaf character. Furthermore, a collection made in the Gifberg

(Oliver 4951) was found to be nearest to *G. plumosa* and, although somewhat anomalous, was referred to this series which then consisted of *G. plumosa* (including *G. solivaga*) and the two new taxa.

In the second form series *G. pilifolia* showed considerable variation with an overlap in the distinguishing characters with *G. pentheri* thus necessitating its reduction to synonymy. A close relationship with *G. hispida* was shown to exist with only a partial separation on the number of leaves per whorl and a distinct separation in the plumosity of the hairs. *G. pentheri* and *G. hirta* appeared to be very similar with only one character showing any disjunction, i.e. the position of the stout hairs on the abaxial surface of the calyx. This series therefore consisted of *G. hispida*, *G. pentheri* (including *G. pilifolia*) and *G. hirta*.

Within these two form series recognizable on the single character difference of leaf hairs, several more or less distinct taxa could be distinguished again on various single character differences. The complex occurs in two main distribution centres, the Mamre area in the south and the mountains west of the Olifants River in the north. Regional separation of the two series in the complex is only partial. The "plumosa" series is concentrated in the south with some outliers in the far north and the "hispida" series in the north with outliers in the south.

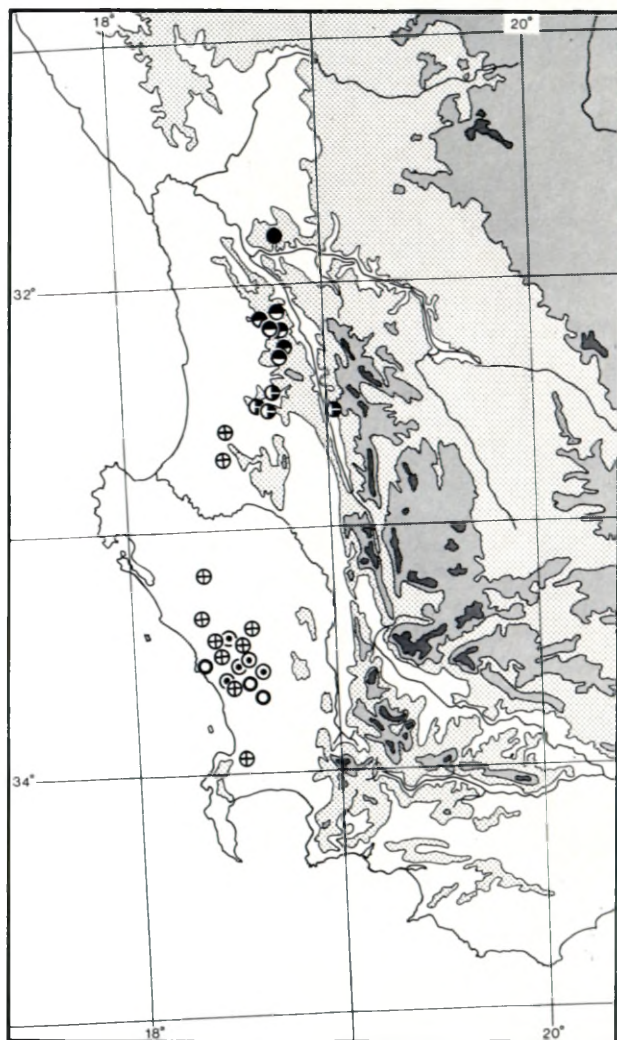


FIG. 4.—Distribution of *Grisebachia plumosa*: ⊕ subsp. *plumosa*; ⊙ subsp. *hirta*; ○ subsp. *irrorata*; ● subsp. *eciliata*; ⊗ subsp. *hispida*; ⊗ subsp. *pentheri*.

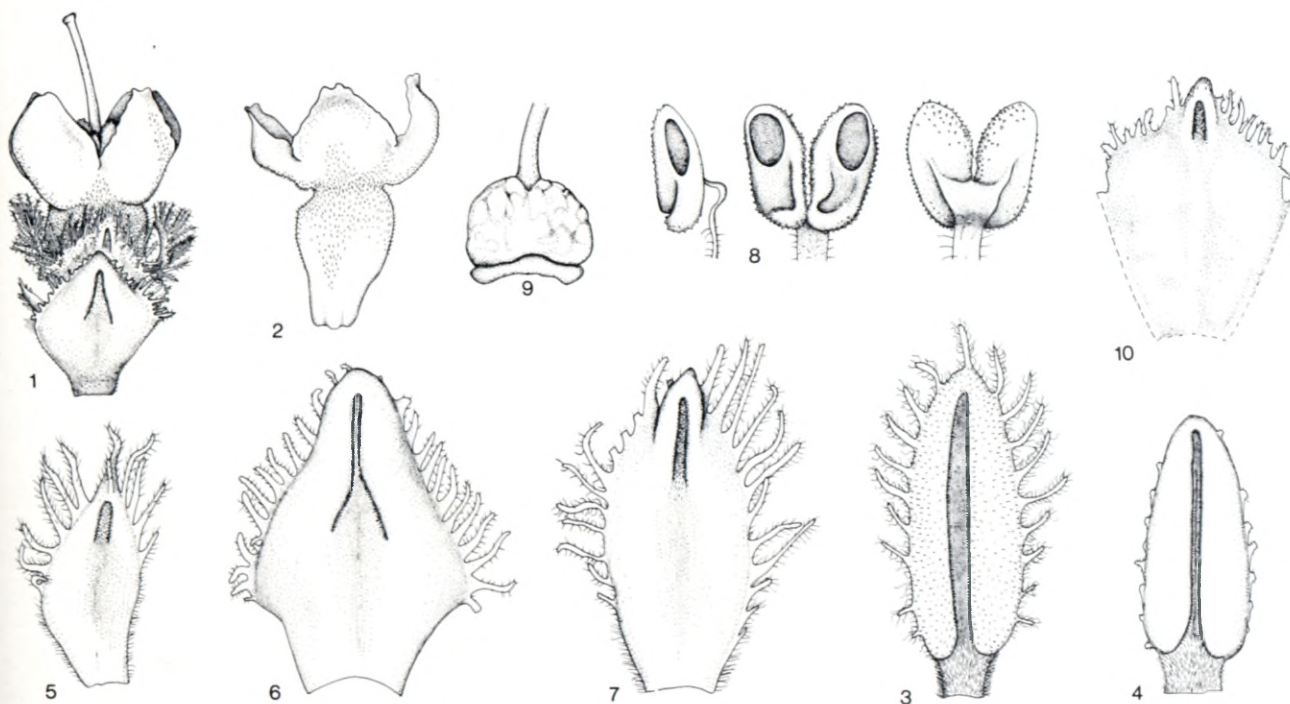


FIG. 5.—*Grisebachia plumosa* subsp. *plumosa*. 1, flower, $\times 8$; 2, corolla, $\times 8$; both from Barker 10388 (NBG); 3, young leaf; 4, old leaf; 5, lateral bracteole; 6, median bracteole of an outer flower; 7, median bracteole of an inner flower; 8, anther, side, front and back views; 9, ovary; all drawn $\times 16$ from the lectotype, Ecklon & Zeyher 268 (MO); 10, sepal, $\times 16$, drawn from Schlechter 8480 (PRE).

It was decided for reasons of expediency to regard the complex as one species with six subspecies based on a single character disjunction occurring with some degree of regional separation over a wide part of the distribution range of the species (Fig. 4). This classification, though not final, attempts to show the type of variation that occurs in this complex. Only a thorough biosystematic study of the populations will solve the problems and should either confirm or correct the above classification I have given.

In floral and foliage characters this is a very variable taxon in which six subspecies are recognized.

Key to the subspecies

Leaves with simple to plumose stout hairs confined to the margins or without cilia, sometimes in older leaves remaining only as short truncate setae:

Cilia simple or plumose or setae present on the leaves:

Calyx hairs eglandular.....(a) subsp. *plumosa*

Calyx hairs glandular.....(b) subsp. *irrorata*

Cilia absent on the leaves, sometimes small compound tufts present, otherwise shortly lanate..(c) subsp. *eciliata*

Leaves with simple to plumose stout hairs on the margins and abaxial surface at least when young, sometimes in older leaves remaining only as short truncate setae:

Hairs on the leaves and calyx eglandular:

Leaves 4-nate; calyx hairs densely white plumose.....

.....(d) subsp. *hispida*

Leaves 3-nate rarely also 4-nate on the same branch; calyx more sparsely hairy, hairs less plumose.....

.....(e) subsp. *pentheri*

Hairs on the leaves and calyx glandular:

Calyx hairs mostly confined to the edges of the sepals and distinctly larger than the few on the abaxial surface; bracteoles and sepals usually glabrous.....

.....(e) subsp. *pentheri*

Calyx hairs mostly of equal size and evenly distributed over the abaxial surface; bracteoles and sepals usually puberulous.....(f) subsp. *hirta*

(a) subsp. *plumosa*

G. plumosa Klotzsch in Linnaea 12: 226 (1838); Benth. in DC., Prodr. 7: 701 (1839); N.E. Br. in Fl. Cap. 4, 1: 345 (1906). Syntypes: Doornhoogde on the Cape Flats, Ecklon & Zeyher s.n. (B†); distributed as 268 (G!; MO!; S!; W!); Doornhoogde, Drège s.n. (B†). Lectotype: Ecklon & Zeyher 268 (MO).

G. serrulata Benth. in DC., Prodr. 7: 701 (1839). Type: Giftberg, Drège 7802 (BM!; K!; MO!; P!; W!). *G. plumosa* var. *serrulata* (Benth.) N.E. Br. in Fl. Cap. 4, 1: 346 (1906).

G. solivaga N.E. Br. in Fl. Cap. 4, 1: 347 (1906). Type: Zeekoe Vlei, Clanwilliam, Schlechter 8480 (BM!; BOL!; E!; G!; K!; MO!; P!; PRE!; W!).

Branches pubescent to tomentose with short stout plumose hairs inbetween, rarely just tomentose. Leaves 3-nate mostly erect and adpressed, pubescent to canopubescent and ciliate with short, occasionally long, stout plumose hairs, becoming glabrous and often scabrid edged with the cilia falling off leaving short truncate setae. Bracteoles pubescent, rarely glabrous, ciliate with short stout plumose hairs, rarely also with similar hairs on the abaxial surface. Sepals pubescent, rarely glabrous, ciliate with stout plumose, rarely subplumose hairs, with a few shorter ones scattered over the abaxial surface. Fig. 5.

CAPE.—3218 (Clanwilliam): Zeekoe Vlei, 122 m (-BA/BB), Schlechter 8480 (BM; BOL; E; G; K; MO; P; PRE; W). S.W. of Aurora (-CB), Barker 9712 (NBG; STE); Aurora to Velddrif, 61 m (-CB), Williams 502 (BM; K); Goergap-Aurora Road (-DA), Thompson 791 (MO; PRE; STE); Sauer area (-DC), Barker 5783 (BOL; NBG; STE); Barker 8087 (NBG; STE); Compton 15488 (NBG); Leighton 167 (BOL; PRE); Lewis 3991 (SAM; STE); Wilman 865 (NBG; PRE). 3318 Cape Town: Hopefield (-AB), Bachman s.n. sub Guthrie 2883 (BOL; K); Darling 244 m (-AD), Bayliss 1663 (B; PRE); Darling (-AD), Grant 4604 (BM); Between Malmesbury and Darling (-AD/BC), Hutchinson 205 (BM; BOL; K; PRE); Salter 4410 (K; PRE); Mamre Road (-BC), Barker 5376 (NBG); Compton 19863 (NBG; STE); Hillslopes west of Abbotsdale (-BC) Oliver s.n. (STE); Burgherspost, Dassenberg, 152 m (-BC), Rourke 500 (NBG; STE); Mamre area, flats and hills (-AD/BC/CB/DA), Barker 5375 (BOL; NBG); 10388 (NBG); Compton 6782 (NBG); 7797 (NBG); 9530 (NBG); 13883 (NBG); Garside 4772 (K); Levyns 3196 (CT); Rycroft 1806 (NBG; STE); Sidey 2289 (MO; S); Stokoe in SAM 62573 (SAM); Between Melk-

bosch and Mamre (-CB/DA), *Salter 1234* (BM; K; MO); 10 miles south of Mamre (-DA), *Davis s.n.* (SAM; STE); Doornhoogde on Cape Flats (-DC) *Ecklon & Zeyher 268* (G; MO; S; W).

Subsp. *plumosa* is characterized by having mostly plumose, occasionally simple, cilia on the leaf margins and no glands on the calyx. The cilia are present at least in the young stages as they often fall off leaving minute truncate setae which can easily be overlooked. This latter character was used by Bentham in creating his *G. serrulata*.

This subspecies is very variable in the degree of subdivision of the stout hairs on the calyx and bracteoles. The specimens of *Bachmann s.n.* from Hopefield are very plumose. The average degree of plumosity occurs in the Mamre collections. The collections from near Aurora have glabrous calyces with simple stout cilia. These latter collections are very similar to the type and only collection of *G. solivaga* N.E. Br. from just west of Clanwilliam.

(b) subsp. *irrorata* E. G. H. Oliver, subsp. nov., a subspecie typica ciliis glandulis calyce et subspecie *hirta* similissime cilis foliorum margine solum dignoscenda.

TYPE.—Bokbaai, *Taylor 5011* (STE, holo.; PRE).

Branches pubescent becoming glabrous with short stout plumose hairs inbetween when older. *Leaves* 3-nate, adpressed but sometimes slightly recurved, pubescent becoming glabrous on the abaxial surface, ciliate with short stout plumose hairs, occasionally gland-tipped when young, sometimes falling off when older and remaining as short truncate setae. *Bracteoles* and *sepals* pubescent mainly at the apex, ciliate with simple to sparsely plumose gland-tipped hairs on the margins and slightly shorter ones on the abaxial surface. Fig. 6.1.

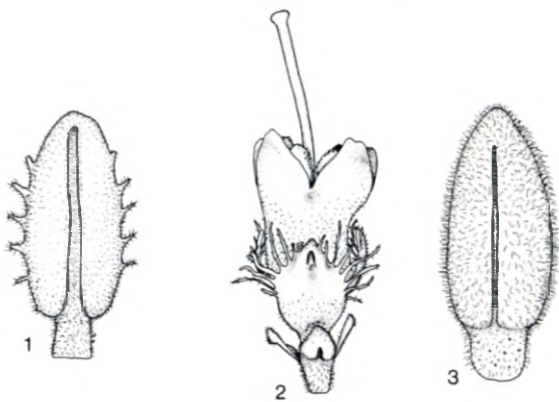


FIG. 6.—*Grisebachia plumosa*: subsp. *irrorata*. 1, leaf, $\times 16$, drawn from the holotype, *Taylor 5011* (STE); subsp. *eciliata*. 2, flower, $\times 8$; 3, leaf, $\times 16$; both drawn from the holotype, *Oliver 4951* (STE).

CAPE.—3318 (Cape Town); Bokbaai, 50 m (-CB), *Taylor 5011* (PRE; STE); near Driefontein on roadside between Philadelphia and Mamre (-DA), *Pillans 6784* (BOL); Mamre hills (-AD/BC/CB/DA), *Compton 9530* (NBG). Between Mosselbanks and Berg Rivers (-DA/DB), *Burchell 981* (K; PRE). Without precise locality: Malmesbury, from flower sellers, *Lamb 4097* (SAM). Locality unreliable: Swartberg at Caledon, *Lamb s.n.* (BOL).

Subsp. *irrorata* is recognizable by the gland-tipped hairs on the calyx and lack of stout hairs on the abaxial surface of the leaves.

Material of this taxon had been, until now, placed under *G. hirta* Klotzsch due to the key character of a glandular calyx without taking into account the

significant differences in the leaf indumentum. In subsp. *irrorata* the leaves are typical of the "plumosa" kind in which the stout hairs are confined to the margins of the leaves and do not occur on the abaxial surface as they occur in subsp. *hirta* (*G. hirta* Klotzsch).

The collection, *Compton 9530*, is intermediate between subsp. *irrorata* and subsp. *plumosa* in having glands only on the abaxial surface of the calyx. There appears to be no intermediate between this taxon and subsp. *hirta*. However, after a biosystematic study this taxon may be shown to be a hybrid between subsp. *plumosa* and subsp. *hirta*.

The three taxa, subsp. *plumosa*, subsp. *irrorata* and subsp. *hirta* are sympatric on the sandy flats of the Mamre area. These flats have unfortunately been decimated by alien vegetation and human activity. The pressure on the area from industrial and urban development is now very great.

A thorough biosystematic study of the populations from this area was not possible and probably never will be possible for a more objective assessment of their relationships.

(c) subsp. *eciliata* E. G. H. Oliver, subsp. nov., in specie foliis sine ciliis pagine abaxiali vel marginibus distinguitur.

TYPE.—Ordinansiekop, Gifberg, *Oliver 4951* (STE, holo.; BOL; K; NBG; MO; PRE; S).

Branches pubescent with simple hairs only. *Leaves* 3-nate adpressed, lanate with simple hairs, occasionally with a few tufts of stouter hairs on the margins. *Bracteoles* pubescent and lanate at the apex. *Sepals* very sparsely pilose, ciliate with irregularly and sparsely plumose hairs, rarely with a few similar hairs on the abaxial surface. Fig. 6.2, 6.3.

CAPE.—3118 (Vanhynsdorp), Ordinansiekop on the Gifberg, 426 m (-DD), *Oliver 4951* (BOL; K; NBG; MO; PRE; S; STE).

Subsp. *eciliata* is distinct in the species for having leaves which do not possess stout hairs on either the margins or abaxial surface. The pubescence is very short, lanate and crisped. There is, however, an occasional tuft of hairs on the margins of the leaves but not similar to those found in the rest of the species.

This taxon is somewhat anomalous in that it has a similarity to *G. plumosa* complex in which the closest affinity is with the material formerly known as *G. solivaga* N.E. Br. now forming part of *G. plumosa* subsp. *plumosa*. The crisped pubescence, lack of distinct stout hairs and the tufts on the leaves are similar to the condition found in *G. ciliaris* subsp. *ciliaris* which occurs in the same area. The broad calyx lobes are similar to the broad sepals in the material formerly known as *G. dregeana* Benth. The sepals of the latter are, however, free or very slightly joined at the base.

It was decided to place this taxon under *G. plumosa* on the basis of the fused calyx segments and to leave *G. ciliaris* to be characterized by its free sepals. The taxon is, however, a close link between these two species and points to the need for a thorough biosystematic study of all the Olifants River taxa to understand their relationships.

(d) subsp. *hispida* (Klotzsch) E. G. H. Oliver, comb. et stat. nov.

G. hispida Klotzsch in *Linnaea* 12: 226 (1838); Benth. in DC., *Prodr.* 7: 701 (1839); Rach in *Linnaea* 26: 790 (1855); N.E. Br.

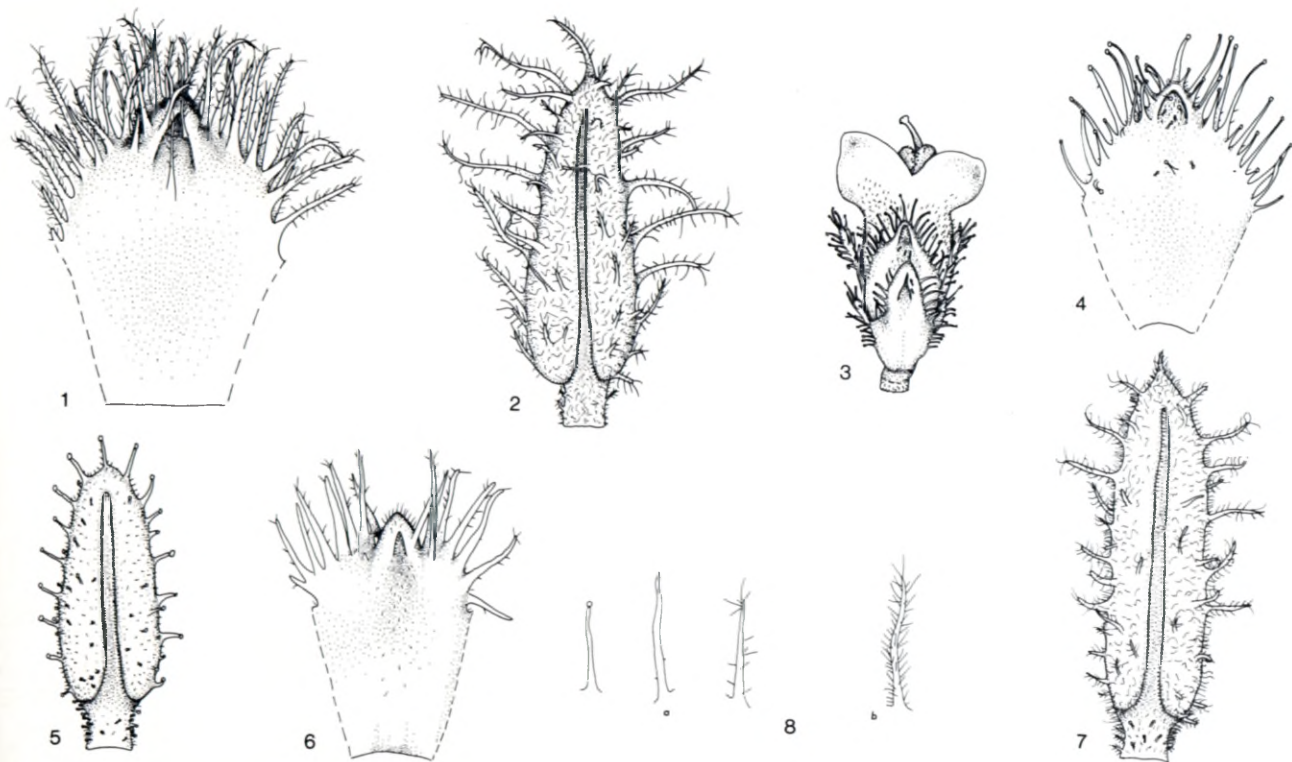


FIG. 7.—*Grisebachia plumosa*: subsp. *hispida*. 1, sepal; 2, leaf; both drawn $\times 16$, from the lectotype, *Ecklon & Zeyher* 267 (G); subsp. *pantheri*. 3, flower $\times 10$; 4, sepal, $\times 16$; 5, leaf, $\times 16$; all drawn from the isotype, *Penther* 2925 (STE); 6, sepal, $\times 16$; 7, leaf, $\times 16$; both drawn from *Oliver* 3869 (STE); 8, cilia variation: a, subsp. *pantheri* b, subsp. *hispida*.

in Fl. Cap. 4, 1: 339 (1906). Syntypes: near Olifantsrivier and farm Brakfontein, July, *Ecklon & Zeyher* s.n. (B†); distributed as 267 (G!; S!; W!); mountains at Winterhoek, Witsenberg and near Vogelvllei; *Ecklon & Zeyher* s.n. (B†; LD!; P!). Lectotype: *Ecklon & Zeyher* 267 (G).

Blaeria pilota E. Mey. ex Benth. In DC., Prodr. 7: 701 (1839). Type: *Drège* s.n. (B†; isos.)

Branches pilose with numerous long stout plumose hairs inbetween. Leaves 4-nate, imbricate but slightly spreading, pilose, long ciliate on the edges with plumose hairs and clothed with similar hairs on the abaxial surface, often breaking off and remaining only as short truncate setae. Bracteoles and sepals pubescent, densely ciliate and clothed on the abaxial surface with long stout very plumose hairs like those on the leaves, eglandular. Fig. 7.1, 7.2.

CAPE.—3218 (Clanwilliam): Sandy uplands north of Paleisheuvel between Berg Valley and Langevallei (—BC), *Acocks* 2994 (S); Paleisheuvel (—BC), *Barker* 6719 (BOL; NBG); Boekenberg near Paleisheuvel, 549 m (—BC), *Compton* 4935 (BOL); Zwartbaskraal east of Boekenberg 300 m, (—BC), *Oliver* 3890 (B; E; K; NBG; MO; PRE; S; STE); Boekenberg 457 m (—BC), *Williams* 817 (NBG); near Zwartbaskraal, 300 m, (—BC/BD), *Drège* s.n. (BOL; K; PRE; S); between Bergvallei & Zwartbaskraal 244 m (—BC/BD), *Drège* s.n. (G—DC); Bergvallei at Zwartbaskraal 244 m (—BC/BD), *Drège* 1180 (P); Olifants River at Brakfontein, (—BD/DB), *Ecklon & Zeyher* 267 (G; S; W). Without locality: *Drège* s.n. (BM; G; P; S). Doubtful locality: 3319 (Worcester), Foot of Winterhoeksberg at Vogelvallei (—AC), *Ecklon & Zeyher* s.n. (LD; P).

Subsp. *hispida* may be distinguished by its 4-nate leaves and calyx thickly covered with densely plumose hairs. In all the material examined the leaves were 4-nate. In subsp. *pantheri* some specimens have been found to possess 4-nate leaves on branches with mostly 3-nate leaves. The subspecies has the largest leaves, flower-heads and flowers in the species.

This subspecies is very similar to some forms of subsp. *pantheri*, some of which used to constitute part of what was formerly *G. pilifolia* N.E. Br.

In these forms the calyx and leaves are eglandular and the hairs very plumose.

Subsp. *hispida* appears to be very restricted in its distribution, occurring only on the sandy hills and flats near Paleisheuvel associated with dry fynbos scrub which, according to Acocks's map of Veld Types (1953), is classified as True Fynbos and not Coastal Macchia.

(e) subsp. *pantheri* (Zahlbr.) E. G. H. Oliver, comb. et stat nov.

G. pantheri Zahlbr. in Ann. Naturh. Mus. Wien. 20: 42 (1905); N.E. Br. in Fl. Cap. 4, 1: 1128 (1909). Type: Elandsfontein, Clanwilliam, Aug. 1894, *Penther* 2925 (BM!; BOL!; STE!; W! holo).

G. dregeana Benth. var. *vestita* Zahlbr. in Ann. naturh. Mus. Wien 20: 43 (1905). Type: Olifants River valley, *Penther* 2917 (W, holo!).

G. pilifolia N.E. Br. in Fl. Cap. 4, 1: 346 (1906). Type: near Clanwilliam, *Leipoldt* 46 (BM!; BOL!; K! holo; PRE!; SAM!).

G. plumosa var. *scabra* N.E. Br. in Fl. Cap. 4, 1: 346 (1906). Type: *Thom* s.n. (BOL!)

Branches pubescent, rarely glabrous, with long stiff plumose eglandular or gland-tipped hairs inbetween. Leaves 3-nate, rarely also 4-nate, pubescent when young, ciliate with stout hairs and clothed with a few similar hairs on the abaxial surface, the hairs being simple and gland-tipped to plumose and eglandular, often breaking off and remaining as short truncate setae. Bracteoles and sepals mostly glabrous, rarely sparsely pubescent, ciliate with simple to plumose cilia which may be gland-tipped, occasionally clothed with a few similar shorter hairs on the abaxial surface down the middle. Fig. 7.3–7.7.

CAPE.—3218 (Clanwilliam): Uitkomst, Graafwater, 427 m, (—BA), *Compton* 4945 (BOL; NBG); 4949 (BOL); *Compton* 6789 (NBG; STE); *Compton* 24218 (NBG; STE); Kanovlei, east of Graafwater, 396 m (—BA), *Oliver* 3869 (STE); Die Berg

road (-BA/BB), *Pamphlett 103* (NBG; STE); Zeekoevlei (-BA/BB), *Pillans 7074* (BOL; K; NBG; PRE); 122 m, *Schlechter 8480* (BM; BOL; E; G; K; MO; P; PRE; STE; W); Kransvlei (-BB), *Compton 20031* (NBG); Summit of ridge south-west of Kransvlei, 640 m (-BB), *Oliver 3873* (STE); Top of Kransvlei Pass, (-BB/BD), *Lewis 2724* (SAM); Lambertschoekberg, 910 m (-BD), *Compton 5490 & 1* (BOL; NBG); *Maguire 419* (BOL; NBG); Olyvenboschkraal (-BD), *Leipoldt 745* (SAM); Crossroads north of Elandsfontein, 640 m (-BD), *Oliver 3879* (BM; MO; STE); Elandsfontein (-BD), *Penther 2925* (BM; BOL; STE; W); Olifants River mountains 610 m, (-BD/DB), *Schlechter 5099* (BM; BOL; K; NBG; NH; PRE). Without precise locality: Clanwilliam, *Leipoldt 46* (BM; BOL; K; PRE; SAM).

Subsp. *pentheri* is characterized by its 3-nate leaves, which are very rarely 4-nate on the same branch, its calyx which is more sparsely hairy and less plumose than in subsp. *hispida* and in the glandular form by having most of the hairs on the margins of the sepals.

This subspecies is very variable in the form of the hairs on the leaves and calyx. In Flora Capensis Brown recognized two separate species based on these hairs, his own *G. pilifolia* with its simple to plumose eglandular hairs and later in the addenda Zahlbruckner's *G. pentheri* with its gland-tipped simple to subplumose hairs. Since Flora Capensis, more material of this group has been collected and has exhibited a complete range between the two extremes thus necessitating a reduction of *G. pilifolia* to synonymy under *G. pentheri* which itself had to be reduced to subspecific rank in the *G. plumosa* complex.

The relationship between the glandular forms of subsp. *pentheri* and subsp. *hirta* is very close and it is only with some careful examination that they can be distinguished. The only character which shows any discontinuity is the distribution of the hairs on the calyx. In subsp. *pentheri* the stout hairs are mostly confined to the margins of the calyx lobes with the hairs on the abaxial surface being few and shorter. In subsp. *hirta* the hairs are more or less evenly distributed over the calyx and are of the same length. This relationship is interesting because the two taxa are widely separated.

Subsp. *pentheri* occurs frequently in scattered populations in sandy areas on the mountains on the west side of the Olifants River near Clanwilliam. Unfortunately much of the habitat of this taxon has been lost to farming practices and all that remains is in the rocky unusable areas. The fynbos in which the plants grow may without human and animal intervention become quite tall and erect plants of this taxon have been seen up to 1 m high.

(f) subsp. *hirta* (*Klotzsch*) E. G. H. Oliver, comb. stat. nov.

G. hirta Klotzsch in Linnaea 12: 226 (1838); Benth. in DC., Prodr. 7: 701 (1839); N.E. Br. in Fl. Cap. 4, 1: 345 (1906). Type: sandflats near Groenkloof, Drège s.n. (B⁺), distributed as 7795 (BM!; BOL!; E!; G!; G-DC!; HAM!; K!; MO!; P!; PRE!; W!). Lectotype: Drège 7795 (P).

Branches pubescent to tomentose with long stiff plumose gland-tipped hairs inbetween. Leaves 3-nate, pubescent when young becoming glabrous, ciliate with long stout simple to plumose gland-tipped hairs and clothed with similar hairs on the abaxial surface, erect to spreading-recurved. Bracteoles and sepals puberulous sometimes sparsely so, ciliate and evenly clothed on the abaxial surface with numerous short stout simple to sparsely plumose gland-tipped hairs. Fig. 8.

CAPE.—3318 (Cape Town): 2 km north-east of Mamre (-AD), Boucher s.n. (PRE; STE); Mamre (-CB), Baker 2445 (BM;

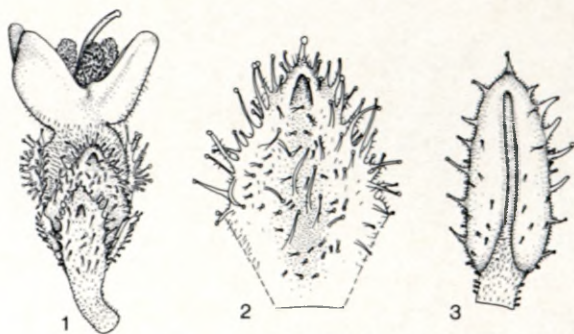


FIG. 8.—*Grisebachia plumosa* subsp. *hirta*. 1, flower, $\times 8$; 2, sepal, $\times 16$; both drawn from Oliver 3763 (STE); 3, leaf, $\times 16$, drawn from the lectotype, Drège 7795 (P).

K); south of Mamre (-CB), Barker 10388 (NBG); Silverstream-strand Road just south of Mamre, 300 m (-CB), Boucher s.n. (STE); south of Mamre, (-CB) Rycroft 2081 (NBG); 1 km north of Pella, 300 m, (-DA), Boucher s.n. (STE); Sandflats near Groenkloof, 60 m (-DA), Drège 7795 (BM; BOL; E; G; G-DC; HAM; K; MO; P; PRE; W); flats just west of Pella, 228 m (-DA), Oliver 3763 (STE); sandy north-east base of south end of Dassenberg, (-DA), Pillans 6881 (BOL); Kalbaskraal (-DA), Van der Merwe 14 (PRE; STE). Without locality: Thom s.n. (BOL); Drège s.n. (S).

Subsp. *hirta* is characterized by its glandular stout mostly simple hairs evenly distributed on the calyx. It differs only in this respect from subsp. *pentheri* and from subsp. *irrorata* in having gland-tipped hairs on the margins and abaxial surfaces of the leaves.

The relationship between subsp. *hirta* and subsp. *irrorata* is very close with the flowers being almost identical. The difference in the leaves, however, is distinct. In subsp. *irrorata* the leaves are typical of subsp. *plumosa* with short stout plumose cilia. As all three taxa are sympatric on the sandy flats near Mamre there is a possibility that hybridisation and introgression may occur. A thorough biosystematic study of populations from the area will have to be carried out to ascertain the relationships of these taxa.

2. *Grisebachia ciliaris* (L.f.) Klotzsch in Linnaea 12: 255 (1838) quoad nom., exl. descr. et spec. in herb. Willd. Type: Herb. Linn. (LINN).

Blaeria ciliaris L.f., Suppl. 122 (1782).

Shrublets mostly low growing and compact or erect up to 75 cm high. Branches subglabrous to pubescent, occasionally arachnoid, the hairs thick and matted, erect or retrorse or very sparse and erect, sometimes with stouter longer hairs inbetween which are either plumose or simple and gland-tipped. Leaves 4-nate, erect and adpressed, sometimes imbricate to spreading recurved, 1–4.5 mm long with the petiole very short to 0.5 mm long, from linear to ovate to obovate, very variable in the indumentum, pubescent with dense crisped retrorse hairs or puberulous with erect hairs, eciliate or rarely with small compound tufts on the margins or sometimes with stout plumose cilia with few to many spreading plume branches, the cilia often falling off and remaining as short setae, all becoming more or less glabrous with age, sometimes subglabrous to glabrous and shiny on the abaxial surface and ciliate and clothed on the abaxial surface with stout simple gland-tipped hairs. Flowers 3–12 in capitate, sometimes nodding, heads at the ends of lateral branchlets; bracteoles 3 subequal to markedly unequal in the outer flowers of the inflorescences to equal in the inner flowers, mostly median to remote, adpressed or recurved, the

median 1,3–5×0,45–2,3 mm, small and oblong to narrowly ovate with a relatively large keel-tip and no markedly expanded base to broadly elliptic or ovate with a broad flat base and relatively small but distinct keel-tip, from almost glabrous to puberulous all over, sometimes with a distinct apical tuft of lanate hairs, sometimes ciliate with short to long stout simple to plumose eglandular or gland-tipped hairs, rarely with a few similar hairs on the abaxial surface at the keel-tip; the pedicel 1,0–2,5 mm long, puberulous to sparsely glandular pilose. *Calyx* 4-partite sometimes slightly joined at the base, 1,5–4,3×0,4–2,3 mm, very variable in size and indumentum, small narrowly oblong to oblong-ovate to broadly elliptic or large oblong-elliptic to broadly elliptic and ovate, slightly keel-tipped occasionally with a knoblike apex, glabrous to pubescent sometimes with a distinct apical tuft of lanate or straight hairs, ciliate with long stout simple to plumose crooked or straight hairs which are eglandular or gland-tipped, plume branches long and spreading or short and erect, sometimes clothed with similar hairs on the abaxial surface, the apex devoid of cilia or ciliate, the cilia as long as, mostly longer than, the width of the sepals. *Corolla* 4-lobed, 2,5–7 mm long, constricted in the middle to two-thirds of the way up, sometimes inconspicuously so, inflated below in the lower part and often 4-angled, the angles alternating with the sepals, cyathiform above the constriction, pubescent outside mainly in the middle region, pubescent to pilose, rarely subglabrous inside around the constriction; lobes erect to slightly spreading, broadly to narrowly deltoid, smooth to slightly crenulate, obtuse, occasionally emarginate. *Stamens* 4, free; filaments mostly linear, expanded at the apex at the point of attachment to the anther, sparsely pilose to villous; anthers manifest, bipartite, 0,8–1,5 mm long, mostly oblong, scabrid to long scabrid, muticous or aristate; awns up to half the length of the cell; pore up to half the length of the cell; pollen grains single. *Ovary* 2-celled with a single ovule in each cell, mostly compressed, ovoid to oblate, obtuse, glabrous to pilose at the apex; style filiform, glabrous, far exserted; stigma subsimple to capitellate. Figs 9–16.

A species forming low compact semispreading to erect shrublets up to 0,5 m occurring in sandy areas in mountains between Porterville and Nieuwoudtville in the western Cape, flowering from August to November.

G. ciliaris is characterized by having the calyx segments free or only very slightly joined at the base, the corolla-tube more or less distinctly constricted in the middle and the cilia on the calyx longer than the width of the sepals.

G. ciliaris is one of the oldest described species among the minor genera of the Ericoideae. Strangely the species is very isolated and far-removed from Cape Town where other species more accessible existed, but were overlooked for so long. Despite its long standing, the species has been very much confused until now. Linnaeus, the younger, stated in the protologue that the species had 3-nate leaves based undoubtedly on a Thunberg specimen. Thunberg himself later published a fuller description from his own specimen stating that the leaves were 4-nate. This error was subsequently repeated by numerous authors until Rach (1853) corrected this.

A similar situation exists with *G. ciliaris* as occurs in *G. plumosa*. In Flora Capensis Brown recognized six species which he grouped on the character of a

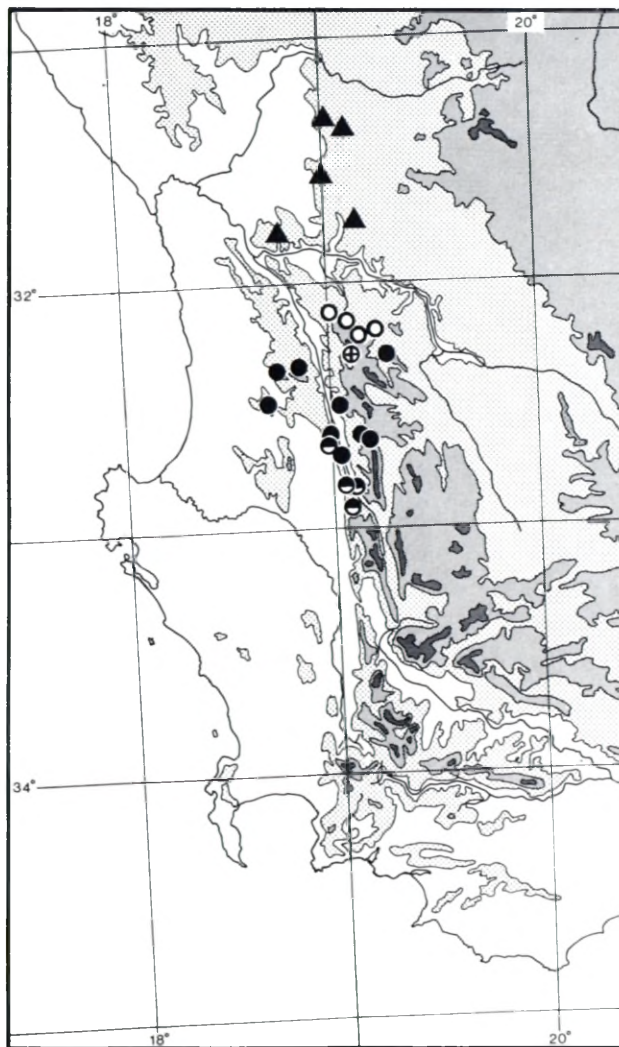


FIG. 9.—Distribution of *Grisebachia ciliaris*: ▲ subsp. *ciliaris*; ○ subsp. *bolusii*; ⊕ subsp. *involuta*; ● subsp. *ciliciflora*; ◐ subsp. *multiglandulosa*.

calyx divided to the base and muticous anthers. He then separated the species on the nature of the indumentum on the leaves, the sepal size and the length and form of the sepal hairs. These species were *G. bolusii*, *G. apiculata*, *G. involuta*, *G. velteriflora*, *G. dregeana* and *G. zeyheriana*. A seventh species, *G. thunbergii* (*G. ciliaris*), he characterized incorrectly by placing it with those species not having a distinctly constricted corolla. On the small amount of material available to Brown the recognition of these taxa as distinct species was feasible but numerous subsequent collections have provided a considerable degree of variation which broke down many of the existing discontinuities in the median bracteoles (Figs 10 & 11), sepal hairs (Fig. 12) and leaf glands.

It would appear that we are dealing with an aggregate species of spatially separated noninterbreeding populations which are in the first stages of evolving into a number of distinct entities which may eventually become sufficiently distinct to be regarded as separate species. At present, similarities are too close to justify this latter classification.

An important feature and character of use in delimiting the subspecies is the nature of the cilia on the calyx, something which is easily observable and yet somewhat difficult to define (Fig. 11) particularly in regard to the plume sidebranches.

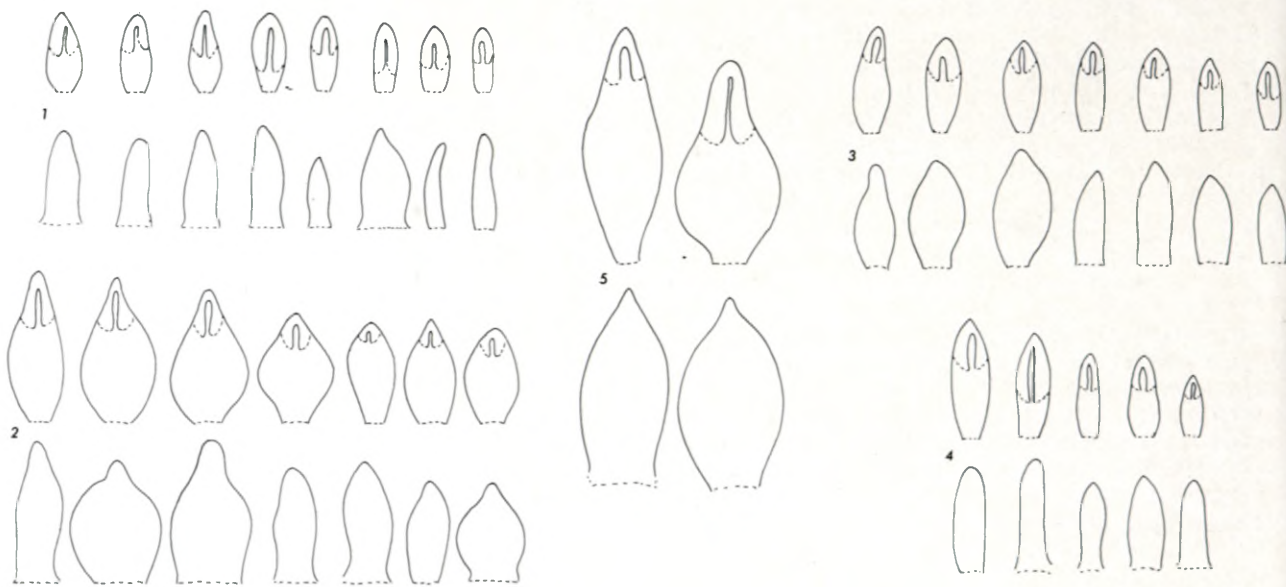


FIG. 10.—*Grisebachia ciliaris*, variation in the median bracteole (above) and sepals (below) of the outer flowers. 1, subsp. *ciliaris*; 2, subsp. *bolusii*; 3, subsp. *ciliciflora*; 4, subsp. *multiglandulosa*; 5, subsp. *involuta*. All $\times 6$.

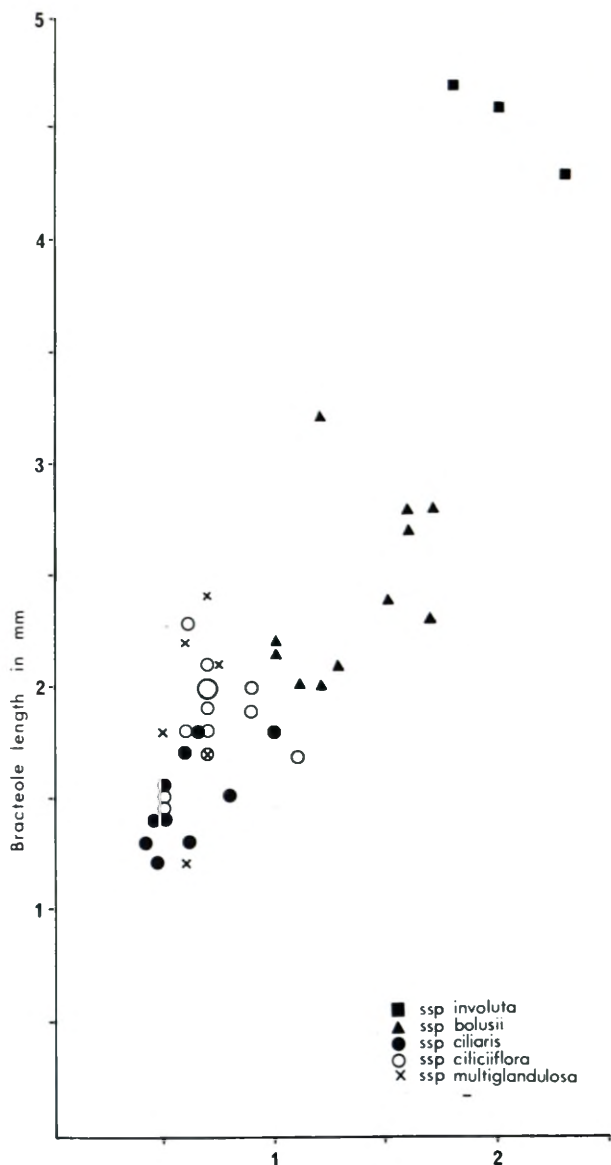


FIG. 11.—*Grisebachia ciliaris*, scatter diagram showing the variation in the median bracteole of the outer 3 flowers in a single inflorescence. Each dot represents the mean measurement of each inflorescence.



FIG. 12.—*Grisebachia ciliaris*, types of calyx cilia, all drawn $\times 16$. 1, subsp. *ciliaris*; 2, subsp. *bolusii*; 3, subsp. *ciliciflora*; 4, subsp. *multiglandulosa*; 5, subsp. *involuta*.

G. ciliaris is confined mostly to the eastern side of the Olifants River occurring as far north as the Bokkeveld Plateau at Nieuwoudtville and the Gifberg (subsp. *ciliaris*). In the northern Cedarberg subsp. *bolusii* is confined to the Pakhuis Pass and area around Heuningvlei and Boontjieskloof with subsp. *involuta* recorded only from the Krakadouw area. Two records of subsp. *ciliciflora* occur near Wupperthal far removed from the rest of the populations which occur in two centres, one in the Elands-kloof mountains and Piekenierskloof, the other in the west on the Boekenberg and Lambertshoekberg. Subsp. *multiglandulosa* is confined to the mountains at the southern end of the main Olifants River Valley. The species seems to be specific to *Grisebachia*-type habitats namely small level open sandy alluvia mostly occurring in the mountains in isolated pockets.

G. ciliaris has several relationships with other species due to its considerable variability. The relationships lie with *G. plumosa* subsp. *pentheri* and subsp. *eciliata* and with *G. incana* and are discussed under the relevant subspecies in *G. ciliaris*.

This is a variable taxon in which five subspecies are recognized.

Key to subspecies

Bracteoles refer to the median bracteoles of the outer 3 flowers in any inflorescence

Bracteoles small up to $1,8 \times 1,0$ mm mostly $1,2 \times 0,5$ mm, mostly with a narrow base and relatively large keel-tip:

Leaves canopubescent with crisped hairs at least when young, not distinctly glandular:

Bracteoles with crisped pubescence, very rarely also with short stout hairs; calyx hairs short, simple and straight to crooked and irregularly plumose with spreading branches.....(a) subsp. *ciliaris*

Bracteoles pubescent and with distinct long plumose cilia; calyx hairs long slender, more or less straight, sparsely but evenly plumose with short forward-pointing branches.....(d) subsp. *ciliatiflora*

Leaves not canopubescent, gland-apiculate or glandular hairy:

Glands on short hairs or sessile, apical and/or marginal only.....(d) subsp. *ciliatiflora*

Glands on long hairs, apical, marginal and on abaxial surface.....(e) subsp. *multiglandulosa*

Bracteoles large, more than 2×1 mm with a broad base and relatively small keel-tip:

Bracteoles less than $3,2$ mm long; sepals less than 3 mm long.....(b) subsp. *bolusii*

Bracteoles more than $4,2$ mm long; sepals more than 4 mm long.....(a) subsp. *involuta*

(a) subsp. *ciliaris*

Blaeria ciliaris L.f., Suppl. 122 (1782); Willd., Sp. Pl. 1: 631 (1798); Wendl., Collect. 49 (1805); Ait., Hort. Kew ed. 2, 1: 249 (1810); Roem. & Schult., Syst. Veg. 3: 170 (1818); Klotzsch in Linnaea 8: 658 (1833); G. Don, Gen. Syst. 3: 805 (1834). Type: Herb. Linn. (LINN, holo.; K, fragm.). *Grisebachia ciliaris* (L.f.) Klotzsch in Linnaea 12: 255 (1838), quoad nom. excl. spec. in herb. Willd. no. 2890.

Erica plumosa Thunb., Prodr. 73 (1794); Salisb. in Trans. Linn. Soc. 6: 339 (1802); Schultes in Thunb. Fl. Cap. 364 (1823). Type: Thunberg no. 9393 (UPS). *Blaeria plumosa*

(Thunb.) Thunb., Diss. Blaeria 9 (1802). *Grisebachia thunbergii* Rach in Linnaea 26: 789 (1853); N.E. Br. in Fl. Cap. 4, 1: 347 (1906). Type as for *Erica plumosa*.

Grisebachia dregeana Benth. in DC., Prodr. 7: 701 (1839); N.E.Br. in Fl. Cap. 4, 1: 342 (1906). Type: Cape Colony, Drège 7803 (K, holo.; isos.).

Branches pubescent with retrorse simple hairs, sometimes arachnoid. Leaves adpressed, $1-2,5$ mm long, narrowly ovate to oblong to obovate, hairy with dense crisped retrorse hairs, often becoming glabrous on the abaxial surface. Bracteoles equal to slightly unequal, median to remote, often recurved, the median $1,3-1,8 \times 0,45-0,8$ mm, narrowly ovate to elliptic to oblong with a relatively large keel-tip and no markedly expanded base, mostly pilose with crisped hairs, very rarely ciliate with a few short stout hairs; pedicel up to $1,5$ mm long. Sepals $1,5-2,2 \times 0,4-1,1$ mm, narrowly oblong to oblong to oblong-ovate, often with a swollen knob-like apex, very slightly keel-tipped, pilose at the base and sometimes in the upper half, the apex clothed with a tuft of lanate hairs, ciliate with simple to plumose stout hairs with irregular short and long spreading plume branches, eglandular or gland-tipped, cilia often crooked, as long as or longer than the width of the sepal, occasionally with some similar hairs on the abaxial surface, the apex usually devoid of cilia, rarely with cilia. Corolla up to $3,5$ mm long, distinctly or indistinctly constricted in the middle, the constriction sometimes not visible in dried material, pubescent outside in the middle region, pilose to almost glabrous inside around the constriction. Anthers $0,8-0,9$ mm long, scabrous, aristate rarely muticous; awns up to half the length of the cell. Ovary glabrous to pilose at the apex. Fig. 13.

CAPE.—3119 (Calvinia): Van Rhyns Pass (—AC), Barker 9427 (NBG; STE); Compton 20884 (BOL; NBG; STE); Hutchinson 763 (BM; BOL; K; PRE); 790 m, Oliver s.n. (STE); 762 m,

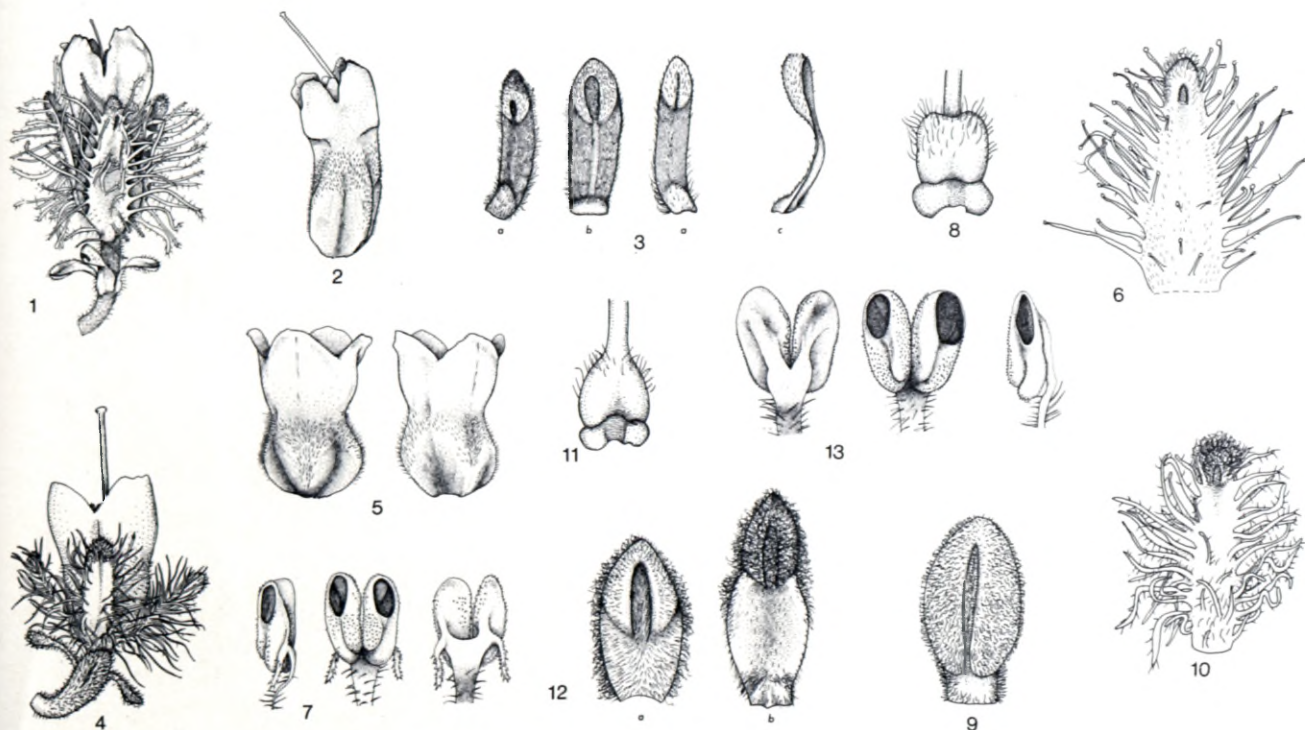


FIG. 13.—*Grisebachia ciliaris* subsp. *ciliaris*. 1, flower, $\times 8$; 2, corolla, $\times 8$; 3, bracteoles, $\times 16$: a, laterals; b, median; c, median inside view; all drawn from the fragment of the holotype (K); 4, flower, $\times 8$; 5, corolla, two views, $\times 8$; 6, sepal, $\times 16$; 7, anther, side, front and back views, $\times 16$; 8, ovary, $\times 16$; 9, leaf, $\times 16$; all drawn from Oliver 3860 (STE); 10, sepal, $\times 16$; 11, ovary, $\times 16$; both drawn from Marloth 7646 (STE); 12, median bracteoles, $\times 16$, a from Marloth 7646 (STE) and b from Middlemost 1594 (NBG); 13, anther, back, front and side views, $\times 16$, drawn from Drège 7803 (MO).

Oliver 3860 (STE; PRE); Salter 1633 (BM; K; MO); L. E. Taylor 2840 (NBG); Oorlogskloof, 580 m (-AC), Lavis in BOL 19811 (BOL); Bokkeveld mountains behind farm Tabaktuin, 910 m (-AC), Leipoldt 740 (BOL; K); Nieuwoudtville near the homestead, 910 m (-AC), Leipoldt 741 (BOL; PRE), Glenridge, just west of Nieuwoudtville (-AC), Lewis 5723 (NBG); 700 m, Oliver 3864 (G; PRE; S; STE); west of Nieuwoudtville, 750 m (-AC), Marloth 7646 (PRE; STE); Middlemost 1594 (BOL; NBG); Willems River, 700 m (-AC), Schlechter 10974 (BM; BOL; K; MO; STE); Lokenburg, 670 m (-CA), Acocks 17287 (PRE); Ekerdam, Calvinia (?), L. E. Taylor 2970 (NBG). 3118 (Vanrhynsdorp): Kobe Pass, 910 m (-DB), Hall 4514 (NBG; STE); Gifberg near top of pass, (-DD), Boucher s.n. (STE); 610 m, Oliver s.n. (STE); Gifberg, 610 m (-DC/DD), Drège 7803 (BM; BOL; E; G; K; MO; P; W); Drège s.n. (G-DC); 910 m. Compton 20885 (NBG); Phillips 7585 (BOL; K; SAM). Without locality: Thunberg s.n. (UPS; S); Thunberg? (LINN; K; LU). Doubtful localities: Clanwilliam, Bayliss s.n. (NBG); Cedarberg Middelberg, Leipoldt 741 (BM; BOL; K; SAM); Nortier Reserve, Clanwilliam, Leipoldt 4365 (BOL).

This subspecies is distinguished by the canopubescens leaves, the hairs being crisped and not glandular, the crisped pubescence on the bracteoles, with rarely short stout hairs, and the relatively short calyx hairs, the hairs being simple and straight to crooked and irregularly plumose with spreading branches (Fig. 12).

Variation within the subspecies occurs in the width of the sepals where the broad form (Lavis 19811) merges into what was *G. dregeana* recorded as a single collection from the Gifberg. Similarly variation in the pubescence on the ovary apex and the presence or absence of anther awns provided a gradation with *G. dregeana*.

There are three groupings of populations within the subspecies. The northern group occurs on the Nieuwoudtville Plateau and has no plumes on the leaves nor cilia on the calyx apices. The two southern populations on the Gifberg and at Lockenberg are intermediates between subsp. *ciliaris* and subsp. *bolusii* in occasionally having plumes on the cilia

and a few cilia on the sepal apices. Due to the large spatial separation, a hybrid origin is ruled out. Another line of relationship occurs with subsp. *ciliciflora* of the Citrusdal area. From this latter it differs in the type of plumose sepal cilia and in having short sepal cilia. Sometimes the leaves of these two subspecies are remarkably similar in having a crisped retrorse indumentum and no cilia.

G. ciliaris (*G. thunbergii* Rach) was incorrectly assessed by Brown, who judged the corollas to be without any distinct constriction in the middle. This condition is apparent in the dried material which, when thoroughly boiled, sometimes shows a slight constriction. However, all fresh material examined possessed distinctly constricted corollas.

This subspecies is most closely related to *G. incana* from the flats near Cape Town—an unusual distributional relationship. It is distinguished by the calyx hairs being as long as or longer than the width of the sepals and, if equal, with a distinct tuft of apical crisped hairs.

(b) subsp. *bolusii* (N.E. Br.) E. G. H. Oliver, comb. et stat. nov.

G. bolusii N.E. Br. in Fl. Cap. 4, 1: 340 (1906). Type: Mountains near Pakhuis Pass, Bolus 8681 (BOL, holo!; K!; NH!; PRE!; STE!; Z!).

Branches puberulous to pilose with simple hairs, sometimes with short stout plumose hairs admixed. Leaves extremely variable, 1,2–3,5 mm, linear-lanceolate to ovate or obovate, pubescent, sometimes with dense crisped hairs or almost lanate becoming glabrous, ciliate with stout plumose hairs or just compound tufts, rarely only pubescent, cilia variable mostly straight with few to many long spreading plume branches, eglandular, often falling off and remaining as stubs. Bracteoles sub-equal to very

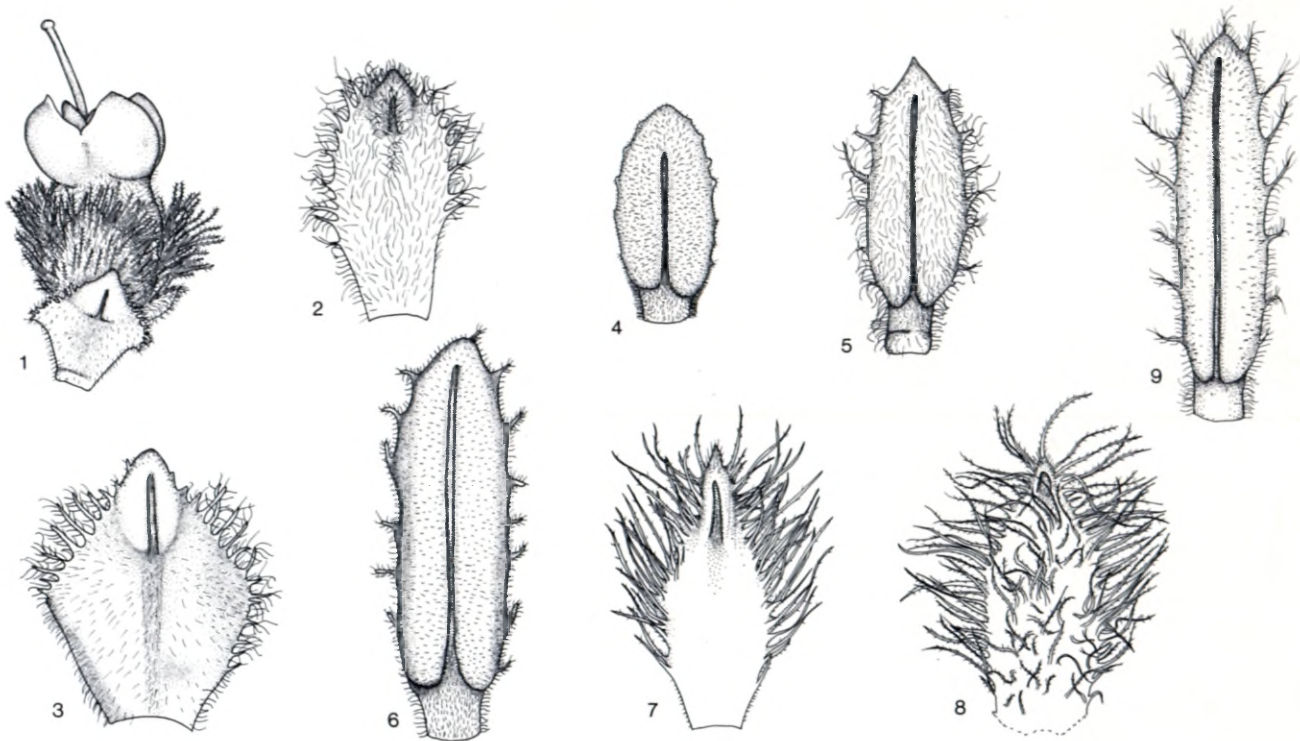


FIG. 14.—*Grisebachia ciliaris*: subsp. *bolusii*. 1, flower, $\times 8$; 2, lateral bracteole, $\times 16$; 3, median bracteole, $\times 16$; 4, leaf, $\times 16$; all drawn from the holotype, Bolus 8681 (BOL); 5, leaf, $\times 16$, drawn from Compton 9634 (STE); 6, leaf, $\times 16$, drawn from Lewis 2725 (STE); subsp. *involuta*. 7, median bracteole, $\times 8$; 8, sepal, $\times 8$; 9, leaf, $\times 16$; all drawn from Bodkin sub Bolus 8680 (BOL).

unequal, adpressed to the calyx, the median elliptic to broadly elliptic or ovate, 2.0–3.2 × 1.0–1.7 mm, with broad flat base and relatively small but distinct keel-tip, the laterals oblong-elliptic to obovate sometimes oblique, glabrous to puberulous, ciliate in the upper half with stout plumose hairs. *Sepals* 2.1–3.0 × 0.9–2.0 mm, oblong-elliptic to very broadly elliptic, pubescent rarely subglabrous, ciliate with short to long stout plumose hairs, rarely subplumose, eglandular, plume branches spreading, relatively long, rarely short and erect, with similar hairs on the abaxial surface, ciliate at the apex and with an apical tuft of straight not lanate hairs. *Corolla* 3–4 mm long, pubescent to pilose inside and outside in the middle region. *Anthers* muticous rarely minutely awned. *Ovary* glabrous. Fig. 14.1–14.6.

CAPE.—3218 (Clanwilliam) (–BB) & 3219 (Wuppertal) (–AA): Pakhuis Pass, *Barker* 5622 (BOL; NBG); *Barker* 9426 (NBG); *Barker* 9426 (NBG); *Bolus* 8681 (BOL; K; NH; PRE; STE; Z); 610 m, *Compton* 4319 (BOL; NBG); 914 m, *Compton* 6864 (NBG); *Compton* 6927 (NBG); 610 m, *Compton* 7738 (NBG; STE); 760 m, *Compton* 9584 (PRE; STE); *Esterhuysen* 3225 (BOL; K; PRE; SAM); 760 m, *Esterhuysen* 23753 (BOL; STE); 610 m, *Levy* 3937 (CT); 760 m, *Levy* 5052 (CT; PRE); *Middlemost* 1731 (NBG; STE); *Salter* 2765 (BM; BOL; K); 3219 (Wuppertal): Heuningvlei (–AA), *Andrag* 130 (STE); Pakhuis Pass, east slopes (–AA), *Lewis* 2725 (SAM; STE); 760 m (–AA), *Marsh* 351 (K; PRE; STE); 914 m (–AA), *Oliver* 3002 (PRE; STE); Boontjiesvlei (–AA), *Stokoe* in *SAM* 55195 (NBG; PRE; SAM); Pakhuis Pass to Heuningvlei, 960 m (–AA), *Taylor* 8537 (STE); 990 m, *Williams* 899 (NBG); Bothasberg, 600–900 m (–AA), *Thorne* in *SAM* 52644 (SAM).

This subspecies is distinguished by having a large median bracteole more than 2 × 1 mm but less than 3.2 mm long with a broad base and relatively small keel-tip and with marginal cilia, leaves mostly ciliate with stout plumose hairs at least when young, sepals less than 3 mm long with very plumose stout hairs with spreading branches.

This is a very variable taxon particularly as to the leaves, some being close to subsp. *ciliaris* with the short crisped indumentum and only a few tufted cilia. The majority of specimens has awnless anthers whereas those of subsp. *ciliaris* are mostly awned except in the southern populations. The bracteoles and leaves with distinct cilia serve to distinguish subsp. *bolusii*. The larger linear-leaved form tends towards subsp. *involuta*. A superficial similarity exists between subsp. *bolusii* and *G. plumosa* subsp. *pentheri* which occurs on the west side of the Olifants River valley. The free, as opposed to joined, sepals with numerous or few abaxial hairs serve to distinguish the two taxa.

Subsp. *bolusii* is very restricted in its distribution occurring only in the area around the summit of the Pakhuis Pass where, as can be expected, it has been frequently collected.

(c) subsp. *involuta* (Klotzsch) E. G. H. Oliver, comb. et stat. nov.

G. involuta Klotzsch in *Linnaea* 12: 227 (1838); Benth in *DC.*, *Prodr.* 7: 701 (1839); Drège, *Zwei Pfl. Docum.* 72 (1843); N.E. Br. in *Fl. Cap.* 4, 1: 340 (1906). Type: Boschklouf, Drège s.n. (B, holo.†; possible isos. G!; G–DC!) distributed as 7801 (BOL!; K!; P!; S!);. Lectotype: Drège 7801 (K).

Branches pubescent with simple hairs. *Leaves* adpressed, up to 4.5 mm long, mostly lanceolate, straight, sparsely puberulous becoming glabrous, ciliate with short stout plumose hairs which become setae. *Bracteoles* unequal, median, adpressed to the calyx, the median 4–5 × 1.7–2.3 mm long elliptic to ovate with an expanded flat base and distinct keel-tip, the laterals about 3 mm long oblong with a slight keel-tip, all glabrous except for a few hairs

on the keel-tip, ciliate with long slightly plumose straight hairs, the plume branches very small and pointing towards the apex of the cilium. *Sepals* 4.3 × 1.9–2.3 mm broadly elliptic, slightly keel-tipped, glabrous, with apical tuft of short straight hairs, ciliate with long straight slightly plumose hairs, plume branches very small and pointing towards the apex of the cilium. *Corolla* 6–7 mm long, constricted two-thirds of the way up, pubescent in the middle region outside, villous inside at the constriction. *Anthers* about 1.5 mm long, muticous, scabrous. *Ovary* glabrous. Fig. 14.7–14.9.

CAPE.—3219 (Wuppertal): Krakadouw (–AA), *Bodkin* sub *Bolus* 8680 (BM; BOL; K; PRE; STE); Boschklouf at the foot of Blaauwberg, 300–600 m (–AA), Drège 7801 (BOL; K; P; S); Drège s.n. (G–DC); Pakhuis mountains (–AA), MacOwan 3268 (SAM).

This subspecies is characterized by its overall larger flowers and inflorescence, the bracteoles being longer than 4.2 mm and the sepals longer than 4 mm, both with a broad base and relatively small keel-tip.

The larger size is the only differentiating character between this subspecies and some forms of subsp. *bolusii*. It also has close similarities with some forms of subsp. *ciliciflora* but, again, the size difference is pronounced and the bracteole shape slightly different. The sepal cilia (Fig. 12) are more closely related to those of subsp. *ciliciflora* than those of subsp. *bolusii*.

Subsp. *involuta* is very restricted in its distribution possibly occurring in only one or two populations on the western side of the Krakadouw range. No recent collections have been made. These populations are allopatric to those of subsp. *bolusii* and subsp. *ciliciflora* making interchange of genetic material highly improbable.

(d) subsp. *ciliciflora* (Salisb.) E. G. H. Oliver, comb. et stat. nov.

Erica ciliciflora Salisb. in *Trans. Linn. Soc.* 6: 339 (1802). Type: Hottentots-Holland, Masson s.n. (BM, holo!). *Blaeria ciliciflora* (Salisb.) G. Don, *Syst. Veg.* 3: 805 (1834). *G. ciliciflora* (Salisb.) Druce in *Rep. Bot. Soc. Exch. Club Brit. Isl.* 1916: 625 (1917).

G. velleriflora Klotzsch in *Linnaea* 12: 227 (1838); Benth. in *DC.*, *Prodr.* 7: 701 (1839); N.E. Br. in *Fl. Cap.* 4, 1: 341 (1906). Type: between Twenty-four Rivers and Olifants River, Drège s.n. (B, holo.†; P!).

G. zeyheriana Klotzsch in *Linnaea* 12: 227 (1838); N.E. Br. in *Fl. Cap.* 4, 1: 342 (1906). Type: near Olifantsrivier and Farm Brakfontein, Ecklon & Zeyher s.n. (B, holo.†) distributed as 269 (G!; K!; LU!; MEL!; MO!; P!; S!; SAM!; W!).

G. apiculata N.E. Br. in *Fl. Cap.* 4, 1: 341 (1906). Type: mountains near Piekenier's Kloof, Schlechter 4969 (K, holo!; BM!; BOL!; G!; P!; PRE!; S!; STE!; W!; Z!).

Branches pubescent with erect to retrorse short simple hairs. *Leaves* adpressed, 1.5–3.0 mm long, linear to ovate, mostly pubescent with adpressed crisped hairs becoming somewhat glabrous on the abaxial surface, rarely glabrous when young, occasionally ciliate with short stout gland-tipped hairs or just apiculate. *Bracteoles* remote or median, unequal to subequal, slightly recurved, 1.4–2.3 × 0.5–0.8 mm, oblong to elliptic, the laterals linear to linear-elliptic, with a distinct keel-tip and flat base, pubescent to subglabrous but with an apical tuft of crisped hairs, ciliate with long stout subplumose hairs; pedicel long pilose. *Sepals* 1.6–2.5 × 0.6–1.3 mm, oblong to broadly elliptic with a slight keel-tip pubescent to glabrous with or without an apical tuft of straight hairs, ciliate with long straight plumose hairs, plume branches small forward pointing, rarely subplumose, rarely gland-tipped. *Corolla* 2.5–3.0 mm long, distinctly constricted and 4-angled

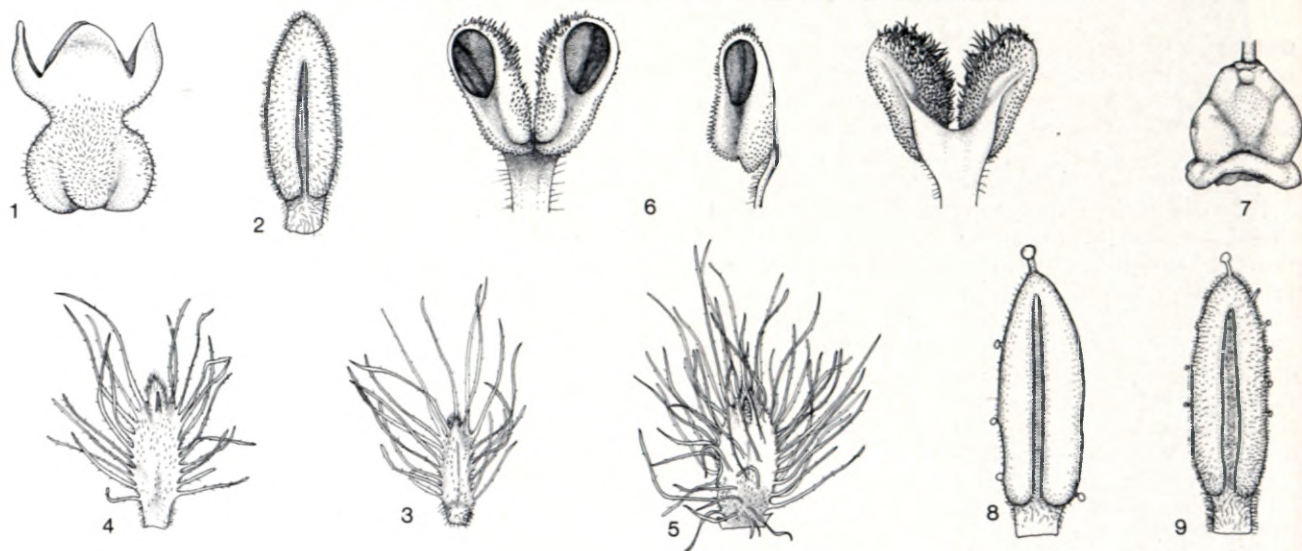


FIG. 15.—*Grisebachia ciliaris* subsp. *ciliciiflora*. 1, corolla, $\times 8$; 2, leaf, $\times 16$; both drawn from *Oliver* 4017 (STE); 3, lateral bracteole, $\times 8$; 4, median bracteole, $\times 8$; 5, sepal, $\times 8$; 6, anther, front, side and back views, $\times 16$; 7, ovary, $\times 16$; all drawn from the holotype, *Masson* s.n. (BM); 8, leaf, $\times 16$, drawn from *Stokoe* in SAM 54847 (STE); 9, leaf, $\times 16$, drawn from *Schlechter* 4969 (STE).

at the base, pubescent to pilose outside and inside in the middle region. *Anthers* about 1 mm long, mucous long scabrous; pore half the length of the cell. *Ovary* glabrous. Fig. 15.

CAPE.—3218 (Clanwilliam): Between Berg and Lang Valley (–BC), *Acocks* 2995 (S); Boekenberg, 548 m (–BC), *Compton* 4947 (BOL); Alexandershoek, 90–120 m (–BC/BD), *Schlechter* 5127 (BM; BOL; K; P; PRE; SAM; STE; W; UPS; Z); Lambertsboekberg, 910 m (–BD), *Compton* 5492 (BOL; NBG); Between Witelskloof & Lambertshoekberg, (–BD), *Pillans* 9057 (BOL; K; PRE); Piekenierskloof, 365 m, (–DB), *Schlechter* 4969 (BM; BOL; G; K; P; PRE; S; STE; W; Z). Without precise locality: Clanwilliam, *Leipoldt* 213 (BOL; K; PRE; SAM); Clanwilliam, *Mader* 181 (BOL; K). 3219 (Wuppertal): Citadelpark near Wuppertal (–AA), *Compton* 24264 (NBG; STE); Brakfontein, 300 m (–AC) *Adamson* sub *Levy* 1320 (CT); by the Olifants River and near Brakfontein, (–AC), *Ecklon & Zeyher* 269 (G; K; LD; MEL; MO; P; S; SAM; W); Elandskloof, 610 m (–CA), *Compton* 5325 (BOL; NBG); 1370 m, *Compton* 16128 (NBG; STE); *Compton* 20965 (BOL; NBG; PRE; STE); *Leipoldt* in *BOL* 21655 (BOL); *Stokoe* in SAM 54847 (SAM; STE); Elandskloof Pass, (–CA), *Häfstrom & Acocks* 1043 (PRE; S; STE); Waterfall between Citrusdal & Elandskloof, (–CA), *Stokoe* 7712 (BOL; NBG; NH; PRE); *Williams* sub *Baker* 1821 (BM); Kleinfontein east of Citrusdal 762 m, (–CA), *Oliver* 4019 (E; K; MO; P; PRE; STE); Allandale, south-east of Citrusdal, 548 m (–CA), *Oliver* 5007 (BM; G; S; STE); near Citrusdal (–CA), *Rust* s.n. (STE); Warmbaths to Modderfontein, (–CA), *Stephens* 7042 (BM; BOL; K; SAM); between Twenty-four Rivers and Olifants River, 300 m (–CC/3319 AA), *Drège* 1179 (P). Without locality: *Drège* s.n. (BM; BOL; G; K; MO; W); *Forsyth* s.n. (BOL; K); *Masson* s.n. (BM; G–DC).

This subspecies is characterized by the small usually subequal narrow-based bracteoles with conspicuous long plumose cilia and by the leaves, when glandular, with the glands apical or marginal only and usually short-stalked to sessile and by the sepals with long plumose hairs having very small erect branches.

Relationships with the other subspecies are in three directions and are somewhat difficult to explain in the case of subsp. *ciliaris* due to the geographical isolation of the latter. The relationships with subsp. *involuta* and subsp. *multiglandulosa* are understandable due to the reasonably close proximity of the populations.

There is considerable variation within this subspecies which necessitated the inclusion of *G. apiculata* and *G. zeyheriana* in the synonymy. The typical form of subsp. *ciliciiflora* possesses leaves with a

crisped, sometimes retrorse, indumentum and calyx with numerous long sparsely plumose hairs with plume branches forward pointing. In some forms the leaves possess sessile or subsessile marginal glands and a large apical gland.

Subsp. *ciliciiflora* occurs in the Citrusdal area mostly at lower altitudes on sandy open patches and on the mountains north-west of the town. The locality near Wuppertal, *Compton* 24264, is unusual and inexplicable.

(e) subsp. *multiglandulosa* E. G. H. *Oliver*, subsp. nov., similis subspecie *ciliciiflorae*, sed distinguitur pilis longis glandulis marginibus et paginis abaxialibus foliorum bracteolarumque.

TYPE.—Cape, Olifants River Valley above Toorgat on the farm Grootfontein, *Oliver* 3972 (STE, holo.; K!; MO!; NBG!; PRE!).

Branches puberulous to subglabrous with stouter gland-tipped hairs admixed. *Leaves* recurved-spreading sometimes straight and adpressed, 1.5–4.5 mm long with petiole 0.5 mm long, lanceolate to ovate mostly glabrous and shiny on the abaxial surface and sparsely puberulous on the adaxial surface, rarely entirely glabrous, occasionally puberulous all over when young, ciliate and clothed on the abaxial surface with short to long stout simple gland-tipped hairs, sometimes those on abaxial surface falling off in erect leaves. *Bracteoles* median to remote, subequal to unequal, 0.8–2.5 mm long the laterals mostly 1.0 mm long, linear to oblong-ovate to oblong-elliptic with an enlarged keel-tip, glabrous to pilose in the lower half, sometimes crisped at the apex, ciliate with stout gland-tipped simple hairs with a few on the keel-tip; pedicel up to 2.5 mm long, sparsely puberulous with simple and gland-tipped hairs. *Sepals* 1.9–2.5 $\times$ 0.5–0.8 mm oblong to oblong-ovate with a slight keel-tip, glabrous, rarely with a few scattered hairs, ciliate with long straight subplumose to simple hairs with similar hairs on the abaxial surface, hairs often gland-tipped. *Corolla* about 4.5 mm long, distinctly 4-angled, pubescent below the constriction sometimes sparsely so and confined to the angles, villous inside. *Anthers* about 0.8 mm long, scabrous, mucous. *Ovary* glabrous. Fig. 16.

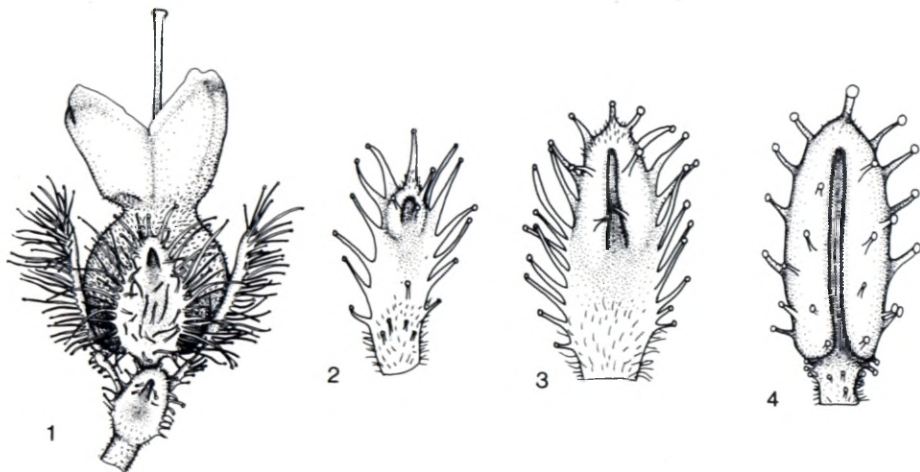


FIG. 16.—*Grisebachia ciliaris* subsp. *multiglandulosa*. 1, flower, $\times 8$; 2, lateral bracteole, $\times 16$; 3, median bracteole, $\times 16$; 4, leaf, $\times 16$; all drawn from the holotype, Oliver 3792 (STE).

CAPE.—3218 (Clanwilliam): Grey's Pass, 457 m (–DB), *Levy's* 1367 (CT; SAM). 3219 (Wuppertal): Olifants River Valley, Keerom (–CC), *Esterhuysen* 17889 (BOL); east slope of Grassuggens, 640 m (–CC), *Oliver* 3992 (STE); *Pillans* 8785 (BOL; PRE; STE); Olifants River Valley above Toorgat on Grootfontein, 548 m (–CC), *Oliver* 3972 (K; MO; NBG; PRE; STE); Grootfontein, Ratel River, 426 m (–CC), *Oliver* 3987 (E; PRE; STE); Porterville mountains, Berghof, 790 m (–CC), *Oliver* 3934 (BM; G; NBG; PRE; STE; Z); 3941 (K; STE; W).

This subspecies may easily be recognized by its leaves which are erect to recurved-spreading mostly glabrous but with distinct long gland-tipped hairs on the margins and abaxial surface, by its small bracteoles up to $1,8 \times 1,0$ mm which have stout subplumose to simple hairs on the margins and abaxial surface of the keel-tip and by the simple to subplumose eglandular or gland-tipped hairs on the sepals.

The material available varies somewhat in floral and foliage characters. The leaves are always gland-ciliate with long stout hairs on the margins and abaxial surface and are mostly distinctly recurved-spreading. But a few specimens have erect adpressed leaves like those of subsp. *ciliciflora*. The calyx cilia may be simple or occasionally plumose with plume branches like those in subsp. *ciliciflora*. It was found that the only distinguishing character is the presence of abaxial hairs on the leaves and bracteoles in subsp. *multiglandulosa*.

Subsp. *multiglandulosa* is confined to the mountains at the southern end of the main Olifants River valley where it occurs mainly on sandy open flat areas. The majority of populations is allopatric to those of subsp. *ciliciflora*, occurring at high altitude only. In the region of Piekenierskloof there is, however, an overlap. The specimen, *Levy's* 1367, is an intermediate very similar to the type and only collection of *G. apiculata* (subsp. *ciliciflora*). Unfortunately all the populations appear to have been removed in this area by agriculture thus making a study of the populations impossible.

3. *Grisebachia incana* (Bartl.) Klotzsch in Linnaea 12:225 (1838); Benth in DC., Prodr., 7:701 (1839); N.E. Br. in Fl. Cap. 4, 1:344 (1906).

Blaeria incana Bartl. in Linnaea 7: 650 (1832). Type: On flats below Tigerberg at Rietvallei, *Ecklon* s.n. (B, holo.†; P!). Lectotype: *Ecklon* s.n. (P).

G. alba N.E. Br. in Fl. Cap. 4, 1: 344 (1906). Type: without locality, *Grey* s.n. (K!).

Small compact shrublets to 30 cm high. Branches pubescent to tomentose with reflexed hairs, occasionally with stout plumose to gland-tipped sub-

plumose hairs in between. Leaves 3-nate adpressed, 1,5–2,0 mm long, elliptic to oblong-obovate, pubescent becoming glabrous on the abaxial surface, ciliate with a few very short stout plumose hairs or with short stout gland-tipped hairs; petiole very short, pubescent, sometimes with gland-tipped hairs. Flowers in small terminal heads of 3–6 (9) on the ends of lateral branchlets, pink, occasionally white; pedicel up to 1,0 mm long pubescent; bracteoles subequal to unequal, median but adpressed, 1,0–1,4 mm long, narrowly oblong to elliptic-oblong often with an enlarged keel-tip, acute or obtuse, the laterals linear, pubescent, ciliate with short stout plumose hairs or subplumose gland-tipped hairs. Calyx 4-partite; lobes $1,2\text{--}1,8 \times 0,3\text{--}0,65$ mm, mostly narrowly oblong, occasionally elliptic-oblong or linear, acute, pubescent with longer straight hairs at the apex, ciliate with stout plumose eglandular hairs to ciliate with stout subsimple gland-tipped hairs, all shorter than the width of the lobe, sometimes with similar but shorter hairs on the abaxial surface. Corolla 2,4–2,7 mm long, constricted at the middle, ellipsoid below, urceolate above, pilose to villous in the middle region and slightly up the back of the lobes, pilose inside around the constriction; lobes very broad, obtuse, erect-spreading. Stamens 8, free; filaments linear, much dilated at the point of attachment, sparsely pilose; anthers manifest, about 0,7 mm long with oblong parallel to spreading cells, scabrid edged, aristate; awns small to obsolete, arising from the apex of the filaments, scabrid; pore relatively small about one quarter the length of the cell. Ovary 2-celled with a single pendulous ovule in each cell, compressed, broadly ovoid, pubescent on top and seated on a distinct nectariferous disc; style filiform, glabrous, far exserted; stigma simple to capitellate. Fruit a hard verrucose nut. Figs 17 & 18.

A species forming small compact shrublets occurring in sandy places on the flats between Sir Lowry's Pass, Kraaifontein and Mamre, flowering early from April to July.

CAPE.—3318 (Cape Town), Flats east of Melkbosch (–CB). *Pillans* 6671 (BOL; K); Between Melkbosch and Mamre (–CB/DA), *Salter* 792 (BM; K); Groenekloof (–DA), *Ecklon* & *Zeyher* 266 (G; MEL; MO; W); Mamre road near Melkbosch-strand road (–DA), *Levy's* 9402 (CT); Mamre turnoff south-west of Olifantskop, 76 m (–DA), *Oliver* 3753 (STE); Koeberg, Baasariesfontein, 168 m, (–DA), *Oliver* 3756 (STE); Melkbosch, 7 km from the sea, (–DA), *Wasserfall* 167 (K; NBG; PRE); Rietvallei (–CD/DC), *Ecklon* s.n. (P); Kraaifontein, 15–30 m, (–DA), *Dümmer* 1553 (E); Gravel pits near Kraaifontein, (–DA), *Esterhuysen* 18638 (BOL; NBG; PRE); Brackenfell (–DA), *Galpin* 12679 (K; PRE; W); Scottsville, Kraaifontein

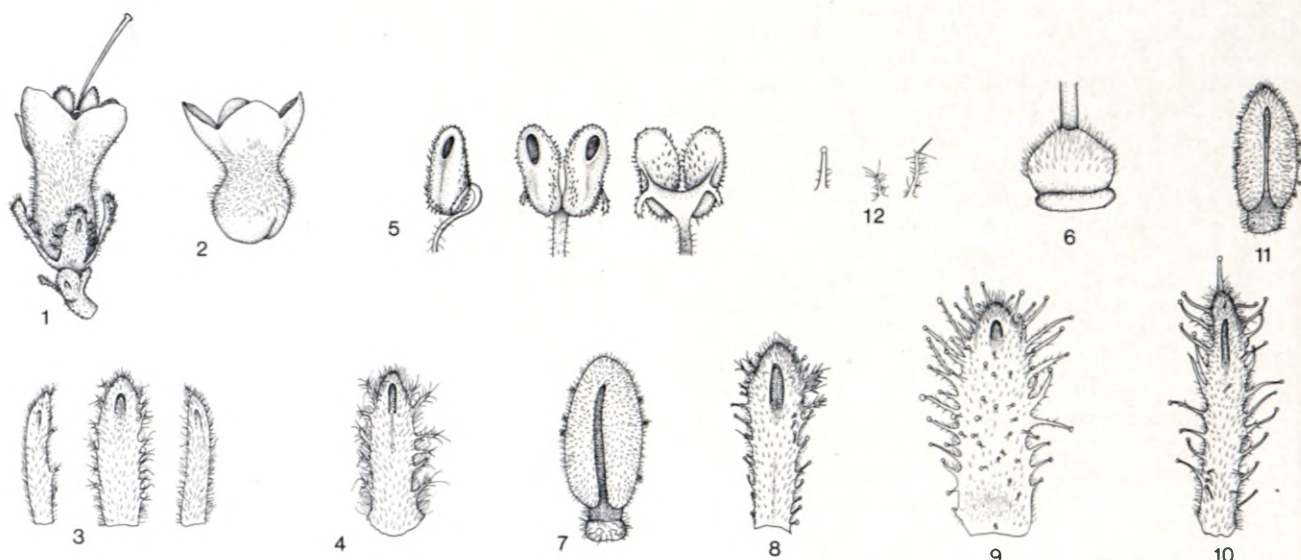


FIG. 17.—*Grisebachia incana*. 1, flower, $\times 8$; 2, corolla, $\times 8$; both from Oliver 3750 (STE); 3, bracteoles, $\times 16$; 4, sepal $\times 16$; 5, anther, side, front and back views, $\times 16$; 6, ovary, $\times 16$; all drawn from the lectotype, *Ecklon* s.n. (P); 7, leaf, $\times 16$, drawn from Oliver 3750 (STE); 8, median bracteole, $\times 16$; 9, sepal, $\times 16$; both drawn from Oliver 3746 (STE); 10, sepal, $\times 16$, drawn from *Stokoe* 6062 (BOL); 11, leaf, $\times 16$, drawn from Oliver 3746 (STE); 12, variation in the hair types on the sepals, $\times 16$.

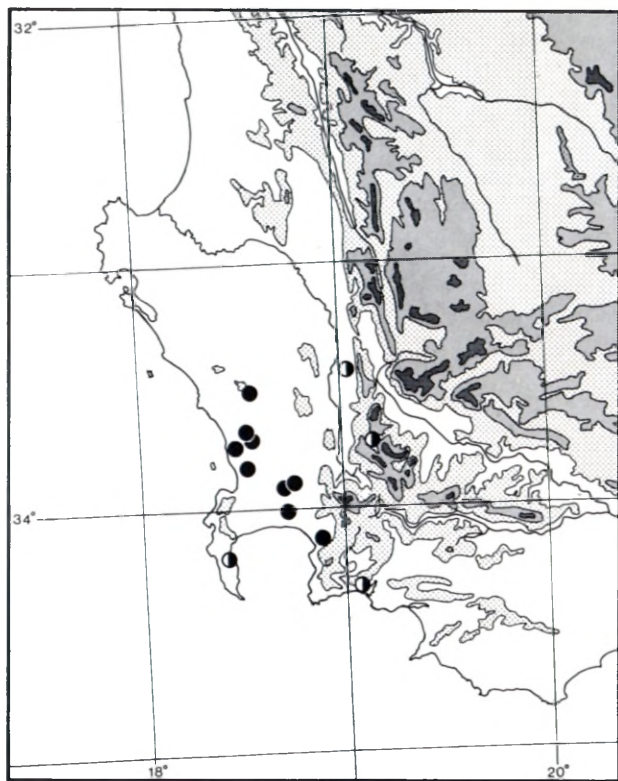


FIG. 18.—Distribution of *Grisebachia incana* (● are doubtful localities).

(-DA), *Markotter* s.n. (STE); Koopmanskloof between Bottelary and Kraaifontein (-DA), Oliver 3746 (STE); 3747 (STE); Base of Tygerberg (-DA), *Pillans* in BOL 17726 (BOL); Brackenfell (-DA) *Salter* 4395 (BM; BOL; K); Kraaifontein (-DA), *Strey* 479 (PRE); Old Tygerberg (-DA), *Zeyher* s.n. (SAM; PRE); Penhill Estate, Eersterivier, (-DC), *Raitt* s.n. (STE); Between the Cape Flats and Stellenbosch, (-DC/DD), *Burchell* 8344 (BOL; K; M; P; PRE; W). 3418 (Simonstown), Sir Lowry's Pass, 305 m, (-BB), *Lamb* 4091 (SAM). Without locality: Cape Town Flower Show, *Stokoe* 6062 (BOL; K; NBG; PRE); *Admiral Grey* s.n. (K); *Lehmann* s.n. (K); *Mund & Maire* s.n. (E; G; K; P; W). Doubtful localities: Vogelvllei, *Ecklon* & *Zeyher* s.n. (HAM; LU; P; UPS; Z); Dutoitskloof, *Erège* 6869 (BM; E; K; W); Hills behind Simonstown, *Lamb* 3223 (BOL; SAM); Kleinmond, *Leipoldt* s.n. (BOL; NBG; P); mountains near Swellendam, *Mund* s.n. (BOL; K).

G. incana may be distinguished from related taxa by its small flowers, small narrow sepals less than 2.0×0.65 mm which have slender straight cilia as long as but mostly shorter than the width of the sepal and by the straight hairs forming the apical tuft on the bracteoles and sepals.

The species affords a good example of geographical vicarism with its closely related species which are well separated spatially, e.g. *G. ciliaris* subsp. *ciliaris*, *G. rigida* and *G. nivenii*.

Difficulty was experienced in distinguishing *G. incana* from *G. ciliaris* subsp. *ciliaris*. The former occurs only on the sandy coastal flats adjacent to the Cape Peninsula, whereas the latter is confined to the summits of mountains around Vanrhynsdorp and Nieuwoudtville.

N. E. Brown unfortunately misinterpreted the corolla shape in *G. ciliaris* subsp. *ciliaris* and so isolated it from *G. incana* in his revision. Several characters were examined in detail and found to have a certain degree of disjunction and, when used in combination, served to distinguish the two taxa. In *G. incana* the leaves possess hairs which are mostly erect as opposed to the crisped retrorse hairs in *G. ciliaris* subsp. *ciliaris*. The leaves are usually edged with short stout plumose hairs or gland-tipped hairs, whereas in *G. ciliaris* subsp. *ciliaris* this rarely occurs. The calyx in *G. incana* is mostly pilose with a tuft of longer straight hairs at the apex and with cilia shorter than the width of the sepal. In *G. ciliaris* subsp. *ciliaris* the calyx is very sparsely puberulous with a distinct apical tuft of long interwoven crisped hairs and with cilia longer than the width of the sepal.

To the east there occur two closely related species, *G. rigida* and *G. nivenii*, both in restricted separate areas. *G. incana* differs from both these species in the size of the sepals, which are less than 2.0×0.65 mm, and in the texture and indumentum of the leaves. In the glandular form of *G. incana* the leaves are very similar to those in *G. rigida* but are not so inflated, are more pubescent and have the glands confined to the margins.

The sepals in this species are the smallest and narrowest in the genus; in one specimen being only

0,3 mm wide. This feature makes the corollas more easily visible than in other species. The anthers are unique in the genus in having the smallest pores relative to the size of the cell.

Two fairly distinct forms occur in the material so far collected. The specimens from the north around Mamre have bracteoles and sepals with more plumose cilia which are eglandular. Those from the south in the Kraaifontein area have sub-plumose gland-tipped hairs on the sepals, bracteoles and on the leaves. This variation is, however, clinal with no distinct disjunction between the two extremes.

N. E. Brown described *G. alba* from a single collection made by Admiral Grey and based it on the single character of white flowers including the anthers. White-flowered forms of *G. incana* have been collected, but these have had pale brown anthers. In all other characters, *G. alba* is identical to the glandular form of *G. incana* and is presumed to be only an aberrant albino of this species.

G. incana is fairly restricted in its distribution occurring only on the recent sand deposits on the coastal flats at Sir Lowry's Pass, Eerste River, Kraaifontein, below Tygerberg and near Melkbosstrand. The records from Simonstown, Kleinmond, du Toit's Kloof and Vogelvlei are very doubtful.

4. *Grisebachia rigida* N.E. Br. in Fl. Cap. 4, 1:343 (1906). Syntypes: near Brand Vley, *Schlechter* 9926 (BM!; BOL!; Z!); mountains between French Hoek and Villiersdorp, *Bolus* 5193 (BOL!; K!; PRE!; Z!). Lectotype: *Bolus* 5193 (K).

Shrublets compact and low to erect up to 50 cm high. Branches pubescent with simple recurved hairs, very occasionally gland-tipped, rarely with stout plumose hairs admixed. *Leaves* 3-nate up to 3,0×1,0 mm, mostly elliptic to narrowly elliptic,

occasionally ovate or oblong-obovate, thick and fattened, pubescent or minutely scabrous on the abaxial surface, rarely glabrous and shiny, pubescent on adaxial surface, ciliate with 7–9 short stout gland-tipped hairs and with some scattered over the abaxial surface, petiole very short, shortly glandular pubescent. *Flowers* 1–8-nate on the ends of lateral branchlets, pink, rarely white; pedicels about 1 mm long, pubescent with some plumose hairs at the apex; bracteoles equal to slightly unequal with the median slightly broader, adpressed to the calyx, ovate to oblong-ovate to elliptic to narrow oblong-elliptic, obtuse, glabrous or sparsely pubescent, ciliate with stout simple to very slightly plumose hairs which are mostly gland-tipped, rarely sparsely pilose inside, keel-tipped. *Calyx* 4-lobed, slightly joined at the base; lobes ovate-elliptic to oblong-elliptic to broadly elliptic up to 2,1–2,8×0,9–2,0 mm, often with incurved margins, subacute, keel-tipped, glabrous or sparsely pubescent mostly in the lower half, ciliate with broadly based stout hairs almost fimbriate in places and with similar hairs up the centre of the abaxial surface, hairs mostly simple or very slightly plumose, rarely gland-tipped, often crooked. *Corolla* up to 4,4 mm long often oblique, distinctly constricted in the middle; tube up to 3 mm long globose ellipsoid, spreading above the constriction, 4-angled, puberulous outside with glabrous patches opposite the sepals, pilose on the inside mainly at the point of constriction; lobes erect-spreading slightly crenulate and emarginate about 1 mm long, very broadly obtuse, pubescent at the base in the middle. *Stamens* 4; filaments linear, sparsely to densely pilose, up to 2,5 mm long; anthers manifest, attached dorsally one third the way up, variable in size, 0,7–1,1 mm long with oblong to obovate parallel or spreading cells, almost glabrous to scabrous, occasionally with some long transparent hairs on the edges, muticous

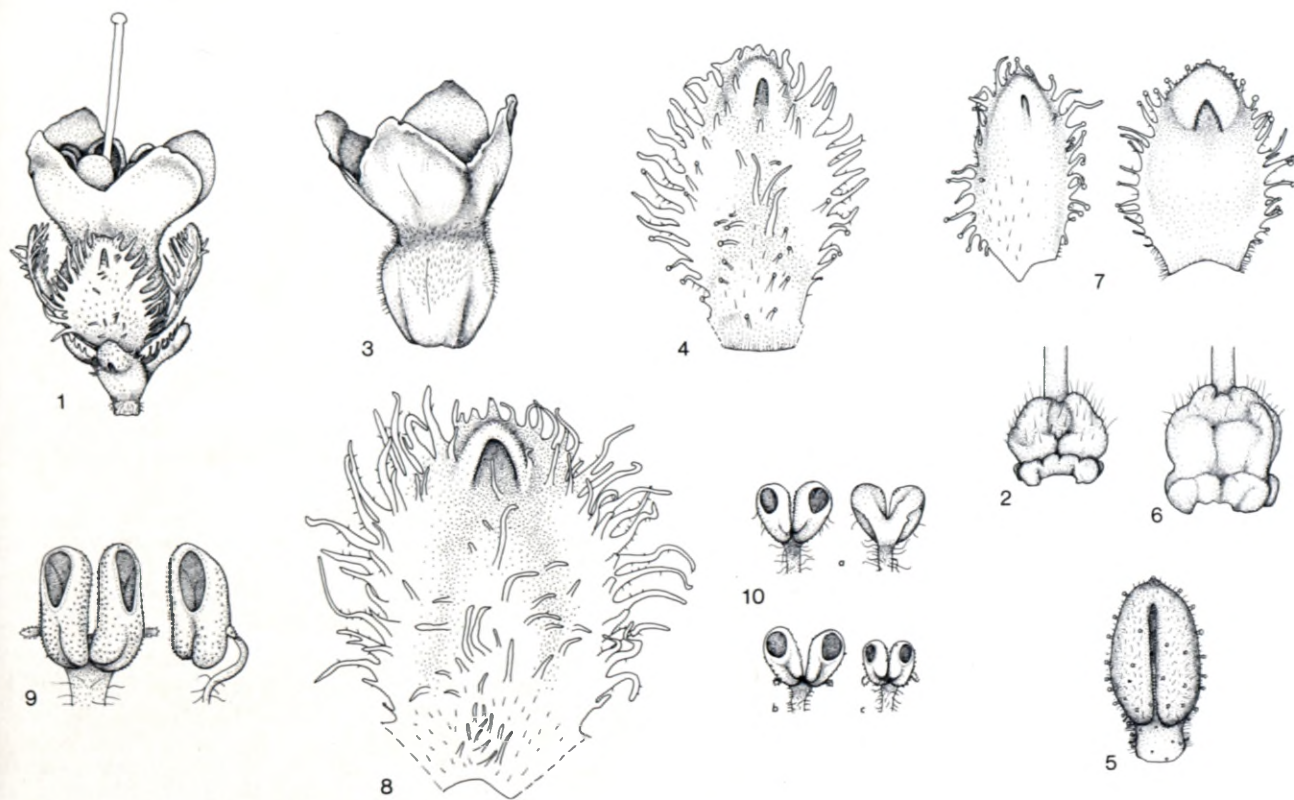


FIG. 19.—*Grisebachia rigida*. 1, flower, ×8; 2, ovary, ×16; both drawn from *Oliver* 3297 (STE); 3, corolla, ×8; 4, sepal, ×16; 5, leaf, ×16; 6, ovary, ×16; all drawn from *Oliver* 3299 (STE); 7, bracteoles, lateral and median, ×16; 8, sepal, ×16; 9, anther, front and side views, ×16; all drawn from an isoelectotype, *Bolus* 5193 (BOL); 10, anther variation drawn ×16: a, *Oliver* 3297 (STE); b, *Salter* 4784 (BOL); c, *Van Breda* 628 (PRE).

or aristate; awns up to 0,4 mm long or one third the length of the cell, arising from the filament apex, spreading laterally to descending, minutely scabrous; pollen grains single. *Ovary* 2-celled with a single pendulous ovule in each cell, $0,6 \times 0,8-0,9 \times 0,9$ mm, broadly ovoid to ellipsoid, compressed, obtuse, variously pilose at the apex, very unevenly wrinkled; style up to 4 mm long, glabrous, exserted; stigma slightly capitate. *Fruit* a hard verrucose nut. Fig. 19.

CAPE.—3319 (Worcester), south-west end of Brandvlei, 213 m, (—CB), *Oliver* 5038 (STE); near Brandvlei, 304 m, (—CB), *Schlechter* 9926 (BM; BOL; Z); Brandvlei Kelders, (—CB), *van Breda* 628 (B; PRE); between Worcester and Villiersdorp (—CB/CD), *Compton* 22918 (NBG); flats north-east of Wabooms Farms, 200 m (—CD), *Oliver* 3299 (STE); Kwaggaskloof near Moordkuil, 200 m (—CD), *Oliver* 3297 (MO; PRE; STE); 13 miles north of Villiersdorp (—CD), *Salter* 4784 (BM; BOL; K; SAM); Doornrivier, 304 m (—CD), *Walters* 1012 (K; PRE; STE); mountain slopes between Villiersdorp and French Hoek (—CC/CD/ 3419 AA/AB), *Bolus* 5193 (BOL; K; PRE; Z). Flowers from August to October.

G. rigida is characterized by its free or slightly joined sepals which are more than $2,0 \times 0,65$ mm with very broad flattened subplumose or simple cilia and by its fattened leaves which are ciliate with short gland-tipped hairs and with a few similar hairs on the abaxial surface.

The species differs from *G. nivenii* in the leaf cilia, less plumose calyx and glabrous inner surface of the sepals. It is closely related to *G. incana* from which it is easily distinguished by its broader sepals with their broad cilia and by the leaves.

G. rigida varies in the size of the sepals where in the type, *Bolus* 5193, they may be as much as $2,7 \times 2,0$ mm. The anthers also vary in size, shape and in the occurrence of awns. A few specimens have anthers with long colourless hairs, a feature very rarely seen in the Ericoideae.

The species occurs on the recent sandy alluvial flats at the eastern base of the Stettyns Mountains between Worcester and Villiersdorp where isolated pockets of fynbos grow (Fig. 20). The surrounding area possesses mountain renosterveld on the shales and Wittenberg quartzites. In this area the species is very susceptible to extinction due to encroaching agriculture and burning.

Bolus's record between French Hoek and Villiersdorp has not been reconfirmed. Although somewhat removed from the main populations and coming from a completely different valley system, this record could be correct due to the numerous sandy alluvial patches in the area.

5. *Grisebachia nivenii* N.E. Br. in Fl. Cap. 4, 1:343 (1906). Syntypes: Hottentots-Holland, ?*Niven* 128 (BOL!; K!); near Zondereinde River, *Gill* s.n. (K!); near Swellendam, *Mund* 3 (K!; PRE!). *Lectotype*: ?*Niven* 128 (K).

G. ciliaris Benth. in DC. Prodr., 7: 701 (1839), non Klotzsch. Type: in prov. Swellendam occidentali, collector not cited.

Shrublets compact, erect, up to 50 cm high. *Branches* minutely pubescent with retrorse hairs. *Leaves* 3-nate, adpressed, up to $1,7 \times 1,2$ mm, broadly ovate to elliptic, very rounded and thick, obtuse or acute, glabrous on the abaxial surface, pubescent on the adaxial surface, ciliate with 5–6 short stout plumose cilia; petiole very short and broad, ciliate. *Flowers* in terminal globose heads of 3–8 on the ends of lateral branchlets, pink, rarely white; pedice's very short, sparsely pubescent, sometimes with stout plumose hairs at the apex; bracteoles adpressed,

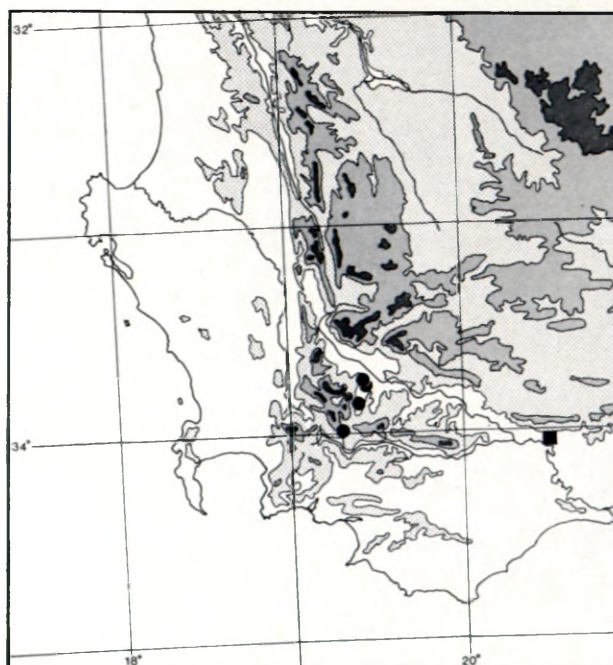


FIG. 20.—Distribution of ● *Grisebachia rigida* and ■ *Grisebachia nivenii*.

about 1,3 mm long, subequal, rarely markedly unequal, mostly oblong-elliptic sometimes the laterals obliquely so, the median rarely angular-ovate, all keel-tipped, obtuse or acute, puberulous outside and inside, ciliate with stout plumose hairs. *Calyx* 4-lobed, sometimes slightly joined at the base; lobes broadly elliptic to narrowly oblong-elliptic, $2,1-2,9 \times 0,65-1,3$ mm, acute, keel-tipped, puberulous on the abaxial surface mainly towards the base, sparsely puberulous on the inside, ciliate with stout broad plumose hairs with similar hairs over the adaxial surface towards the centre, rarely gland-tipped. *Corolla* up to 4,0 mm long, sometimes oblique, distinctly constricted in the middle; tube up to 3 mm long, globose ovoid to ellipsoid, urceolate above the constriction, pubescent to pilose in the middle and lower part and up the back of the lobes and inside the tube around the constriction; lobes broadly obtuse, erect or slightly spreading. *Stamens* 4; filaments linear, sparsely to densely pilose; anthers manifest, about 0,8 mm long, oblong, dorsifixed one third of the way up, papillate, aristate; pore about a third of the length of the cell; awns small, spreading to deflexed, arising from the filament at the point of attachment to the anther; pollen grains single. *Ovary* 2-celled with a single pendulous ovule in each cell, $0,7-0,6$ mm, ovoid compressed, obtuse sparsely pilose at the apex; style exserted, up to 4 mm long; stigma capitate or subsimple. *Fruit* verrucose, hard. Fig. 21.

A species forming compact erect shrublets up to 50 cm high occurring in a very restricted area of sandy flats south-east of Swellendam, flowering from July to September.

CAPE.—3420 (Bredasdorp), Bontebok National Park, 90 m (—AB), *Acocks* 22371 (PRE; STE); 100 m, *Barnard* 583, (STE); 581 (PRE), 100 m, *Liebenberg* 6464 (B; PRE; STE); 90 m, *Oliver* 1519 (NBG; STE); *Oliver* 4305 (STE); 4306 (NBG; PRE; STE); sandy places near Swellendam, 180–240 m (—AB), *Mund* 3 (K; PRE); Buffeljagsrivier (—BA), *Zeyher* 3330 (SAM). Without precise locality: Zondereinde River, *Gill* s.n. (K). Doubtful locality: Hottentots-Holland, alpine rock places *Niven* or *Masson* 128 (K). (cf. Fig. 20).

G. nivenii may be recognized by its very fattened shiny adpressed leaves which are glabrous on the

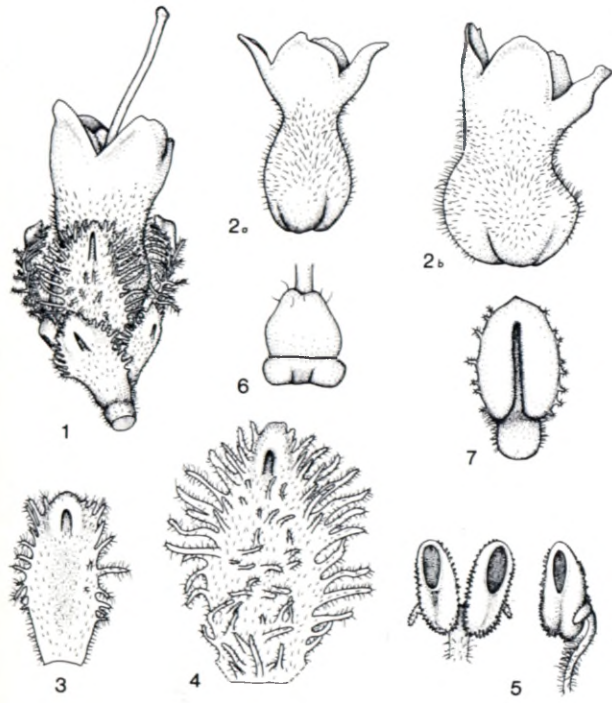


FIG. 21.—*Grisebachia nivenii*. 1, flower, $\times 8$; 2, corolla variation, $\times 8$; all drawn from Oliver 4305 (STE); 3, median bracteole, $\times 16$; 4, sepal $\times 16$; 5, anther, front and side views, $\times 16$; all drawn from the lectotype, Niven 128 (K); 6, ovary, $\times 16$; 7, leaf, $\times 16$; both drawn from Oliver 4305 (STE).

abaxial surface and have 5–6 very short stout plumose cilia and by its more or less free sepals which have short stout flattened plumose cilia.

The species is closely allied to *G. rigida* and *G. incana*. It differs from *G. rigida* in having glabrous shiny leaves, even when young, with plumose cilia and no gland-tipped cilia. The calyx cilia are more plumose than in *G. rigida* and there is a sparse pubescence on the inside of the sepals. From *G. incana* it differs in leaf details, the latter having pubescent nonfattened leaves. The sepals in *G. nivenii* are broader, more than 2.0×0.65 mm.

G. nivenii is geographically isolated as it occurs only on the sandy flats in the hilly country south-east of Swellendam where it is far removed from its closest allies, *G. rigida* and *G. incana*. Like nearly all the other species in the genus it is confined to a few small patches of alluvial sand. The surviving populations in the area now lie within the boundaries of the Bontebok National Park.

There is some confusion about the collector of the lectotype of the species. It was labelled as "C.B.S. Masson" but N. E. Brown changed this to Niven. The handwriting is definitely not Niven's, but matches that on the type of *Eremia brevifolia* Benth. which Brown cited as collected by Masson. Neither of these labels exactly matches the handwriting of Masson in the Kew Archives. Brown labelled this sheet as the type.

Variation within the species is very slight. The sepals in Zeyher 3330 are somewhat narrower than in the other specimens and have some gland-tipped hairs.

The *G. parviflora*/*G. minutiflora* group

Along the main chain of mountains and high level plateaux running in a north-south direction

from the Cedarberg through the Cold Bokkeveld to the Worcester District, there is a series of vicarious taxa. Superficially they are very similar in their low compact to spreading habit, small white subcalycine to calycine flowers, manifest anthers and ciliate calyx lobes.

One very variable taxon (A) is widespread from the Cedarberg to the mountains south of Worcester and eastwards to near Swellendam, occurring on dry stony slopes with short dry restiad/ericoid vegetation. It usually forms a low compact to sprawling shrublet with branches spreading amongst the restiads. It consists of three distinct allopatric vicariads and has had the names *G. parviflora* (Klotzsch) Druce (*G. ermioides* MacOwan) and *G. similis* N.E. Br. applied to it.

The second taxon (B) is much more restricted, occurring in the central and southern Cold Bokkeveld on dry open sandy flats and forms a low compact shrublet sometimes slightly sprawling and rooting at the nodes. This has had the names *G. minutiflora* N.E. Br. and *G. nodiflora* N.E. Br. applied to it. As with the taxon A, there are two distinct allopatric vicariads in this taxon.

To my knowledge the two taxa only grow in reasonably close proximity in the Hartebeeskloof and Winkelhaak areas where I have observed them. In the former locality the plants of taxon A (*G. parviflora*) were few and were outliers of the larger populations higher up the rocky slopes. The plants of taxon B (*G. minutiflora*) were locally common on open sandy patches. In the latter locality taxon B was flowering three months later than the early flowering vicariad of taxon A.

The main morphological difference between these two taxa lies in the form of the inflorescence. In A the flowers are generally 1–4-nate at the ends of short axillary branchlets which are often clustered together in a pseudospike along the main and lateral branches. In B the flowers are terminal on the ends of short branchlets with up to 36 flowers forming a cluster. These clusters usually hang downwards making the plants less conspicuous than those of taxon A. Except for one vicariad, plants of taxon B are glandular particularly on the margins of the calyx. The glands terminate plumose cilia. In taxon A the few glands are confined to the short simple cilia on the calyx.

Taking into account the habitat and morphological differences, I have decided to regard the two taxa A & B as closely related species referred to *G. parviflora* and *G. minutiflora* respectively and to recognize several subspecific taxa.

6. *Grisebachia parviflora* (Kotzsch) Druce in Rep. Bot. Soc. Exch. Club Brit. Isl. 1916: 625 (1917). Type: Hills between Puspas Valley and Kogmanskloof mountains, Ecklon & Zeyher s.n. (B†, holo.; isos.?). Neotype: flats between Witsenberg and Skurfdeberg, Zeyher 1117 (K!, neo.; BOL!; G!; SAM!; STE!; W!).

Low compact to spreading shrublets up to 20 cm high, rarely up to 50 cm. Branches erect or spreading often entwining among the surrounding vegetation, with numerous short branchlets, pubescent sometimes with glands admixed. Leaves 3-nate up to 3 mm long with the petiole, erect to spreading, straight to markedly recurved, linear to lanceolate rarely ovate, acute, flat to trigonous, glabrous or at first puberulous, ciliate sometimes with gland cilia or sessile glands, sometimes gland-apiculate: petiole adpressed ciliate.

Flowers 1-4-nate at the ends of extremely short branchlets arranged in a spike-like manner along the branches; pedicels very short, less than 0,5 mm long; bracteoles 3, equal to subequal, adpressed to the calyx or slightly spreading, very variable in size, up to 1,5 mm long, in shape from linear to elliptic-oblong to ovate, acute to obtuse, glabrous or pubescent ciliate with or without sessile or stalked glands white. *Calyx* 4-lobed for $\frac{1}{2}$ - $\frac{3}{4}$ its length, campanulate 0,6-1,8 mm long and 0,3-0,8 mm wide, glabrous or pubescent, white; lobes erect variable in shape from elliptic-oblong to ovate to subquadrate, the apex acute cuspidate or subtruncate with an apiculus, with or without a distinct keel-tip and with or without a distinct median ridge, ciliate, with or without sessile or stalked glands. *Corolla* 4-lobed, up to $3 \times 1,7$ mm long, mostly $2 \times 1,2$ mm, funnel-shaped sometimes broadening more above the middle, nowhere constricted, occasionally tubular-ellipsoid; tube glabrous inside sometimes glabrous outside or puberulous in lower half to fully pubescent; lobes erect to incurved, rarely slightly spreading, obtuse, broader than long, glabrous entire. *Stamens* 4 included or manifest; filaments filiform glabrous; anthers up to 1,1 mm long with oblong parallel separate cells, basal, minutely scabrous, aristate; awns $\frac{1}{2}$ - $\frac{3}{4}$ the length of the cell to rudimentary, ciliate; pore $\frac{1}{2}$ - $\frac{3}{4}$ the length of the cell, pollen grains single. *Ovary* 2-celled with a single ovule per cell in one subspecies, rarely 2 ovules per cell and sometimes 3 cells, ovoid to ellipsoid, up to $1 \times 0,7$ mm, obtuse glabrous to puberulous on the top, sometimes thickly pubescent; style far exserted, straight or curved, glabrous up to 4 mm long; stigma minutely capitate. Figs 22 & 23.

A species generally low, sparse and sprawling in habit, occasionally compact, occurring frequently on dry stony slopes and flats on mountains from the Cedarberg to Du Toit's Kloof eastwards to near Swellendam, flowering from as early as July to as late as January.

A very variable taxon in which three subspecies are recognized.

Key to the subspecies

Leaves erect to spreading, straight or slightly curved, calyx lobes acute to obtuse:

Corolla tube glabrous or puberulous in the lower $\frac{1}{2}$, calyx usually glabrous.....(a) subsp. *parviflora*

Corolla tube pubescent all over, calyx pubescent.....(c) subsp. *pubescens*

Leaves markedly recurved, calyx lobes subquadrate, subtruncate.....(b) subsp. *eglandula*

(a) subsp. *parviflora*

Eremia parviflora Klotzsch in Linnaea 12: 488 (1938); N.E. Br. in Fl. Cap. 4, 1: 334 (1905). *Grisebachia parviflora* (Klotzsch) Druce in Rep. Bot. Soc. Exch. Club Brit. Isl. 1916: 625 (1917).

Erica shalliana Hort. Berol. ex Klotzsch in Linnaea 12: 498 (1838), nom. nudum.

Grisebachia eremoides MacOwan in J.Linn. Soc. 25: 392 (1890); N.E. Br. in Fl. Cap. 4, 1: 349 (1906); Compton in Jl S. Afr. Bot. 1: 151 (1935). Syntypes: Witsenberg and Houw Hoek Zeyher 1117, near Tulbagh Waterfall, MacOwan 2685 (SAM!); MacOwan sub Herb. Norm. 564 (BM!; BOL!; G!; K!; P!; PRE!; SAM!; UPS!; W!).

G. eremoides var. *pubicalyx* N.E. Br. in Fl. Cap. 4, 1: 349 (1906). Type: Mountains of Tulbagh Kloof, Bolus 5304 (BOL!; K!; PRE!; SAM!).

G. similis N. E. Br. in Fl. Cap. 4, 1: 350 (1906). Type: Cold Bokkeveld, Schlechter 8896 (BOL!; K!; numerous isos!).

G. similis var. *grata* N.E. Br. in Fl. Cap. 4, 1: 350 (1906). Type: Cedarberg, near Sneekop and Wuppertal, Bodkin sub Bolus 8628 (BOL!; PRE!).

Low erect to spreading shrublet. *Leaves* erect to spreading, straight or curved. *Calyx* glabrous to sparsely puberulous; lobes ovate, elliptic-oblong to broadly oblong, apex acute to cuspidate with a distinct keeltip and median ridge. *Corolla* up to $2 \times 1,2$ mm; tube glabrous to puberulous in the lower half rarely up to $\frac{1}{2}$ of the length. *Ovary* glabrous to puberulous on the top. Fig. 22.1-22.6.

CAPE.—3219 (Wuppertal): Middelberg Hut (-AC), Barnes in Bol 19485 (BOL); Sneekop 1070 m (-AC), Bodkin sub Bolus 8628 (BOL; PRE); Middelberg Plateau (-AC), Bond 1359 (NBG); Juriesberg (-AC), Compton 6269 (NBG); 7023 (NBG; STE); Sneekop 1680 m (-AC), Compton 6270 & 6271 (NBG); Cedarberg Tafelberg (-AC), Esterhuysen 8158 (BOL); Langberg 1520-1820 m (-AC), Esterhuysen 7315 (BOL; K; PRE); Hoogvertoon near Sneueberg hut, 1280 m (-AC), Haynes 815 (STE); Middelberg (-AC), Levyns 2906 (CT); Lewis in BOL 22217 (BOL); Sneueberg (-AC/CA), Pocock 393 (BOL; STE);

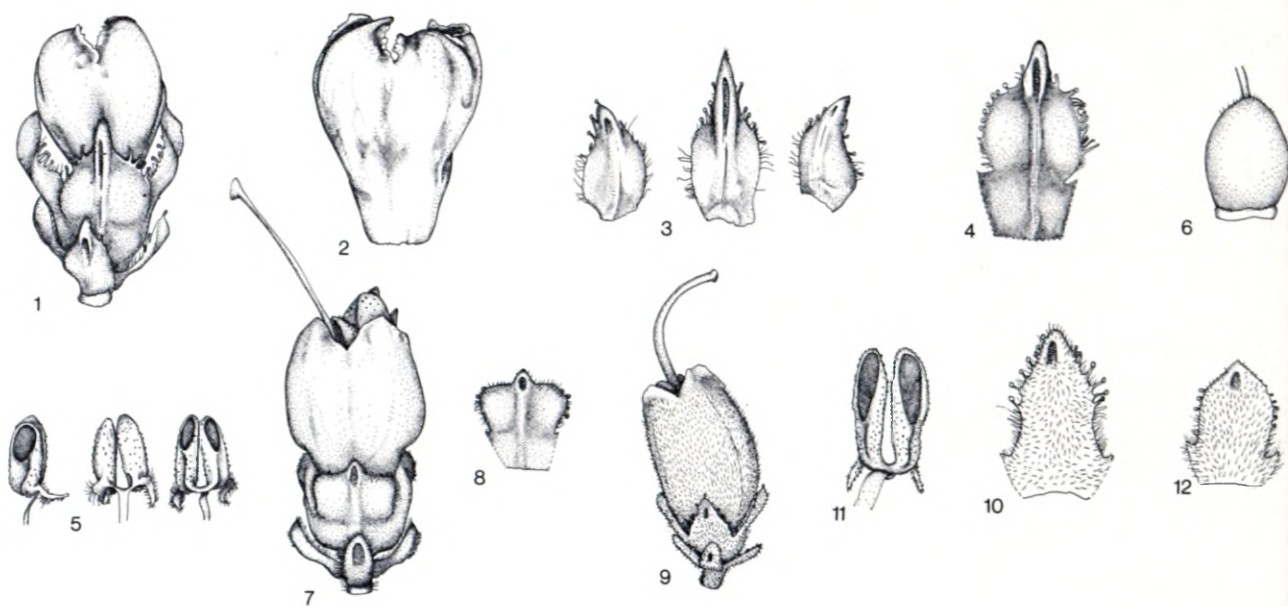


FIG. 22.—*Grisebachia parviflora*: subsp. *parviflora*. 1, flower, $\times 16$; 2, corolla, $\times 16$; 3, bracteoles, $\times 16$; 4, sepal, $\times 16$; 5, anther, side, back and front views, $\times 16$; all drawn from an isoelectotype, Zeyher 1117 (STE); subsp. *eglandula*. 7, flower, $\times 16$; 8, sepal $\times 16$; both drawn from Esterhuysen 5924 (PRE); subsp. *pubescens*. 9, flower, $\times 8$; 10, sepal, $\times 16$; 11, anther, $\times 16$; all drawn from the holotype, Oliver 4310 (STE); 12, sepal, $\times 16$, drawn from Oliver 4312 (STE).

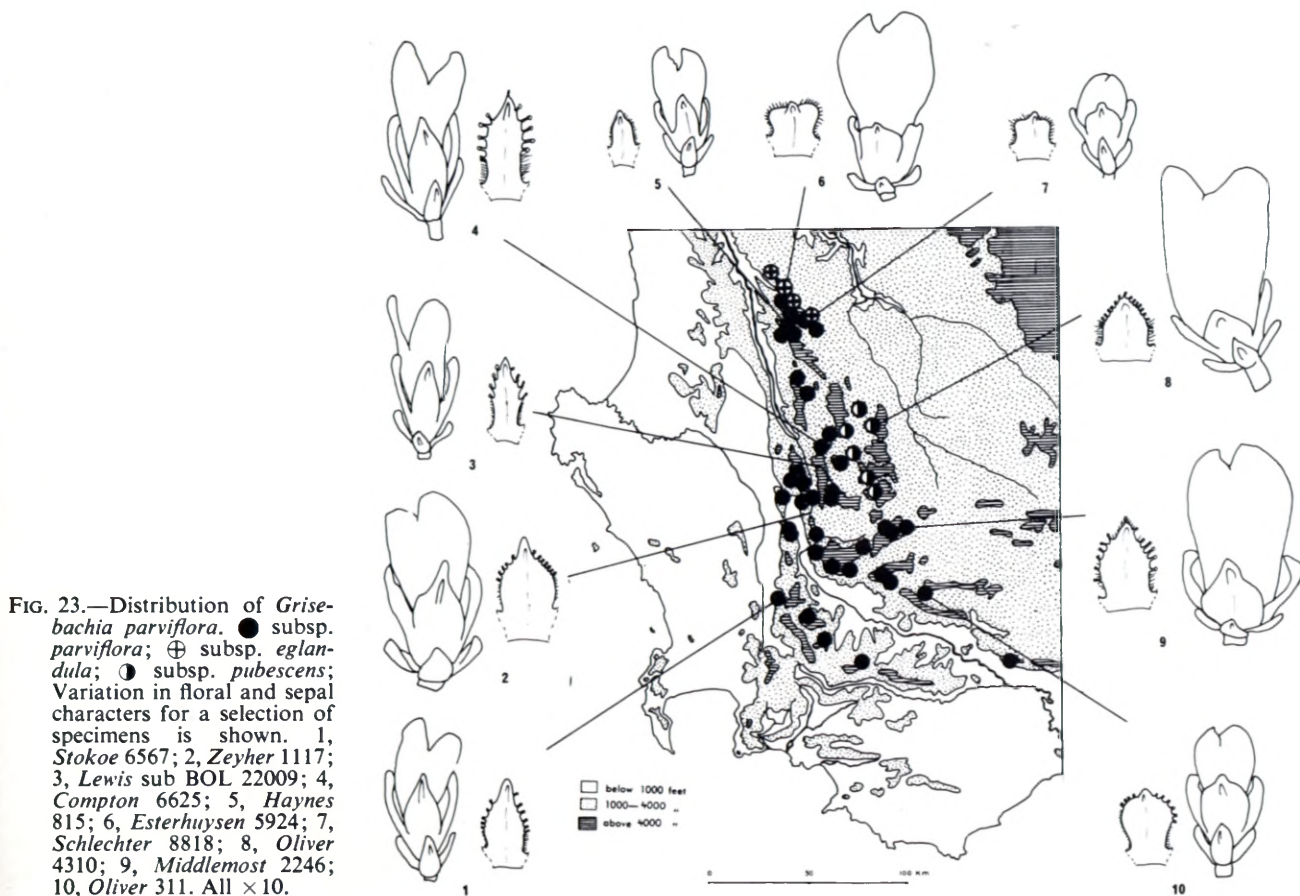


FIG. 23.—Distribution of *Grisebachia parviflora*. ● subsp. *parviflora*; ⊕ subsp. *eglandula*; ● subsp. *pubescens*; Variation in floral and sepal characters for a selection of specimens is shown. 1, *Stokoe* 6567; 2, *Zeyher* 1117; 3, *Lewis* sub BOL 22009; 4, *Compton* 6625; 5, *Haynes* 815; 6, *Esterhuysen* 5924; 7, *Schlechter* 8818; 8, *Oliver* 4310; 9, *Middlemost* 2246; 10, *Oliver* 311. All $\times 10$.

Koupoort near Krakadouw (–AC), *Pocock* 546 (STE); Tafelberg 1830 m (–AC), *Stokoe* in SAM 55134 (NBG; PRE); Sneekop (–AC), *Stokoe* in SAM 55154 (SAM); Elands-kloof (–CA), *Esterhuysen* 3227 (BOL; K; NBG; PRE); Donkershoek Kop, 1520 m (–CA), *Stokoe* 9246 (BOL); Duiwelskloof (–CA), *Stokoe* in SAM 65522 (SAM; STE); Middeltuyn, Cold Bokkeveld (–CC), *Hanekom* 792 (K; PRE); Bokkeveld Tafelberg, 1890 m (–CD), *Schlechter* 10091 (BM; BOL; E; G; K; MO; P; PRE; S; STE; W; Z); 1370 m (–CD), *Bond* 702 (NBG); De Keur (–CD), *Compton* 6625 (NBG); *Compton* 16126 (NBG; STE). Without precise locality: Cedarberg, *Primos* sub Marloth 11678 (PRE); *Primos* sub Marloth 11729 (PRE); Koude Bokkeveld, 1520 m, *Schlechter* 8896 (BM; BOL; E; G; K; MO; NH; P; PRE; S; STE; W); 3319 (Worcester): Winterhoek Ridge Peak, 1650 m (–AA), *Andreae* 1113 (PRE; STE); 7 miles West of Gydo Pass (–AA), *Hutchinson* 1030 (BOL; K); Peak below Great Winterhoek 1830 m (–AA), *Phillips* 1817 (BOL; SAM); Great Winterhoek, 1830 m (–AA), *Phillips* s.n. (BOL; K); Visgat (–AA), *Pillans* 9684 (BOL; PRE); Visgat (–AA), *Stokoe* in SAM 63952 (BM; SAM; STE); Sneegat (–AA), *Stokoe* 7266 (BOL); Little Winterhoek 2018 m (–AA), *Stokoe* 6065 (K; NBG); Hartbeest Kloof, Bokberg 1188 m (–AB), *Kirsten* 442 (STE); Op-die-Berg Village, 980 m (–AB), *Oliver* 4032 (B; E; MO; PRE; STE; S); Hartbeest Kloof, Valboskloofberg, 1140 m (–AB), *Oliver* 5147 (STE); top of Gydo Pass (–AB), *Lewis* in BOL 22009 (BOL; P); top of Gydo (–AB), *Maguire* 1778 (NBG; PRE; STE); Inkruip, Witsenberg (–AC), *Esterhuysen* 23450 (BOL, K, PRE, STE); Tulbagh Waterfall, 420 m, (–AC), *Bolus* 5304 (BOL; K; PRE; SAM); *MacOwan* 2685 (SAM); 270 m (–AC), *MacOwan* in Herb. Norm 564 (BM; BOL; G; K; P; PRE; SAM; UPS; W); Witsenberg near Steendahl, 400 m (–AC), *Bolus* 5376 (BOL); Roodesandberg (–AC), *Compton* 6624 (NBG); Witsenberg near Tulbagh (–AC), *Leighton* 1333, (BOL; PRE); Flats between Witsenberg and Schurftberg (–AC/AD), *Zeyher* 1117 (BOL; G; K; SAM; STE; W); Slab Peak, 1220 m (–AD), *Compton* 11960 (NBG); Slab Peak, Michells Pass (–AD), *Esterhuysen* 6182 (BOL); *Stokoe* in SAM 54996 (SAM); Mostertshoek 1220–1520 m (–AD), *Esterhuysen* 9882 (BOL); 300 m (–AD), *Guthrie* 2414 (BOL), Gorge west of Ceres (–AD), *Hutchinson* 610 (BM; BOL; K; PRE); Ceres, lower slopes, 610 m (–AD), *Levyns* 4702 (CT); Matroosberg (–BC), *A. Bolus* s.n. (BOL); *Lamb* 610 (BOL); 1520 m, *Marloth* 2215 (BOL; PRE); *Marloth* 2351b (PRE); Matroosberg near Lakenvlei 1220 m (BC), *Phillips* 1583, (SAM); 1980 m (–BC), *Phillips* 2134 (SAM); Prospect Peak, Hex River Valley, 760 m (–BC), *Esterhuysen* 15908

(BOL; PRE); Bokkerivier (–BD), *Middlemost* 2246 (NBG); *Middlemost* 2278 (NBG); Du Toit's Peak 1220 m (–CA/CC), *Esterhuysen* 23775 (BOL); Molenaarsberg 914 m (–CA), *Esterhuysen* 30354 (BOL; S; STE); Seven Sisters Wellington (–CA), *Stokoe* 6067, (K; NBG; PRE; STE); Audensberg, 1670 m (–CB), *Compton* 9761 (NBG; STE), Brandwacht Peak 1828 m (–CB), *Esterhuysen* 11004 (BOL; PRE) Stettynsberg, 1670 m (–CD), *Esterhuysen* 11057 (BOL); Keeromsberg, 1270 m (–DA), *Esterhuysen* 9293 (BOL); Wild (Wilge) River (–DA), *Niven* s.n. (BM); Saw Edge Peak 3000 (DA), *Oliver* 3793 (K; MO; PRE; STE); Koo Mountain above Berger's Pass, (–DB), *Oliver* 311 (STE); Wildepaardeberg (–DC), *Stokoe* 2527 (BOL; K); 3320 (Montagu); Leeurivierberg (–CD), *Esterhuysen* 27874 (BOL; PRE; STE); Without locality: *Wordsworth* 14034 (K); *Niven* s.n. (G–DC).

G. parviflora is characterized by the flowers being 1–4-nate in small heads clustered along the branches in a congested spike-like manner, the corolla tube not contracted in the middle and the simple cilia on the calyx lobes. The species is closely allied to *G. minutiflora* and has a remarkable superficial resemblance to *Eremia curvistyla* (N.E. Br.) E. G. H. Oliver differing basically in the number of stamens. All three species are sympatric.

The true identity of this species has been overlooked until now as it has nearly always been referred to the later *G. eremioides* MacOwan. Klotzsch in describing it placed the species in Don's genus *Eremia* using as his type an Ecklon & Zeyher collection from "Hills between Puspas Valley and Kogmans-kloof Mountains". Without seeing the type, N. E. Brown followed Klotzsch in keeping the species in *Eremia*. But later in his work on *Grisebachia* he stated that he had seen the type and found that the species was conspecific with *G. eremioides* which he proceeded to retain under the Kew Rule. This was picked up by Druce in his search through Flora Capensis for new combinations but never applied by subsequent botanists.

Unfortunately the holotype in Berlin is no longer extant and all the Ecklon & Zeyher material distributed as *Eremia parviflora* Klotzsch turns out to be *Anomalanthus scoparius* Klotzsch. N. E. Brown on examining the type sent to him on loan stated "The description of Klotzsch is very erroneous, as the calyx is not subequal to the corolla, but considerably shorter than it, and the stamens are 4, not 8 as Klotzsch states. It is identical with Zeyher 1117, except that the leaves are straighter, like those of Schlechter 10091". This statement clears up the discrepancies in the type description and also paves the way for the typification of the species. Without any authentic duplicate material available, I consider that it is justifiable to rely on N. E. Brown's comparison and therefore select Zeyher 1117 in the herbarium at Kew as the neotype. The above published note by N. E. Brown also appears on the sheet at Kew.

Five duplicates of Zeyher 1117 are located in various herbaria and all come from "Flats between the Witsenberg and Skurfdeberg". The locality of Houw Hoek on one of the sheets in SAM as cited by MacOwan in his protologue is erroneous.

To date no additional material of *G. parviflora* has been collected in the same area as that visited by Ecklon & Zeyher. But in the variation pattern, I have found in the calyx that the broadly elliptic-acuminate lobes of Zeyher 1117 could well have occurred in the holotype. The leaf difference noted by N. E. Brown is not vitally significant as variation in this character has been noted even on the same plant.

The basic variation occurring in *G. parviflora* is found in the shape of the calyx lobes, the arrangement of the leaves and the indumentum of the flowers, the widest range being in the shape of the calyx lobes. In subsp. *parviflora* three groups occur:

- (a) large lobes with a broad elliptic base and acuminate apex, sparsely gland-ciliate or ciliate, common, central to southern in distribution represented by the neotype, Zeyher 1117;
- (b) large lobes, narrow elliptic-oblong with an acute apex, distinctly gland-ciliate, less common and confined to the central region of the distributional range (Winterhoek to central Cold Bokkeveld).
- (c) small lobes mostly elliptic-oblong with an acute apex, northern in distribution centred on the southern and central Cedarberg.

N. E. Brown described (b) and (c) with their narrow elliptic-oblong acute lobes in combination with the possession of erect straight leaves as a separate variety, var. *grata*. I have found that neither the calyx lobe shape nor the leaf arrangement show any significant differences. There is a definite intergrading between the broad based apiculate and the narrow elliptic-oblong acute sepals as seen in Compton 6624 from Roodesandberg, Stokoe 6067 from the Wellington mountains and Esterhuysen 11057 from Stettynsberg. In leaf arrangement variation from erect straight leaves through to curved slightly spreading leaves can occur on the same plant. There were therefore no grounds for keeping the two species separate.

N. E. Brown also described *G. similis* var. *publicalyx*. The collection Maguire 1778 from Gydo, presumably from one population, possesses glabrous calyces. This also occurs in the Compton and Esterhuysen collections from Slab Peak. The indumentum of both

the calyx and corolla occurs randomly with most southern collections having a glabrous calyx but the lack of hairs and pubescence of the collections from the northern Cedarberg and eastern Bokkeveld are significant in the delimitation of subsp. *eglandula* and subsp. *pubescens*.

(b) subsp. *eglandula* (N.E. Br.) E. G. H. Oliver, stat. nov.

Grisebachia eremioides var. *eglandula* N.E. Br. in Fl. Cap. 4, 1: 349 (1906). Syntypes: Cedarberg Range at Ezels Kop, Schlechter 8818 (BM!; BOL!; G!; K!; P!; PRE!; STE!; Z!); near Clanwilliam, Leipoldt 135 (BOL!). Lectotype: Leipoldt 135 (BOL).

Small shrublet, compact to spreading. Leaves stiffly trigonous, markedly spreading-recurved when mature. Calyx lobes subquadrate, subtruncate with a thickened apiculus, rarely very broadly angular-ovate, closely ciliate with short simple hairs occasionally with a few subsessile glands, otherwise glabrous, rarely sparsely puberulous. Corolla glabrous, rarely sparsely puberulous. Ovary thickly pubescent on the upper half. Fig. 22.7, 22.8.

CAPE.—3219 (Wuppertal); Pakhuis (—AA), Barker 4505 (NBG); Esterhuysen 5924 (BOL; PRE); Esterhuysen 21764 (BOL); Krakadouw, 910 m (—AA), Bodkin s.n. (BOL); Stokoe in SAM 55129 (NBG; PRE; SAM); Stokoe in SAM 56776 (SAM); Rocklands, 790 m (—AA), Kruger 1031 (STE); Eselbank, 1220 m (—AC), Schlechter 8818 (BM; BOL; G; K; P; PRE; STE; Z); Crevasse Peak, 1220 m (—AC), Taylor 7459 (PRE; STE). Without precise locality: near Clanwilliam, Leipoldt 135 (BOL); Bokkeveld, 1580 m, Schlechter 8919 (7) (BM; BOL; E; G; K; MO; P; PRE; STE; UPS; W; Z).

In the Cedarberg, the northern part of the distribution range of this species, two reasonably distinct groupings, A & B, of specimens can be made on the shape of the calyx lobes, the pubescence, the arrangement of the leaves and the distribution. Group A has small narrow acute puberulous calyx lobes with no marked apiculus and erect straight leaves and is ascribed to subsp. *parviflora*. Group B has generally small flattened quadrate to subquadrate glabrous calyx lobes with a distinct apiculus and markedly recurved leaves. The pubescence on the ovary is much longer and denser.

There is very little overlap in these characters between the two groups in the Cedarberg and both seem to be fairly distinct. The affinities of group B appear to lie with the collections much further south. The leaf arrangements in A and B are very distinct in the Cedarberg but not between B and some random southern collections of subsp. *parviflora* in which the leaves can be spreading and curved eg. in Bolus 5403 from Tulbagh. The calyx shapes of B, although distinct in the Cedarberg, have similarities in some southern collections.

The distributions of the two groups A & B are relatively easily separable with A occurring west and south of the Krakadouw-Welbedacht mountain range and B north and east of the range. A detailed investigation of the range is necessary to ascertain whether this separation is in fact true or just due to lack of records.

There is, then, in the Cedarberg a reasonable discontinuity in several characters coupled with a spatial separation. This should warrant recognition at specific level, but as there are definite similarities with certain elements to the south, I feel that recognition is only justifiable at subspecific level.

On two collections N. E. Brown described this vicariad as var. *eglandula*. An examination of all the collections showed that small subsessile glands are present on the margins of the calyx.

N. E. Brown annotated the collection *Leipoldt* 135 in BOL as the type. It is unfortunate that it is unlocalized.

The collection *Schlechter* 8919 given as just Bokkeveld is undoubtedly this subspecies and I regard the locality as an error.

(c) subsp. *pubescens* E. G. H. Oliver, subsp. nov., a subspecies typica et subspecies *eglandula* floribus majoribus, tubo corollae omnino pubescenti, calyce omnino pubescenti, distributione et florescentia dignoscenda.

TYPE.—Cape, Ceres Dist: Katbakkies in the Swartruggens (–DC) *Oliver* 4310 (STE, holo.; BM; BOL; E; G; K; MO; NBG; PRE; S).

An erect to spreading shrub up to 50 cm high. *Calyx* pubescent; lobes oblong-triangular to broadly so, ciliate with fine simple hairs and stouter gland-tipped hairs admixed. *Corolla* 2–3 mm long and 1,2–1,7 mm broad; tube pubescent over the whole length, tubular-ellipsoid. Fig. 22.9–22.12.

CAPE.—3219 (Wuppertal): Schurweberg, east of Bokkeveld Tafelberg, 1060 m (–CD), *Esterhuysen* 20651 (BOL; K; NBG; MO; PRE; S; STE); Zuurvlaakte north of Rietvlei in the Swartruggens, 1060 m (–CD), *Oliver* 6114 (PRE; STE); Katbakkies in the Swartruggens, 1220 m (–DC), *Levyns* 1860 (CT; SAM); 1188 m, *Oliver* 4310 (BM; BOL; E; G; K; MO; NBG; PRE; S; STE); *Oliver* 4312 (B; C; G; GRA; HAM; MEL; P; STE; W; Z); 1066 m, *Taylor* 5890 (PRE; STE). 3319 (Worcester): Winkelhaak, 960 m (–AB), *Oliver* 4318 (BOL; E; K; MO; NBG; PRE; STE); Onverwacht in S. Swartruggens, 1220 m (–BA) *Acocks* 23660 (PRE; STE); Baviaansberg, 1060–1220 m (–BA), *Esterhuysen* 29847 (BOL).

There are several collections from the eastern part of the Cold Bokkeveld which have a different appearance and earlier flowering time from the rest of the collections of *G. parviflora*. The flowers are generally much larger with the corolla tube completely pubescent. The Levyns collection from Katbakkies has the corolla tube pubescent for three-quarters of its length. In nearly all the collections of *G. parviflora* the corollas are glabrous to puberulous and then usually below the level of the sepals. The collections of Middlemost from Bokkerivier to the south are intermediate tending towards the pubescence of the Levyns collection.

The flowering time of the eastern Bokkeveld collections is significant being from June to September for material in full flower. The collections of *Levyns* 1860 and *Esterhuysen* 20651 & 29847 and *Oliver* 6114 though recorded for Sept., Oct. and Nov. are of fruiting material. The flowering time for collections of *G. parviflora* elsewhere and particularly in the adjoining areas of the Bokkeveld are Sept.–Dec. for material in full flower. This means that cross-pollination, even if the populations were sympatric, could not take place. The Middlemost collections from Bokkerivier were collected in November in full flower.

Despite there being little morphological disjunction between the group of eastern Bokkeveld collections and the rest of *G. parviflora*, I consider that the geographical and reproductive isolation warrants recognition of this group as a distinct subspecies of *parviflora*.

7. *Grisebachia minutiflora* N.E. Br. in Fl. Cap. 4,1: 348 (1906). Type: Cape, near Klein Vlei in Cold Bokkeveld, *Schlechter* 10064 (BM!; BOL!; G!; K, holo!; MO!; P!; PRE!; S!; STE!; W!).

Low compact to semi-spreading shrublet up to 20 cm high. Branches long when spreading and sometimes rooting at the nodes, pubescent, with glandular hairs intermingled when young, 3-angled when young. *Leaves* 3-nate, up to 3,5 mm long, the petiole 0,5 mm long, ovate to narrowly oblong, straight erect or slightly spreading, imbricate or shorter than the internodes, subobtuse, thick, pubescent or glabrous when young with a few to numerous sessile glands on the margins, becoming glabrous except on the adaxial surface, sometimes terminating in a sessile gland. *Flowers* in terminal globose heads of up to 36 flowers on short branchlets, not forming congested spikes, white; pedicels almost none up to 0,8 mm long; bracteoles 3, adpressed or recurved-spreading, equal or very unequal in some outer flowers in inflorescences, mostly 0,5–1,7 mm long, if equal then linear acute or subacute and minutely keel-tipped, if unequal then the median one large and leaflike and well keeled, glabrous or pubescent, ciliate towards the base with simple hairs and a mixture of simple and larger plumose and gland-tipped hairs towards the apex. *Calyx* 4-lobed from $\frac{1}{4}$ – $\frac{1}{3}$ its length, up to 1,9 mm long, pubescent, the pubescence short over the whole surface or in zones with sometimes longish hairs; tube obconic or tubular with spreading lobes; lobes ovate-oblong to very broadly ovate up to 0,9 mm long and 1 mm broad, erect or spreading, sometimes with pubescence on the inside at the top, ciliate with short or long cilia which are simple or variously plumose from base to apex, mostly gland-tipped, keel-tipped and thickened, acute to subobtuse. *Corolla* 4-lobed, obconic to tubular with spreading upper half, not constricted, glabrous inside and outside, up to 2,4 mm long; lobes short broad obtuse slightly crenulate, erect or slightly spreading. *Stamens* 4, manifest or slightly exerted; filaments filiform, glabrous, sigmoid at the apex; anthers up to 0,7 mm long with almost parallel sides, oblong, minutely scabrous, awned about $\frac{1}{3}$ the way up the back of the cell; awns up to $\frac{1}{3}$ the length of the cell sometimes spreading; pore about $\frac{1}{3}$ the length of the cell. *Ovary* 2-celled with a single pendulous ovule per cell, ellipsoid, puberulous at the apex; style filiform, glabrous, far exerted up to 2,2 mm long; stigma simple or slightly swollen. Fig. 24.

A species forming compact erect to semispreading low shrublets, occurring in sandy places in the Cold Bokkeveld north of Ceres, flowering from October to January.

A variable taxon in which two subspecies are recognized.

Key to the subspecies

Cilia on the calyx gland-tipped.....(a) subsp. *minutiflora*
Cilia on the calyx not gland-tipped.....(b) subsp. *nodiflora*

(a) subsp. *minutiflora*

G. minutiflora N.E. Br. in Fl. Cap. 4,1: 348 (1906). Type: *Schlechter* 10064 (K, holo!; numerous isos!).

Leaves pubescent when young with several sessile glands on the margins, becoming glabrous except on the adaxial surface, or glabrous with numerous sessile glands over the surface but pubescent on the adaxial surface. *Pedicels* almost absent or up to 0,4 mm long; bracteoles usually adpressed, mostly up to 1,1 mm long, occasionally up to 1,3 mm. *Calyx* pubescent in zones, glabrous on inner surface, cilia plumose or simple, gland-tipped. Figs 24.1–24.8 & 25.

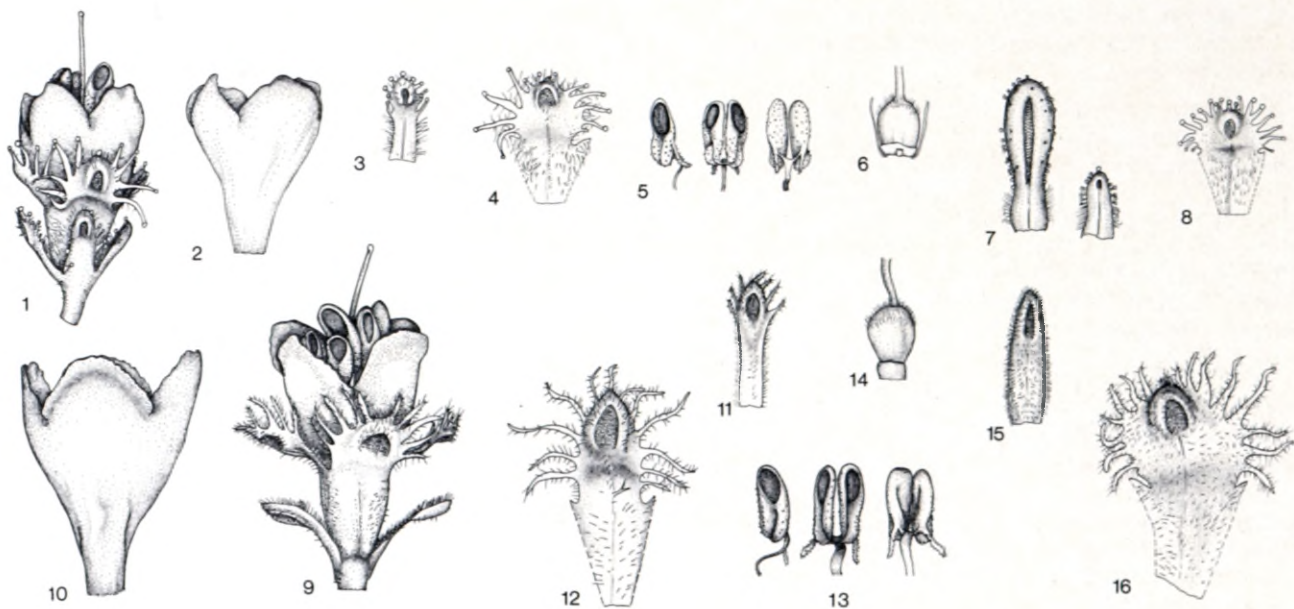


FIG. 24.—*Grisebachia minutiflora*: subsp. *minutiflora*. 1, flower; 2, corolla; 3, median bracteole; 4, sepal; 5, anther, side, front and back views; 6, ovary; all drawn from an isotype, *Schlechter* 10064 (STE); 7, variation in median bracteole, drawn from *Oliver* 4105 (STE); 8, sepal, drawn from *Oliver* 6106 (STE); subsp. *nodiflora*, form A. 9, flower; 10, corolla; 11, median bracteole; 12, sepal; 13, anther, side, front and back views; 14, ovary; all drawn from an isotype, *Schlechter* 10188 (STE); form B. 15, median bracteole; 16, sepal; both drawn from *Schlechter* 10188 (STE). All drawings $\times 16$.

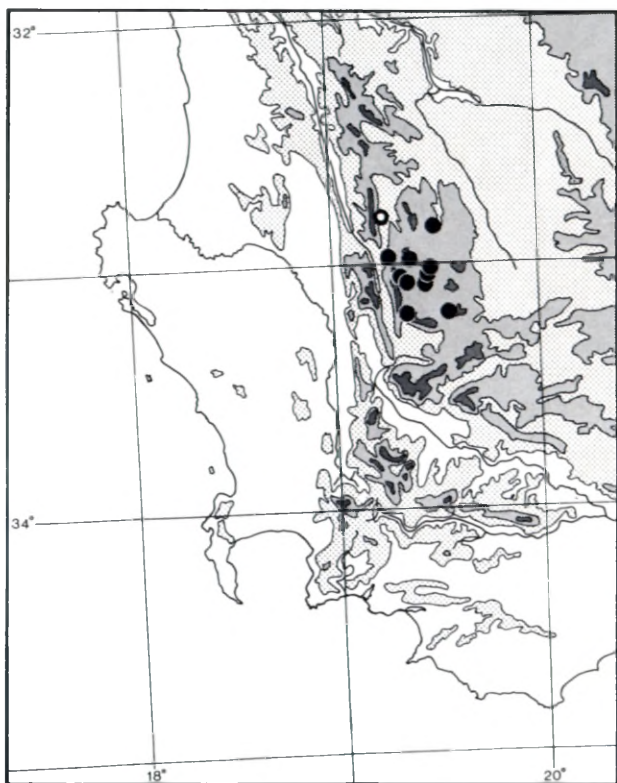


FIG. 25.—Distribution of *Grisebachia minutiflora*. ● subsp. *minutiflora*; ○ subsp. *nodiflora*.

CAPE.—3219 (Wuppertal), between de Keur and Kromfontein, 914 m (–CD), *Oliver* 4105 (BM; C; E; G; K; MO; MEL; P; PRE; S; STE; W; Z); Rietvlei Dam in Swartuggens, 970 m (–CD), *Oliver* 6106 (PRE; STE); Stompiesfontein in the Swartuggens (–DC), *Esterhuysen* 29304 (BOL; STE). 3319 (Worcester), near Sandberg (–AB), *Bond* 659 (NBG); *Esterhuysen* 3457 (BOL; PRE); Gydo, 1370 m (–AB), *Compton* 18722 (NBG); Gydoberg (–AB), *Leighton* 2254 (BOL; PRE); between Loch Lynne and Winkelhaak, 960 m (–AB), *Oliver* 5117 (B; BOL; E; G; K; MO; PRE; STE); S.W. of Winkelhaak,

960 m (–AB), *Oliver* 5124 (C; GRA; K; P; PRE; STE); Tuinskloof, south of Houdenberg, 940 m (–AB), *Oliver* 5130 (BOL; MEL; NBG; PRE; STE); near Klein Vlei; 1220 m (–AB), *Schlechter* 10064 (BM; BOL; G; K; MO; P; PRE; S; STE; W); Baviaansberg, 1676 m (–BA), *Bond* 1436 (NBG); 1463 m, *Stokoe* 4543 (BOL); *Stokoe* 4550 (BOL; K).

(b) subsp. *nodiflora* (N.E. Br.) E. G. H. Oliver, stat. nov.

G. nodiflora N.E. Br. in Fl. Cap. 4, 1: 438 (1906). Type: Cape, Schoongezicht in Cold Bokkeveld, *Schlechter* 10188 (BM!; BOL, lecto!; E!; G!; K!; MO!; P!; PRE!; S!; STE!; W!; Z!).

Leaves pubescent when young, occasionally with a few sessile glands on the margins. *Pedicels* up to 0,8 mm long; bracteoles usually adpressed and recurved towards the apex, mostly up to 1,7 mm long. *Calyx* pubescent in zones or evenly with pubescence also on the inner surface in the upper quarter, cilia plumose to the apex and not gland-tipped. Fig. 24.9–24.16.

CAPE.—3219 (Wuppertal), Schoongezicht, 1370 m (–CC), *Schlechter* 10188 (BOL & numerous duplicates).

G. minutiflora is characterized by the globose inflorescences of 6–36 flowers scattered along the branches, the corolla-tube not contracted in the middle, the plumose cilia on the calyx lobes and the general glandular condition of the flowering branches. It is closely allied to *G. parviflora*.

When Brown revised the genus he had two collections of *Schlechter* to examine and justifiably described them as two new species, *G. minutiflora* and *G. nodiflora*, basing them on the presence or absence of gland-tipped plumose or simple cilia on the calyx lobes.

Since then no further material referable to *G. nodiflora* has been collected, but there have been 12 collections of *G. minutiflora*. The type of *G. nodiflora* possesses no glands on the calyx lobes, whereas in the collections of *G. minutiflora* there are always some glands present on the cilia, but these may be extremely small in some flowers. The material

was then examined for other characters. Brown used the differences in the size of the inflorescence heads, but this is invalid as the heads in *Oliver* 4105 are much larger than in *Schlechter* 10188. He also used the degree of feathering on the cilia, but this is very variable in *G. minutiflora* from simple to almost fully plumose.

Slight differences were found in the length of the pedicel which is absent to 0,4 mm long in *G. minutiflora* and up to 0,8 mm long in *G. nodiflora*. The bracteoles of the former are usually adpressed whereas in the latter they are approximate but curved-spreading. I decided to reduce *G. nodiflora* to sub-specific level under *G. minutiflora*, because of the difference in the glandular state of the cilia and the slight discontinuities in the bracteoles and pedicel characters coupled with the allopatric distribution.

At first examination I found that there was a distinct difference in the type of pubescence on the calyces with *G. minutiflora* having zones that were pubescent and glabrous and with *G. nodiflora* having an evenly pubescent calyx. Close examination of *Schlechter* 10188 duplicates showed there to be two distinct forms. In one the pubescence is zoned as in *G. minutiflora*, in the other it is evenly distributed over the calyx, a condition not found in *G. minutiflora*. This variability suggests a closer relationship between the two taxa than was previously accorded to them.

The material on sheets of *Schlechter* 10188 can easily be separated into two forms, A & B, on the type of pubescence and the shape of the calyx lobes. In form A the pubescence is zoned and the calyx lobes are oblong to elliptic-oblong acute. In form B the pubescence is denser and evenly distributed over the calyx the lobes of which are transversely broadly elliptic obtuse. These variations can only be recognised as forms at present as they presumably came from one population. This has not been rediscovered and until such time as it is, no further status can be given to this variation.

The specimens examined in detail have been assigned to the two forms as follows:

Herbarium	Form A	Form B
BOL.....	1 twig	—
BOL.....	2 twigs	—
E.....	—	4 twigs
MO.....	1 twig	2 twigs
PRE.....	2 twigs	1 twig
STE.....	1 twig	1 twig
K.....	1 twig	1 twig

N. E. Brown did not designate a holotype but labelled one sheet in BOL (form A only) and one in K (form A & B) as types. From the protologue two characters can be pinpointed to determine which form he used to describe his species, i.e. "ca yx lobes oblong, acute". These undoubtedly refer to form A. I have therefore chosen the *Schlechter* sheet labelled as the type in BOL as the lectotype.

8. *Grisebachia secundiflora* E. G. H. Oliver sp. nov., in genere singulari ovario unicellulari et inflorescentiis secundis densis sed affinis *G. parviflorae* (Klotzsch) Druce.

Frutex humilis compactus vel effusus ad 0,8 m altus. Rami multi ascendentes foliis tantum ad extrema, pubescentes demum canopubescentes et lamelliformes. Folia 3-nata imbricata demum patentia 3-4 mm longa petiolo 1 mm, anguste ovata ad elliptica, pubescentia glabrescentia, ciliata ciliis brevibus crassis plumosis et apiculata demum

serrulata, interdum ciliis glandulis parum glauca ad olivacea; petiolo quam lamina pubescentiora. Flores 3-nati in remulis axillaribus brevissimis, aggregate in pseudospicam secundam dense farotam ad 3,5 cm longam versus extrema ramorum; pedicellis brevissimis 0,5 mm longis; bracteolis 3 adpressis, mediana ad 1,0×0,6 mm saepe minore quam lateralibus ovatotriangulare, lateralibus ad 1,3×0,6 mm anguste ovatis, interdum obliquis, omnibus glabris ad pubescentibus, ciliatis ciliis simplicibus vel plumosis interdum glandulis, apiculatis cilio longo plumoso, albidis ad chlorinis. Calyx 4-lobatus campanulatus ad 2,1 mm longus junctus quadrante ad tertia parte, ad dimidio tubi corollae glaber ad puberulus albidus ad chlorinus; lobis in latitudine inaequalis, ab- et adaxialibus latioribus quam lateralibus, late ovatis ad obovatis parum cucullatis ciliatis ciliis plumosis crassis interdum glandulis cum ciliis simplicibus immixtis, apiculatis, indistincte sulcatis apice. Corolla 4-lobata 3,5-4,5 mm longa et 1,3-1,6 mm lata, angusto tubulosa et parum inflata in parte tertio e basi, ad breviori multo inflata in dimidio interiore, pubescens in parte medio et intra glabra, albidus; lobis 0,6×0,6-1,0×0,9 mm erectis ad parum patentibus, obtusis, glabris. Stamina 4 libera; filamentis anguste linearibus glabris albidis; antheris ad 1,0×0,5 mm, inclusis ad manifestis, subbasaliter dorsifixis, laevigatis ad minute scabridis, aristatis; aristis dorsalibus, deorsum currentibus, cellulis plus minusve dimidio brevioris; pollinis singularibus. Ovarium 1-cellulare ovulo uno pendulo apicale, rarissime 2-cellulare, parum obliquum, 0,7-0,6 mm glabrum viride; disco distincto rubro; stylo filiformi 4,0-4,5 mm longo, exserto glabro; stigmatibus capiteallato.

TYPE.—Cape, Ceres District, Swartruggens in the Cold Bokkeveld, *Oliver* 6105 (STE, holo.; BM; BOL; E; G; K; MO; NBG; P; PRE: S; W).

Low compact but sprawling shrublets up to 0,5 mm high, much branched. Branches numerous ascending with leaves only towards the ends, finely pubescent becoming grey pubescent and flaky with age. Leaves 3-nate, closely imbricate, spreading when older mostly 3-4 mm long with the petiole 1 mm long, narrowly ovate to elliptic, pubescent becoming glabrous, ciliate with short stout plumose hairs and apiculate with a long stout plumose hair, becoming serrulate, occasionally with gland-tipped cilia when young, slightly glaucous to olive-green; the petiole more pubescent than the lamina. Flowers 3-nate on very short axillary branchlets crowded into a densely packed second pseudo-spike up to 3,5 cm long towards the ends of the main branches; pedicel very short about 0,5 mm long; bracteoles 3 adpressed to the calyx, the median up to 1,0×0,6 mm often smaller than the laterals, ovate-triangular, the laterals up to 1,3×0,6 mm narrowly ovate sometimes oblique, all glabrous to pubescent, ciliate with simple and plumose cilia sometimes gland-tipped, apiculate with a long plumose hair, white to pale yellow-green. Calyx 4-lobed campanulate up to 2,1 mm long joined from quarter to one third of its length, reaching halfway up the corolla-tube, glabrous to puberulous white to pale yellow-green; lobes unequal in width, 1-1,7 mm, the ab- and adaxial being broader than the laterals, broadly ovate to obovate slightly cucullate, ciliate with stout plumose cilia which may be gland-tipped with simple cilia inbetween, apiculate, indistinctly sulcate at the apex. Corolla 4-lobed 3,5-4,5 mm long and 1,3-1,6 mm wide, narrow tubular and slightly inflated one third of the way up

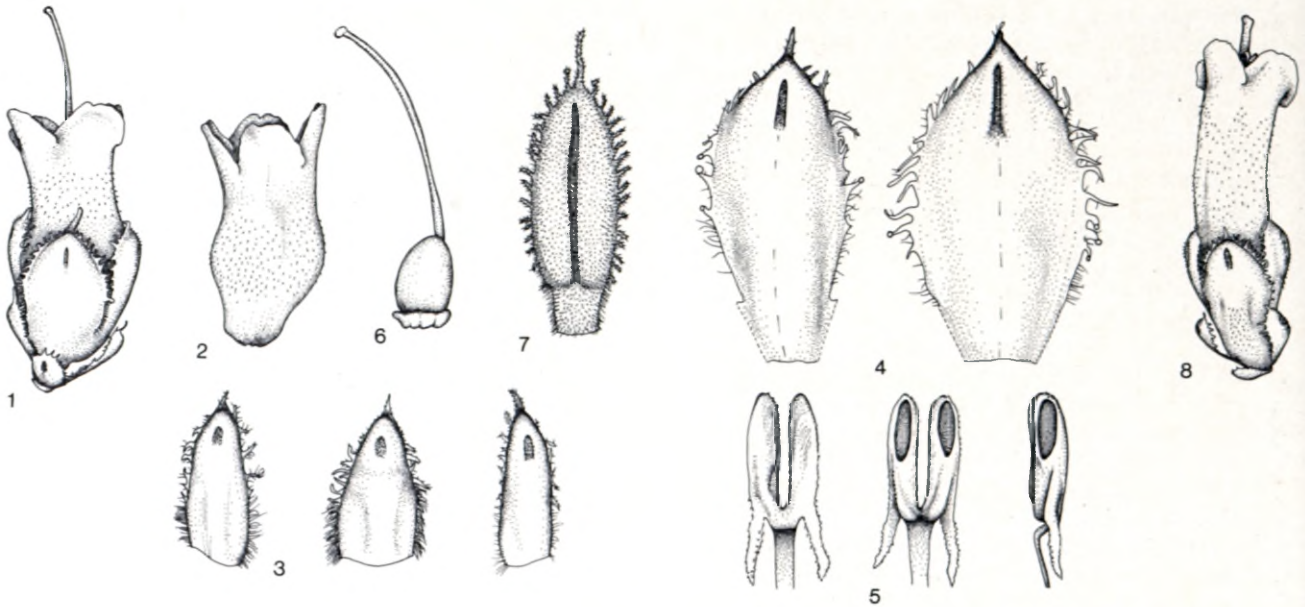


FIG. 26.—*Grisebachia secundiflora*. 1, flower, $\times 8$; 2, corolla, $\times 8$; 3, three bracteoles, $\times 16$; 4, sepals, lateral and abaxial, $\times 16$; 5, anther, back, front and side views, $\times 16$; 6, gynoecium, $\times 16$; 7, leaf, $\times 8$; all drawn from the holotype, Oliver 6105 (STE); 8, flower, $\times 8$, all drawn from Oliver 5044 (STE).

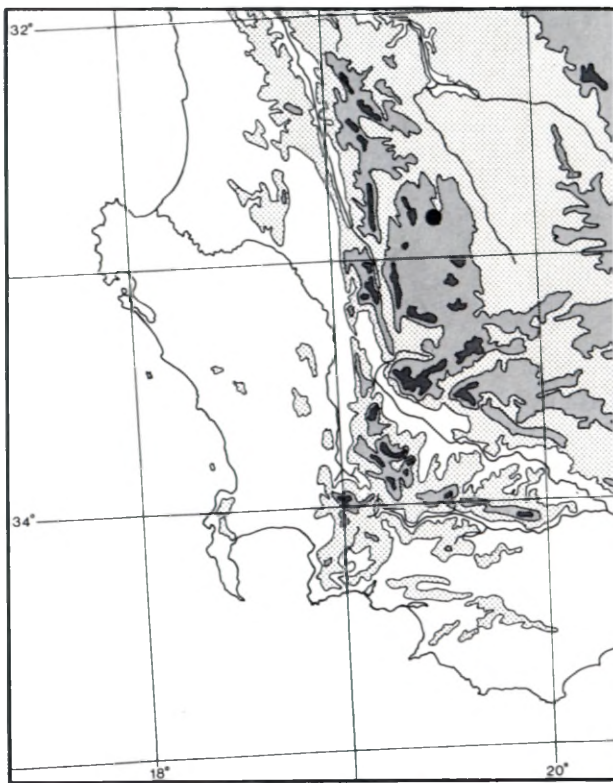


FIG. 27.—Distribution of *Grisebachia secundiflora*.

to short tubular and much inflated in the lower half, finely pubescent in the middle region and glabrous inside, white: lobes varying from $0,6 \times 0,6$ – $1,0 \times 0,9$ mm, erect to slightly spreading, obtuse, glabrous. *Stamens* 4, free; filaments narrow linear, glabrous white; anthers up to $1,0 \times 0,5$ mm, included to manifest, subbasally attached on the dorsal surface smooth to minutely scabrid, aristate; awns dorsal pointing downwards, about half the length of the cell, minutely ciliate, white; pore about half the length of the cell; pollen grains single. *Ovary* 1-celled with a single pendulous apical ovule, very rarely

2-celled, slightly oblique, $0,7 \times 0,6$ mm, glabrous, greenish, seated on a distinct dark red nectariferous disc; style filiform, 4,0–4,5 mm long, exserted, glabrous; stigma capitellate. Figs 26 & 27.

CAPE.—3219 (Wuppertal); Rietvlei (–CD), MacGregor in BOL 31286 (BOL); Swartruggens, Rosendal area, north-east of the farmstead, 960 m (–CD), Oliver 6105 (BM; BOL; E; G; K; MO; NBG; P; PRE; S; STE; W); 6107 (B; C; PRE; STE); 1066 m, Oliver 6115 (NBG; PRE; STE). Locality uncertain; Ceres Wildflower Show, Oliver 5044 (PRE; STE). Flowering in October.

G. secundiflora is very distinct in the genus with its erect second pseudospicate inflorescences, its considerably bare branches and 1-celled ovary.

The species was first seen by me at the Ceres Wildflower Show in October 1974 when I was doing the naming of specimens. The collector and locality unfortunately could not be traced. A few weeks later the material collected the previous year in the Swartruggens by Dr J. MacGregor was sent to me for identification.

An examination of the above collections showed that they constituted a new and very distinct species which I was not able to place satisfactorily in any known genus. Following Dr MacGregor's directions, I visited the Swartruggens and located the species in three disjunct sparse populations. A range of material was collected and examined for variations in the critical character, the 1-celled uniovulate ovary. An examination of numerous flowers produced only a few with unequally 2-celled ovaries.

The species is remarkably similar to *Eremia totta* (Thunb.) G. Don in the outward appearance of the flowers and leaves but cannot be placed near that species which has 8 stamens and a 4-celled ovary. *Eremia* has been considerably amended to include the 1-celled *Eremia curvistyla* (N.E. Br.) E. G. H. Oliver but still retains the constant character of eight stamens (Oliver, 1976).

To a lesser extent the species is similar in outward appearances to *Grisebachia parviflora* (Fig. 22) and *G. minutiflora* (Fig. 24) both of which it grew with in the Swartruggens. They all possess four stamens. Until this revision, all species of *Grisebachia* possessed

2-celled ovaries with very few exceptions having 3-celled ovaries.

There were thus four ways of dealing with the new species: (1) placing it under *Eremia* and having to amend the generic circumscription even further to include the 4-stamened condition, thus causing a breakdown in the distinction between *Eremia* and *Grisebachia*; (2) placing it under *Grisebachia* and amending the generic circumscription to include this 1-celled species; (3) placing it in either *Anomalanthus* or *Syndesmanthus*, genera with 4 stamens and a 1-celled ovary, but which have no resemblance to it; (4) describing the species as a separate monotypic genus.

Taking into account the implications of the above, it was decided to broaden the circumscription of *Grisebachia* to include the 3-celled variations particularly in *G. parviflora* subsp. *pubescens* and the 1-celled, rarely 2-celled, condition occurring in the new species.

In the Swartruggens *G. secundiflora* was found in three separate populations consisting of only a few scattered plants each. At the lower altitude the plants were growing on sandy flats with a population of *G. minutiflora* nearby. Higher up the mountain they were growing on sandy, rocky slopes together with some plants of *G. parviflora* subsp. *pubescens*.

In all cases *G. secundiflora* formed decumbent yet compact shrubs up to 0,5 m high and up to 1 m across with numerous ascending to decumbent branches. The branches were strikingly bare and devoid of leaves except towards their ends. The white conspicuous secund inflorescences were subterminal. This contrasted strongly with the very compact low shrublet of *G. minutiflora* or the sparse spreading procumbent to semi-erect plants of *G. parviflora* ssp. *pubescens* which were all in fruit.

Some variation in floral characters occurs. The pubescence on the calyx may be present or absent on different twigs in the collections Oliver 6105, 6107 and 6115 and is present in MacGregor s.n. It is absent in Oliver 5044 from the flower show. The corolla tube in the collections of Oliver and MacGregor from the Swartruggens are short, tubular and inflated in the lower half whereas in the material from the flower show it is distinctly longer and narrower. As this latter material is unlocalized no further comments on its status can be given.

SPECIES NON SATIS COGNITAE

1. *Erica nodiflora* Salisb. in Trans. Linn. Soc. 6: 340 (1802). Type: *Hibbert* s.n. (?).

Blaeria nodiflora G. Don., Syst. Veg. 3: 805 (1834); Klotzsch in Linnaea 12: 246 (1838) sub. sp. non sat. cog.

Bentham places this species under *G. plumosa* Klotzsch and N. E. Brown accepts this. No type specimen has been seen and the description could fit most species of *Grisebachia*.

2. *Erica capitata* Salisb., Prodr. 293 (1796), non L. Type: ?. Bentham and N. E. Brown place this species under *G. plumosa*, presumably because in the Kew copy of the Prodr. Salisb. has written in pencil 'Nodiflora MS'. Salisbury gave no description quoting only Linnaeus incorrectly.

3. *Blaeria ciliaris* sensu Klotzsch in Linnaea 8: 658 (1933), non *G. ciliaris* (L.f.) Klotzsch in Linnaea 12: 225 (1838); N.E. Br. in Fl. Cap. 4, 1: (1906). Type: *Willdenow Herb.* no. 2890 (B!).

Klotzsch wrongly ascribed the Willdenow specimen to the species which had, up until then, been cited as *Blaeria ciliaris* L.f. In his description he stated that the leaves were 4-nate, possibly repeating the slip made by Thunberg and copied by most subsequent authors. The Willdenow specimen has in fact 3-nate leaves.

Rach (1855) in examining Klotzsch's specimen and that of Thunberg stated that they were not of the same species. Brown noted that Thunberg's specimen was identical to the type in the Linnaean Herbarium.

I have been able to examine the Willdenow specimen in the Berlin Herbarium. The material certainly does not belong to *G. ciliaris* (L.f.) Klotzsch subsp. *ciliaris* and is only in young bud stage from which it is not possible to identify it with any certainty.

SPECIES EXCLUDED

Grisebachia eriocephala (Klotzsch) Benth. in DC., Prodr. 7: 702 (1839) based on *Finckea eriocephala* Klotzsch in Linnaea 12: 238 (1838) = **Acrostemon eriocephalus** (Klotzsch) N.E. Br. in Fl. Cap. 4, 1: 335 (1906).

Grisebachia bruniades (Klotzsch) Benth. in D.C., Prodr. 7: 702 (1839) based on *Finckea bruniades* Klotzsch in Linnaea 12: 238 (1838) = **Acrostemon eriocephalus** (Klotzsch) N.E. Br.

UITTREKSEL

Hierdie is 'n hersiening van die genus *Grisebachia* Klotzsch waarin 8 spesies erkenning geniet. Die genus behoort tot die Ericaceae-Ericoideae en is endemies in die suidwestelike deel van die Kaapprovinsie. Die ondersoek het getoon dat 'n groot mate van variasie onder die spesies voorkom wat dit noodsaak om 7 spesies tot infraspesifieke rang en 7 spesies tot sinonieme te verlaag, terwyl 1 spesie as 'n takson met 'n onduidelike identiteit beskou word. Die nuwe spesies, *G. secundiflora* E. G. H. Oliver, is beskryf.

REFERENCES

- BENTHAM, G., 1839. Ericaceae. In DC., Prodr. 7: 580-733. Paris.
- BENTHAM, G., 1876. Ericaceae. In Benth. & Hook. f., Gen. Pl. 2: 577-604. London: Reeve.
- BROWN, N. E., 1906. *Grisebachia*. In W.T. Thistleton-Dyer, Fl. Cap. 4, 1: 337-350. Ashford: Reeve.
- BROWN, N. E., 1909. Addenda and Corrigenda, Ericaceae. In W.T. Thistleton-Dyer, Fl. Cap. 4, 1: 1123-1129. Ashford: Reeve.
- DRUDE, O., 1897. Ericaceae-Ericoideae. In Engl. & Prantl, Pflanzenfam. 4, 1: 57-65. Leipzig: Engelmann.
- KLOTZSCH, J. F., 1838. Ericaceae, genera et species. Linnaea 12: 211-247.
- OLIVER, E. G. H., 1975. Ericaceae. In Dyer, Gen. 1: 429-439. Pretoria: Botanical Research Institute.
- OLIVER, E. G. H., 1976. Studies in the Ericoideae. I. The genera *Eremia* and *Eremiella*. Bothalia 12: 29-48.
- PHILLIPS, E. P., 1926. Ericaceae. In Gen. ed. 1, 457-465. Pretoria: Division of Botany and Plant Pathology.
- PHILLIPS, E. P., 1944. Notes on the minor genera of the Ericaceae. Jl S. Afr. Bot. 10: 69-73.
- PHILLIPS, E. P., 1951. Ericaceae. In Gen. ed. 2, Pretoria: Division of Botany.
- WEIMARCK, H., 1941. Phytogeographical groups, centres and intervals within the Cape flora. Lunds Univ. Arsskr. 37: 1-143.