



ANNALS  
OF THE  
SOUTH AFRICAN MUSEUM

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*VOLUME IX.*



ANNALS  
OF THE  
SOUTH AFRICAN MUSEUM

VOLUME IX.



PRINTED FOR THE  
TRUSTEES OF THE SOUTH AFRICAN MUSEUM  
BY ADLARD & SON & WEST NEWMAN, LTD., LONDON.  
1911—1918.





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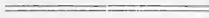
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DATE OF ISSUE OF THE PARTS.

- Part 1, February 28th., 1911.
- Part 2, May 30th., 1912.
- Part 3, October 30th., 1913.
- Part 4, April 8th., 1915.
- Part 5, March 18th., 1917.
- Part 6, June 30th., 1917.
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- |       |   |
|-------|---|
| I.    | <ul style="list-style-type: none"> <li>Chlamydomonas marina, Cohn.</li> <li>Ankistrodesmus convolutus, Corda.</li> <li>Oocystis elliptica, W. WEST, var. africana, G. S. WEST, var. n.</li> <li>Ecdysichlamys, G. S. WEST, gen. et sp. n.</li> <li>Pediastrum Pearsoni, G. S. WEST, sp. n.</li> <li>Tetraedron trigonum, (Nag) Hansg., var. isoscelum, G. S. WEST var. n.</li> <li>Rhizoclonium hieroglyphicum, Kutz. var.</li> <li>Homoethrix africana, G. S. WEST, sp. n.</li> <li>Zygospore of Cosmarium subcostatum, Nordst., forma minor, W. &amp; G. S. WEST.</li> <li>Cosmarium bireme, Nordst., var. crassum, W. &amp; G. S. WEST, forma.</li> <li>Cosmarium Pappekuilense, G. S. WEST, sp. n.</li> <li>Cosmarium alatum, Kirchn., var. aequatoriense, Nordst., forma.</li> <li>Cosmarium Pearsoni, G. S. WEST, sp. n.</li> </ul> |
| II.   | <ul style="list-style-type: none"> <li>Enteromorpha gracillima, G. S. WEST, sp.n.</li> <li>Enteromorpha gracillima, forma breviramosa, G. S. WEST.</li> <li>Cosmarium geometricum, W. &amp; G. S. WEST. var. adoxoides, G. S. WEST, var n.</li> <li>Cosmarium laeve, Rabenh., var. distentum, G. S. WEST, var n.</li> <li>Oedogonium inversum, Wittr. A form.</li> <li>Oedogonium Pringsheimii, Cramer, forma.</li> <li>Myxobractron hirudiforme, G. S. WEST, sp. n.</li> </ul>   |
| III.  | <ul style="list-style-type: none"> <li>Mesembrianthemum gracilistylum, L. BOLUS.</li> <li>Mesembrianthemum denticulatum, Haw. var. candidissimum.</li> </ul>  |
| IV.   | <ul style="list-style-type: none"> <li>Xysmalobium Pearsonii, L. BOLUS.</li> </ul>  |
| V.    | <ul style="list-style-type: none"> <li>Cynanchum Meyeri, Schltr. var. angustifolia, L. BOLUS.</li> </ul>  |
| VI.   | <ul style="list-style-type: none"> <li>Nenax Dregei, L. BOLUS.</li> <li>Anticharis juncea, L. BOLUS.</li> <li>Sutera rigida, L. BOLUS.</li> </ul>   |
| VII.  | <ul style="list-style-type: none"> <li>Lotononis exstipulata, L. BOLUS.</li> <li>Crotalaria Pearsoni, Baker. f.</li> <li>Indigofera limosa, L. BOLUS.</li> </ul>  |
| VIII. | <ul style="list-style-type: none"> <li>Sporobolus sladenianus, F. BOLUS.</li> <li>Agathosma sladeniana, R. GLOVER.</li> <li>Lycium roseum, L. BOLUS.</li> </ul>   |

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1.—*On the Collections of Dried Plants obtained in South-West Africa by the Percy Sladen Memorial Expeditions, 1908–1911. (Report No. 5.)—By H. H. W. PEARSON, Sc.D., F.L.S., Professor of Botany in the South African College, Cape Town.*

IN the expedition of 1908–1909, a general account of which has already been published,\* rather more than 3,000 numbers of flowering plants were collected. In addition to these a few ferns, Characæ, fresh-water Algæ and Lichens were also obtained. About 2,000 of these are natives of Namaqualand and Bushmanland. A second expedition, working between Eendekuil and Bethany Drift, on the Orange River, is planned to leave Cape Town at the end of November, 1910. This will, no doubt, yield considerable additions to the collections already obtained.

West Africa, south of the Benguela tableland, is a region of peculiar botanical interest. Many of its species are endemic; others appear to be remarkably limited in their distribution; all exhibit a high degree of adaptation in habit, structure, or constitution to the desert conditions, more or less severe, which prevail throughout the area. Many portions of this region have been examined, as thoroughly as circumstances would permit, by Drège, Welwitsch, Schinz and many other botanical travellers, but the wealth of the

\* Pearson, H. H. W., 1910, *Journal of the Royal Geographical Society*, p. 481.

flora is still far from being exhausted. Such knowledge as has been acquired in very many cases lacks precision owing to the poverty of the specimens available for description and, further, on account of the difficulties of travel and the remarkable power which the vegetation possesses of remaining dormant during the long spells of drought, few localities are known with any degree of thoroughness. Much, therefore, yet remains to be done in determining the geographical range of species both within the region itself and beyond it into contiguous areas.

The further study of the vegetation of this tract of country—nowhere thickly populated and to a large extent without settled habitations—is greatly to be desired also for economic reasons. Its most important permanent industry is pastoral, and it is only necessary to direct attention to the fact that comparatively little is known respecting its fodder plants and species poisonous to stock—which are numerous. In this respect the grasses call for special notice. The profusion of members of this family on the dry sandy plains of Bushmanland is in itself remarkable, and the possibility of bringing some of these into cultivation elsewhere for pastoral purposes is worthy of attention. Other families which force themselves upon the notice of the traveller include the Euphorbias which predominate both in size and numbers over the rest of the vegetation throughout extensive areas. These have attracted some attention as possible sources of caoutchouc. The distribution and conditions of growth of any of the Namaqualand Euphorbias may in the future become questions of commercial importance. Agriculture is practised here and there, frequently under somewhat primitive methods of irrigation. There can be no doubt that with improved means of communication and access to markets the cultivation of certain crops is capable of further extension. These considerations furnish economic justification for any efforts that can be made to obtain a more complete knowledge of the composition of the native vegetation and of the conditions under which it lives.

In the furtherance of this object it is proposed to publish in the following pages a list of the species represented in the collections of the Percy Sladen Memorial Expeditions, with such additional information from field notes and from other collections as may seem desirable. A general discussion of certain prominent features of the vegetation and of its relationships with contiguous floras will be deferred until the determination of the species is completed.

ITINERARY OF THE PERCY SLADEN MEMORIAL EXPEDITION, 1908-9.

The facts recorded in the following itinerary are arranged in six columns. The numbers of the stages given in column 2 are attached to the specimens constituting the first set which will be incorporated in the Kew Herbarium.\* The elevations (in feet) given in the fourth column are, in nearly all cases, corrected Aneroid determinations. Under the title "Remarks" in the sixth column are recorded such characters of the various localities as appeared to be of outstanding importance. These facts are transcribed from field note-books, and it is probable that some of the specific names used will need correction when the specimens have been more thoroughly studied.

I am indebted to the Royal Geographical Society for permission to reproduce the accompanying map, which was prepared by Mr. Milne for publication in the Journal of the Society.†

\* A set will also be placed in the Herbarium of the South African Museum.

† Pearson, H. H. W., *l.c.*, 1910.

Date.	Stage.	Region.	Elevation.	Locality.
1908.				
Nov. 27 .....	1	Cape	1,080	Ceres
„ 27 .....	2	Cape		Nine miles along the Leeuwfontein Road
„ 28 .....	3	Cape		Thence to Leeuwfontein
„ 28 .....	4	Cape	2,320	Leeuwfontein
„ 28 .....	5	Cape		Thence to Hottentot's Kloof
„ 29 .....	6	Cape	2,500	Hottentot's Kloof
„ 29 .....	7	Cape	2,500-2,000	Thence to Karoo Poort
„ 30 .....	8	Karoo		Thence to Zoutpansdrift
„ 30 .....	9	Karoo	2,000	Zoutpansdrift
„ 30 .....	10	Karoo		About 9 miles along Beukesfontein Road
Dec. 1 .....	11	Karoo		Thence to Beukesfontein
„ 1 .....	11	Karoo	1,420	Beukesfontein
„ 1 .....	12	Karoo		Thence to Gansfontein (15 miles)
„ 2 .....	13	Karoo	1,200	Gansfontein
„ 2 .....	14	Karoo		Thence to Pappekuil
„ 3 .....	14	Karoo	950	Pappekuil
„ 3 .....	15	Karoo		Thence to Stompiesfontein
„ 4 .....	15	Karoo	800	Stompiesfontein
„ 4 .....	16	Karoo		Thence to Schurkraal
„ 5 .....	16	Karoo	1,100	Schurkraal
„ 5 .....	17	Karoo		Thence to Draaikraal
„ 6 .....	17	Karoo	1,700	Draaikraal
„ 6 .....	18	Karoo to Upper		Thence to Kareeboomfontein
„ 7 .....	18	Upper	About 2,500	Kareeboomfontein
„ 7 .....	19	Upper		Thence to Calvinia
„ 8-9 ...	19	Upper		Calvinia
„ 9-10...	19	Upper	2,700	Thence to Holle Rivier
„ 9-10...	20	Upper		Thence to Brakrivier



Remarks.

- Mainly rocks near stream at the head of Mitchell's Pass.  
 Undulating country, dry. Grain cultivation. Sheep and ostriches.
- Undulating country, dry. Grain cultivation. Sheep and ostriches. *Salix capensis*,  
 Gunnera, grasses, &c., in small stream-bed containing stagnant water.
- Dry hills; abandoned cultivation; river-bed still retaining stagnant water.
- Road rises about 600 feet, and then descends again. Dry undulations, bush, grass, and  
 succulents. Corn.
- Dry hills rising to about 3,500 feet. Succulents, proteaceous bush, grasses. Corn.
- Road gently descends a narrowing valley. Corn cultivation. *Elytropappus*. Mingling  
 of Cape and Karoo forms. Vegetation generally in good condition.
- Dry. *Cotyledon fascicularis*, Euphorbias, &c., very abundant on hills.
- Dry, stony flats. Much dead vegetation. Water scarce. Sheep, goats, ostriches.
- Dry, stony flats. Much dead vegetation. Little living vegetation.
- Dry, stony flats. Much dead vegetation. Little living vegetation.
- Weak spring (H<sub>2</sub>S). A little cultivation under irrigation (figs, meallies, pumpkins,  
 potatoes). *Acacia horrida*, *Ehrharta spinosa*, *Suaeda fruticosa*.
- Augea capensis*, Mesembrianthema, Euphorbias. Extensive stretches of quite bare  
 ground.
- Weak spring (H<sub>2</sub>S). Three date-palms in farm-garden. *Acacia horrida* (tree), with  
*Viscum*. Away from the immediate vicinity of the spring the undulating stony  
 ground was exceedingly dry and almost destitute of vegetation except Mesembrian-  
 themata.
- Acacia horrida*, *Galenia fruticosa*, *Ehrharta spinosa*, *Aristida* spp., Mesembrianthema, a  
 few Composites, &c., in dry, sandy river-bed away from which the stony ground is  
 extremely barren. Dead plants of *Hoodia* sp. (?) were plentiful.
- Weak spring (H<sub>2</sub>S). Gansfontein plants near water: *Codon africanum* and little else  
 away from it.
- Away from sandy river-courses, country almost without living vegetation.
- Farm abandoned on account of the drought. Many dead Sarcocaulons. Living vegetation  
 includes little besides *Augea capensis*, Mesembrianthema and columnar Euphorbias.  
 Cedarberg Mountains have been clearly visible for two days.
- Country becomes more hilly (approaching Roggeveld Mountains). *Acacia horrida* with  
*Viscum capensis* common in river-beds. *Lycium*, *Zygophyllum*, *Galenia*, Mesembrian-  
 themata, *Solanum*, Euphorbia, but all very dried up. No annuals.
- Dates, oranges, figs, and a little corn under irrigation. Good water from well in river-  
 bed. Halophytes. *Asclepias fruticosa*.
- Dry but becoming less barren. Road rapidly nears the Roggeveld Range.
- Augea capensis*, halophytes, *Melanthus*, *Acacia horrida*, *Rhus viminalis*, Composites and a  
 Nieuveveld *Salvia*. A dry, sandy river-bed and saline flat situated under the north-  
 western spur of the Roggeveld Mountains.
- Road ascends about 800 feet up the Blaaukrantz Pass to the plateau north-east of the Rogge-  
 veld ridge. Composites and other upper region forms become predominant as elevation  
 increases. Vegetation in good condition. Lichens, mainly crustaceous, are abundant.
- Weak spring, away from which vegetation is very dry. Country mountainous.
- Peaches, oranges, vines, water-melons, salt-bushes, lucerne, under irrigation; water  
 obtained from Oorlogs Rivier. Ostriches, horses, sheep, and some cattle. *Arundo*  
 and an exotic *Tamarix* in river-bed.
- Road runs along foot of the Hantam Range. Vegetation much dried up. At Holle Rivier  
 is a deep river-bed (100-150 feet) with steep, rocky sides. A little moisture was still  
 retained, but the farm was abandoned on account of the drought. The garden con-  
 tained a great mass of *Opuntia*, a few fig-trees and one date-palm. *Cadaba juncea*,  
*Rhus viminalis* with *Viscum*, *Hibiscus urens*, grasses and succulents (Crassulacæ) in  
 the ravine.
- Broken country. Crossed two branches of the Doorn Rivier, in which were found a *Ficus*,  
*Statice scabra*, *Tamarix articulata* and some other Namaqualand forms.

Date.	Stage.	Region.	Elevation.	Locality.
1908. Dec. 11 ...	20	Upper and Namaqualand	1,600	Brakrivier
„ 11 ...	21	Upper and Namaqualand (the latter predominant)		Thence to Kopjes Kraal
„ 12 ...	21	Upper	2,300	Kopjes Kraal
„ 12 ...	22	Upper		Thence to Loeriesfontein
„ 13-14	22	Upper	2,800	Loeriesfontein
„ 14-15	23	Upper, Namaqualand, Karoo	1,700 (Grauwater)	Thence to Grauwater
„ 15-16	24	Karoo and Namaqualand	1,700-1,600	Thence to Klipplaat
„ 16-17	25	Namaqualand and Bushmanland	1,600-1,700	Thence about 10 miles to the north-east
„ 17-18	26	Bushmanland		Thence to a position said to be 8 miles south or south-west of Bitterfontein
„ 18-19	27	Bushmanland		Thence to a position said to be about 8 miles south-west or west of Bitterfontein
„ 19-20	28	Bushmanland	2,300	Thence to a position a few miles east of Nieuwfontein
„ 20 ...	29	Bushmanland and Upper		Thence to Nieuwfontein
„ 21 ...	29	—	2,700	Nieuwfontein
„ 21-22	30A	Upper, Namaqualand, and Karoo		Thence to Alewyn's Fontein
„ 22 ...	30B	Upper, Namaqualand, and Karoo	2,900	Alewyn's Fontein
„ 22-23	31A	Upper, Namaqualand, and Karoo		Thence about 15 miles on the road to Kamabies
„ 23 ...	31B	Upper, Namaqualand, and Karoo	3,200	Fifteen miles north of Alewyn's Fontein
„ 23-24	32A	Upper, Namaqualand, and Karoo		Thence to Kamabies
„ 24 ...	32B	Namaqualand	3,000	Kamabies
„ 24-25	33A	Namaqualand		Thence to a position about 2 miles south of Tweefontein
„ 25 ...	33B	Namaqualand	2,700	Two miles south of Tweefontein

## Remarks.

The farm is situated in the river-bed which lies in a very broad valley, above which the hills rise about 1,000 feet. Below the hilltops Namaqualand species predominate—in addition to those found on the 10th, there were here *Aloe dichotoma*, *Vogelia africana*, *Exomis* and *Didelta*. *Augea capensis* and many halophytes at the bottom of the valley.

Road for some distance lies in Hantam's river-bed, which is fringed with a very dense growth of Tamarix bearing "thousands" of clumps of *Viscum*, and with an undergrowth of *Suaeda fruticosa*, *Lycium sp. (austrinum?)* and some grasses. *Aloe dichotoma* on hill-slopes facing north. On ascending 700 feet to level of Kopje's Kraal, upper-region forms again predominate.

In the deep ravine, *Vogelia africana* and Tamarix (without *Viscum*). On open ground, *Mesembrianthemum spinosum* and Composites. River-bed contains much saline efflorescence. Sheep, goats and a few cattle.

Water supply good. Village surrounded by extensive cornfields (wheat and oats). Namaqualand forms in the ravines. *Hibiscus urens*.

Road descends sandy bed of Kromme River and then crosses a series of undulating plains. As the elevation falls the flora becomes more markedly karroid. *Acacia horrida* (20–25 feet) near Grauwater water-pit. Farm deserted.

Near the end of the stage, ascended about 400 feet to cross the Langeberg Range. This range bears a great development of Namaqualand forms (including *Aloe dichotoma*). On the sandy plains at the foot of the pass, *Hoodia Gordonii* is extraordinarily abundant, with both flowers and fruits. Very little water at Klipplaat. No habitations.

Over sandy plains, in which *Aloe dichotoma* occurred abundantly. Towards the end of the stage grasses became predominant (as individuals, perhaps as species). Vegetation in broad, sandy river-bed in better condition than at any station north of Karooport.

Sandy surface very dry and barren. Vegetation mostly dead. *Mesembrianthema*, grasses, &c., which were afterwards found again near the Orange River. Abandoned cultivation.

Country uninhabited. Very dry. No surface water. The water at Bitterfontein is highly charged with mineral salts.

A broad, sandy river-bed, with fairly dense vegetation, whose constituents were almost identical with those of the river-bed in stage 25.

Very barren. A mixture of upper-region and Bushmanland species. Horses, cattle, donkeys, sheep, and goats.

Lichens very abundant. Flat country with abrupt hills. *Acacia horrida* absent.

Many cattle. Vegetation dried up.

Karoo flora with *Mesembrianthema* on the plains; many Namaqualand forms (including *Aloe dichotoma*) in deep ravine about 600 feet below general surface. Many lichens. *Tribulus sp.*

Water-hole, fed by a spring, lies at the lowest point in a broad, sandy plain, sloping gradually up on all sides to amphitheatre of rugged, barren hills rising about 1,000 feet above it. Namaqualand forms predominate. Rainless for five months. Kamiesberg in sight.

Deep sand in broad valley. *Aloe dichotoma* abundant. Many columnar Euphorbias and *Mesembrianthema*. Many dead Sarcocaulons on the hills.

Date.	Stage.	Region.	Elevation.	Locality.
1908. Dec. 25-26	34A	Namaqualand and Bushmanland		Thence to Rietfontein
„ 26-27	34B	Namaqualand and Bushmanland	2,300	Rietfontein.
„ 27 ...	35	Namaqualand		Thence to O'okiep (3,050 feet)
„ 30 ...	36	Namaqualand		Rattelpoort
1909. Jan. 3-4 ...	37	Bushmanland	3,000	Kweekfontein
„ 4-5 ...	38A	Bushmanland		Thence to Ougrabies
„ 5 .....	38B	Bushmanland	3,000	Ougrabies.
„ 5-6 ...	39A	Bushmanland		Thence to Aggenys
„ 6-7 ...	39B	Bushmanland	3,000	Aggenys
„ 7-8 ...	40A	Bushmanland		Thence to Pella
„ 8 .....	40B	Bushmanland	1,500	Pella
„ 8-9 ...	41A	Bushmanland		Thence to Groot Rozynbosch
„ 9 .....	41B	Bushmanland	2,800	Groot Rozynbosch
„ 9-10 ...	42A	Bushmanland		Thence to Wortel
„ 10 .....	42B	Bushmanland	2,700	Wortel
„ 10-11...	43A	Bushmanland		Thence to Dabainoris
„ 11 .....	43B	Bushmanland	1,500	Dabainoris
„ 11-12...	44A	Bushmanland		Thence to Abbasis
„ 12 .....	44B	Bushmanland	800	Abbasis

## Remarks.

Collected for about 2 miles in the sandy bed of a tributary of the Buffels River. *Acacia horrida* (just flowering), *Salix capensis*, Tamarix, Labiates, Cyperaceæ, &c. Bushmanland grasses.

Broad, sandy river-bed. *Parkinsonia africana*, grasses (including *Ehrharta spinosa*) in sand. *Aloe dichotoma* and a *Euclea* (tree) on hills. Figs, pears, plums, peaches, apricots, quinces, pomegranates, grapes, loquats, dates, lucerne, wheat, under irrigation in river-bed. Markets at Springbokfontein and O'okiep.

Corn and other cultivation under irrigation on flat lands. Country very mountainous. In the considerable rise from Rietfontein to Baviaan's Poort (? 4,000 feet), Amaran-  
taceæ are numerous.

Mountain west of railway station, about 4,500 feet s.m. *Diosma*, Selaginæ and other Cape forms near the summit. Flora rich. *Cotyledon fascicularis* common on lower slopes.

Namaqualand flora on the hills (rising about 1,000 feet); Bushmanland on the sandy plains. Many sheep and cattle. Small Acanthaceæ.

*Portulacaria namaquensis*.

Sandy valley: hills rising about 1,000 feet. Dunes of red sand. Water-hole dry, receives only surface rain-wash. Many young seedlings appearing in the sand. *Parkinsonia* common. *Portulacaria sp.* on hill-slopes.

Roadway heavy; passes over about twenty-four "waves" of red sand-dunes, some of which are 40 feet high. *Parkinsonia*, grasses, Leguminosæ, *Hermannia*, &c.

North-west corner of a vast sandy plain, where it abuts abruptly against a group of mountains 1,500-2,000 feet high. On the plains a great development of *Euphorbias*, *Parkinsonia*, *Acacia giraffe* (one tree), *Tribulus*, grasses, *Mesembrianthema*, *Sisyndite sparteæ*, &c. On the hills, Acanthaceæ, *Aloe dichotoma*, *Thesium*, *Sarcostemma*, *Ficus*, *Portulacaria namaquensis*, and many other forms. On sand-dunes 4 miles to the east, many young seedlings, *Ehrharta spinosa*, *Parkinsonia*, *Rhigozum*, *Mesembrianthemum spinosum*, *Hoodia*, *Sarcocaulon*, &c. Figs and dates under irrigation near water-hole.

Sandy plains, becoming stony where descent to Pella commences. *Zizyphus mucronata* (in dry river-beds), *Cataphractes Alexandri*, *Melianthus*, *Mesembrianthema*, grasses, *Euphorbias*.

Broad, sandy river-bed: high hills (1,000-2,000 feet) to north of mission station. *Acacia giraffe*, *Euclea Pseudebenus*, *Tribulus*, grasses, *Euphorbias*, *Sisyndite sparteæ*, in sand; *Vogelia*, *Kissenia*, *Aloe dichotoma*, small Acanthaceæ on hills. All fruits enumerated under 34b and corn under irrigation in mission garden.

*Mesembrianthema*, a very fine *Hermannia*, *Sarcocaulon*, *Rhigozum* on the stony plains; trees in narrow ravine. *Rhus sp.* ("Rozynbosch"—"Raisinbush"), *Euclea*, *Salix*, *Ficus*; *Acacia giraffe*.

Many *Euphorbias*, large *Hoodias*, and *Rhigozum*.

Warte-hole at bottom of a narrow valley, 1-2 miles long, between hills of about 800 feet. Flora very rich. *Euphorbias* in great abundance. *Parkinsonia*, *Bauhinia*, *Hoodia*, Acanthaceæ, *Sarcostemma*, *Acacia giraffe*, many seedlings, especially grasses and Cucurbitaceæ.

Much bare ground. *Bouchea*, *Asparagus*, *Aloe dichotoma*, *Euphorbias*, grasses, thickets of *Rhigozum trichotomum*, *Cadaba juncea* and of *Zizyphus mucronata*, many *Hoodias* and *Parkinsonias*.

*Euclea Pseudebenus* and *Tamarix* (Dabai) in sand near water-hole; *Aloe dichotoma*, *Pachypodium namaquanum*, *Bauhinia garipensis*, *Portulacaria namaquensis*, *Forskohlea*, Acanthaceæ and Asclepiadaceæ on hills. Water-supply poor, impregnated with H<sub>2</sub>S. *Sisyndite sparteæ*, on sandy plains; grasses almost absent.

Road through deep sand falling gently to Orange River. Great development of tall bushes of columnar *Euphorbias* (including *Aggenys Euphorbia*); *Aloe dichotoma*, *Bauhinia garipensis*, few grasses, *Parkinsonia*, Acanthaceæ.

Desert flat separated from river by a broad belt of scrub (see *Nature*, 1909, p. 466).

Date.	Stage.	Region.	Elevation.	Locality.
1909. Jan. 12 .....	45A	Bushmanland		Thence to Raman's Drift
„ 13 .....	45B	Bushmanland	700	Raman's Drift
„ 13-14...	46A	Bushmanland		Thence to Henkriesfontein
„ 14 .....	46B	Bushmanland	1,100	Henkriesfontein
„ 14-15...	47A	Bushmanland to Namaqualand		Thence to Eenriet
„ 15 .....	47B	Namaqualand	3,000	Eenriet
„ 15 .....	48	Namaqualand		Thence to Steinkop
„ 16 .....	49	Namaqualand		Klipfontein
„ 17 .....	—	Namaqualand		O'okiep
„ 19-20...	50A	Namaqualand to Bushmanland		Thence to Sabies
„ 20 .....	50B	Bushmanland	3,100	Sabies
„ 20 21...	51	Bushmanland	2,900	Thence to Aus
„ 21-22...	52A	Bushmanland		Thence to Raman's Drift
„ 23 24...	52B	Bushmanland	700	Raman's Drift
„ 24 .....	—	Bushmanland to Great Namaqualand		—
„ 25-26...	53A	Great Namaqualand		Thence to a position 20 km. north of Raman's Drift
„ 26 .....	53B	Great Namaqualand	2,400	20 km. north of Raman's Drift
„ 26-27...	54A	Great Namaqualand		Thence to 20 km. south of Warmbad
„ 27 .....	54B	Great Namaqualand	2,400	20 km. south of Warmbad
„ 27-28...	55A	Great Namaqualand		Thence to Warmbad, through Aleuriesfontein
„ 28-29...	55B	Great Namaqualand	2,300 (Warmbad)	Warmbad, and thence to a position 2 miles south of Dabaigabis
„ 30 .....	56	Great Namaqualand	2,500	Two miles south of Dabaigabis (Dubbeeknabies of J. E. Alexander)
„ 30-31...	57A	Great Namaqualand		Thence to Gabis, with a short stay at the Dabaigabis water-hole
„ 31 .....	57B	Great Namaqualand	2,800	Gabis
„ 31-Feb. 1	58A	Great Namaqualand		Thence to position 2 miles west of Ganus
Feb. 1 .....	58B	Great Namaqualand	3,100	A little west of Ganus (1 mile south of the stone marked "27 km. nach Dreihuk")
„ 1-2 ...	59A	Great Namaqualand		Thence to position about 15 km. along the road to Gründoorn

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Remarks.

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Along river-bank under steep granite cliff on which were seen *Aloe dichotoma*, and probably *Pachypodium*. On the stony beach, a *Zizyphus* was almost strangled by the roots of a *Ficus* about 40 feet high.

Gentle ascent through deep sand in river-bed and over the "Wolftoon" (Pearson, Journ. R.G.S., 1910, p. 495).

In situation, with respect to mountains bordering Orange River, and in vegetation very similar to Pella.

Road through deep sand.

Narrow valley enclosing hills 500-1,000 feet. Euphorbias, Mesembrianthema, Composites. Namaqualand forms predominant, but *Aloe dichotoma* not seen.

Mesembrianthema, *Galenia fruticosa*.

Vegetation very similar to that of Rattelpoort (36), but dried up.

Vegetation very similar to that of 33A. Much Tamarix in stream-bed.

Plains of red sand; dry ravine 100-200 feet deep; hills 1,000-1,500 feet. Vegetation of the same type but richer.

Passing to the left of the Gesellschaft Bank—a dome of granite rising abruptly from the sandy plain. Vegetation at foot of hill very rich. Euphorbias, *Sisynidite spartea*, &c., on the plain.

Hills south of Police Camp very barren. Acanthaceæ, Asclepiadaceæ, *Bauhinia garipensis*, *Euphorbia virosa* and two other species.

Crossed to the German side.

Hill-slopes very barren. Vegetation of valley quite similar to that between the Gesellschaft Bank and Raman's Drift (52A and B). Road through deep sand.

Sandy plains. Bushmanland flora, including Euphorbias, Parkinsonia, Rhigozum, Tribulus, &c.

Sandy plains.

River-bed among rugged hills. Bushmanland and Namaqualand vegetation, but richer in forms than any locality south of the river except perhaps Wortel (42B).

Very barren, but many seedlings, especially grasses, here and there. Bushmanland forms.

Very barren. South of Warmbad the surface is very stony. Between Warmbad and Dabaigabis sandy and undulating.

A sandy plain; station near dry bed of tributary of the River Houm. In the river-bed, fine trees of *Acacia horrida*, with Cadaba, Tamarix, Galenia, grasses, &c. On the plain, many trees of *Acacia giraffæ*, with nests of *Philetaerus socius* (rarely in the river-bed itself), Mesembrianthema, Hoodia, Rhigozum, Peliostomum, Tribulus, *Augea capensis*, Parkinsonia, small Euphorbias, grasses, &c.

River-bed and low hills opposite the mission station. *Augea capensis*, Euphorbias, Suaeda, Tamarix, Parkinsonia, Bouchea, Rhigozum, *Euclea Pseudebenus*, *Acacia horrida*, *A. giraffæ*.

Passing through Dreikuk.

Sandy plain; rain had recently fallen and vegetation was flourishing. Many seedlings and small annuals. The Great Karas Berg in sight to the north.

Passed over belt of sand-dunes. Harpagophytum.

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Date.	Stage.	Region.	Elevation.	Locality.
1909. Feb. 2 .....	59B	Great Namaqualand	3,300	About 15 km. north-west of Ganus
„ 2-3 ...	60A	Great Namaqualand		Thence to position about 20 km. SSE. of Gründoorn
„ 3 .....	60B	Great Namaqualand	3,900	About 20 km. SSE. of Gründoorn
„ 3-4 ...	61A	Great Namaqualand		Thence to Gründoorn
„ 4 .....	61B	Great Namaqualand	3,300	Gründoorn
„ 4-5 ...	62A	Great Namaqualand		Thence to Sabiesis
„ 5 .....	62B	Great Namaqualand	3,000	Sabiesis
„ 5-6 ...	63A	Great Namaqualand		Thence to Holoog
„ 6 .....	63B	Great Namaqualand	2,500	Holoog
„ 7 .....	64	Great Namaqualand	2,100	Gawachab
„ 8-9 ...	65	Great Namaqualand	2,300	Seeheim
„ 10 ...	66	Great Namaqualand	2,900	Gobas
„ 10-11	67	Great Namaqualand	3,300	Keetmanshoep
„ 12 .....	68	Great Namaqualand	3,100	Sandverhaar
„ 13-15...	69	Great Namaqualand	3,200	South of the railway line, 20 km. west of Sandverhaar



## Remarks.

- A flat plain south of Great Karas Berg and almost on the watershed between the Houm and the Kameeldoorn Rivers. Surface here and there of dried mud, elsewhere sandy but very barren. The bush following the numerous small river-beds gives the country the appearance of fallow-fields separated by hedges. Away from the river-beds the vegetation is Karroid—Mesembrianthema, Euphorbias—with a few halophytes. River-bed flora as at Dabaigabis, but without *Acacia horrida*. A bushy *Acacia* (? *A. hebeclada*) is very prominent; *A. giraffe* is the only tree.
- Surface sandy, gradually rising. Small broken hills. Vegetation good; knee-high bushes (many dead), grasses, &c.
- Sandy plain sloping to the east; many broken kopjes near dry bed of Kameeldoorn River. Very dry. *Atriplex*, *Mesembrianthema*, grasses, &c., on the plain; *Rhigozum* (mostly dead) along minor stream-beds; *Acacia giraffe*, *Zizyphus*, &c., along larger stream-beds. *Augea capensis*. Many species on kopjes (*Oxalis*, grasses, *Vogelia*, &c.).
- Road ascends a little and then drops suddenly about 200 feet to a sandy plain which slopes gently down to Gründoorn. Collected on kopjes to about 4,700 feet. Plains dried up: *Hoodia* common.
- Dry. Good water-supply. Collected mainly on low kopjes about 1½ miles east of the farm. *Rhigozum*, *Acacia hebeclada*, *A. horrida*, *A. giraffe* are fairly common in sandy stretches alongside the shallow river-bed. Horses, cattle, sheep, and goats.
- Over undulating sandy plains, very dry. Vegetation poor.
- Water-hole in a broad, sandy river-bed surrounded by sandstone-capped hills rising about 1,000 feet. Near the water-hole, *Acacia horrida*, *A. giraffe*, *Euclea Pseudebenus*, *Tamarix*, *Sisyndite spartea* and bushy Euphorbias (as at Aggenys—39 B). On the hills, *Aloe dichotoma*, *Euphorbia virosa* and other Euphorbias, *Bauhinia garipensis*, *Vogelia africana*, *Cadaba juncea*, *Asclepiads*, *Blepharids*, *Amaranths*, &c.
- A broad, sandy valley leading up from Sabiesis towards Holog was rich in forms including many annuals. On a broad, sandy plain at the top of this valley a large area is dotted with clumps (10–20 feet in diameter) of the “Aggenys Euphorbia.”
- At this date the railhead. Much of the “Aggenys Euphorbia” on the limestone hills. *Rhigozum*, *Cataphractes*, *Acacia giraffe*, *Montinia acris*, *Asclepiads*, grasses, &c., near and in river-beds.
- About half a mile from the south bank of the Löwen's River, due west of the Little Karas Berg. On the sandy plains south of the river, *Parkinsonia*, *Rhigozum*, *Acacia giraffe*, and much dead bush. South bank fringed by belt of sand-dunes. River had recently flowed; a few pools still left; on the banks, *Acacia horrida* (trees), *Zizyphus mucronata*, *Euclea*, *Lycium*, *Tamarix*, grasses, &c. *Salix capensis* apparently absent.
- Parkinsonia* and *Hoodia* are very common on plains between Gawachab and Seeheim. Seeheim in bed of the great Fish River. River now in flood. Sandstone hills rising 600 feet. Collected on hills and in beds of Fish and Schaf Rivers. On river bank *Acacia horrida*, *A. giraffe*, *Bauhinia garipensis*, *Sisyndite spartea*, *Euclea Pseudebenus*, &c. No *Salix* seen. *Ophioglossum vulgatum* is said to occur here in sand.
- Aloe dichotoma* on the hills between Seeheim and Gobas. Gobas in bed of small tributary of the Fish River. Hills to the south (about 1,000 feet) are of limestone with vertical outcrops of dolerite. *Parkinsonia* and *Aloe dichotoma* common. Vegetation dried up. Dolerite quite barren. Grasses, *Ficus* sp., bulbs, &c., on limestone.
- “Aggenys Euphorbia” common between Gobas and Keetmanshoep but not seen on the sandy plateau east of K. Vegetation poor. *Acacia giraffe*, grasses, &c.
- Shallow bed of a tributary of the Fish River (now quite dry). Sandstone hills rising to about 600 feet; their bases buried in waves of sand. “Aggenys Euphorbia” very abundant on sandstone and shallow sand. *Rhigozum*, *Acacia horrida*, *A. giraffe*, *A. hebeclada* and another, *Aloe dichotoma*, *Harpagophytum*, *Zizyphus mucronata*. Many annuals, especially Leguminosæ, on the sand-dunes.
- Heavy rains, line washed away. A gravelly plain with low hills of black limestone to the east. *Aloe dichotoma*, *Sarcocaulon* (2 spp.), *Asclepiads* on the hills; *Rhigozum* and the “Aggenys Euphorbia” with *Monsonia ovata* (?), *Tribulus* and other annuals on the plains; along a dry, sandy stream-bed *Cataphractes*, *Bouchea gariepina*, *Cadaba juncea*, *Bauhinia garipensis*, *Grewia* sp., *Parkinsonia africana* (common), *Acacia giraffe*, &c.

Date.	Stage.	Region.	Elevation.	Locality.
1909. Feb. 15-16...	70	Great Namaqualand	3,250	Buchholzbrunn
„ 16 ...	71	Great Namaqualand	3,500 (circ.)	Kuibis
„ 17 ...	72	Great Namaqualand	3,500 (circ.)	Akam River (8 km. south of Kuibis)
„ 18 ...	73	Great Namaqualand	4,500	Schakalskuppe
„ 19 .....	—	Great Namaqualand	4,600	Aus
„ 20 .....	74	Great Namaqualand	3,500 (circ.)	At the railway station “ 122 km. (18 km. west of Aus)
„ 21 .....	75	Great Namaqualand	2,700	Gorup
„ 22 .....	76	Great Namaqualand	1,800	Tschauchab
„ 23 .....	77	Great Namaqualand	1,000	Rotkuppe
„ 24 .....	—	—	0	Lüderitzbucht
„ 25 .....	—	Great Namaqualand	—	Colman's Kop
March 2-7	78	Damaraland	1,500	Welwitsch
„ 10-12	-	Damaraland	0-100	Mouth of R. Swakop and sand- dunes over the Walfish Bay border
„ 24 ...	—	Angola	0	Lobito Bay
„ 25 ...	—	Angola	—	St. Paul de Loanda
„ 31 ...	—	Angola	0-160	Thence to Cassualala

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Remarks

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- Shallow, sandy river-bed with limestone hills to the east. In the river-bed, *Codon* (*africanum*?), *Sisyndite spartea*, *Zizyphus*, *Acacia giraffe*, *A. hebeclada* and another, *Cadaba juncea*, *Euclea Pseudebenus*; on the hills, *Sarcocaulon*, *Euphorbia*, &c. Vegetation not in good condition.
- Plains between Buchholzbrunn and Kuibis are thickly covered with large angular blocks of quartzite. The "Aggenys *Euphorbia*" occurs spasmodically, and grasses are abundant between the blocks. In the deep sand at Kuibis, *Ophioglossum vulgatum* is common. In the gorge at Kuibis the usual river-bed trees occur (including *Acacia horrida*).
- Passed stretches of sand and, towards the river, an undulating plain strewn with quartzite blocks. On the sand *Rhigozum*, *Cataphractes*, a small bushy *Acacia* and various bulbous monocotyledons. Near the river the vegetation was rich—many grasses, small *Acanthads*. In the river gorge much bush with grasses, reeds, rushes, &c. (Standing water only.)
- An extensive sandy plain with hills rising to 5,600 feet. On the plains many annuals and other herbaceous plants—*Tribulus* spp., *Ficoids*, *Monsonia*, grasses, *Euphorbias* (annual and perennial, all small). This was the only "green" surface seen between Ceres and the Tropic. *Acanthaceæ* and bushy *Mesembrianthema*. Near the hills *Rhigozum* is common. On the hills, *Oxalis*, *Pelargonium*, grasses, *Polygala*, *Blepharids*, *Euphorbias*, with a marked preponderance of *Compositæ*. The general appearance of the hill-tops was very similar to that of the Nieuveld Mountains near Beaufort West. *Aloe dichotoma* was not seen. *Acacias* also appeared to be absent but some small umbrella-shaped trees seen on the plain in the distance were not identified.
- Vegetation Karroid. Very dry. *Acacia horrida* in river-bed.
- Sandy plain with barren hills to about 4,500 feet. Small grasses and other annuals, *Ophioglossum vulgatum*, bulbous monocotyledons. *Hoodia* and small bushy *Mesembrianthema*, *Euphorbias*, *Composites* and many seedlings in the sand; *Acacia horrida*, *A. giraffe* in shallow river-bed; *Acanthads*, *Asclepiads*, *Cadaba*, bushy *Composites* on hills. This place is about 10 km. from the eastern boundary of the littoral desert.
- A barren, sandy plain, with low hills. Two species of *Euphorbia* are abundantly represented on the sandy slopes at the bases of the hills, and with them occur *Sarcocaulon* (2 spp.), *Hoodia* and dead bushes of *Zygophyllum*, a *Hermannia*, *Vogelia*, and three species of *Aristida*. *Acacia giraffe* represented by a few small trees in the river-beds and also on the sandy hill-slopes—nearly all appeared to be dying.
- Extremely barren plains with a surface of fine gravel and coarse sand; hills rising about 1,500 feet. The same species as at Gorup, but the larger of the two *Euphorbias* seemed to be absent. Only two dwarfed trees of *Acacia giraffe* were seen.
- Country between Tschauchab and Rotkuppe extremely barren; the only species seen from the train in 30 km. were a Gorup *Euphorbia* and thousands of leafless and flowerless specimens of a *Sarcocaulon*. At Rotkuppe undulating plains of sand and gravel, with very rough hills rising 1,000–1,500 feet. Large sand-dunes on the hill-tops and supporting much vegetation including grasses, bushy *Asclepiads* (2), *Pitaranthos*, *Leguminosæ*, *Sarcocaulon*, *Pelargonium*, and some *Composites* and *Mesembrianthema*. *Augea capensis*, *Sarcocaulon* and *Euphorbia* on the plains.
- No plants seen in a ride of 4 km. Atmosphere thick with blown sand and fine gravel. *Welwitschia*, &c. Few annuals in Khan valley; perennial vegetation less active than in January, 1907.

Collected on Sandspit bounding the harbour on the west.

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Date.	Stage.	Region.	Elevation.	Locality.
1909. April 1 ...	—	Angola	160-2,500	Thence to N'Dalla Tandu and Granja San Luiz
„ 2-5	—	Angola	2,400 (circ.)	Granja San Luiz
„ 6-8	—	Angola	2,000	Montobello
„ 9-12	—	Angola		Granja San Luiz
„ 19 ...	—	Angola		Lobito Bay
„ 22 ...	101	Angola	20	Mossamedes
„ 23 ...	102	Angola	200 (circ.)	Mossamedes
„ 25 ...	103	Angola	20	Mossamedes
„ 27 ...	104	Angola	10-1,700	Mossamedes to the railhead (Km. 107)
„ 28 ...	105	Angola	1,700	Railhead (Km. 107)
„ 29 ...	106	Angola	1,600	Camp north of the railway about 1.5 km. east of No. 105
„ 30 ...	107	Angola	1,600	Along dry sandy river-bed crossing the line imme- diately west of the camp 106—south of the railway South of the railway between 105 and 106
May 1 .....	108	Angola	1,600	South of the railway between 105 and 106
„ 2-4 ...	—	Angola	1,600-6,000	From 106 to Humpata
„ 5 .....	109	Angola	6,097	Humpata
„ 6 .....	110	Angola	6,097	Humpata
„ 7 .....	111	Angola	6,097	Humpata
„ 8 .....	112	Angola	6,097-5,460	Thence to Lubango
„ 10 .....	113	Angola	6,097-5,900	Humpata to edge of High Plateau towards Huilla

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Remarks.

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Dense forest commences a few miles east of Cassualala and ceases near N'dalla Tandu.  
The hills of Golungo Alto are seen from the train to the north.

Dense forest.

Dense forest. *Gretum africanum*.

Sandy slopes behind cable station. Luxuriant growth of *Aristida* sp. (knee-high) and other grasses; *Zygophylla*, *Ficoideæ*, *Compositæ*, &c.

About 8 miles south-east of Mossamedes towards R. Coroca. *Welwitschia*, *Euphorbia* with stout, 7-angled columnar stems, *Asclepiads*, grasses, &c.

Mouth of Bero River—ground wet, frequently marshy—*Sueda fruticosa*, *Nicotiana glauca*, *Arundo*, *Ficoideæ*, grasses, &c. Sugar-cane, banana, and other tropical and subtropical cultivation.

After leaving bed of R. Géroual, railway passes for about 40 miles over a stony desert in which grasses are abundant after exceptional rains. At about 1,000 feet, *Vitis macropus* occurs in abundance, mainly between Km. 44 and 55. Higher up, grasses become thicker, and bushes—*Acacias*, *Bauhinia* (? *gariepina*), *Combretaceæ*, *Acanthaceæ*—become increasingly abundant and of larger size; with the grasses occur numerous herbaceous plants—*Capparidaceæ*, *Pedaliaceæ*, *Leguminosæ*, *Ficoideæ*, *Euphorbias*. At and beyond Km. 107, a low, open forest prevails. No surface water between Mossamedes and Km. 107, except at Pedra Grande.

Open forest of low trees, among which *Copaifera Mopane* is usually predominant; with it a tall bushy *Combretum* is abundant and *Acacia* spp., *Ficus*, &c., are less common. Grasses, *Ficoideæ*, *Leguminosæ*, *Monsonias*, *Pedaliaceæ*. Abrupt granite blocks, often of immense size, rise above the trees.

Forest of the same character as at 105, but richer. Undergrowth very rich in grasses, also including *Pedaliaceæ*, *Oldenlandiæ*, *Monsonia*, *Acanthaceæ*, *Capparidaceæ*. The arborescent species are here of lower growth than at 105, and form an open "thicket" rather than forest. (106A = South of the railway; 106B = North.)

Grasses and other herbaceous plants very abundant and mostly in flower. *Sansevieria* (sp. n.) in sand at the top of a large granite block in the stream-bed about  $\frac{1}{2}$  mile from the railway.

Near the Munnino River the forest opens out and large stretches are densely grass-covered (grasses about 3 feet) and bear scattered trees of *Ficus* sp., *Acacia albidia*. After crossing the river, *Copaifera Mopane* prevails until the ascent of the Shella Pass has commenced. *Bauhinia gariepensis* occurs on broken ground; *Cataphractes Alexandri* is locally common. *Adansonia digitata* becomes common above Capan-gombe. In the pass, above the *Copaifera* and *Baobab*, ferns become abundant (*Adiantum*, *Pellaea*, &c.). A stemless *Phoenix* is common about 1,500 feet from the top. Near top of pass an arborescent *Euphorbia*, 40 feet high, is common; also *Dombeya*, *Ficus*, *Acacias*, *Clematis*, &c. Above the pass the country is undulating and grassy, with proteaceous trees and bushes, *Muraltias*, *Gladioli*, *Salvias*, *Plantago*, *Helichrysum*, *Melastomaceæ*, &c.

Grass-covered plains with proteaceous bushes, *Aloe Baumii*, &c.; marshy places here and there. Cultivation—Wheat, *Zea Mais*, sorghum, tomatoes, *Sechium edule*, &c.

Collected mainly along banks of water-furrow which leads water from the Nene River.

Collected mainly in marshy places.

Road passes over a ridge about 7,000 feet. Extensive grassy plains with proteaceous and leguminous forest on the slopes above Lubango. At Lubango much cultivation on small scale—Wheat, potatoes, maize, sorghum, figs, &c.; roses, bananas, oranges, pepper-trees (*Schinus molle*), oleanders in gardens. *Eucalyptus globulus* here and at Humpata near habitations.

Vegetation as in 109–112. *Pteris aquilina*, *Buphane disticha*.

Date.	Stage.	Region.	Elevation.	Locality.
1909. May 11 .....	114	Angola	5,900-5,512	Thence to Huilla Mission Station
„ 12 .....	115	Angola	5,512-4,593	Thence to Chibia
„ 12-13	116	Angola		Thence to Quihita
„ 14 .....	117	Angola		Thence towards Gambos Fort
„ 15 .....	118	Angola	3,810 (fort)	Thence to Gambos Fort and on to Mission Station
„ 16 .....	119	Angola		Thence towards Cahama
„ 17 .....	120	Angola		On towards Cahama
„ 18 .....	121	Angola		Cahama, and thence to left bank of Caculovar River
„ 19 .....	122	Angola	3,450 (Tchipelongu)	Thence to Tchipelongu Mission Station
„ 20 .....	123	Angola		Thence to Caculovar River, opposite Houmbe
„ 21 .....	124	Angola	3,450 (Houmbe)	To Houmbe, and thence through Cunene Marshes to Fort Rosadas
„ 22 .....	125	Angola		Thence towards Tchipelongu Mission Station
„ 23 .....	126	Angola		Tchipelongu, and thence on Ediva Road
„ 24 .....	127	Angola		To N'jambi, and thence to San Januario Cotton Estate and towards Cahama
„ 25 .....	128	Angola		Cahama and towards Gambos
„ 26 .....	129	Angola		On towards Gambos
„ 27 .....	—	Angola		Gambos Mission and Fort
„ 28 .....	—	Angola		Thence towards Quihita
„ 29 .....	—	Angola		To Quihita
„ 30 .....	—	Angola		Thence to Chibia
June 4 .....	—	Angola		Thence to Huilla
„ 5 .....	—	Angola		Thence to Tehevinguiro
„ 6 .....	—	Angola		Thence to Munhino River
„ 7 .....	—	Angola		Thence to Mossamedes
„ 11 .....	130	Angola		Benguela to Km. 82.5 on the Katanga Railway
„ 12 .....	—	Angola		Lobito Bay
„ 17 .....	—	Congo		Cabinde
„ 19-21	—	San Thomé		San Thomé
July 2 .....	—	Cape Verde Islands		St. Vincent
„ 14 .....	—	Portugal		Praia das Maças

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Remarks.

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- Various European plants in Mission garden—Apples, strawberries, onions, cabbages, beet, mangold wurzel, French beans, ivy; also guavas, pepper-trees, Bougainvillea, *Pinus maritima*, *P. canariensis*, *Araucaria imbricata*, *Eucalyptus robusta*, *E. rostrata*, *E. gigantea*, *Photinia japonica*, *Coffea arabica*.
- Proteaceæ gradually become scarce, and beyond Chibia are replaced by Acacias (including *A. albida*), *Copaifera*, &c. Grasses abundant.
- Much grass. *Copaifera*, Acacias, *Zizyphus*, *Aloe Baumii* and another, *Strychnos*, *Asclepiads*, one epiphytic orchid (*Ansellia sp.*), *Vitis quadrangularis*, *Lippia*, *Sansevieria*, &c.
- Grass abundant, but dried up. Baobab reappears. *Ficus sp.* (handsome tree). *Copaifera* not common. Plumbago; *Acacia albida* rather common; *Amarantaceæ*, *Sansevieria*, &c.
- Grasses dried up. *Copaifera* predominant. Many small *Acanthaceæ*; two Aloes; *Sansevieria* very common. No baobabs.
- Copaifera* predominant. Baobabs towards end of stage. Many extensive open spaces with much grass; *Ficus* (60 feet); *Acacia* (bush); much *Loranthus*.
- Copaifera* predominant; Baobabs; grasses; *Combretum* (as at 105).
- Bauhinia* predominant; *Combretum*; small vegetation dried up. Near the river the *Copaifera* is replaced by Acacias.
- Acacias alternating with *Copaifera*. *Zizyphus* common along dry river-bed. Baobabs increasing in number. Undergrowth (grasses) dried up. Acaulescent palm (*Hyphæne sp?*).
- Small Baobabs very abundant; *Copaifera* rare; Acacias predominant. Country more open. Small vegetation dried up. Palms 30–40 feet here and there. *Asclepiad-lianas*, *Combretum*.
- At Houmbe, slight elevation surrounded by open *Acacia* Bush, with little *Copaifera*. In open ground, Palms (two), *Ficus* (50 feet), Baobabs, tall columnar *Euphorbia* (25 feet), dead herbaceous vegetation. Cunene Marshes—*Marsilia*, *Azolla*, *Utricularia*, *Arundo* and other grasses; *Ficus* and *Acacia sp.* on high ground. Beyond Fort Rosadas, Baobabs, *Copaifera*, Acacias.
- Copaifera* with undergrowth of grasses or Acacias with undergrowth mainly of *Amarantaceæ* and *Acunthaceæ* (few grasses). But these relationships are not constant. *Salix* and *Rhus* along banks of Caculovar River.
- Sansevieria* common.
- Grass-land and Savannah with open forest here and there. Above 1,000 feet, vegetation very similar to that of Stage 107 but *Copaifera* not seen.
- Shore plants only.
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2. ITINERARY OF THE PERCY SLADEN MEMORIAL EXPEDITION TO THE ORANGE RIVER,\* 1910-1911. (*Report No. 7.*) †—By H. H. W. PEARSON, Sc.D., F.L.S.

THE expedition set out from Cape Town on November 23, 1910; reached the Orange River at a point between Bethany and Skate's Drifts (opposite the German Police Barracks) on the morning of December 29th; and concluded its work at Van Rhyn's Dorp on January 23, 1911.

The route from Eendekuil—at that time the terminus of the North-Western Railway line—to O'okiep deviated but little from the post-cart road. From Annenous (a station on the O'okiep-Port Nolloth Railway) the track followed is not accurately laid down throughout its length on any existing map. Many of the localities visited north of O'okiep are indicated on sheets 127 K and L, 127 F, and 127 E of the Reconnaissance Maps of the British War Office.

Except in the deviations from the main route from Numees Mine to Kuboos and from O'okiep to Anegas, Mr. B. Melle, of the South African College, accompanied the expedition throughout the journey. Mr. N. S. Pillans, of the Union Department of Agriculture, was attached to the expedition from November 23rd to December 16th (Cape Town to O'okiep), and rendered valuable assistance in the collection of living and dried plants in that portion of the journey. I have much pleasure in recording my indebtedness to these gentlemen.

\* Assisted by a grant from the Royal Society.

† The following Reports have been published or are in the press :—

No. 1. "Travels of a Botanist in South-West Africa," by H. H. W. Pearson, *Journal of the Royal Geographical Society*, 1910.

No. 2. "The Anatomy of *Welwitschia mirabilis*, Hook. f. in the Seedling and Adult States," by M. G. Sykes, *Trans. Linn. Soc.*, vii. (1910), p. 327.

No. 3. "On the Seed-coat of *Carica Papaya*," by E. L. Stephens, *Annals of Botany*, 1910.

No. 4. "On the Embryo of *Welwitschia*," by H. H. W. Pearson, *Annals of Botany*, 1910.

No. 5. *Ann. S.A. Museum*, ix., 1.

No. 6. (In the press.)

On leaving the neighbourhood of the Oliphant's River on December 1st, the expedition entered a dry, more or less desert stretch which merged into Namaqualand proper between Van Rhyn's Dorp and Nieuwe Rust (December 3rd). All the localities visited between December 3rd and January 6th lie within Namaqualand. Rattelkraal, Rietfontein, Koeberg and Dobabeep are situated on the western border of Bushmanland. At Anegas the road again enters Namaqualand, but quickly rises on the Khamiesberg to an elevation beyond which the typical Namaqualand vegetation is replaced by forms whose affinities are with those of the Cape Region.

Except in Bushmanland, the principal vegetative season of the regions visited occurs in the spring (August to October). It is probable that many species flowering in the spring, particularly to the north of Van Rhyn's Dorp, are still unknown. But as far north as Bethany Drift the vegetation of this season has been studied by various botanists, notably by J. F. Drège. On the Khamiesberg, and also at lower elevations to the north of Bowesdorp, thunder rains occur more or less spasmodically in the summer season. In years when these rains do not fail, a considerable number of species are in flower in January and February. This is especially the case in the little-known region lying to the north of the Port Nolloth-O'okiep Railway. The summer of 1910-11 was particularly favourable for the development of this secondary flowering season, and from a preliminary examination of the collections it appears that they include a considerable proportion of species not previously found.

It was intended to take a complete series of readings of Maximum, Minimum, and Wet and Dry bulb temperatures. Owing to various circumstances, particularly to accidents with the thermometers, this intention was not carried out. But there is so little definite information regarding the meteorological conditions of the region that the few observations taken should perhaps be placed on record.

Except where it is otherwise stated, the maximum readings were taken under the wagon, the thermometer being suspended about 2 feet above the ground. This was the only position in which shade could be obtained for 2 hours or more before and after midday. Owing to the strong reflection from the ground the readings are, probably in all cases, higher than those which would have been registered by a properly screened instrument. When two readings are recorded for the same locality they were taken on successive days (*e.g.*, Stinkfontein, Nov. 5-6). The minimum readings were given by a thermometer hung in a bush

at about  $2\frac{1}{2}$  feet from the ground. Wherever possible the bush chosen was a leafless *Euphorbia*; in all other cases the bushes were microphyllous. The highest minimum recorded was  $88^{\circ}$ —at Windhoek on the night of November 30th. This was due to a hot wind blowing with much force from the top of the Gifberg, the prevalence of which is indicated by the name Windhoek. The thermometers used were all standardised at Kew. One of them was kindly lent for the purposes of the expedition by Mr. C. M. Stewart, B.Sc., Secretary to the Meteorological Commission, Cape Town.

The wet and dry bulb readings were obtained from two ordinary thermometers mounted together in a metal case—the only form obtainable that was likely to withstand the vicissitudes of wagon-travelling. Except where it is otherwise stated, the readings were taken at 2 p.m.; those marked \* were recorded when the instrument was hung for a special purpose in a bush of *Euphorbia Dregeana* or *Mesembryanthemum Barklyi*. As far as possible they were shaded, but they could not be entirely protected; this, together with the reflection from the bare ground, makes the readings higher than would have been given in a screen. All other readings were taken under the same conditions as those described for the maximum thermometer.

The aneroid used was one of Messrs. Cary's (No. 1359). On the return of the expedition it was calibrated in the physics laboratory of the South African College by my colleague, Mr. W. H. Logeman. The altitude readings in column 3 are obtained by applying the mean of pressure corrections for rising and falling pressure, assuming that pressure at sea-level = 30.07 inches, *i.e.*, the mean of the last 10 years. At the same time the results of the calibration were such as to lead to the conclusion that very little faith can be placed in the figures obtained.

Date.	Stage.	Altitude.	Max.	Min.	Wet.	Dry.
1910. Nov. 24.....	Eendekuil to Toll House on Pickenier's Pass					
„ 24-25 ...	Top of Pickenier's Pass	2,000	82	50·5	68·5	80·5
„ 25 .....	Boontjes Rivier	940		56	6·2	89
„ 25-26 ...	Hex River			55		
„ 26-27 ...	Kradouwkrantz	700	92	55	66·5	88
			79		62	77
„ 27 .....	Rondegat	700				
„ 28 .....	Clanwilliam					
„ 28-29 ...	Langkloof			47·5		
„ 29 .....	Through Nardouw Kloof to Builshoek	700	89		57	87
„ 30 .....	Doorn River Bridge	400			65	96
„ 30-Dec. 1	Windhoek			88		
Dec. 1.....	Attis		108		70	105
„ 1-2.....	Van Rhy'n's Dorp	200				
„ 2-4.....	Nieuwerust	1,620	77		59	77
„ 4-5.....	Two miles east of Bitter- fontein				52	54
„ 5-6.....	Stinkfontein (South)	950	77		(3 a.m.) 60	76
			85·5		57	61·5
					(9 p.m.) 54	58
					(5.30 a.m.) 62	84
„ 6-7.....	Four miles south of Garies	1,600				
„ 7 .....	Garies	1,000			62	78
„ 7-8.....	Middelkraal	1,950			53·5	58
					(5 a.m.)	
„ 8.....	Brakdam	2,300	77		58	75
„ 8-9.....	Rietkloof	2,600			50	54
					(10 p.m.) 50	52
					(5.30 a.m.) 52	
„ 9-10 ...	Koets	2,750	94·5		52	62·5
					(5.30 a.m.) 62·5	93
„ 10-13 ...	Bowesdorp	3,100	91	55	60	90
			93·5	65	47	57
					(4.35 a.m.) 55	70
					(6 a.m.) 63·5	92
„ 11.....	Summit of Sneeuwkop	5,380			(4 p.m.)	
„ 12.....	S.W. lower middle slopes of Sneeuwkop					
„ 13.....	Arkoep	2,700	96			
„ 13-14 ...	Brandt Rivier	2,180		54·5	50	56
					(Early morning.)	
„ 14.....	Mesklip	2,900	89		62	89
„ 14-15 ...	Blaustaasie	3,100	77	49	51	54
					(5.30 a.m.) 64	77

Remarks.

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Slight rain.  
Rained heavily all night.

Collected on plateau (Bokkeveld) 1,200 feet above right bank of Oliphant's River.

Road leaves Oliphant's River and crosses dry sandy plain.

Strong, hot S.E. wind from top of Gift Berg, lasting all night.  
Crossed Widouw's River, in which was no water but a dense growth of *Acacia horrida*.  
At Attis much cultivation in river-bed. Vines, fruit trees, corn.

Road from V.R.D. to Nieuwerust crosses arid plain in which the only surface water was intensely bitter. *Mesembryanthema*.

Southern limit of *Aloe dichotoma*, on this road, is about 1 mile south of Stinkfontein.

Cape flora. Two Heaths. *Leucospermum* (all specimens seen were killed by fire).

Crossed Buffel's River (1,850 feet). *Euphorbia Dregeana* occurs south of this.

Heavy dew at night.

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Date.	Stage.	Altitude.	Max.	Min.	Wet.	Dry.
1910.						
Dec. 15 .....	Summit of Vogelklip	4,030				
„ 15-16 ...	Springbokfontein	3,430				
„ 16 .....	O'okiep	3,410				
„ 21 .....	Klipfontein	3,360				
„ 23 .....	Annenous	2,160				
„ 23-24 ...	Outspan W. of Chubiessis Water	2,010			67*	108·5*
„ 24-26 ...	Stinkfontein (North)	2,510		56	65*	96*
„ 26 .....	Modderfontein	2,360			66*	104*
„ 26-27 ...	Outspan (brakwater) south of Chubiessis Mine	2,060				
„ 27 .....	Outspan midway between Chubiessis Mine and S.E. corner of TeAlee Mountain Mass	1,820			66·5*	89*
„ 27-28 ...	Doornpoort	2,060		48·5		49 (4.50 a.m.)
„ 28 .....	Daunabis water-hole	1,000			70*	102*
„ 28-29 ...	Outspan about half-way to Orange River	1,520		53·5		
„ 29-31 ...	South bank of Orange River near Bethany Drift	550		63	69*	89*
„ 31-Jan. 1	Kuboos (Richtersveld) <i>via</i> Numees Mine and the top of Hell's Kloof	850 (Kuboos)		55°	69	98
1911.						
Jan. 1-2 .....	Doornpoort	2,010				
„ 2 .....	Eastern upper and inner slopes of the TeAlee Mountains	2,800				
„ 2-3 .....	Midway to Chubiessis Mine (outspan of Dec. 27)	1,720		59		
„ 3 .....	Outspan of Dec. 26-27				62*	83*
„ 3-4 .....	Modderfontein	2,390		59		
„ 4 .....	Stinkfontein (North)					
„ 4-5 .....	Outspan of Dec. 23-24					
„ 5-6 .....	Outspan 4 miles north of Annenous	1,880		57·5		
„ 6 .....	O'okiep					
„ 7-8 .....	Ratelkraal	3,720				
„ 9 .....	Steinkop					
„ 12 .....	Koeberg	4,110 (summit)				
„ 12-13 ...	Dobabeep	3,150				
„ 13 .....	Rietfontein					
„ 13-15 ...	Anegas	2,900				
„ 14 .....	Summit of the Zuurberg	3,910				



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Remarks.

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Cape flora predominates above 3,800 feet.

Restio and other Cape genera on hills.

*Sisyndite spartea*, *Mesembryanthemum Barklyi*, *Euphorbia Dregeana*, *Ehrharta spinosa*.

*E. Dregeana*; *Ceraria Namaquana*, *Aloe dichotoma* (tree and bush).

Bushy *Aloe dichotoma*, *Cotyledon fascicularis* (abundant), *Euphorbia Dregeana*, and *E. mauritanica*, *Mesembryanthemum Barklyi*, *Vogelia africana*.

Great development of *Mesembryanthemum Barklyi*.

*Euphorbia Dregeana*, *Acacia horrida*, *Tamarix*, *Euclea Pseudebenus*, *Mesembryanthemum Barklyi*.

*Euphorbias* and *Mesembryanthema* only. *Euphorbia Dregeana*, Undulating Karroid plain.

Heavy mist and dew. Doornpoort is situated under N.E. corner of TeAlee Mountain Mass.

Road from Doornpoort passes through remarkable ravine whose sides are composed of indurated sand and fine gravel, thence gradually descending over undulating plain to Daunabis. Flora rich in ravine. *Euphorbia mauritanica*, *E. Dregeana* at Daunabis.

Sky overcast after 5 a.m. No fog nor dew. Road from Daunabis ascends to about 1,800 feet. Both varieties of *Aloe dichotoma* common.

*Sisyndite spartea* very common. *Mesembryanthemum Barklyi*, *Euphorbia Dregeana*, *Aloe dichotoma*, both forms. Other vegetation very similar to that which occurs between Henkriesfontein and Raman's Drift.

Path rises to about 2,500 feet. On the hills occur *Aloe Pearsoni*, *Ceraria Namaquensis*, *C. fruticulosa*, and *Euphorbia Dregeana*, all very abundant. Around the water-hole near the top of Hell's Kloof, *Adiantum Ethiopicum*.

*Mesembryanthemum Barklyi* in Doornport Ravine.

No Cape forms. Heavy rain on TeAlee on night of January 2.

Cloudy.

Sky overclouded. Barometer falling.

Rained heavily from 11 p.m. onwards.

Rain ceased at 1 p.m.

Little rain had fallen here.

Heavy rain with thunder commencing 2.55 p.m. A second thunderstorm during the night. Rain ceased 7 a.m.

Junction of Bushmanland and Namaqualand. Montane floras distinct.

Isolated hill (about 400 feet) in S.W. Bushmanland. Vegetation mainly succulent and of Namaqualand affinity—quite distinct from that of the plains of Bushmanland. *Aloe dichotoma* and *Ceraria* are both absent. No *Ficus* seen.

*Acacia giraffe*, *Augea capensis*, *Ophioglossum vulgatum*. Grasses.

*Euphorbia Dregeana* very abundant. This locality was visited on December 26-27, 1908 (Ann. S. Afr. Museum, ix., 1, p. 8).

Road passes among the eastern foothills of the Khamesberg. *Aloe dichotoma* (tree) remarkably abundant. *Euphorbia mauritanica* and *E. Dregeana*, *Ficus* sp.; *Acacia horrida* in river-beds.

Flora similar to that of Sneeuwkop, but no Heaths nor *Leucospermum*.

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Date.	Stage.	Altitude.	Max.	Min.	Wet.	Dry.
1911. Jan. 15-17 ...	Leliefontein Mission Station	4,730	69 (Hungon branch of a poplar tree; completely shaded)			
„ 16 .....	Summit of hill N.W. of Mission Station.					
„ 17 .....	Summit of Beacon Hill 2 miles S.E. of Mission Station					
„ 17-18 ...	Ezelsfontein	3,910				
„ 18-19 ...	Outspan 3 miles N.E. of Garies	1,100		48.5		
„ 19 .....	Garies	900				
„ 20-21 ...	Stinkfontein (South)	750				
„ 21-22 ...	Nieuwerust	1,250				
„ 22-23 ...	Brakpüts	500				
„ 23 .....	Van Rhy'n's Dorp					

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Remarks.

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Many Cape genera. Elytropappus covering large areas.

Leucospermum.

Two Heaths; Leucospermum.

Heavy rain from N.W. from 5 p.m. to 7.30 a.m.

Road passes down Roodeberg Kloof and along the valley of the Wilgehout River. *Aloe dichotoma* ascends to 2,700 feet. *Osteospermum*, *Restio*, *Elytropappus*, *Dodonaea* (Wilgehout) descend to 2,700 feet. *Mesembryanthemum Barklyi* ascends to about 1,000 feet. Heavy dew at night.

Rained slightly.

Sky overcast all day. No rain.

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3. LIST OF THE PLANTS COLLECTED IN THE PERCY SLADEN  
MEMORIAL EXPEDITIONS, 1908-9, 1910-11.

**PORTULACACEÆ.\***

*By H. H. W. Pearson and Edith L. Stephens.*

1. ANACAMPSEROS.

1. *A. NAMAQUENSIS*, sp. nov., affinis *A. lanigeræ*, a qua in stirpibus longis, foliis obovato-globosis vel cuneatis, lanugine brevioris et minus dense, et capillis stipulaceis brevioribus differt.

*Fruticulus* pumilus, caudice brevissimo ramoso. *Stirpes* glabri, fulvi, griseo-albide pruinosi, rugosi, supra foliis confertis instructi, ad 12 cm. longi. *Folia* sessilia, crassa, obovato-globosa vel cuneata, infra gibbosa, lanugine longiusecula alba vestita, 4-5 mm. longa lataque; capillis stipulaceis paucis complanatis flavisque axillaribus, circa 6 mm. longibus, parum cincinnatis vel crispis, stirpis parte inferiore paucibus persistentibus instructa. *Racemus* simplex, pauciflorus; pedunculus glaber, 5-8 cm. longus; pedicelli circa 6 mm. longi. *Bractea* oppositæ, ovatæ, supra membranaceæ albæque, longe acuminatæ, aliter foliis similes. *Flos* (tantum immaturus) roseus: *sepala* navicularia, ovata, subacuta, parum imparia, 5-6 mm. longa, 3.5 mm. lata, nervis circa quindecim parallelis viridibus, persistentia; *petala* obovato-oblonga vel elliptico-oblonga, obtusa, hyalina, 3.5 mm. longa, 1.5-2 mm. lata; *stamina* uno et viginti in flore investigato, inæqualia; filamenta 2-2.5 mm. longa; antheræ oblongæ, 0.8-1 mm. longæ; *ovarium* complanatum, ovoideum, 1 mm. longum; stylus vix 1 mm. longus, stigmata

\* Percy Sladen Memorial Expeditions in South-West Africa. Report No. 8. The working up of this group has been assisted by a grant from the Union Government.

stylo in longitudine æquala. *Capsula* conica, loculo uno, valvis tribus. *Semina* numerosa, complanata, capillis brevis ramentaceis fimbriata.

Little Namaqualand: Richtersveld; among bushes on quartzite hills north of Modderfontein, 6161.

A dwarf undershrub, with a very short branched caudex. Stems glabrous, brownish, with a grey-white bloom, wrinkled, with the upper parts thickly beset with leaves. Leaves sessile, fleshy, obovate-globose to cuneate, gibbous beneath, clothed with white wool, 4–5 mm. long and broad, bearing in their axils several long flattened yellow hairs, which are slightly curled or waved and about 6 mm. long, a few persisting on the lower part of the stem. Raceme simple, few-flowered, with a glabrous peduncle, 5–8 cm. long, and pedicels about 6 mm. long. Bracts opposite, ovate, membranous and white above, and produced into a long point; otherwise like the leaves. Flower rosy (Pearson): sepals boat-shaped, subacute, slightly unequal, 5–6 mm. long, 3·5 mm. broad, with about 15 parallel green nerves; petals ovate-oblong or elliptico-oblong, obtuse, hyaline, 3·5 mm. long, 1·5–2 mm. broad; stamens twenty-one in the single flower investigated; filaments 2–2·5 mm. long; anthers oblong, 0·8–1 mm. long; ovary compressed (perhaps the result of pressure in drying?), ovoid, 1 mm. long; style scarcely 1 mm. long; stigmatic arms as long as style.

2. *A. AFFINIS*, sp. nov., affinis *A. lanceolata*, a qua in foliis obovatis vel cuneatis, pedunculorum ramosorum longitudineque differt.

*Fruticulus* pumilus, caudice brevissimo (circa 2·5 cm.), ramoso, aspero fulvoque. *Rami* breves (1–1·5 cm. longi) supra foliis dense vestita, infra foliorum deciduorum basibus conferti. *Folia* sessilia, crassa, obovata vel cuneata, infra parum convexa, acuta vel acuminata, glabra, 8–12 mm. longa; capillis stipulaceis axillaribus, numerosis, longis (ad 3 cm.), albis, nitidis, complanatis instructa. *Racemus* ramosus, 1–4 florus; pedunculus longus (ad 15 cm.), glaber; pedicelli circa 2·5 cm. *Bractea* circa 6, sparsæ, inferæ foliaceæ, superæ lanceolatae, spathaceæ, in nervis principibus coriacea, in margine membranacea, foliorum longitudine dimidium, capillis stipulaceis axillaribus instructa. *Flores* non visi. *Capsula* 1-loculata, 6-dentata, 1·2–2 cm. longa. *Semina* parva, fulva, alis tribus albido-canis instructa.

Little Namaqualand: Sandy ground, summit of pass between Garies and Middelkraal, 5608.

A dwarf undershrub with a short caudex (about 2·5 cm.), branched, brown, and rugged. Branches closely beset with leaves above, covered with leaf-bases below, short (1–1·5 cm.). Leaves sessile, fleshy, obovate to cuneate, acute to acuminate, slightly convex beneath, glabrous, 8–12 mm. long, bearing in their axils many long (up to 3 cm.) white shining flattened stipular hairs. Raceme branched, 1–4 flowered, with a long glabrous peduncle (up to 15 cm.); pedicels about 2·5 cm. Bracts about 6, scattered, lower ones leaf-like, upper lanceolate, sheathing, with a coriaceous midrib and membranous margin, about half as long as the leaves, bearing stipular hairs in their axils. Flowers not seen. Capsule 1-celled, 6-toothed, 1·2–2 cm. long. Seeds small, brown, with three whitish-grey wings.

## 2. CERARIA.

2. CERARIA, gen. nov., dicecia, floribus singulis rarissime hermaphroditis. Sepala 2, abbreviata, persistentia. Petala 5, sepalis longiora, hypogyna, libera, tandem accrescentia. Stamina in masculis 5, in fœminis ad staminodia linearia reducta vel rarissime antheris abortivis instructa. Ovarium in fœminis et masculis 3-quetrum et applanatum, 1-ovulatum; stigma 2–3 fidum; stylus 0 vel brevissimus; ovulum basale. Fructus immaturus complanatus, asymmetricus, unipterus, membranaceus, coccineus, corolla accrescente arcte vestitus. Fructus vix maturus (in specie una visus) baccatus, asymmetricus, apterus, corolla accrescente basi cinctus.

Arbores parvæ, frutices, vel fruticuli. Folia per anthesin perpauca (? præcipue hysterantha) geminata vel fasciculata, parva, carnosa, plana vel tereta. Flores parvi, rosei, nodis floriferis (? aphyllis) in fasciculis vel racemis axillaribus dispositi.

Ceraria differs from Portulacaria in being dicecious and in having a slightly flattened ovary and a fruit which is at first 1-winged and later (nearly ripe fruit seen only in *C. fruticulosa*) fleshy and wingless; the fruit of Portulacaria is 3-winged and dry.

Key to the Species.

Tall bushes or small trees, not usually less than 6 ft. high. Ultimate twigs as thick as a goose-quill. Flowers very numerous and crowded.

Living stems not readily inflammable. Surface of stem dull grey.  
Leaves 3-4.5 mm. long .. .. . namaquensis.

Living stems readily inflammable. Surface of stem pale yellow.  
Leaves less than 2 mm. long .. .. . gariepina.

Low bush, rarely more than 2½ ft. high. Ultimate twigs less than 1 mm. in diameter. Flowers few and scattered.. .. . fruticulosa.

1. C. NAMAQUENSIS. (*Descriptio emendata.*) *Frutex* vel arbor parva, 1.2-3 metres altus, ramis pseudo-dichotomis, ramulis ultimis crassitudine pennæ anserinæ similibus. *Rami* crassi, fragiles, partibus junioribus (in statu sicco) inæqualiter rugosis, glabri, colore tenebrose grisei, sæpe pruinosi, nodis prominentibus pulvinoideis 6-12 mm. distantibus instructi, e quibus rami quasi cicatricosi videt. *Folia* sessilia, geminata, carnosa, obovoidea, parum complanata, 3-4 mm. longa. *Racemi* 1-4 e quoque nodo, breves, simplices; pedunculi inter foliorum bases inserti, sæpe complanati, 1-16 mm. (plerumque 8-16 mm.) longi; pedicelli 1-6, 1-flori, 2-4 mm. longi, bracteis paucis, minutissimis, ovatis, denticulatis irregulariter involu-crati. *Portulacaria namaquensis* Sond., in Fl. Cap. ii., 386.

Little Namaqualand: Steep slope facing west, opposite Chubiessis outspan, 5975, 5976. Also common in the Richtersveld.

A shrub or small tree, with pseudo-dichotomous branching, the ultimate branches as thick as a goose-quill. Branches stout, brittle, with the younger parts irregularly wrinkled when dry, dark grey, often with a bloom, beset at intervals of 6-12 mm. with prominent pulvinus-like nodes, which give the branches a scarred appearance. Leaves sessile, geminate, fleshy, obovoid, slightly flattened, 3-4 mm. long. Racemes short and simple, 1-4 from each node; peduncles inserted between the bases of the leaves, often flattened, 1-16 mm. (usually 8-16 mm.) long; pedicels 1-6, 1-flowered, 2-4 mm. long, involu-crated by a few very minute ovate denticulate bracts.

2. C. GARIEPINA, sp. nov. *Frutex*, 90-150 cm. altus, ramis brevibus, crassis, pseudo-dichotomis, ramulis ultimis crassitudine pennæ anse-rinæ similibus, partibus junioribus (in statu sicco) parum rugosis *Rami* glabri, subflavi, pruinosi, nodis prominentibus, pulvinoideis, 6 mm. vel plerumque minus distantibus, instructi. *Folia* per

anthesin minuta, sessilia, geminata, crassa, obovoidea, minus quam 2 mm. longa. *Racemi* 1-4 e quoque nodo, breves, simplices; pedunculi inter foliorum bases inserti, sæpe complanati, 13-20 mm. longi; pedicelli 1-6, 1-flori, 2-4 mm. longi, bracteis paucis minutissimis ovatis denticulatis irregulariter involuerati (*Gardener's Chronicle*, 1911, fig. 91).

Bushmanland: Kopjes between Kweekfontein and Ougrabies, 3789; Aggenys, lower and middle slopes facing north, 2946; also at Dabainoris.

Shrub, 90-150 cm. high, with short thick pseudo-dichotomous branches, the ultimate branches of the thickness of a goose-quill. Branches glabrous, pale yellow, with a greyish bloom, beset at intervals of 6 mm., or usually less, with raised cushion-like nodes. Leaves minute, sessile, geminate, thick, obovoid, less than 2 mm. long. Racemes 1-4, short and simple, arising from each node; peduncles inserted between the bases of the leaves, often flattened, 13-20 mm. long; pedicels 1-6, 1-flowered, 2-4 mm. long, involucreted by a few very minute ovate denticulate bracts.

3. C. FRUTICULOSA, sp. n. *Frutex* 30-60 cm. altus rarissime altior, multi-ramosus, ramis virgatis pseudo-dichotomis vel monopodialibus. *Rami* graciles, ramulis ultimis gracillimis minus quam 1 mm. latis, glabri, rugosi, rubro-fulvi, partibus junioribus sæpe pruinosis, nodibus prominentibus pulvinoideis parvis 4-18 mm. distantibus, in quattuor lineis dispositis, plerumque oppositis. *Folia* sessilia, geminata, carnosa, complanata, obovata vel oblongo-obovata, minutissime apiculata, 4-6 mm. longa. *Flores* 1-6 e quoque nodo, pedicellis 1-floris 2-4 mm. longis suffulti.

Bushmanland: Very abundant on mountains east of Aus, 3,000 ft., 4715. Hill-slopes at Ougrabies, 3,000 ft., 2927. Little Namaqualand: Pass between Stinkfontein and Modderfontein, 5997. Richtersveld; stony plain between Daunabis and Bethany Drift, 6030. On rocks above Brakwater pool, near top of Hell's Kloof, 6075, 6076. TeAlee Mountains, middle and upper slopes, 6142.

A much-branched virgate shrub, 30-140 cm. high, with pseudo-dichotomous or monopodial branching. Branches slender, the ultimate branches being less than 1 mm. in diameter, glabrous, wrinkled, reddish-brown, younger parts often with a whitish bloom,



with small raised cushion-like nodes at intervals of 4–18 mm., and arranged in four ranks, generally opposite. Leaves sessile, geminate, fleshy, flattened, obovate or oblong-obovate, minutely apiculate, 4–6 mm. long. Flowers 1–6 arising together on each node, on 1-flowered pedicels 2–4 mm. long. Nearly ripe fruit (seen in this species only) fleshy, deep crimson, and hemispherical in shape, nearly 1 cm. long and about 6 mm. broad, with the outgrown corolla still adherent round its base.

## CAPPARIDACEÆ.\*

*By Edith L. Stephens.*

The classification of the genera here followed is that of Pax, in Engler and Prantl, *Nat. Pfl.*, iii., 2 Abt., pp. 220–236.

### 1. CLEOME.

1. *Cleome minima*, sp. nov. [*Cleome*, sect. *Herbaceæ*, Eichl.]

Herba, circa 7 cm. alta, ramosa, pubescentia glandula in floccis parvis vel capillis longioribus singulis indusiata, e qua quasi canescens videt. Folia simplicia vel 3-foliolata, 3–5 cm. longa; foliola et folia simplicia linearia, supra canaliculata, in canale capillas ferentia, apice acuta crassata flavaque; petiola foliolis dimidio brevior. Racemus simplex, terminalis; pedicella (in flore uno maturo visa) 6 mm. longa. Sepala 4, oblonga, apice subacuta vel obtusa minute ciliataque, margine membranacea albaque, 2 mm. longa, 1 mm. lata. Petala 4, sessilia, oblongo-obovata, apice obtusa parum incurvataque, venosa, cærulea [Pearson], 4 mm. longa, 3 mm. lata. Stamina 6, e toro breve subgloboso; filamenta 2 mm. longa; antheræ dorsifixæ, extrorsæ,  $1\frac{1}{2}$  mm. longæ. Ovarium sessile, arcuatum,  $1\frac{1}{2}$  mm. longum; stylus complanatus,  $\frac{1}{2}$  mm. longus; stigma late capitata. Fructus ignotus.

Great Namaqualand: Sandy plain, Schakalskuppe, 4,500 ft., 4791.

A herb, about 7 cm. high, branching, covered with glandular pubescence in little tufts or longer single hairs, giving it a hoary appearance. Leaves simple or 3-foliolate; petiole 1–2 cm. long,

\* Percy Sladen Memorial Expeditions into South-West Africa, 1908–1911. Report No. 9. The working up of this group has been assisted by a grant from the Union Government.

channelled on the upper side; leaflets linear, slightly grooved above, with a line of hairs in the groove, thickened, acute, and yellow at the apex. Raceme simple, terminal; pedicel 6 mm. long in the only mature flower seen. Sepals 4, oblong, subacute or obtuse and minutely ciliate at the apex, with a membranous whitish margin, 2 mm. long, 1 mm. broad. Petals 4, oblong-obovate, obtuse and slightly incurved at the apex, veined, blue, 4 mm. long, 3 mm. broad. Stamens 6, all fertile, on a short subglobose torus; filaments 2 mm. long; anthers dorsifixed, extrorse,  $1\frac{1}{2}$  mm. long. Ovary sessile, arcuate,  $1\frac{1}{2}$  mm. long; style  $\frac{1}{2}$  mm. long, flattened, stigma widely capitate. Fruit unknown.

## 2. GYNANDROPSIS.

*G. pentaphylla*, DC., Prod., i., 238.

Great Namaqualand: Stream-bed near pass leading down to Gründoorn, 4355; Sandverhaar, 4279.

## 3. POLANISIA.

1. *P. lutea*, Sond., in Fl. Cap., i., 57.

Bushmanland: Broad sandy valley leading down to Raman's Drift, 4699, 4702. Little Namaqualand: Common in dry river-beds on south side of pans between Daunabis and Bethany Drift, 6028. Great Namaqualand: Stony ground near Holoog, 4103; top of sandstone ridge 12 km. west of Sandverhaar, 3,500 ft., 4594, 4595; new shallow stream-bed on stony plain 12 km. west of Sandverhaar, 4619, 4627.

2. *P. dianthera*, DC., Prod., i., 242.

Great Namaqualand: Gründoorn, 3134; common in sandy places 21-30 km. north of Raman's Drift, 4014; sandstone hills 12 km. west of Sandverhaar, 3,300 ft., 4592.

Corolla yellow, purple marked at base.

3. *P. linearifolia*, sp. nov.

Aff. *Polanisia semitetrandra*, Th. Dur. et Schinz (*Dianthera semitetrandra*, Klotzsch), sed foliis quinquefoliatis, floribus parum majoribus, et numero ampliore staminodium differt.

Herba, ad 20 cm. alta, ramis pseudo-dichotomis, striatis, viridibus. Folia quinquefoliolata; petiola complanata, viridis, foliolo similis, 10-20 mm. longa; foliola angusto-linearia, acuta vel obtusa,

10–25 mm. longa, minus quam  $\frac{1}{2}$  mm. lata. Racemi terminales vel axillares; pedunculi ramis foliosis similes; bracteae simplices, foliolis similes, in petiola breve basim coarta; pedicelli ad 12 mm. longi, in fructu paulum longiores erubescensque. Sepala 4, lanceolata vel elliptica, acuta, nervis viridibus, 2–3 mm. longa,  $\frac{3}{4}$  mm. lata. Petala 4, cuneata vel elliptico-obovata, apice emarginata vel rotundata, dentata vel plana, flava, erubescens, 4–6 mm. longa, 1–1 $\frac{1}{2}$  mm. lata. Stamina 6, e quibus 3–5 sunt staminodia; filamenta staminodiaque erubescens et petalis demum superantia; antherae 2 mm. longae, basifixae, versatiles. Ovarium complanatum, circa 5 mm. longum; stylus brevissimus; stigma late capitata, bilobata. Fructus striatus, ad 3 cm. longus, 2–3 mm. latus; stipes ad 16 mm. longus.

Great Namaqualand: Common on sandy plain, Schakalskuppe, 4,500 ft., 4777.

Herb, up to 20 cm. tall, with pseudo-dichotomous branching and green striate stem and branches. Leaves 5-foliolate; petioles green and flattened, having the appearance of a leaflet, 10–20 mm. long; leaflets narrow-linear, acute or obtuse, 10–25 mm. long, less than  $\frac{1}{2}$  mm. broad. Racemes several, terminal or axillary; peduncles resembling leafy branches; bracts simple, resembling leaflets, narrow-linear, narrowed at the base into a short petiole, 20 mm. long, less than  $\frac{1}{2}$  mm. broad; pedicels to 12 mm. long, lengthening slightly and becoming reddish in the fruit. Sepals 4, lanceolate or elliptical, acute, green-veined, 2–3 mm. long,  $\frac{3}{4}$  mm. broad. Petals 4, cuneate or elliptico-ovate, toothed or entire, rounded or emarginate at the apex, yellow fading to pink, 3–6 mm. long, 1–1 $\frac{1}{2}$  mm. broad. Stamens 6, of which 3–5 are staminodes; anthers basifixed, versatile, 2 mm. long; filaments and staminodes cylindrical, at first as long as petals, later elongating and becoming reddish. Ovary flattened, about 5 mm. long; style very short; stigma widely capitate, bilobed. Fruit striate, up to 3 cm. long, 2–3 mm. broad; stipes 16 mm. long.

4. *P. Beattiana*, sp. nov.

Proxima *P. Paxii*, Schinz (*Cleome platycarpa*, Schinz); capsula multo angustiore et sepalorum longitudine petalis proportionale differt.

Herba, 8–20 cm. alta, eramosa; stirpes folia calyces fructusque capillis rigidis glandulis indusiati. Stirpes teretus, canaliculatus.

Folia alternantia, trifoliolata, inferrima et suprema sæpe bifoliolata vel simplicia; petiola in inferrimis ad 15 cm. longa, canaliculata, gracilisque, in intermediis seriatim brevior, in supremis sæpe non instructa; foliola elliptico-oblonga, obtusa, 12–18 mm. longa, 1–3 mm. lata; lamina in foliis simplicibus latior plerumque brevior. Racema terminalis; flores in axillis foliorum superiorum; pedicelli in flore maturo ad 18 mm. longi, in fructu parum longiores. Sepala 4, lanceolata, acuta vel obtusa, nervata, viridia, 3 mm. longa. Petala obovata, basim coarta, flava, erubescens, 4–5 mm. longa. Stamina 8, omnia fertilia, e toro breve subglobose, primo petalis æquales, demum inæqualiter producta; antheræ basifixæ, versatiles; filamenta teretia. Ovarium sessile, 4–7 mm. longum; stylus complanatus,  $\frac{1}{2}$  mm. longus; stigma late capitata, obscure bilobata. Fructus ad 30 mm. longus et 2 mm. latus.

Great Namaqualand: Sandy plains west of Ganus, 4483; dry stream-bed between Gründoorn and Sabiesis, 3,000–4,000 ft., 4581.

A herb, 8–20 cm. high, unbranched, with stem, leaves, calyces, and pods covered with stiff glandular hairs; stem terete and furrowed. Leaves alternate, trifoliolate, the lowest and uppermost often bifoliolate or simple; petiole slender, channelled, up to 15 cm. long in the lowest leaves, gradually becoming shorter in the intermediate leaves, often not developed in the uppermost; leaflets elliptico-oblong, obtuse, 12–18 mm. long, 1–3 mm. broad; lamina in the simple leaves wider and usually shorter. Raceme terminal; flowers in the axils of the upper leaves; pedicels up to 18 mm. long, lengthening slightly in the fruit. Sepals 4, lanceolate, acute or obtuse, veined, green, 3 mm. long. Petals obovate, narrowed at the base, yellow turning to pink, 4–5 mm. long. Stamens 8, all fertile, inserted on a short subglobose torus, at first as long as the petals, later elongating unequally; anthers basifixed, versatile; filaments terete. Ovary sessile, unilocular, with two parietal placentæ bearing numerous ovules, 4–7 mm. long; style flattened,  $\frac{1}{2}$  mm. long; stigma widely capitata, obscurely 2-lobed. Fruit a siliqua up to 30 mm. long and 2 mm. broad.

#### 4. CAPPARIS.

*C. sp.* (*C. punctata*, Burch. Trav., i., 492, or a very closely allied species).

Little Namaqualand: Common among granite rocks in southern

slopes of TeAlee Mountains, 6163; river-bed south of steep pass in road to Stinkfontein, 5971.

The material of this species is insufficient for complete determination.

#### 5. BOSCIA.

*B. fetida*, Schinz in Abhandl. bot. Ver. Prov. Brand., xxix., 49.

Bushmanland: Sand-dunes at Aggenys, 2950; common from Zuurwater to Aggenys, 3562; sandy valley from Raman's Drift towards Henkriesfontein, 3113.

#### 6. CADABA.

*C. juncea*, Harv., Gen. S. Afr. Pl., ed. ii., 13.

Upper Region: Pendent from precipitous rocky face of Holle Rivier bank, 2,700 ft., 3980; rocky sides of ravine at Kopje's Kraal, 2,300 ft., 4896. Little Namaqualand: Common among rocks on pass between Grauwater and Klipplaat, 3283; at foot of rocky kopje 44 miles south of Nieuwe Rust, 6412. Great Namaqualand: Common in river-bed north of Ganus, 2,300 ft., 4512.

#### 1. MÆURA.

1. *M. arenicola*, Gilg.

Great Namaqualand: Flat mountain-top about 1,000 ft. above the water-hole of Sabiesis, 4352.

2. *M. stenophylla*, Sprague (= *Boscia angustifolia*, Harv., Fl. Cap., i., Add., 19).

Bushmanland: on south bank of Orange River near Abbasis, 3000. Great Namaqualand: Sandy river-bed, 12 km. north of Raman's Drift, 4056.

## POLYGALACEÆ.\*

*By Edith L. Stephens.*

#### 1. POLYGALA.

1. *P. oppositifolia*, Linn., var. *rhombofolia*, Harv., Fl. Cap., i., 82.

\* Percy Sladen Memorial Expeditions into South-West Africa, 1908-1911. Report No. 10. The working up of this group has been assisted by a grant from the Union Government.

Cape Region : Hillside at Leeuwfontein, 3211, 3216.

2. *P. virgata*, Thunb., Fl. Cap., ed. Schult., p. 555, var. *genistoides*, Harv., Fl. Cap., i., 85.

Upper Region : At base of kopje, Alewyn's Fontein, 3320. Bushmanland : In river-bed a few miles east of Nieuwefontein, 2,700 ft., 3491; Groot Rozynbosch, in river-bed, 2,800 ft., 3623. Little Namaqualand : Dry stream-bed on lower south-east slopes of Vogelklip, 5905; among rocks on Khamiesberg plateau, 3,400 ft., 6246. Great Namaqualand : Akam River, 4723.

3491 was pollinated by a grey-backed bee.

3. *P. leptophylla*, Burch. in DC. Prod., i., 323.

Great Namaqualand : Stony slopes on kopje near Gründoorn, 3142; river-bed at Buchholzbrunn, 3,250 ft., 3640; 25 km. south of Warmbad, 4030; sandy valley north of Sabiesis, 4104; rocky hills near Holoog, 4139; sandy stream-beds near Dabaigabis, 4388; shallow river-bed on stony plain 12 km. west of Sandverhaar, 3,200 ft., also on kopjes, 4617.

4. *P. leptophylla*, Burch., var. (?).

Great Namaqualand : Sandstone hills at Seeheim, 2,500 ft., 3727. Fully developed flowers are required for complete determination.

## 2. MUNDTIA.

1. *M. spinosa*, Kunth, in DC. Prod., i., 338; var. *angustifolia*, Harv., in Fl. Cap., i., 95.

Cape Division : Roadside between Hottentot's Kloof and Karrooport, 4813.

2. *M. rigida*, E. Mey., in Herb. Drège, and Harv., in Fl. Cap., i., 112.

Little Namaqualand : Summit of kopje south of Leliefontein, 5,500 ft., 6306; upper southern slopes of Sneeuwkop, 5,000 ft., 5793; ravine in upper slopes on south-west slopes of Vogelklip, 3,500 ft., 5923.

## ANACARDIACEÆ.\*

By S. Schönland.

### 1. HEERIA.

HEERIA, Meisn. Gen., 75 (1837); Engler, Natürl. Pflanzenfam., iii., 5, p. 166.

*Anaphrenium*, E. Mey., ms., in Endl. Gen. Pl. Suppl., i., 1425 (1841); Engler, Anacardiaceæ in DC. Mon. Phan., iv., p. 355. *Rhus*, sp., Sonder, in Harvey and Sonder, Flora Capensis, i., p. 521.

1. *H. dispar* (Presl), Engl. *Rhus dispar*, Presl., in Bot. Bem., p. 72; Sonder, in Fl. Cap., i., p. 521. *Anaphrenium dispar*, E. Mey.; Engler, *l. c.*, p. 359.

“Little Namaqualand. Tree, 4–11 ft. Common from first plateau to summit of mountain 3 miles north-east of Stinkfontein (south), 5630; in fruit, 6.12.10.”

“Little Namaqualand. Tree, 8–10 ft. Plaatklip, 1,600 ft., 3852; in fruit, 6.12.08”: “Richtersveld. Tree, 12 ft. Barren slopes of dry stream-banks just south of Daunabis, 5999; in fruit, 28.10.1910.”

“Bushmanland. Bush, 5 ft. high. Granite knoll south of Kweekfontein water-hole, 3,200 ft., 3802; 3.1.09.”

“Great Namaqualand. Shrub, 5–8 ft. Kopje 20 km. north of Raman’s Drift, 2,500 ft., 4531; 26.1.09.”

The following probably also belongs to *H. dispar*. It has only young leaves and neither flowers nor fruits:—

“Great Namaqualand. Tree, 10–15 ft. Barren slopes in Orange River Valley north of Raman’s Drift, 4057; 25.1.09.”

2. *H. argentea* (Thunb.), Engl. *Sideroxylon argenteum*, Thunb., Prodr., p. 36. *Rhus Thunbergii*, Hook., Icon. Pl., i., p. 595; Sonder, *l. c.*, p. 521. *Rhus argyrophylla*, Presl., Bot. Bem., p. 42. *Anaphrenium argenteum*, E. Mey., in Drège Pl. Cap.; Engler, *l. c.*, p. 360.

“Cape Region. Tree, 10–12 ft. On upper edge overhanging Nardouw Kloof, western aspect, 5432; 29.11.10.”

“Tree, 9 ft. Summit of south-west slopes above Pickenier’s Pass, 5125; in fruit, 24.11.10.”

3. *H. crassinervia*, Engl. *Anaphrenium crassinervium*, Engler, in Engl. Bot. Jahrb., x., p. 37.

\* Percy Sladen Memorial Expeditions into South-West Africa, 1908–1911. Report No. 11.

“Great Namaqualand. Tree, 12–15 ft. Dry granite slopes south of Gorup railway station, 3,000 ft., 4171; 21.2.09.” “Between Dabaigabis and Gründoorn, 4,250 ft., 3150; in flower, 3.2.09.” “Tree, 12 ft. (to bush, 4 ft.). Common on barren mountains south of Tschauchab railway station, 2,000 ft., 4458; in fruit, 22.2.09.” “Tree, 12–15 ft. Flowers white. Kopje 15 miles south-east of Gründoorn, 4564; in flower, 3209.”

I have seen well-authenticated material of this species, and as neither flower nor fruit is described by Engler, I append descriptions of both ( $\sigma$  Pearson 4564,  $\varphi$  Marloth 5019, fruit Pearson 4458). I would call attention to the fact that this species has only 2 styles, while the genus has been diagnosed by Engler, *l. c.*, p. 355, as having 3 styles.

Calycis laciniæ ovatae obtusae dorso tomentosæ circ. 2 mm. longæ, petala oblongo-obovata circ. 4 mm. longa, stamina circ. 2.5 mm. longa, filamentis subulatis circ. 1.5 mm. longis antheris ovatis, staminodiis in floribus feminis quam stamina paullum minoribus et iis similibus sed sterilibus. Discus parum elevatus 5-crenatus. Ovarium subglobosum, styli 2 inferne connati apice divergentes in stigmata crassa subglobosa exeuntes. Fructus drupaceus, subreniformis 9 mm. latus, 5 mm. longus, leviter compressus paullum obliquus, pericarpio leviter et irregulariter verrucoso.

#### 4. *H.*, n. sp. (?).

Ramulis novellis pubescentibus deinde glabris; foliis alternis obovato-oblongis vel subovatis in petiolum brevem cuneatim angustatis, subcoriaceis nervis atque venis reticulatis utrinque haud prominulis supra glabris subtus glaucis minutissime pubescentibus.

Folia majora circ. 7 cm. longa circ. 3 cm. lata nervis lateralibus inter se circ. 2 mm. distantibus, petiolo 3–5 mm. longo.

In the absence of flowers and fruits I do not venture to put a name to this specimen, which seems to belong to an undescribed species. The comparatively thin leaves on which the veins are not raised, distinguish it from *H. dispar*, with which at first sight it might be confounded. It seems to come very close to *H. concolor* (Presl), with which I am not acquainted. The latter is, however, said to be quite glabrous.

“Great Namaqualand. Dry river-bed south of Warmbad, 2,400 ft., 4020; 26.1.09.”

## 2. RHUS.

RHUS, L., Gen. n. 369; Sonder, in Fl. Cap., i., p. 504, pr. p.; Engler, *l. c.*, p. 371; Diels, in Engl. Bot. Jahrb., xxiv., p. 568; Schönland, in Rec. Alb. Mus., ii., p. 231.



1. *Rh. angustifolia*, L., spec. 882; Sonder, *l. c.*, p. 507; Engler, *l. c.*, p. 405; Diels, *l. c.*, p. 571.

Cape Region. "Bush, 4-8 ft. Overhanging stream east side of Pickenier's Pass, 5225; young fruit, 24.11.10." "River-bed, Nardouw Kloof. Bush, 6 ft. 5341; young fruit, 29.11.10."

2. *Rh.*, sp. (*Rh. obovata*, Sond., aff.). None of the specimens here grouped together have either flowers or fruits.

"Bushmanland. Shrub, 8-10 ft. Chief constituent of thickets at foot of Gesellschaft Bank, 2,700 ft., 4695; 21.1.09."

"Little Namaqualand. Mountain pass south of Klipplaat, 1,700 ft., 3854; 16.12.08." Richtersveld; "Bush, 4-6 ft. Constituent of dense bush at foot of granite glacis in lower west slopes of TeAlee Mountains. Common, 6164; 2.11.10."

"Great Namaqualand. Sand-dunes at hilltops north of Rotkuppe railway station, 2,000 ft., 4465; 23.2.09." "Bush, 3 ft. Common on lower slopes south of Tschauchab railway station, 2,000 ft., 4263; 22.2.09." "Bush, 6 ft. Stony plains 20-30 km. north of Raman's Drift, 4017; 16.1.09."

3. *Rh. dissecta*, Thunb., Fl. Cap., p. 267. Sonder, *l. c.*, p. 509; Engler, *l. c.*, p. 408; Diels, *l. c.*, p. 572.

"Cape Region. Shrub, 7 ft. Below cliffs, eastern aspect, Olifants River, Kradouw Krantz, 5300; in fruit."

4. *Rh. tomentosa*, L., Sp. pl. 382. Sonder, *l. c.*, p. 508; Engler, *l. c.*, p. 407; Diels, *l. c.*, p. 572.

"Cape Region. Common on hillsides at Leeuwfontein, 2,400 ft., 3221; young fruit, 28.11.08."

5. *Rh.*, sp. (*Rh. undulata*, aff.). All of the following specimens most likely belong to *Rh. undulata*, Jacq., in hort. Schoenbr., t. 346. None of them (except the last) has flowers or fruits.

"Cape Region. Spreading bush, 15 ft. high. Between Ceres and Leeuwfontein, 3246; 28.11.08."

"Karoo. Shrub, 4-6 ft., or dwarf tree. Between Karroopoort and Zoutpansdrift, 5015; 30.11.08."

“Upper Region. Spreading bush or small tree, 2–12 ft. Common in Blaauwkrantz Pass, 2,500 ft., 4960; 6.12.08.” “Lower slopes of Hantamberg between Calvinia and Holle Rivier. Low, spreading bush. 3964; 10.12.08.”

“Little Namaqualand. Bush with varnished leaves. At all elevations in Rattel Poort Mountain, 2978; 30.12.08.” “Broken country 15 miles north of Alewyn’s Fontein, 3,200 ft. Bush, 4–6 ft. 3927; in fruit, 23.12.08.”

“Great Namaqualand. Bush, 4–5 ft., leaves varnished. At base of mountain north of Schakalskuppe railway station, 4,900 ft., 4220; 18.12.09.”

6. *Rh. puberula*, E. and Z., Enum., p. 145; Sonder, *l. c.*, i., p. 511; Engler, *l. c.*, p. 427; Diels, *l. c.*, p. 581.

Differt a typo foliis subglabris foliolis margine ciliatis, foliorum petiolus 3–6 mm. longus, foliola lateralia lanceolata vel oblonga acuta vel obtusa 1.5–2.2 cm. longa 4–6 mm. lata, intermedium lanceolatum 1.5–2.7 cm. longum 4–7 mm. latum.

“Orange River Region. Tree, 20–30 ft. Close to water’s edge at Raman’s Drift, 3112; in fruit, 13.1.09.”

The following, a spiny shrub without flowers and fruit, will most likely also have to be referred to *Rh. puberula*, E. & Z. The leaves are practically glabrous, except that here and there the margins of the leaflets are slightly ciliate. Engler, *l. c.*, p. 427, states that this species is sometimes spiny.

“Damaraland. Namib at Welwitsch. Shallow, dry stream-courses. Bush, 2–2½ ft. Branches weak and spreading. 4154; 2.3.09.”

7. *Rh. mucronata*, Thunb., in Thunberg Fl. Cap., p. 264; Sonder, *l. c.*, p. 513; Engler, *l. c.*, p. 432; Diels, *l. c.*, p. 583.

Cape Region. Bush, 5 ft. East slopes above Pickenier’s Pass, 5208; in flower, 24.11.10.”

8. *Rh. Burchelli*, Sond., ms.; Engler, *l. c.*, p. 412; Diels, *l. c.*, p. 574.

“Little Namaqualand. Bush, 3–4 ft. Broken country 15 miles north of Alewyn’s Fontein, 3,200 ft., 3928; 23.12.08.” There is a second label (probably by mistake) attached to this specimen. “Hills around Kamabies water-hole, 3,300 ft., 3946; 27.12.08.” “Slopes of kopje south of Kamabies, 3,200 ft., 3958; 24.12.08.” “Bush, 4 ft.

In rocky places, Koets, 5728; 9.12.10." "Bush, 3-7 ft. Common on upper slopes of Zuurberg (Anegas). Also common on Khamiesberg plateau, 6257 (*a*); 14.1.11."

"Great Namaqualand. Aromatic bush, 8-10 ft. Among rocks between Dabaigabis and Gründoorn, 4,200 ft., 3174; 3.2.09."

"Bushmanland. Kweekfontein, granite kopje, 3,300 ft., 3800; 3.1.09." "Granite knoll at Kweekfontein, 3,300 ft., 3801; 3.1.09."

The following are close to *Rh. Burchelli*, Sond.:—

"Cape Region. Bush, 10 ft. Among rocks on hills at Leeufontein, 2,600 ft., 3228; 28.11.08."

"Little Namaqualand. Closely clinging to gneissic boulders at Alewyn's Fontein, 2,900 ft., 3341; 22.11.08."

9. *Rh. rigida*, Mill., dict. n. 14; Sonder, *l. c.*, p. 520; Engler, *l. c.*, p. 416; Diels, *l. c.*, p. 576.

"Cape Region. Bush, 4 ft. Summit slopes above Pickenier's Pass, 5132; 24.11.10."

10. *Rh. celastroides*, Sond., *l. c.*, p. 519; Engler, *l. c.*, p. 417; Diels, *l. c.*, p. 576.

3418 (further information lost).

"Little Namaqualand. On hills at Rietfontein, 2,500 ft. Bush, 10 ft. 3761; 26.12.08."

11. *Rh. viminalis*, Vahl, Symb., iii., p. 50; Sonder, *l. c.*, p. 515; Engler, *l. c.*, p. 442; Diels, *l. c.*, p. 588; Schönland, *l. c.*, p. 247.

"Bushmanland. Tree, 5-20 ft. Near dry stream-beds between Aggenys and Pella, 2,000 ft., 2582; in fruit, 7.1.09."

Little Namaqualand; Richtersveld: "Tree, 25 ft. Near Doornpoort water-hole, 6136; in flower, 2.1.11." "Tree, 25 ft. Constituent of bush lining banks of Orange River at Sendling's Drift, 6098; in flower, 30.12.10."

To this probably also belongs the following:—

"Orange River Region. Close to water's edge near Abbasis, 3102; 12.1.09."

12. *Rh. lancea*, L. f., Suppl., p. 184; Sonder, *l. c.*, p. 514; Engler, *l. c.*, p. 444; Diels, *l. c.*, p. 589; Schönland, *l. c.*, p. 248. "Cape Region. Tree, 15-20 ft. Roadside between Hottentotspoort and Karroo Poort, 4807; 29.11.08."

"Karoo Region. Tree, 20 ft. River-bed at Schuurkraal, 1,100 ft., 5000; 5.12.08."

“Little Namaqualand. Bush, 3–5 ft. Mountain slopes south of Twefontein, 3,100 ft., 3782; 25.12.08.”

“Great Namaqualand. Tree, 20–25 ft. Akam river-bed near standing water, 4726; 17.2.09.” “Tree, 20 ft. Dry stream-bed between Dabaigabis and Grün-doorn, 3,900 ft., 3121; 3.2.09.”

The following specimens, collected by Professor Pearson, cannot be determined with any degree of certainty. They are all without flowers and fruits, and otherwise incomplete.

Nos. 3006 (aff. *Rh. puberula* ?), 5994, 5030 (a tree with very spiny branches and very small petiolated trifoliate leaves. I am afraid the label of this specimen was exchanged for one of the labels of *Rh. viminalis* or *lancea*).

The following may belong to *Anacardiaceæ*, but are also too incomplete for determination: Nos. 4149, 4190, 3567, 4143, 6101.

## CRASSULACEÆ.\*

By S. Schönland.

### 1. CRASSULA.

#### 1. *C. Sladeni*, Schönl., n. sp.

Fruticulus crassus e basi ramosus. Rami dense foliati. Folia connato-perfoliata oblique ovata obtusa grisea subplana succulentia extus leviter convexa intus leviter concava majora 5 cm. longa 3 cm. lata. Inflorescentia terminalis breviter pedunculata, pedunculo circ. 1 cm. longo 2 bracteis vacuis munito, laxe cymoso-corymbosa floribus pedicellatis pedicellis 2–4 mm. longis. Sepala basi connata 2 mm. longa lobis ovatis acutis extus convexis subcarinatis circ. 1.5 mm. longis. Petala lingulata obtusa sine mucrone subterminali erecto-patentia basi connata alba apicem versus medio atropurpureo-lineata apice irregulariter maculata, 4 mm. longa. Stamina tubo brevi corollæ adnata quam petala subæquilonga filamentis subulatis antheris parvis albis subovatis. Carpidia quam filamenta subæquilonga stylis subulatis quam ovaria subæquilonga. Squamæ minutæ castaneæ subrectangulares latioræ quam longæ.

Little Namaqualand. “Richtersveld; Low quartz hills near Numees mine, 6126. Common between Kaboos and Sendling’s Drift; 29.12.10.”

\* Percy Sladen Memorial Expeditions into South-West Africa, 1908–1911. Report No. 12.

This species resembles and is allied to *Crassula lactea*, Ait., from which, however, it differs in the shape of the inflorescence, and especially in floral structure.

2. *C. Pearsoni*, Schönl. nom. nov. (= *Cr. brevifolia*, Harv., in *Flora Capensis*, ii., p. 339).

Little Namaqualand. "Richtersveld; Dense bushes, 9-12 in. On quartzite above Brakwater pools at the head of Hell's Kloof, 6089; 31.12.10."

To this species may also belong a scrap collected at "Alewyn's Fontein, 2,900 ft., in sand, 3496; 22.12.08."

Harvey's name has to be dropped if, as I think, the genus *Bulliarda* should be included in *Crassula*. *Bulliarda brevifolia*, E. et Z., should then be called *Crassula brevifolia* (E. et Z.), Schönl.

I have before me Zeyher 661, on which Harvey's species was founded. His description is hardly adequate. The following notes, taken from live specimens collected at Springbokfontein, Namaqualand, and Pearson 6089, will supplement and in parts correct it.

A small subdichotomously richly branched shrub about 30 cm. high. Leaves connate-perfoliate, obliquely obovate, subsemiterete, flat inside, subcarinate on outer surface, circ. 1 cm. long. Inflorescence laxly few-flowered cymoso-corymbosa subpedunculate, the foliage usually passing gradually into bracts. Flowers with a pronounced, not at all pleasant honey-smell, pedicellate, pedicels circ. 3 mm. long. Sepals green with red tip, connate, rather thin, circ. 1.5 mm. long, lobes circ. 1 mm. long, subobovate obtuse, convex on the outside. Petals creamy-white or yellowish, oblong, carinate, obtuse, erectopate or even strongly recurved at the tip, with or without a small mucro behind the apex, connate at the base, 3.25 mm. long. Stamens attached to the short corolla-tube, about three-fourths the length of the petals. Filaments white, subulate, anthers ovate, pollen yellow. Carpels greenish, about the length of the stamens, ovaries gradually passing into the short, slightly recurved styles, minutely scabrous all over and minutely ciliate along inner margin. Squamæ membranous, broadly obcuneate, slightly rounded off at the apex.

3. *C. MacOwaniana*, Schönl. et Bak. fil., in *Journ. of Bot.*, 1898, p. 361.

"Little Namaqualand. Shrub, 1 ft. Crevices in Plaatklip, 3051."

"Bush, 1 ft. Krantz in pass leading from Springbok to O'okiep, 5966; 16.12.08."

4. *C. MacOwaniana*, Schönl. et Bak. fil., var. *crassifolia*, Schönl., n. var.

"Little Namaqualand. Bush, 2-3 ft. Granite hill behind Nieuwe Rust, 5503."

In the structure of the flowers there is practically no difference between this and the type. The leaves are, however, much thicker and shorter, being only circ. 2 cm. long, whereas in the type they reach a length of 6 cm. They are here circ. 5 mm. thick, whereas in the type they hardly reach this thickness. They are almost fusiform.

5. *C. rudis*, Schönl. et Bak. fil., in Journ. of Bot., Aug., 1902.

"Little Namaqualand. Among bushes near roadside between Stinkfontein and Garies, 5645."

This number comes from the same neighbourhood as the type of *Cr. rudis*. As far as can be judged from the rather meagre material, it agrees with it in floral structure, in the filiform peduncle, and the few-flowered lax inflorescence. The shape of the leaves is also similar, but their length is circ. 2 cm. as compared with circ. 1 cm. in the type; further, the stem is much longer here, namely, circ. 30 cm.

6. *C. connivens*, Schönl., in Rec. of the Albany Museum, ii., p. 141.

"Bush, 1-1½ ft. high. Leaves white. Amongst rocks in Middle Khamiesberg, circ. 4,000 ft., 6342; 15.1.11."

The sepals are a trifle longer than in the type and are proportionately narrower; the petals are a trifle shorter than in the type. The white colour of the leaves is due to the fact that the cuticle becomes detached and air gathers underneath it.

7. *C. albiflora*, Bot. Mag., t. 2391, var. *minor*, Schönl., n. var.

"Cape Region. Flowers white. Bush up to 2 ft. Stems erect. Upper north-east slopes above Pickenier's Pass, 5130; 24.11.10."

"Little Namaqualand. Lower middle slopes of Sneeuwkop, 5840."

These are close to a plant labelled *Cr. albiflora minor* in Harvey's Herbarium. They differ from the type in having more laxly leafy stems, somewhat smaller and narrower leaves, more laxly branched inflorescence, and slightly smaller flowers. Further, the bristles on the upper internodes of the stem are not so large as in the type. Schlechter 9849, collected at Genadendal, agrees on the

whole with these specimens, but as the differences from the type are only matters of degree, it is perhaps best to refer them all to *Cr. albiflora*.

8. *C. squamulosa* (Willd. (?), Suppl. 15), Harvey, in *Flora Capensis*, ii., p. 345.

“Cape Region. Pickenier’s Pass, eastern slopes. Corolla white, 5144; 25.1.10.”

There seems to be no doubt that this is Willdenow’s species, as it agrees with the description. It is certainly also Harvey’s plant. There seems to be no original of Willdenow’s species in existence. A plant cultivated in 1837 in the Berlin Botanical Gardens, and preserved in the Herbarium of the Berlin Botanical Museum, named *Crassula squamulosa*, is *Cr. scabra*, L.; but no reliance can be placed on the naming of this specimen, as it was preserved a quarter of a century after Willdenow’s death.

9. *C. deceptrix*, Schönl. et Bak. fil., in *Journ. of Bot.*, Aug., 1902.

Little Namaqualand. “Richtersveld; Western slopes of ridge on south side of pass between Dannabis and Bethany Drift, 6056; 29.12.10.”

“Under quartzite rocks in sand on hills north of Modderfontein, 6160; 3.1.10.”

“Little Bushmanland. Slopes at Eenriet, 4079; 15.1.09. Also 6210.”

10. *C. deltoidea*, Thunb., in *Nova Acta Nat. Cur.*, vi., p. 334; Harvey, in *Flora Capensis*, ii., p. 350 (*Cr. deltoidea*, L. fil.).

“Little Namaqualand. Among quartz pebbles in rock fissures in upper north-west slopes near Chubiessis outspan, 6174.”

11. *C. mesembrianthoides*, Schönl. et Bak. fil., in *Journ. of Bot.*, Aug., 1902.

“Little Namaqualand. Southern edge of Stinkfontein (north) plateau, sand, 6215; 4.1.11.” Also “5484,” received from the late Dr. Bolus.

The original description being rather scanty, I append a few notes taken from one of Professor Pearson’s specimens.

Leaves connate-perfoliate, obovate lanceolate, semiterete, very convex on the outside, flat on the inner side except near the apex

where it is slightly convex, slightly incurved, quite smooth, the longest 1·3 cm. long, 5 mm. broad, circ. 5 mm. thick. Inflorescence terminal, cymoso-corymbose, few-flowered, pedunculate. Peduncle slender, circ. 5 cm. long with two empty bracts. Flowers pedicellate, pedicels 1–2 mm. long. Calyx 2 mm. long, minutely pubescent on the outside, lobes ovate-lanceolate circ. 1·5 mm. long, ciliate on the margin. Petals ovate, slightly united at the base, erect, without mucro, 1·5 mm. long. Stamens four-fifths the length of the petals with large ovate anthers which are longer than the subulate filaments. Carpels 0·75 mm. long, ovaries obliquely ovate passing into the extremely short styles. Squamæ about half the length of the carpels, thin, subrectangular, rounded off and slightly excised at the apex.

12. *C. grisea*, Schönl., n. sp.

Fruticulus e basi ramosus, ramis circ. 7 cm. longis dense foliatis. Folia crassa lanceolata grisea minute papillosa connato-perfoliata subsemiteretia intus subplana extus subcarinata apice leviter incurvata circ. 3 cm. longa. Inflorescentia terminalis pauciflora lace cymoso-corymbosa pedunculata, pedunculo gracile circ. 5 cm. longo 2 bracteis vacuis munito. Flores pedicellati pedicellis 2–3 mm. longis. Sepala basi connata, 2 mm. longa, lobis subovatis obtusis extus minuta pubescentibus et leviter carinatis, 1 mm. longis. Petala basi connata 2·5 mm. longis erectis, lobis ovatis obtusis circ. 2 mm. longis. Stamina tubo corollæ adnata corollæ circ.  $\frac{2}{3}$  longitudinem æquantia, filamentis subulatis antheris subovatis. Carpella 1–2 mm. longa stigmatis sessilibus. Squamæ obtusæ apice rotundatæ et emarginatæ circ. 6 mm. longæ.

“Little Namaqualand; Richtersveld. Rocky slopes (facing west) north of pass between Daunabis and Bethany Drift, 6054; 29.12.10.”

This species belongs to the same group as *Cr. deltoidea*, Thunb., and is one of those species which connect sect. *Eu-Crassula* with sect. *Globulea* through the absence of a style and the comparatively very large squamæ.

13. *C. lycopodioides*, Lam., Dict., ii., 173; Harvey, in Fl. Cap., ii., 351; *Cr. imbricata* [Solander in], Ait. Hort. Kew, ed. i., vol. i., p. 393; *Cr. muscosa*, Thunb., in Thunberg, Flora Capensis, ed. Schultes, p. 281, *ex parte*; *Cr. lycioides*, E. Mey. (ex Harvey); *Tetraphyle lycopodioides*, E. & Z., Enum., p. 294.

“Upper Region. Hanging in masses from the perpendicular



sides of the Holle River ravine, 2,600 ft. Also at Loeriesfontein, 4888; 10.12.08."

"Karoo Region. Pappekuil, 950 ft., 3910; 4.12.08."

"Little Namaqualand. Rocky slopes at Eenriet, 3,000 ft., 3100; 15.1.09." "Lowest slopes of Sneeuwkop, 5871; 12.12.10." "A few miles north of Nieuwe Rust, 5542; 4.12.10." "Richtersveld; Under bushes, upper middle slopes of TeAlee Mountains, 6146; 2.1.11."

The varieties of this species founded by Harvey in Fl. Cap., ii., p. 351, on Ecklon and Zeyher's species of *Tetraphyle*, are very difficult to separate.

3910 and 4888 are close to the type. 6146, 5871 and 5542 may be placed under var. *polpodacea*, Harv. (*Tetraphyle polpodacea*, E. et Z., Enum., p. 293). 3100 is an exceptionally robust form (with leaves 6 mm. long), and comes close to var. *obtusifolia*, Harv. (*Tetraphyle littoralis* and *T. propinqua*, E. & Z., Enum., p. 293).

14. *C. glomerata*, L., Mant., 20; Harvey, in Flora Cap., ii., p. 352.

"Cape Region. Marshy ground, south slopes above Pickenier's Pass, 5179; 24.11.10."

15. *C. corallina*, Thunb., in Nova Acta, vi. (1778), 334 (*Cr. dasyphylla*, Harv., in Flora Cap., ii., p. 355).

"Bushmanland. Aggenys. Common on sand at foot of hills. Also at Wortel, 2945; 7.1.09."

"Little Namaqualand, Richtersveld. Sandy plains near south edge of Stinkfontein plateau, 6204; 4.1.11."

There can hardly be any doubt that this is Thunberg's plant, which was meant by Harvey as his *Cr. dasyphylla*. It seems, however, that the latter also included a species from the eastern parts of Cape Colony which is perhaps distinct, though closely allied, and which I have described as *Cr. Simiana*, Schönl., in Journ. Linn. Soc. (Bot.), xxxi., 1897.

It may be mentioned that the plant called *Tetraphyle corallina* by Ecklon and Zeyher (Enum., p. 293), for which they quote as a synonym *Cr. corallina*, Thunb., does not belong to the genus *Crassula*. It is *Anacampseros ustulata*.

16. *C. expansa* [Dryander in], Aiton Hort. Kew, i., p. 390,

No. 17; Britten and Bak. fil., in Journ. of Bot., 1897, p. 483; Harvey in Fl. Cap., ii., p. 354 *pro parte*; *Cr. maritima*, Schönl., in Bull. de l'herb. Boiss., v. (1897), p. 862.

“Upper Region. Common in rock crevices in ravine of Holle River, 2,500 ft., 4889; 10.12.08.”

“Little Namaqualand. Clefts in granite behind Nieuwe Rust, 5504; 4.12.10.” “Richtersveld. Doorn Poort Ravine. Compact bush, 1 ft., or scrambling among bushes. 6126; 1.1.11.”

All these specimens appear to belong to Dryander's species, which in the dry state is not always easy to distinguish from *Cr. filicaulis*, E. et Z., Enum., p. 295. In fact, Harvey (*l. c.*) lumped the two together. Whether Ecklon and Zeyher's specimens are *Cr. filicaulis*, Haw., in Phil. Mag., 1824, 186, as assumed by them, seems to me to be very doubtful.

17. *C. dentata*, Thunb., in Thunberg, Flora Capensis, p. 393.

“Cape Region. Common in moist soil near stream at head of Mitchell's Pass, 3497; 27.11.08.”

18. *C. sp.*

“Little Namaqualand. On decomposed granite on upper slopes of hills south-west of Chubiessis outspan. Difficult to distinguish from rock, 6173; 5.1.11.”

“Bushmanland. Koeberg, upper south slopes, 6287; 2.1.11.”

This is allied to and may be a form of *Cr. columnaris*, Thunb. It is without flowers. It is smaller than the ordinary forms of *Cr. columnaris*. The leaves are carinate and acuminate, and by these characters it is distinguished from this species and from *Cr. Barklyi*, N. E. Br., in Kew Bull., 1906, p. 19.

19. *C.* (§ *Sphæritis*) *Sphæritis*, Harv., in Flora Cap., ii., p. 359; Schönland, in Engler's Bot. Jahrb., Bd. 45, p. 252.

“Cape Region. Leeuwfontein, 3212, 3178; 28.11.08.” “Pickenier's Pass, standing among bushes in sand near toll. Corolla yellow, 5107; 24.11.10.” “First plateau, Kradouw Krantz, western aspect, 5287; 26.12.10.”

20. *C.* § (*Sphæritis*) *virgata*, Harv., in Flora Cap., ii., p. 360; Schönland, *l. c.*, p. 252.

“Cape Region. Ridges (south aspect) of Hex River to outspan of Nov. 26th, 5266.”

“Little Namaqualand. Scrambling among shrubs at the base of gneissic kopje near Plaatklip, 3061; 16.12.08.” “Karroid plain 8 miles north of Van Rhyn’s Dorp, 5456; 2.12.10. 5447; 3.12.10. 5455; 3.12.10.”

“Little Bushmanland. Kopjes between Plaatklip and Bitterfontein, 3052; 17.12.10.”

21. *C.* (§ *Sphaeritis*) *clavifolia*, E. Mey.; Harvey in *Flora Cap.*, ii., p. 360.

“Cape Region. Mountain-tops of Hottentots’ Kloof, 3912; 29.11.08.”

22. *C.* (§ *Sphaeritis*) *decipiens*, N. E. Br., in *Gard. Chron.*, Jan., 1903.

[Information as to locality, &c., doubtful, but probably “Southern slopes of Koeberg (Bushmanland), 6288; 12.1.11.”]

23. *C.* (§ *Sphaeritis*) *sericea*, Schönl., in *Engler’s Bot. Jahrb.* Bd. 45, p. 254.

“Little Namaqualand. Low pass immediately north of Nieuwe Rust, northern aspect, 5552; 4.12.10.” “Upper northern slopes of Rietkloof Mountain, 5721; 9.12.10.” “Kopje at Nieuwefontein, 2,700 ft. Common, 4954; 21.12.08.” “Richtersveld. Bush, 1½ ft. Under bushes and granite blocks, TeAlee Mountains, middle slopes, 6140; 2.1.11.” “Klipplaat, 1,600 ft., 3942; 16.12.08.”

“Bushmanland. On gneissic kopjes near Bitterfontein, 2,000 ft., 3053; 17.12.08.”

This species was described from somewhat imperfect specimens collected by R. Schlechter (11436). As noted by Professor Pearson, it is a bush 1½ ft. high. It branches freely; the older portions of the stem and branches are efoliate, the leaves are congregated at the ends of the youngest branches, which, like the leaves, are densely pubescent, while the older stems are glabrous. The leaves reach a length of 2.5 cm., the larger ones are distinctly contracted towards the base. The peduncle may reach a length of 15 cm.; the empty bracts on it are oblong, obtuse, and not lanceolate acute, as stated in the original description.

24. *C.* (§ *Sphæritis*) *incana*, Harvey, in Flora Cap., ii., p. 359; *Sphæritis incana*, E. et Z., in Enum., p. 300.

“Little Namaqualand. Scrambling among bushes on granite hills behind Nieuwe Rust, 5501; 4.12.10.”

The specimens are rather defective, but agree sufficiently well with the descriptions of this species that I am pretty confident of the correctness of the determination. Unfortunately I do not know a type specimen.

25. *C.* (§ *Sphæritis*) *scalaris*, Schönl. et Bak. fil., in Journ. of Bot., Oct., 1898.

“Little Namaqualand. Under quartzite blocks on hills north of Stinkfontein, 6166; 4.1.11.”

26. *C.* (§ *Sphæritis*) *hystrix*, Schönl., in Engler's Bot. Jahrb., Bd. 45, p. 256.

“Little Namaqualand. Upper western slopes of hills opposite Nieuw Rust, 5498; 4.12.10.”

## 2. COTYLEDON.

1. *Cotyledon orbiculata*, L., Sp. pl., 429 (1753).

“Little Namaqualand. Common on low kopje at Bakhuis, 5439; 3.12.10.”

“Bushmanland.  $2\frac{2}{3}$ – $3\frac{1}{2}$  ft. Very abundant on lower southern slopes of Koeberg, 6223; 12.1.11.”

2. *C. decussata*, Sims, Bot. Mag., t. 2518.

“Little Namaqualand. 2 ft. Stem stout. Mountain pass south of Klipplaat, 2,000 ft., 3943; 16.12.08.” Also at Alewyn's Fontein.

3. *C. Pillansi*, Schönl., in Rec. Alb. Mus., ii., p. 152 (*Cot. cuneata*, Harv. non Thunb.).

“Little Namaqualand. Between Middelkraal and Brakdam, south of ridge, western aspect, 5592; 8.12.10.”

4. *C. fascicularis*, Ait. Hort. Kew, ii., 106 (1789).

“Bushmanland. Upper slopes of hills north of Kweekfontein, 3,600 ft., 3578; 4.1.09.”

5. *C. Wallichii*, Harv., in *Flora Cap.*, ii., p. 374.

“Karoo Region. With Euphorbias, &c., in saline alluvial ground at De Bosch, near Schurkraal, 1,100 ft., 3920; 5.12.08.”

The following, which has only young flower-buds, evidently also belongs here:—

Little Namaqualand: “Bakhuis, 5441; 3.12.10.”

6. *C. reticulata*, Thunb., in *Prodr. Fl. Cap.*, i., 83 (1794).

“Little Namaqualand. Plains south of Klipplaat, 1,700 ft. Pith soft and semi-fluid. 3945; 16.12.08.” “Kopje at Rietfontein, 2,500 ft., 3766; 26.12.08.”

7. *C. Pearsoni*, Schönl., n. sp.

Fruticulus valde ramosus. Caulis crassus sublignosus circ. 2 cm. diam. Rami breves circ. 1 cm. diam. in statu florifero efoliati apicem versus tuberculati inflorescentiis numerosis lateralibus pedunculatis, pedunculis 5–7 cm. longis, elongatis sublignosis glanduloso-pubescentibus interdum leviter tortuosis 4–5 foliis depauperatis minimis spiniformibus munitis, apice laxe cymoso-ramosis paucifloris, bracteis florigeris glanduloso-pubescentibus subulatis circ. 1.5 mm. longis. Flores nutantes pedicellati, pedicellis glanduloso-pubescentibus, filiformibus 12–20 mm. longis. Sepala sublibera navicularia ovato-lanceolata acuta extus glanduloso-pubescentia 4 mm. longis. Corolla albida rubrolineata extus glanduloso-pubescentis, tubo infundibuliformi 10 mm. longo, lobis oblique lanceolatis acutis 7 mm. longis. Stamina tubo corollæ basi adnata, interiora circ. 10 mm. longa, exteriora circ. 12 mm. longa, filamentis albis appianatis glabris, antheris rubris late oblongis apiculatis. Carpodia gracilia, stylis subulatis, 9 mm. longa. Squamæ minutæ subrectangulares longiores quam latæ apice rotundatæ et leviter emarginatæ circ. 0.75 mm. longæ.

“Little Namaqualand. Northern slopes between Annenous and Chubiensis outspan, 5981; 23.12.10.” “Bakhuis. Common, 5450; 13.12.10.”

*C. Pearsoni* is closely allied to *C. reticulata*, Thunb. As in this species, the peduncles become very hard after flowering, but in *C. Pearsoni* they are, except in the upper, floriferous portion,

unbranched. The leaves are unknown, being shed, as in allied species, before the flowers appear. They leave on the branches rounded, somewhat hollow tubercles, which are usually absent in *C. reticulata*. The length of the corolla in the latter is only about 1 cm., whereas in *C. Pearsoni* it is about 1.7 cm.

8. *C. papillaris*, L. f., Suppl., p. 242 (1781); Thunb., Prodr., p. 83 (1797). This species is much more variable than I formerly thought. It includes *C. glutinosa*, Schönl., in Rec. Alb. Mus., i., p. 119.

“Upper Region. Boulders between Nieuwefontein and Alewyn’s Fontein, 2,300 ft., 3433; 22.12.08.” “Hills around Loeriesfontein, 3,000 ft., 4860; 13.12.08.”

“Little Namaqualand. Among bushes on hillsides above Brakrivier, 1,900 ft. 1½ ft. Flowers whitish brown. 4878; 11.12.08.”

“Sandy karroid plain along dry river-bed south of Bakhuis, 5440.”

“Bushmanland.” Ratelkraal; Sandy plains. Forming round compact cushions 1 ft. in diam. Among bushes. 6213; 8.1.11.”

9. *C. hemisphærica*, L. Sp., 614.

“Cape Region. Among rocks on summit of Nardouw Kloof, western aspect, 5431; 29.11.10.”

The following may also belong to this species, but the material is not sufficient for exact determination:—

“Little Namaqualand. Broken country along Kansaap River, one day south of Kamabies, 3058; 23.12.06.”

“Bushmanland. Common in rock crevices at Kweekfontein, 3,200 ft., 3721; 4.1.09.”

“Upper Region. In ravine at Kopje’s Kraal, 4871; 12.12.08.”

A specimen from “Little Bushmanland, Aggenys, 3028; 7.1.09,” should be compared with *Cotyledon nana*, N. E. Br., in Gard. Chron., 3rd series, xxx., 270 (1901). It has, like this species, a one-flowered peduncle. It seems to me, however, to be nothing but a weak specimen of *C. hemisphærica*.

Another specimen, labelled “Fissures in quartzite slopes above Brakwater pools, 6077; 31.12.10,” differs only from typical *C. hemisphærica*, L., by much narrower and thicker leaves, which in the dried specimens look almost fusiform.

On the other hand, a specimen labelled "Little Bushmanland. Rocky slopes at Eenriet, 3,000 ft., 4069; 15.1.09," comes close to the type of—

10. *C. Alstoni*, Schönl. et Bak. fil., in Journ. of Bot., 1902, p. 98.

Lastly, a specimen labelled "Koeberg (Bushmanland). Common in rock crevices, 6284; 12.1.11," agrees closely with the type of—

11. *C. Marianæ*, Marl., in Trans. S. A. Phil. Soc., xviii., p. 46 (1907), but I must add that it is hardly possible always to determine the species most nearly allied to *C. hemisphærica*, except from fresh or exceptionally well-preserved specimens, and the last names must, therefore, be accepted with some reserve.

## GENTIANACEÆ.\*

By A. W. Hill.

### 1. SEBÆA.

#### 1. *S. (Tetrandria) ecarinata*, A. W. Hill.

Species *S. albenti*, R. Br., ob calycem ecarinatum affinis, sed tenuior, corolla antherisque minoribus glandulis styli prope apicem dispositis.

Annua erecta, tenuis. Caulis 10–12 cm. altus, simplex. Folia glabra, opposita, elliptico-cordata vel elliptica, obtusa, 7–9 mm. longa, 5–7 mm. lata, glauca, carnosæ. Flores albi, in cymas compactas corymbiferas paucifloras terminales dispositi; bracteæ foliosæ, ovato-vel obovato-ellipticæ, subacutæ, conspicuæ; pedicelli brevissimi. Calyx 5 mm. longus, segmentis obovatis subacutis vel subtruncatis erosis ecarinatis. Corollæ tubus 5 mm. longus; lobi ovati, subacuti, 2·5 mm. longi. Filamenta 0·5 mm. longa; antheræ 0·5 mm. longæ, apice glandula stipitata instructa. Stylus 3 mm. longus, prope apicem biglandulosus, stigmatibus bilabiato.

Cape Region. Piquetberg Div; Pickenier's Pass, east side near summit, damp places, 5229.

\* Percy Sladen Memorial Expeditions in South-West Africa, 1908–1911. Report No. 13.

The secondary stigma or biglandular swelling occurs just below the normal stigma, at the level of the anthers, and is almost confluent with it.

*Sebæa ecarinata*, A. W. Hill (sect. *Tetrandria*), is nearly allied to *S. albens*, R. Br., in the absence of keel or wing to the calyx segments. It differs from this species in being much more slender with few-flowered terminal inflorescences. The calyx segments differ in being usually truncate, notched, or fringed, and the flowers are smaller in all their parts.

2. *S. (Pentandria-Lageniades) membranacea*, A. W. Hill.

Species ex affinitate *S. pusillæ*, E. Mey., caulibus folisque majoribus, segmentis calycis membranaceis dorso scabridulis præcipue differt.

Annua erecta. Caulis 10–15 cm. altus e basi ramosus, ramis 3–4 axillaribus erectis. Folia glabra, opposita, late ovata vel ovato-lanceolata, acuta 1–1.5 cm. longa. Flores in cymas elongatas paucifloras terminales dispositi, ramis 1–2 cm. longis pedicellis 1–2 mm. longis; bracteæ foliosæ, lanceolatæ. Calyx 5–6 mm. longus, segmentis anguste carinatis membranaceis dorso scabridulis in tubo 1.5 mm. longo connatis partibus liberis lineari-lanceolatis acuminatis. Corollæ tubus 4 mm. longus, lobi 2 mm. longi, elliptici, obtusi. Filamenta brevissima, infra sinus corollæ paullo inserta; antheræ 0.75 mm. longæ, apice glandula minuta vel nulla, basi glandulis 2 conspicuis instructæ. Stylus 1–1.5 mm. longus, stigma cum glandulis confluentis. Capsula ovoidea.

Little Namaqualand: Sneeuwkop, upper western slopes, damp places in shade of rocks, 5776; between Bowesdorp and Grootgans, south side of pass among grass, 5881.

*Sebæa membranacea*, A. W. Hill (sect. *Pentandria-Lageniades*), is an interesting species most nearly allied to *S. pusilla*, Eckl., with its var. *major*, A. W. Hill. It is distinguished by being the largest species of the group, reaching a height of 6 in., with several branches from near the base of the stem. It differs from its allies in having the membranous, acuminate calyx segments united to form a tube for  $\frac{3}{4}$  lin. The anthers are  $\frac{3}{8}$  lin. long with large basal glands, and the style is only  $\frac{1}{2}$ – $\frac{3}{4}$  lin. long, being smaller than in *S. pusilla*.



2. CHIRONIA.

1. *C. baccifera*, Linn., var. *Burchellii*, Prain.

Cape Region. On eastern slopes of Pickanier's Pass, near summit, 5227.

Little Namaqualand. Lower southern slopes of Sneeuwkop, 5863; lower western slopes of Sneeuwkop, 5769; marshy ground in the Wilgehout Ravine on the south-western slopes of the Khamiesberg, 3,100 ft., 6380; among bushes in ravines at the upper end of the lower plateau, on the south-east slopes of Vogelklip, 5918.

2. *C. Schinzii*, Schoch.

Little Namaqualand. Khamiesberg; on the steep sides of pass, east of Leliefontein, 5,000 ft., 6295.

3. LIMNANTHEMUM.

*L. thunbergianum*, Griseb.

Cape Region: Oliphant's River valley; pools at Hex River, 5261.



## 4. FRESH-WATER ALGÆ.\*—By G. S. WEST, M.A., D.Sc., F.L.S.

## PLATES I, II.

So little is known of the fresh-water algæ of South-West Africa, or for that matter of South Africa as a whole, that the collections made by Professor Pearson in 1908–1911 have proved of considerable interest. The present report deals only with those collections made between November, 1908, and July, 1909, mainly from the edge of the South-West African Plateau, an area with little rainfall and few places in which algæ are able to exist.

The algæ examined were from the following regions :—

1. ANGOLA. On the sides of the water-conduit and tank of the cable-station at Mossamedes there was a thin green stratum consisting of an interesting aggregation of small algæ, including immense numbers of *Ankistrodesmus convolutus*, a new African variety of *Oocystis elliptica*, and an undescribed species of *Myxobactron*, one of the rarest genera of the Chroococcaceæ. A saline marsh south of the river Bero contained great quantities of *Chlamydomonas marina*.

At Cazengo (3,000 feet), in a small stream in the dense forest, and attached to stones, was a quantity of *Rhizoclonium hieroglyphicum*, amongst which were numerous Diatoms.

2. KAROO. The water in all the places collected from smelt strongly of sulphuretted hydrogen. In springs at Pappekuil (950 feet) and Gansfontein (1,200 feet) were several Desmids and Diatoms. At Benkesfontein, in a spring in which the water was at a temperature of 27·25° C., were *Merismopedia glauca* and *Nitzschia Palca*.

3. UPPER (OR COMPOSITE) REGION. Most of the algæ collected in this region were obtained from stagnant pools and drying mud in the Holle River (at 2,700 feet). A large form of *Rhizoclonium hieroglyphicum* was mixed with several filamentous blue-green algæ, several Desmids, and a sterile *Spirogyra*. Attached to the *Rhizoclonium* were quantities of *Uronema confervicolum*. Numerous Diatoms occurred amongst these various filamentous algæ.

\* Percy Sladen Memorial Expedition in South-West Africa, 1908–1911. Report No. 14.

At Kopjes Kraal (2,300 feet) were two species of *Enteromorpha*, *E. intestinalis*, and a very slender species which I have described as *E. gracillima*.

4. LITTLE NAMAQUALAND. Stagnant pools at Brakrivier (1,600 feet) yielded only a few Diatoms, whereas a varied assortment of algæ occurred at Pella (1,500 feet) in the wet mud on the banks of a dam. The most interesting of these was an undescribed species of *Pediastrum*. Some collections from running water at Henkriesfontein (3,000 feet) were chiefly remarkable for the abundance of Diatoms. A pool at Aggenys (6,000 feet) was the only locality from which *Navicula cuspidata* was observed. Collections from Dabainoris (1,500 feet) and Kamiebies (3,000 feet) yielded mostly Diatoms, although one collection from the latter place contained the only fruiting specimens of *Spirogyra* collected on the expedition. A floating mass of algæ in a dam at Rozynbosch (2,800 feet) consisted of *Sphæroplea annulina* with ripe oospores, *Edogonium Welwitschii* and *E. Pringsheimii* in a state of fructification, several members of the Protococcales, and about half a dozen Desmids, one of which, *Cosmarium subcostatum* forma *minor*, was in a state of conjugation.

A small spring at Nieuwfontein (2,700 feet) contained a form (forma *breviramosa*) of *Enteromorpha gracillima*.

5. GREAT NAMAQUALAND. On drying mud in Löwen's River at Gawachab (2,100 feet) an undescribed species of *Homæothrix* occurred amongst a dense tangle of moss-protonema. The most interesting alga at Gründoorn (3,400 feet) was *Edogonium inversum*, which was in fine fruiting condition attached to the wall of a cattle-trough. In a warm spring at Warmbad (2,300 feet) was a quantity of *Symploca thermalis* and *Aphanothece caldariorum*.

6. CAPE REGION BETWEEN CERES AND KAROOPOORT. A few Diatoms and Chroococcaceous algæ were observed near Leeuwfontein (2,300 feet).

The total number of algæ which could be accurately identified was 140, consisting of 38 species of Myxophyceæ, 48 species of Bacillarieæ, and 54 species of Chlorophyceæ. There were also about 14 other species of algæ which were not in a condition for accurate identification.

The Myxophyceæ were fairly representative of the whole group, with the exception of the wet-rock families of the Seytonemaceæ and Stigonemaceæ.

Diatoms occurred in all the situations from which algæ were collected, and were often very abundant. *Amphora coffæiformis*

sometimes occurred in great quantity, and appears to be a species very widely distributed in Africa. Species of *Rhopalodia* are similarly very generally distributed throughout the African continent. Among the more interesting of the Diatoms observed, were *Nitzschia Tryblionella* var. *victoriae*, a variety of *Surirella Engleri*, *Navicula bahusiensis*, and *Fragilaria virescens* var. *exigua*.

The Chlorophyceæ were fewer than one would have expected, due perhaps to the small rainfall of the areas traversed, and the liability of the water-holes and streams to become dry. The Protococcales were fairly well represented, and the two species of *Enteromorpha* are particularly interesting. Species of *Edogonium* were not common, but fortunately three of them were obtained with reproductive organs. Sterile species of *Spirogyra* occurred almost everywhere in the pools and streams, but, as in most other tropical areas, no species possessing "replicate" ends to the cells were observed. Only one was in a fruiting state, viz., *S. varians*, one of the most frequent of European species. Considering the nature of the collecting-grounds the family Desmidiaceæ was well represented.

It should also be mentioned that there was an entire absence from the collections of algæ belonging to the group of the Heterokontæ.

## CLASS MYXOPHYCEÆ.

### ORDER COCCOGONEÆ.

#### FAMILY CHROOCOCCACEÆ.

##### 1. *Aphanothece caldariorum*, Richter.

Great Namaqualand. In a pool of a spring smelling strongly of sulphuretted hydrogen at Warmbad; 28.1.09. Temp. of water 35°C.

##### 2. *Myxobactron hirudiforme*, G. S. West, sp. n.

M. cellulis inter algas chlorophyceas et myxophyceas varias libere natantibus, diametro 15-31-plo longioribus, subrectis sed irregulariter et levissime curvatis, polis inæqualibus, una plerumque obtuse rotundata, altera gradatim attenuata et sæpe subcapitata; contentu cellularum homogeneo et pallide ærugineo. Multiplicatio cellularum bipartitione transversa.

Long. cell. 30-62  $\mu$ ; lat. 1.8-2  $\mu$ . (Figs. 54-60.)

Angola. Floating among other algæ in the tank of the cable-station at Mossamedes.

Two other species of this genus are known, *M. Usterianum*, Schmidle, from the Philippines and *M. palatinum*, Schmidle, from Germany. *M. hirudiforme* is distinguished from the former by being proportionately shorter and in the different character of its extremities; from the latter by its proportionately greater thickness and by the character of the poles, which are not of greater diameter than the median portion of the cell.

I have not met with a member of this genus before, and *M. hirudiforme* is one of the most remarkable blue-green algæ I have yet come across. Specimens were carefully stained, but they showed no signs of anything like a definite central-body, and no trace of transverse cell-walls. It may be that *Myxobactron* is one of the most primitive of the blue-green algæ.

3. *Merismopedia glauca*, (Ehrenb.) Näg.

Little Namaqualand. In dam at Pella; 8.1.09. Among other algæ and a species of *Chara* at Dabainoris; 11.1.09.

Cape Region between Ceres and Karooport. In a spring smelling strongly of sulphuretted hydrogen at Leeuwefontein; 28.12.08.

4. *Merismopedia tenuissima*, Lemm.

Karoo. Floating in spring smelling strongly of sulphuretted hydrogen at Pappekuil; 2.12.08. Floating in similar spring at Gansfontein; 2.12.08.

Little Namaqualand. In a dam at Kamiebies; 24.12.08.

Great Namaqualand. In a cattle-trough at Gründoorn; 4.2.09.

Cape Region between Ceres and Karooport. In a spring smelling strongly of sulphuretted hydrogen at Leeuwefontein; 28.12.08.

5. *Merismopedia punctata*, Meyen.

Little Namaqualand. In wet mud on the banks of a dam at Pella; 8.1.09. In a dam at Kamiebies; 24.12.08 Dabainoris; 11.1.09.

6. *Tetrapedia glaucescens*, (Wittr.) Boldt.

Long. cell.  $5.5 \mu$ ; lat.  $6 \mu$ .

Little Namaqualand. Among *Chara* sp. in dam at Pella; 8.1.09.

7. *Gomphosphæria aponina*, Kütz.

Little Namaqualand. In wet mud on banks of dam at Pella; 8.1.09. Dabainoris; 11.1.09. From the latter locality the specimens were exceptionally fine.

8. *Microcystis prasina*, (Wittr.) Lemm.

Diam. cell.  $3-3.6 \mu$  diam. colon.  $16-52 \mu$ .

Little Namaqualand. In wet mud on banks of dam at Pella ; 8.1.09.

9. *Chroococcus minor*, (Kütz.) Näg.

Karoo. In spring smelling strongly of sulphuretted hydrogen at Gansfontein ; 2.12.08.

Little Namaqualand. In dam at Pella ; 8.1.09.

Great Namaqualand. In spring at Warmbad ; 28.1.09. Temp. of water 35° C.

Forma *minima*, West, in Journ. Linn. Soc. bot. 1894, p. 275, t. 16, f. 18. *Chr. minutus* var. *minimus*, von Keissler, in Verhandl. der Zool. bot. Ges. Wien, 1901, p. 394, f. 1, 2. *Chr. minimus*, (v. Keissl.) Lemm., in Archiv. für Botan. utg. af K. Sv. Vet.-Akad. Bd. 2, No. 2, 1904, p. 102.

Upper (or Composite) Region. Holle River ; 10.12.08.

Little Namaqualand. In dam at Kamiebies ; 24.12.08. Dabainoris ; 11.1.09. In dam at Pella ; 8.1.09.

10. *Chroococcus minutus*, (Kütz.) Näg.

Great Namaqualand. In spring smelling strongly of sulphuretted hydrogen at Warmbad ; 28.1.09.

11. *Chroococcus varius*, A. Br.

Angola. Attached to the sides of a shallow concreted water-conduit at Mossamedes.

12. *Chroococcus pallidus*, Näg.

Little Namaqualand. In dam at Pella ; 8.1.09.

13. *Chroococcus turgidus*, (Kütz.) Näg.

Upper (or Composite) Region. On drying mud, Holle River ; 10.12.08.

Little Namaqualand. In dam at Pella ; 8.1.09. In spring at Henkriesfontein ; 14.1.09.

Cape Region between Ceres and Karoopoort. In a spring smelling strongly of sulphuretted hydrogen at Leeuwefontein.

#### FAMILY CHAMÆSIPHONIACEÆ.

14. *Chamæsiphon incrustans*, Grun.

Angola. On *Rhizoclonium hieroglyphicum* in Cazengo District.

15. *Chamæsiphon gracilis*, Rabenh.

Long. 30–46  $\mu$  ; lat. cell. 2–2.4  $\mu$ , cum vag. 3.2–3.8  $\mu$ .

Angola. With the preceding species, but epiphytic on *Vaucheria* sp. (sterile).

## ORDER HORMOGONEÆ.

## FAMILY OSCILLATORIACEÆ.

16. *Spirulina subtilissima*, Kütz.

Upper (or Composite) Region. On drying mud in bed of Holle River; 10.12.08.

Forma.

Diam. trich.  $1\ \mu$ ; diam. spir.  $2.6\ \mu$ .

Little Namaqualand. In dam at Pella (very common); 8.1.09.

17. *Spirulina tenuissima*, Kütz. (= *Sp. subsalsa*, Ørsted.)

Crass. trich.  $1.4-1.5\ \mu$ ; crass. spir.  $4.2\ \mu$ .

Little Namaqualand. Rather rare in dam at Pella; 8.1.09.

18. *Spirulina major*, Kütz.

Little Namaqualand. On wet mud at Pella; 8.1.09.

19. *Oscillatoria animalis*, Ag.

Little Namaqualand. On wet gravel in dam at Rozynebosch; 9.1.09.

20. *Oscillatoria chlorina*, Kütz.

Crass. trich.  $3.5\ \mu$ .

Little Namaqualand. In dam at Pella; 8.1.09.

21. *Oscillatoria formosa*, Bory.

Little Namaqualand. With the preceding species.

22. *Oscillatoria Okeni*, Ag.

Little Namaqualand. In dam at Pella; 8.1.09. Among other floating algæ at Dabainoris; 11.1.09.

23. *Oscillatoria tenuis*, Ag.

Karoo. In shallow stream, Beukesfontein; 1.12.08.

Upper (or Composite) Region. Holle River; 10.12.08.

Little Namaqualand. In dam at Pella; 8.1.09.

24. *Oscillatoria limosa*, Ag.

Crass. trich.  $20\ \mu$ .

Upper (or Composite) Region. Holle River; 10.12.08.

25. *Oscillatoria princeps*, Vauch.

Karoo. In spring smelling strongly of sulphuretted hydrogen at Pappekuil; 2.12.08. In a similar spring at Gansfontein; 2.12.08.

26. *Phormidium angustissimum*, W. & G. S. West.

Little Namaqualand. In dam at Pella; 8.1.09.

Great Namaqualand. In spring (sulphureous) at Warmbad; 28.1.09.



This species was originally described from Angola in 1897.

27. *Phormidium foveolarum*, (Mont.) Gomont.

Angola. Attached to the sides of water-conduit at the cable-station, Mossamedes.

28. *Phormidium laminosum*, (Ag.) Gomont.

Crass. trich. 1.4  $\mu$ .

Upper (or Composite) Region. On drying mud, Holle River; 10.12.08

Little Namaqualand. In dam at Pella; 8.1.09.

29. *Phormidium fragile*, (Menegh.) Gomont, forma *tenuis*, W. & G. S. West, in Report on Sci. Investig. British Antarctic Expedition 1907-9, vol. i., part vii., 1911, p. 291, t. 25, f. 76.

Crass. trich. 0.9-1  $\mu$ .

Angola. In slightly saline marsh south of the mouth of River Bero, Mossamedes.

Upper (or Composite) Region. On drying mud in river-bed, Holle River; 10.12.08.

30. *Phormidium molle*, (Kütz.) Gomont.

Little Namaqualand. In dam at Pella; 8.1.09.

31. *Phormidium tenue*, (Menegh.) Gomont.

Upper (or Composite) Region. Holle River; 10.12.08.

Little Namaqualand. In dam at Pella; 8.1.09. In dam at Henkriesfontein; 14.1.09. Floating in pool at Aggenys; 6.1.09.

32. *Phormidium* sp.

This alga stands near to *Phormidium Corium*, (Ag.) Gomont, but differs in several essential points. The trichomes are pale æruginous, 2.5-3.8  $\mu$  in thickness, and slightly attenuated towards the extremities. Cell-walls distinct, and here and there apparently thickened in a somewhat irregular manner. The material was insufficient for complete investigation, and for the present I hesitate to say anything more definite concerning its specific identity.

Angola. In a saline marsh south of the mouth of the River Bero Mossamedes.

33. *Lyngbya major*, Menegh.

Crass. fil. 22-25  $\mu$ ; trich. 17.5-18  $\mu$ .

Little Namaqualand. In spring at Henkriesfontein; 14.1.09.

34. *Symploca thermalis*, (Kütz.) Grun.

Great Namaqualand. Forming, along with *Phormidium angustissimum*, a short column from the base of a pool in a sulphureous spring at Warmbad. Temp. of water 35° C.

## FAMILY NOSTOCACEÆ.

35. *Anabæna cylindrica*, Lemm., in Forschungsber. Biol. Stat. Plön, iv., 1896, p. 186, f. 8-12.

Crass. cell. 3-3.5  $\mu$ ; lat. heterocyst. 5.8-6  $\mu$ , long. heterocyst. 8  $\mu$ ; long. spor. 14-19  $\mu$ , lat. spor. 5.5-6  $\mu$ .

Upper (or Composite) Region. On mud in the river-bed, Holle River; 10.12.08.

Little Namaqualand. In spring at Henkriesfontein; 14.1.09.

36. *Nodularia turicensis*, (Cramer) Hansg. (= *N. Harveyana*, Born. & Flah.)

Little Namaqualand. Attached to stones in running water at Henkriesfontein; 14.1.09.

37. *Nostoc paludosum* Kütz.

Little Namaqualand. Floating in dam at Rozybosch; 9.1.09.

## FAMILY RIVULARIACEÆ.

38. *Homæothrix africana*, G. S. West, sp. n.

H. filis parvis, sparsis inter protonema muscorum, subrectis vel curvato-flexuosis, plerumque curtis; vagina arcta et firma, in filis juvenibus hyalinis et achrois, in filis vetustis lamellosis et aureo-brunneis; trichomatibus brevibus, ab base gradatim et gradatim in pilum subobtusum brevem attenuatis, inter cellulas non constrictis; cellulis inferioribus diametro paullo brevioribus, plerumque pæne subquadratis, iis superioribus tam longis quam latis vel diametro  $1\frac{1}{2}$ -plo longioribus; cellula basali hemisphærica; cellula apicali obtusa; *heterocystis nullis*.

Crass. fil. ad bas. 7.8-11.5  $\mu$ ; crass. trich. ad bas. 5.8-6.3  $\mu$ . (Figs. 36, 37.)

Great Namaqualand. Among moss-protonema on drying mud in Löwen's River, Gawachab; 7.2.09.

This appears to be a distinctive species, but should be compared with another African species, *H. cartilaginea* nov. comb. (= *Calothrix cartilaginea*, G. S. West, in Journ. Linn. Soc. Bot. xxxviii, 1907, p. 181, t. 10, f. 7), which has been found in Tanganyika. It differs from that species in the absence of the cartilaginous stratum, and in the much more cylindrical trichomes, which are not torulose and are without a basal swelling. The sheaths also differ in becoming golden-brown and lamellose in the older filaments.

## CLASS BACILLARIEÆ.

## ORDER CENTRICÆ.

## FAMILY COSCINODISCACEÆ.

39. *Cyclotella Meneghiniana*, Kütz.

Karoo. In spring at Gansfontein ; 2.12.08.

Little Namaqualand. In dam at Henkriesfontein ; 14.1.09.

40. *Cyclotella Kützingiana*, Chauvin.

Little Namaqualand. Among floating algæ and *Chara* sp.,  
Dabainoris ; 11.1.09.

Great Namaqualand. In cattle-trough at Gründoorn ; 4.2.09.

## ORDER PENNATÆ.

## FAMILY TABELLARIACEÆ.

41. *Denticula tenuis*, Kütz.

Upper (or Composite) Region. Holle River ; 10.12.08.

Little Namaqualand. In dam at Pella ; 8.1.09. Among various  
algæ at Dabainoris ; 11.1.09. In dam at Kamiebies ; 24.12.08.

In some of the above localities this species was very abundant.

## FAMILY FRAGILARIACEÆ.

42. *Fragilaria virescens*, Ralfs, var. *exigua*, Grun. (Van Heurck,  
Synops. Diat. Belg. t. 44, f. 3).

Angola. In small stream in Cazengo District.

43. *Synedra Acus*, (Kütz.) Grun.

Little Namaqualand. In water-pit at Eenriet ; 15.1.09. Var.  
*delicatissima*, (W. Sm.) Grun.

Little Namaqualand. In dam at Pella ; 8.1.09.

44. *Synedra Ulna*, (Nitzsch) Ehrenb.

Angola. In stream in Cazengo District.

Karoo. In sulphureous spring at Gansfontein ; 2.12.08.

Upper (or Composite) Region. Holle River ; 10.12.08.

Little Namaqualand. In running water at Henkriesfontein ;  
14.1.09. In dam at Kamiebies ; 24.12.08.

Cape Region between Ceres and Karooport. Leeuwefontein ;  
28.12.08.

Var. *splendens*, (Kütz.) Van Heurck.

Little Namaqualand. Henkriesfontein; 14.1.09.

Var. *vitrea*, (Kütz.) Van Heurck.

Upper (or Composite) Region. Holle River; 10.12.08.

45. *Synedra Oxyrhynchus*, Kütz.

Angola. In stream in Cazengo District.

#### FAMILY EUNOTIACEÆ.

46. *Eunotia pectinalis*, (Kütz.) Rabenh.

Upper (or Composite) Region. Holle River; 10.12.08.

#### FAMILY ACHNANTHACEÆ

47. *Achnanthes minutissima*, Kütz.

Little Namaqualand. In dam at Pella; 8.1.09.

Var. *cryptocephala*, Grun.

Angola. In stream in Cazengo District.

Karoo. In sulphureous spring, Gansfontein; 2.12.08.

Upper (or Composite) Region. Holle River; 10.12.08. In dam at Kariboomfontein; 8.12.08.

Little Namaqualand. Dabainoris; 11.1.09.

Great Namaqualand. Gründoorn; 4.2.09.

48. *Achnanthes lanceolata*, (Bréb.) Grun.

Angola. In stream in Cazengo District.

Upper (or Composite) Region. Holle River; 10.12.08.

49. *Achnanthes coarctata*, Bréb.

Upper (or Composite) Region. On drying mud in the river-bed, Holle River; 10.12.08.

#### FAMILY COCCONEIDACEÆ.

50. *Cocconeis Placentula*, Ehrenb.

Angola. In stream in Cazengo District.

#### FAMILY NAVICULACEÆ.

51. *Navicula bahusiensis*, Grunow. (Cleve, Synops. Navic. Diat. II, 1895, p. 4.)

Angola. Among *Pleurococcus dissectus* and *Edysichlamys obliqua*, forming a thin stratum on sand-grains in a shallow depression which received the water from the cable-station bath-rooms at Mossamedes.

Var. *istriana*, Grun.

Angola. With the type form.

52. *Navicula borealis*, (Ehrenb.) Kütz.

Angola. In stream in Cazengo District.

Upper (or Composite) Region. Holle River; 10.12.08.

53. *Navicula Brébissonii*, Kütz.

Upper (or Composite) Region. Holle River; 10.12.08. Among *Tetraspora explanata* in dam at Kariboomfontein; 8.1.09.

54. *Navicula cryptocephala*, Kütz.

Angola. In stream in Cazengo District.

Karoo. In sulphureous spring, Gansfontein; 2.12.08.

Upper (or Composite) Region. Holle River; 10.12.08.

Little Namaqualand. In spring at Henkriesfontein; 14.1.09.

Among various algæ at Dabainoris; 11.1.09.

55. *Navicula cuspidata*, Kütz.

Little Namaqualand. Very typical specimens in a small pool at Aggenys; 6.1.09. Altitude 3,000 feet.

56. *Navicula elliptica*, Kütz.

Angola. In stream in Cazengo District.

57. *Naviculua gibba*, (Ehrenb.) W. Sm.

Angola. In stream in Cazengo District.

58. *Navicula limosa*, Kütz.

Angola. In stream in Cazengo District.

59. *Navicula mutica*, Kütz.

Karoo. In sulphureous spring at Gansfontein; 2.12.08.

Little Namaqualand. In dam at Henkriesfontein; 14.1.09.

Among other algæ on submerged stones, Dabainoris; 11.1.09.

60. *Navicula Pupula*, Kütz.

Upper (or Composite) Region. On drying mud in Holle River; 10.12.08.

Little Namaqualand. In dam at Kamiebies; 24.12.08.

61. *Navicula radiosa*, Kütz., var. *tenella*, (Bréb.) Cleve, Synops. Navic. Diat. II, 1895, p. 17.

Little Namaqualand. Among *Myxonema tenue* and *Nodularia turicensis* in running water, Henkriesfontein; 14.1.09.

62. *Navicula rhynchocephala*, Kütz.

Angola. In stream in Cazengo District.

63. *Navicula sphaerophora*, Kütz.

Angola. In stream in Cazengo District.

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

Upper (or Composite) Region. On drying mud in Holle River; 10.12.08.

Little Namaqualand. In dam at Pella; 8.1.09. In running water at Henkriesfontein; 14.1.09. In pool at Aggenys; 6.1.09. On submerged stones at Dabainoris; 11.1.09. Among *Spirogyra varians* in spring at Kamiebies; 24.12.08. In dam at Rozybosch; 9.1.09.

This species was certainly the most abundant Diatom observed in the collections. It occurred in a great variety of situations and exhibited a considerable amount of variation in the shape of the valves. Great variation in outward form was shown by this Diatom in another African area. O. Müller has described and figured a very interesting and continuous series of forms from the saline lake El Kab in Upper Egypt (*vide* Hedwigia, Bd. xxxviii, 1899, pp. 300–305, t. 12, f. 1–15).

64. *Navicula viridis*, Kütz.

In stream in Cazengo District.

65. *Navicula* sp.

I have not succeeded in identifying this species, and it may possibly be new. It agrees with those species which were formerly placed in the genus *Schizonema* in its absolutely transverse striations. These striations are very delicate (27 to 29 in  $10\mu$ ), rather more so than in a species of the section *Schizonema*, and they are in no way divergent. Long. valv. 26–28  $\mu$ ; lat. valv. 5.3–5.5  $\mu$ .

Great Namaqualand. Attached to the concrete walls of a cattle-trough at Gründoorn; 4.2.09.

66. *Stauroneis anceps*, Ehrenb.

Upper (or Composite) Region. Holle River; 10.12.08.

Var. *linearis*, (Ehrenb.) Cleve, Synops. Navic. Diat. I, 1894, p. 147.

Long. valv. 47  $\mu$ ; lat. 8  $\mu$ ; striis 24 in  $10\mu$ .

Little Namaqualand. Abundant in dam at Henkriesfontein; 14.1.09.

67. *Gyrosigma Spencerii*, (Quek.) O.K., var. *exilis*, Grun.

Angola. In stream in Cazengo District.

#### FAMILY GOMPHONEMACEÆ.

68. *Gomphonema gracile*, Ehrenb.

Angola. In stream in Cazengo District.

Karoo. In sulphureous spring at Gansfontein; 2.12.08.

Upper (or Composite) Region. Holle River; 10.12.08. In dam at Karieboomfontein; 8.12.08.

Little Namaqualand. In dam at Pella; 8.1.09. In dam at Henkriesfontein; 14.1.09. In a water-pit at Eenriet; 15.1.09.

69. *Gomphonema lanceolatum*, Kütz.

Little Namaqualand. In dam at Henkriesfontein; 14.1.09.

70. *Gomphonema parvulum*, Kütz.

Angola. In water-conduit at Mossamedes. In stream in Cazengo District.

Little Namaqualand. In spring at Henkriesfontein; 14.1.09. Among various algæ at Dabainoris; 11.1.09.

Var. *micropus*, (Kütz.) Cleve.

Upper (or Composite) Region. In dam at Kariboomfontein; 8.12.08.

Great Namaqualand. In cattle-trough at Gründoorn; 4.2.09.

71. *Rhoicosphenia curvata*, (Kütz.) Grun., var. *fracta*, (Sehum.) Cleve.

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

#### FAMILY COCCONEMACEÆ.

72. *Cocconema æqualis*, (W. Sm.) nov. comb. (= *Cymbella æqualis*, W. Sm.)

Upper (or Composite) Region. Holle River; 10.12.08.

73. *Amphora coffæiformis*, Ag.

Angola. In stream in Cazengo District.

Karoo. In sulphureous spring at Gansfontein; 2.12.08.

Upper (or Composite) Region. Holle River; 10.12.08.

Little Namaqualand. In dam at Henkriesfontein; 14.1.09. Among various algæ and *Chara* sp. at Dabainoris; 11.1.09. In pool at Aggenys; 6.1.09.

This Diatom appears to have a very wide African distribution.

Var. *perpusilla*, Grun.

Little Namaqualand. In a pool at Aggenys; 6.1.09.

74. *Rhopalodia gibba*, (Kütz.) O. Müller.

Little Namaqualand. In pools at Brakrivier; 11.12.09.

75. *Rhopalodia gibberula*, (Ehrenb.) O. Müller.

Karoo. In sulphureous spring, Gansfontein; 2.12.08.

#### FAMILY NITZSCHIACEÆ.

76. *Nitzschia amphibia*, Grun.

Little Namaqualand. In dam at Henkriesfontein; 14.1.09.

77. *Nitzschia Denticula*, Grun. (= *Denticula obtusa*, W. Sm.)  
Little Namaqualand. With the preceding species.
78. *Nitzschia constricta*, (Kütz.) Pritch. (= *N. dubia*, W. Sm.)  
Little Namaqualand. In dam at Kamiebies; 24.12.08.
79. *Nitzschia linearis*, (Ag.) W. Sm.  
Angola. In stream in Cazengo District.  
Little Namaqualand. In pools at Brakrivier; 11.12.09. In dam  
at Henkriesfontein; 14.1.09.
80. *Nitzschia Kützingiana*, Hilse.  
Angola. In concreted water-conduit, Mossamedes.  
Upper (or Composite) Region. On drying mud, Holle River;  
10.12.08.
81. *Nitzschia Palæa*, (Kütz.) W. Sm.  
Karoo. In sulphureous spring at Pappekuil; 2.12.08. In  
similar spring at Beukesfontein; 1.12.08.  
Upper (or Composite) Region. On drying mud, Holle River;  
10.12.08. In dam at Kariboomfontein; 8.12.08.  
Little Namaqualand. In spring at Henkriesfontein; 14.1.09.
- Var. *tenuirostris*, Grun.  
Upper (or Composite) Region. In dam at Kariboomfontein;  
8.12.08.  
Little Namaqualand. In running water at Henkriesfontein;  
14.1.09.
- Var. *debilis*, Van Heurck.  
Karoo. In spring at Benkesfontein; 1.12.08.
82. *Nitzschia stagnorum*, Rabenh.  
Angola. In concreted water-conduit, Mossamedes.  
Upper (or Composite) Region. Holle River; 10.12.08.  
Little Namaqualand. In pool at Aggenys; 6.1.09.
83. *Nitzschia Tryblionella*, Hantzsch.  
Upper (or Composite) Region. Holle River; 10.12.08.
- Var. *victoriae*, Grun.  
Angola. In stream in Cazengo District.
84. *Hantzschia Amphioxys*, (Ehrenb.) Grun.  
Little Namaqualand. In dam at Rozynbosch; 9.1.09.  
Great Namaqualand. On drying mud at Löwen's River,  
Gawachab; 7.2.09.



## FAMILY SURIRELLACEÆ.

85. *Surirella ovalis*, Bréb.

Karoo. In sulphureous spring at Gansfontein; 2.12.08.

Upper (or Composite) Region. Holle River; 10.12.08. In dam at Kariboomfontein; 8.1.09.

Little Namaqualand. In dam at Pella; 8.1.09. In dam at Henkriesfontein; 14.1.09. In pool at Aggenys; 6.1.09. In water-pit at Eenriet; 15.1.09.

From the dam at Henkriesfontein some striking deformities of the valves were observed in quantity.

86. *Surirella Engleri*, O. Müller, var.

Angola. In stream in Cazengo District.

The variety observed was transitional between *S. Engleri* and *S. Nyassæ*, O. Müller, and agreed very well with the form described and figured by Ostefeld in Bull. Mus. Comp. Zool. Harvard, lii, 1909, t. 1, f. 11.

87. *Cymatopleura Solea*, (Bréb.) W. Sm.

Angola. In stream in Cazengo District.

All the specimens seen were relatively very wide in the valve-view and they probably constitute a distinct variety.

## CLASS CHLOROPHYCEÆ.

## ORDER PROTOCOCCALES.

## FAMILY VOLVOACEÆ.

88. *Chlamydomonas marina*, Cohn, in Hedwigia, 1865, p. 97, figs. a-g.

Angola. In slightly saline marsh south of the mouth of the River Bero, Mossamedes.

The specimens were exactly typical, and there was no trace of a pigment spot (or stigma). The cup-shaped chloroplast contained a conspicuous pyrenoid. (Figs. 1-4.)

## FAMILY PALMELLACEÆ.

89. *Tetraspora explanata*, Ag.

Upper (or Composite) Region. Floating in dam at Kariboomfontein; 8.12.08.

90. *Glæocystis gigas*, (Kütz.) Lagerh.

Angola. In stream in Cazengo District.

Little Namaqualand. In dam at Kamiebies; 24.12.08.

#### FAMILY PLEUROCOCCACEÆ.

91. *Pleurococcus angulosus*, (Corda) Menegh.

Diam. cell. 6–12  $\mu$ .

Angola. Forming a thin stratum on the sides of a concreted water-conduit at Mossamedes.

92. *Pleurococcus dissectus*, Kütz.

Angola. Forming a thin green stratum on sand-grains in a shallow depression which received the water from the bath-rooms of the cable-station, Mossamedes.

#### FAMILY AUTOSPORACEÆ.

93. *Oocystis elliptica*, W. West, var. *africana*, var. n.

Var *minima*; autosporis 4 vel 8, dense compactis; chromatophoris multe lobatis parietalibus singulis vel binis.

Long. cell. 8–13  $\mu$ ; lat. cell. 4.5–7  $\mu$ . (Figs. 14–17.)

Angola. Abundant among *Ankistrodesmus convolutus* and *Pleurococcus angulosus* on the sides of a concreted water-conduit at Mossamedes.

The proportions of the cells of this variety are exactly those of the type. Some of the largest cells show the very faintest indication of polar thickenings, and the old wall of the mother-cell very early becomes gelatinous and disappears, the four or eight autospores remaining for some time in a cluster as though agglutinated together. The cells may possess a single parietal chloroplast, which is much lobed, or two parietal chloroplasts.

The early disappearance of the walls of the mother-cells distinguishes this African variety from all other known forms of the species.

#### ECDYSICHLAMYS, G. S. West, gen. n.

Cellulæ in strato mucoso viridi tenuissimo et expanso confertissime aggregatæ, oblique ellipsoideæ, latere una leviter convexa, latere altera valde convexa (subsemicirculari), polis minutissime apiculatis; chromatophora parietali magna et singula in cellula unaquaque, cum pyrenoide singulo (rarissime pyrenoidibus binis) conspicuo, et granulis minutissimis numerosis; nucleo singulo plerumque unilateraliter dispositis; membrana cellularum firma, indistincte

lamellosa, lamellæ exteræ (et vetustæ) plus minusve irregulariter dissociatæ. Propagatio autosporis 2, vel 4 e divisione transverse vel oblique in cellula matricali ortis.

94. *Ecdysichlamys obliqua*, sp. unica.

Character idem ac generis; cellulis parvis, diametro circiter  $1\frac{3}{5}$ - $1\frac{3}{5}$ -plo longioribus.

Long. cell. 8·7-13·7  $\mu$ ; lat. 5-8·8  $\mu$ . (Figs. 18-29).

Angola. Forming a thin green stratum, one layer of cells in thickness, with *Pleurococcus dissectus*, on sand-grains in a shallow depression which received the water from the bath-rooms of the cable-station, Mossamedes.

This genus undoubtedly stands near to *Oocystis*, Næg., but differs in several important respects. In the first place the cells of this alga form a dark green, compact, attached stratum, one layer of cells in thickness, whereas all species of the genus *Oocystis* are free-floating, solitary or gregarious colonies. The oblique nature of the cells, with one side very much flattened, is also characteristic, although one known species of *Oocystis* possesses asymmetrical cells (*vide O. asymmetrica*, W. & G. S. West, in Journ. Roy. Micr. Soc., 1894, p. 14, t. 2, f. 27).

The outer layers of the cell-wall, which in all the cells is very firm as in *Oocystis*, are often thrown off in a manner comparable with the exuviation of the outer layers of the wall which occurs in *Nephrocytium ecdysiscepanum*, W. & G. S. West. The outermost layer often alone separates and exists as an outstanding envelope such as may be seen in *Oocystis parva*, W. & G. S. West (*vide* G. S. West in Journ. Bot., 1899, t. 394, f. 14-16).

The chloroplast is very massive and practically fills the whole cell. It contains one, or very rarely two, conspicuous pyrenoids, such as do not occur in any species of *Oocystis* except *O. natans*, (Lemm.) Wille.

In the formation of the autospores the division of the protoplast is somewhat variable. When only two autospores arise in the mother-cell, the division is often exactly transverse, whereas at other times it is oblique. When four autospores are being formed in the one mother-cell, two oblique division-planes are formed simultaneously.

Each pole of the cell is terminated by a very delicate and scarcely discernible apiculus.

95. *Tetraëdron minimum*, (A. Br.) Hansg.

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

Little Namaqualand. In dam at Pella; 8.1.09.

96. *Tetraëdron trigonum*, (Näg.) Hansg., var. *isoscelum*, G. S. West, var. n.

Var. *minimum*, cellulis cum lateribus binis elongatis subrectis vel leviter concavis, latere tertio breviori et valde retuso; angulis minute spinulatis.

Diam. min. (c. spin.) 6–10  $\mu$ , max. 13–18  $\mu$ . (Figs. 33, 34.)

Little Namaqualand. Floating in dam at Rozynbosch; 9.1.09.

97. *Scenedesmus obliquus*, (Turp.) Kütz.

Angola. In stream in Cazengo District.

Karoo. In sulphureous spring, Gansfontein; 2.12.08.

Little Namaqualand. In dam at Pella; 8.1.09. Among other algæ at Dabainoris (in great quantity); 11.1.09. In dam at Kamiebies; 24.12.08. In great abundance in dam at Rasynboch; 9.1.09.

Cape Region between Ceres and Karooport. In sulphureous spring at Leeuwefontein; 28.12.08.

98. *Scenedesmus bijugatus*, (Turp.) Kütz.

Karoo. In sulphureous spring at Pappekuil; 2.12.08. In similar spring at Gansfontein; 2.12.08.

Little Namaqualand. In dam at Henkriesfontein; 14.1.09. Among various algæ at Dabainoris; 11.1.09.

Forma ad *Sc. incrassatum*, Bohlin, accedens, sed cellulis sine apiculis.

Angola. In stream in Cazengo District.

Little Namaqualand. In dam at Rasynbosch; 9.1.09.

99. *Scenedesmus acutiformis*, Schröder, var. *brasiliensis*, (Bohlin) W. & G. S. West.

Little Namaqualand. In water-pit at Eenriet; 15.1.09.

100. *Scenedesmus denticulatus*, Lagerh., var. *linearis*, Hansg.

Karoo. In sulphureous spring, Beukesfontein; 1.12.08. Temp. of water 27·25° C. In similar spring at Gansfontein; 2.12.08.

101. *Scenedesmus quadricauda*, (Turp.) Bréb.

Karoo. In sulphureous spring at Beukesfontein; 1.12.08; and in similar spring at Pappekuil; 2.12.08.

Upper (or Composite) Region. Holle River; 10.12.08.

Little Namaqualand. Among other algæ at Dabainoris; 11.1.09. In stagnant pool in river-bed at Aus (colouring the water green); 21.1.09. In water-pit at Eenriet; 16.1.09.

102. *Dactylococcus bicaudatus*, A. Br.

Long. cell. 24  $\mu$ ; lat. 4·5  $\mu$ .

Little Namaqualand. In dam at Rozynbosch; 9.1.09.

The genus *Dactylococcus* is well established by the species *D. bicaudatus*, A. Br., and *D. dispar*, W. & G. S. West.

Stages of *Scenedesmus obliquus* are often observed, and can easily be obtained in cultures, agreeing almost exactly with Nägeli's original species *D. infusionum*. But even if *D. infusionum* is to be regarded merely as one state of *Scenedesmus obliquus*, the two species of *Dactylococcus* mentioned above fit in all details Nägeli's original description of this genus, and hence *Dactylococcus*, Näg., must be retained.

Recently, Grobéty (in Bull. Soc. Bot. Genève, 2nd ser. vol. 1, 1909, p. 357) has instituted the name "*Ourococcus*" for *Dactylococcus bicaudatus*. This name is not only quite unnecessary, but was used in 1845 by Hassal for his first subgenus of *Hæmatococcus*, Ag., and was corrupted by Kützing into "*Urococcus*." Hence it is in the highest degree improper to use the name *Ourococcus* again for a genus of green algae.

103. *Ankistrodesmus convolutus*, Corda.

Angola. Very abundant in the water-conduit and water-tank of the cable-station at Mossamedes.

This interesting species was in great abundance. The peculiar spiral twist possessed by the cells causes considerable variation in form according to the position of the individual. One pole frequently appears rounded when the other is acutely pointed. (Figs. 5-13).

104. *Cælastrum sphaericum*, Näg.

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

#### FAMILY HYDRODICTYACEÆ.

105. *Pediastrum Boryanum*, (Turp.) Menegh.

Karoo. With the preceding species.

106. *Pediastrum Pearsoni*, G. S. West, sp. n.

P. cænobiis compactis, ellipsoideis in ambitu, sine lacunis, e cellulis 8 (2 centralibus et 6 marginalibus) vel 15 (5 centralibus et 10 marginalibus) formatis; cellulis centralibus plus minusve irregulariter pentagonis; cellulis marginalibus subhexagonis, margine exteriori angulari-rotundato; cellula marginali unaquaque cum processibus distantibus brevibus (2.4-6  $\mu$  longis) binis, delicatulis et subcapitatis, oblique dispositis; membrana cellularum firma et sæpe suberassa, minute scrobiculata; chromatophora unaquaque cum pyrenoidibus singulis vel binis.

Lat. cell. centr. 13–27  $\mu$ ; lat. cell. margin. 17–30  $\mu$ ; lat. cœnob. (sine proc.) 32–68  $\mu$ ; long. proc. 2.4–6  $\mu$ . (Figs. 30–32).

Little Namaqualand. In dam at Pella; 8.1.09.

The very compact cœnobium, the entire character of the marginal cells, and the oblique disposition of the small marginal processes, are the distinguishing features of this species. It should be carefully compared with *P. integrum*, Näg.

It was not uncommon in the dam at the above locality, and no other species of the genus occurred with it.

## ORDER SIPHONALES.

### FAMILY VAUCHERIACEÆ.

#### 107. *Vaucheria* sp.

Angola. In stream in dense forest in Cazengo District. Crass. fil. 150–166  $\mu$ . Only sterile filaments were observed, and some of these were clothed with numerous colonies of the epiphyte *Chamæsiphon gracilis*, Rabenh.

## ORDER SIPHONOCADIALES.

### FAMILY CLADOPHORACEÆ.

#### 108. *Rhizoclonium hieroglyphicum*, Kütz.; em. Stockm.

Crass. fil. 21.5–25  $\mu$ .

Angola. Among *Vaucheria* sp. in stream in dense forest in Cazengo District.

The specimens were fairly typical, and many of the filaments were encrusted with colonies of *Chamæsiphon incrustans*, Grun.

Var. (Fig 35.)

This approaches var. *riparium*, (Harv.) Stockm., but the transverse walls were of considerable thickness (15–17  $\mu$ ) and there were no "rhizoids." Cras. fil. 33–34  $\mu$ . Numerous plants of *Uronema confervicolum*, Lagerh., were epiphytic on the filaments.

Upper (or Composite) Region. Holle River, attached to the rocky sides of stagnant pools; 10.12.08.

### FAMILY SPHÆROPLEACEÆ.

#### 109. *Sphæroplea annulina*, (Roth) Ag.

Crass. cœnocy. 42–46  $\mu$ ; diam. oospor. matur. 16–24  $\mu$ .

Little Namaqualand. Floating in dam at Rozybosch; 9.1.09.

This alga was mixed with species of *Edogoniæm*, and a number of Desmids and Protococcales. The transverse walls of the filaments were 7–8  $\mu$  in thickness. In all the filaments examined were ripe oospores.

## ORDER ULVALES.

### FAMILY ULVACEÆ.

110. *Enteromorpha intestinalis*, (L.) Link.

Diam. cell. 8–16  $\mu$ .

Upper (or Composite) Region. In shallow stream ("brakwater") smelling of sulphuretted hydrogen at Kopje's Kraal; 12.12.08.

111. *Enteromorpha gracillima*, G. S. West, sp. n.

*E. pallide viridis*, lapides irroratos in rivulo affixa; thallo 9–16 cms. longo, angustissimo, tubuloso, capillare et ramoso; filis primariis usque ad 250  $\mu$  crassis, flexuosis; ramis angustioribus, 64–110  $\mu$  crassis multe elongatis et flexuoso-undulatis, apicibus breviter et gradatim attenuatis sed non monosiphoniis; cellulis subirregulariter polygonatis, 9–23  $\mu$  crassis; vix in seriebus longitudinalibus dispositis sed plus minusve irregulariter ordinatis. (Figs. 43, 44.)

Karoo. In spring smelling strongly of sulphuretted hydrogen at Gansfontein; 11.1.09.

Upper (or Composite) Region. Attached to stones in shallow stream at Kopje's Kraal; 12.12.08. Water smelling strongly of sulphuretted hydrogen. Another sample was mixed with a sterile species of *Spirogyra*.

It does not seem possible to identify this species with any of those already described. It is most certainly not a form of *E. plumosa*, Kütz., but it should be carefully compared with *E. clathrata*, (Roth) J. Ag. From the latter it differs in its more slender habit, with fewer, less patent, and more elongated branches, which are, however, much more flexuose. The cells are also much more irregular, both in shape and in disposition.

It is possible that fully grown plants may exceed 16 cms. in length, as the longest specimens examined did not appear to be quite perfect. For its length it is the narrowest known species of the genus. The branches are narrower than the main axis, of considerable length (up to 9 cms.), and by no means numerous.

The occurrence of another inland species of *Enteromorpha* is very interesting. Moreover, species of this genus, although frequently

growing under the influence of sewage contamination, have not previously been discovered in sulphureous springs.

Forma *breviramosa*.

Forma filis primariis undulato-crispatis; ramis brevioribus, cum ramulis paucis brevissimis (e seriebus cellularum duabus formatis). Crass. fil. prim. usque 278  $\mu$ ; crass. ram. 52–91  $\mu$ ; crass. ramul. 20–25  $\mu$ . (Figs. 45, 46.)

Little Namaqualand. In brackish water from a weak spring at Nieuwefontein; 21.12.08.

## ORDER ULOTRICHALES.

### FAMILY ULOTRICHACEÆ.

112. *Ulothrix tenerrima*, Kütz.

Crass. fil. 8  $\mu$ .

Little Namaqualand. In dam at Rozynbosch; 9.1.09.

113. *Uronema confervicolum*, Lagerh.

Crass. fil. 5–7.5  $\mu$ .

Upper (or Composite) Region. In quantity, epiphytic on a variety of *Rhizoclonium hieroglyphicum* which was attached to the rocky sides of stagnant pools, Holle River; 10.12.08.

Each cell contained a very massive and much-lobed chloroplast, the lobes appearing like large cushions.

### FAMILY CHÆTOPHORACEÆ.

114. *Myxonema tenue*, (Ag.) Rabenh.

Little Namaqualand. Attached in running water at Henkriesfontein; 14.1.09.

## ORDER CONJUGATÆ.

### FAMILY ZYGNEMACEÆ.

115. *Zygnema* sp. (sterile).

Diam. fil. 23–24  $\mu$ .

Little Namaqualand. In dam at Pella; 8.1.09.

116. *Zygnema* sp. (sterile).

Diam. fil. 20  $\mu$ .

Upper (or Composite) Region. In bed of Holle River; 10.12.08.



117. *Spirogyra* sp. (sterile).

Diam. cells. 22–24  $\mu$ ; cells  $2\frac{1}{2}$ –4 times as long as broad; chloroplast solitary, with 2–4 turns.

Karoo. In sulphureous spring at Gansfontein; 2.12.08.

Cape Region between Ceres and Karooport. In sulphureous spring at Leeuwefontein; 28.12.08.

118. *Spirogyra* sp. (sterile).

Diam. cells 28–32  $\mu$ ; cells 4–6 times as long as broad; chloroplast solitary, with  $3\frac{1}{2}$ –7 turns.

Upper (or Composite) Region. Floating in dam at Karieboomfontein; 8.12.09.

Little Namaqualand. In dam at Kamiebies; 24.12.08.

119. *Spirogyra* sp. (sterile).

Diam. cells 33–34  $\mu$ ; cells 4–6 times as long as broad; chloroplasts 3, making  $1\frac{1}{2}$ – $2\frac{1}{2}$  close turns, and with large pyrenoids.

Little Namaqualand. In dam at Pella; 8.1.09. In dam and also in running water at Henkriesfontein; 14.1.09

120. *Spirogyra* sp. (sterile).

The following most probably all belong to the same species:—

*a.* Diam. cells 34–36  $\mu$ ; cells 2–5 times as long as broad; chloroplast solitary, with  $3\frac{1}{2}$ –5 turns, rough edges, and large pyrenoids.

Little Namaqualand. In pool at Aggenys; 6.1.09. In dam at Kamiebies; 24.12.08.

*b.* Diam. cells 34–38  $\mu$ ; cells 2–3 times as long as broad; chloroplast solitary, broad, with rough edges and large pyrenoids, and with close turns of spiral.

Little Namaqualand. In stagnant pools at Brakrivier; 11.12.09.

*c.* Diam. cells 34–39  $\mu$ ; cells 2–4 times as long as broad; chloroplast solitary, broad, with conspicuous pyrenoids, and making 4–8 turns.

Little Namaqualand. In water-pool at Aggenys; 6.1.09.

*d.* Diam. cells 35–38  $\mu$ ; cells 1–3 times as long as broad; chloroplast solitary and broad, making 1–5 turns.

Upper (or Composite) Region. In stagnant pools, Holle River; 10.12.08.

Cape Region between Ceres and Karooport. In small pool at Leeuwefontein; 28.11.08.

Possibly the two following are also referable to the same species:—

*e.* Diam. cells 36–38  $\mu$ ; with one or two large chloroplasts.

Karoo. In sulphureous spring at Pappekuul; 2.12.08. Also in similar spring at Beukesfontein; 1.12.08.

Upper (or Composite) Region. In stagnant pools, Holle River 10.12.08. Floating in dam at Karieboomfontein; 8.12.08.

Little Namaqualand. In spring at Henkriesfontein; 14.1.09. Floating in masses in small pool at Aggenys; 6.1.09.

*f.* Diam. cells 36–42  $\mu$ ; cells with one or two large chloroplasts containing conspicuous pyrenoids.

Karoo. In sulphureous spring at Pappekuil; 2.12.08. Also in sulphureous spring (temp. of water 27·25° C.) at Beukesfontein; 1.12.08.

Upper (or Composite) Region. In stream at Kopje's Kraal; 12.12.08.

Little Namaqualand. In stagnant pools, Brakrivier; 11.12.09. Floating in dam at Henkriesfontein; 14.1.09.

121. *Spirogyra* sp. (sterile).

Diam. cells 42–48  $\mu$ ; cells  $\frac{3}{4}$ –2 (generally 1 $\frac{1}{4}$ ) times as long as broad; chloroplasts 2, making  $\frac{1}{2}$ –2 turns, and with large pyrenoids.

Karoo. Floating in sulphureous spring at Pappekuil; 2.12.08.

122. *Spirogyra varians*, (Hass.) Kütz.

Crass. fil. 36–38  $\mu$ ; long. zygosp. 50–56  $\mu$ ; lat. zygosp. 33–34  $\mu$ .

Little Namaqualand. In dam at Kamiebies; 24.12.08.

123. *Mougeotia* sp. (sterile).

Diam. 7·5–8  $\mu$ ; cells 12–16 times as long as broad.

Little Namaqualand. In dam at Pella; 8.1.09.

124. *Mougeotia* sp. (sterile).

Diam. 13  $\mu$ ; cells 7–9 times as long as broad.

Karoo. In sulphureous spring at Gansfontein; 2.12.08.

#### FAMILY DESMIDIACEÆ.

125. *Cylindrocystis pyramidata*, W. & G. S. West.

Long. 39  $\mu$ ; lat. 24  $\mu$ ; lat. isthm. 22  $\mu$ .

Little Namaqualand. In dam at Rozynbosch; 9.1.09.

126. *Closterium acerosum*, (Schrank) Ehrenb.

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

Upper (or Composite) Region. In dam at Karieboomfontein; 8.12.08.

127. *Closterium Dianæ*, Ehrenb.

A small form, but otherwise quite typical; long. inter apic. 224  $\mu$ ; lat. 19  $\mu$ .

Little Namaqualand. Among *Chara* sp. in dam at Pella; 8.1.09.

128. *Closterium Ehrenbergii*, Menegh.

Rather small form; long. 364  $\mu$ ; lat. 56  $\mu$ .

Little Namaqualand. In pool at Aggenys; 6.1.09.

129. *Closterium lanceolatum*, Kütz.

Long. 264–312  $\mu$ ; lat. 42–48  $\mu$ .

Karoo. In sulphureous spring, Gansfontein; 2.12.08.

Little Namaqualand. Among various algæ, Dabainoris; 11.1.09.

In dam at Rozynbosch; 9.1.09.

130. *Closterium Leibleinii*, Kütz.

Lat. 27  $\mu$ .

Little Namaqualand. In dam at Rozynbosch; 9.1.09.

131. *Closterium moniliferum*, (Bory) Ehrenb.

Lat. 46  $\mu$ .

Little Namaqualand. In pool at Aggenys; 6.1.09.

132. *Cosmarium alatum*, Kirchn., var. *æquatoriense*, Nordst. in Wittr. & Nordst. Alg. Exsic. 1893, No. 1166; W. & G. S. West, Monogr. Brit. Desm. III, 1908, p. 257, t. 90, f. 8. *Euastrum hexagonum*, W. & G. S. West, 1896.

Forma angulis basalibus semicellularum majoribus et levissime bilobulatis, lobuli superiori minori.

Long. 58  $\mu$ ; lat. 47–49  $\mu$ ; lat. isthm. 13.5  $\mu$ . (Fig. 41.)

Little Namaqualand. In dam at Rozynbosch; 9.1.09.

This tropical variety of *C. alatum* was previously known from Central Africa and Ecuador.

133. *Cosmarium bireme*, Nordst., var. *crassum*, W. & G. S. West, in Trans. Linn. Soc. bot. ser. 2, 1895, p. 56, t. 6, f. 36.

Forma papilla centrali semicellularum minori.

Long. 20–21.5  $\mu$ ; lat. 16–18  $\mu$ ; lat. isthm. 4.8–5.5  $\mu$ ; crass. 13  $\mu$ . (Fig. 39.)

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

This variety has only previously been recorded from Madagascar.

134. *Cosmarium Botrytis*, Menegh.

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

Var. *depressum*, W. & G. S. West.

Little Namaqualand. In dam at Rozynbosch; 9.1.09.

135. *Cosmarium contractum*, Kirchn.

Forma membrana cellularum valde et densissime punctata.

Long. 29  $\mu$ ; lat. 23  $\mu$ ; lat. isthm. 7  $\mu$ ; crass. 13.5  $\mu$ .

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

136. *Cosmarium formosulum*, Hoff.

Long. 51–53  $\mu$ ; lat. 43–44  $\mu$ ; lat. isthm. 11·5–12  $\mu$ ; crass. 26  $\mu$ .

Karoo. Among *Spirogyra* sp. in sulphureous spring at Gansfontein; 2.12.08.

Cape Region between Ceres and Karooport. In sulphureous spring at Leeuwefontein, abundant among *Spirogyra* sp.; 28.12.08.

137. *Cosmarium geometricum*, W. & G. S. West, var. *adoxoides*, G. S. West, var. n.

Var. *sinu lineari* ad extremum ampliato; apice semicellularum leviter concavis vel rectis.

Long. 9·5–10  $\mu$ ; lat. 9–10  $\mu$ ; lat. isthm. 2·5  $\mu$ ; crass. 5·2  $\mu$ . (Fig. 47.)

Little Namaqualand. Among *Chara* sp. in dam at Pella; 8.1.09.

The semicells of this tiny desmid have the minutely apiculate angles and also the slightly papillate central area of *C. geometricum*, but the closed sinus of *C. adoxum*.

*C. geometricum* was originally described from Madagascar.

138. *Cosmarium læve*, Rabenh.

Little Namaqualand. In dam at Pella; 8.1.09.

Var. *distentum*, G. S. West, var. n.

Var. *semicellulis latioribus*, lateribus subdilatis; a vertice visis cum tumore parvo ad medium utrobique.

Long. 26–29  $\mu$ ; lat. 21–24  $\mu$ ; lat. isthm. 6–7  $\mu$ ; crass. 15·5  $\mu$ . (Fig. 48.)

Little Namaqualand. In dam at Pella; 8.1.09. Among various algæ, Dabainoris; 11.1.09. In dam at Kamiebies; 24.12.08.

Great Namaqualand. In cattle-trough at Gründoorn; 4.2.09.

This desmid occurred abundantly in the above-mentioned localities. Forms of *C. læve* appear to be very widely distributed and by no means uncommon throughout the African continent.

139. *Cosmarium Logiense*, Bissett, forma *expansa*, W. & G. S. West, Monogr. Brit. Desm. IV, 1911, p. 16, t. 99, f. 7. (= *C. latum* var. *minor*, Roy & Biss., Scott. Desm. 1894, p. 105, t. 2, f. 11.)

A rather small form: long. 50  $\mu$ ; lat. 46  $\mu$ ; lat. isthm. 17  $\mu$ .

Karoo. In sulphureous spring at Gansfontein; 2.12.08.

This form should be compared with that described and figured by Gutwinski from Poland as "*C. Logiense* forma?" (vide Rozprawy Wysz. mat.-przyr. Akad. Umiej. Krakow. xxxiii, 1896, p. 25, t. 7, f. 33).

140. *Cosmarium obtusatum*, Schmidle.

Long. 67  $\mu$ ; lat. 56  $\mu$ ; lat. isthm. 14  $\mu$ .

Karoo. In sulphureous spring at Gansfontein; 2.12.08.

141. *Cosmarium Pappekuilense*, G. S. West, sp. n.

*C. parvum*, circiter tam longum quam latum, profundissime constrictum, sinu acutangulo et aperto; semicellulæ transverse suboblongæ, margine ventrali leviter convexo, margine dorsali (apice) recto, lateribus rotundo-convexis; semicellulæ a latere visæ subcirculares; a vertice visæ oblongæ, polis rotundatis, lateribus subrectis; membrana minute granulata, granulis in seriebus verticalibus circ. 15 dispositis, 7-8 in serie unaquaque, chromatophora singula axiali in semicellula unaquaque, cum pyrenoide centrali, in lobos radiatos subangustos subirregulariter producta.

Long.  $27\ \mu$ ; lat.  $27-28.5\ \mu$ ; lat. isthm.  $8\ \mu$ ; crass.  $13\ \mu$ . (Fig. 40.)

Karoo. In sulphureous spring at Pappekuil; 2.12.08.

In general outline this species agrees most closely with *C. bioculatum*, Bréb., var. *hians*, W. & G. S. West, but differs in its larger size, its distinctly granulate cell-wall, and in the irregularly lobed chloroplasts. From *C. Wittrockii*, Lund., it differs in its oblong semicells, both in front and vertical views, and in its much finer granulation. The form of the front view is also very like that of *C. staurastroides*, Eichl. & Gutw., but its other characters are quite different.

142. *Cosmarium Pearsoni*, G. S. West, sp. n.

*C. mediocre*, circiter  $1\frac{1}{2}$ -plo longius quam latum, profundissime constrictum, sinu angustissimo-lineari ad extremum ampliato; semicellulæ subsemicirculares, apice indistincte et subanguste truncato, angulis basalibus leviter rotundatis; a latere visæ circulares; a vertice visæ subanguste ellipticæ; membrana dense granulata, ad marginem semicellulæ uniuscujusque circiter 48-50, granulis parvis margines versus in seriebus confertis verticalibus ordinatis, centrum versus granulis paucioribus et irregulariter dispositis; pyrenoidibus binis in semicellula unaquoque.

Long.  $73\ \mu$ ; lat.  $62-64\ \mu$ ; lat. isthm.  $22\ \mu$ ; crass.  $35\ \mu$ . (Fig. 42.)

Upper (or Composite) Region. Holle River, in drying mud in the river-bed; 10.12.08.

This species should be carefully compared with *C. Botrytis* var. *depressum*, W. & G. S. West, from which it is distinguished by the density and disposition of its smaller granules.

143. *Cosmarium præmorsum*, Bréb.

Forma cellulis paullo longioribus; long.  $55-60\ \mu$ ; lat.  $43-46\ \mu$ ; lat. isthm.  $13\ \mu$ .

Great Namaqualand. Abundant in a cattle-trough at Gründoorn; 4.2.09.

144. *Cosmarium Pseudobroomci*, Wolle, var. *compressum*, G. S. West, in Journ. Linn. Soc. bot. xxxviii., 1907, p. 123, t. 7, f. 11.

A slightly larger form : long.  $40\ \mu$ ; lat.  $40\text{--}42\ \mu$ ; lat. isthm.  $13\ \mu$ . Angola. In stream in Cazengo District.

This variety was first found in the vicinity of Tanganyika.

145. *Cosmarium quadratulum*, (Gay) De Toni.

Little Namaqualand. In dam at Rozybosch; 9.1.09.

146. *Cosmarium subcostatum*, Nordst., forma *minor*, W. & G. S. West.

Zygosporæ globosæ, verrucis truncatis (ad marginem 9 visis) obsessæ, verruca unaquaque cum granulis 7 circa spinam brevem centrale. (Fig. 38.)

Long. cell.  $26\text{--}28\ \mu$ ; lat.  $20.5\text{--}23\ \mu$ ; lat. isthm.  $7\text{--}8\ \mu$ ; crass.  $13\text{--}14\ \mu$ ; diam. zygosp. sine verruc.  $24\ \mu$ , cum verruc.  $30\text{--}32\ \mu$ .

Angola. In shallow concreted water-conduit at Mossamedes.

Karoo. In sulphureous spring at Pappekuil; 2.12.08. In similar spring at Gansfontein; 2.12.08.

Little Namaqualand. In dam at Pella; 8.1.09. Among other algæ at Rozybosch, with zygospores; 9.1.09.

This small form was first described from Angola in 1897, but has since been shown to have a wide geographical distribution, especially in the tropics. No zygospores of the species have previously been observed.

147. *Staurastrum alternans*, Bréb.

Forma angulis leviter subrotundatioribus: long.  $26\ \mu$ ; lat.  $22\ \mu$ ; lat. isthm.  $9.5\ \mu$ .

Little Namaqualand. On wet mud in dam at Pella; 8.1.09.

148. *Staurastrum subdilatatatum*, W. & G. S. West.

Forma granulis paucioribus validioribusque: long.  $23\text{--}26\ \mu$ ; lat.  $21\text{--}25\ \mu$ ; lat. isthm.  $8.5\text{--}9\ \mu$ .

Little Namaqualand. Among *Chara* sp. floating in dam at Pella; 8.1.09.

## ORDER CÉDOGONIALES.

### FAMILY CÉDOGONIACEÆ.

149. *Cedogonium inversum*, Wittr., in Öfvers. af K. Vet.-Akad. Förhandl. No. 6, 1876, p. 47, t. 13, f. 22-24.

Crass. cell. veget.  $14\text{--}18\ \mu$ ; altit.  $2\text{--}3\frac{1}{2}$ -plo major;

„ oogon.  $28\text{--}30\ \mu$ ; „  $27\text{--}30\ \mu$ ;

„ oospor.  $26\text{--}29\ \mu$ ; „  $24\text{--}28\ \mu$ . (Figs. 49, 50.)

Great Namaqualand. In cattle-trough at Gründoorn; 4.2.09.

The specimens did not entirely agree in all details with the description and figures of this species, as the vegetative cells were a little thicker and the oogonia a trifle smaller. It is not necessary to give these African plants a varietal name, as I think such differences as were apparent come well within the limits of variation for a species of *Edogonium*. Moreover, the dimensions of the vegetative cells and oogonia are the same as in *Ed. inversum* forma *subclusum* Wittr., but the latter has the oogonia 2-4-seriate, whereas they were solitary in the specimens from Great Namaqualand.

150. *Edogonium Pringsheimii*, Cramer; Wittr., 1870; Wittr. Prodr. Monogr. *Edog.*, 1874, p. 33, t. 1, f. 16, 17.

Forma membrana oosporarum crassa ( $5\mu$ ) et nigro-brunnea.

Crass. cell. veget. (♀) 17-19  $\mu$ ; altit.  $2\frac{1}{2}$ - $3\frac{1}{2}$ -plo major;

„ oogon. 34-36  $\mu$ ; „ 36-44  $\mu$ ;

„ oospor. 28-30  $\mu$ ; „ 29-30  $\mu$ ;

„ cell. antherid. 12-15  $\mu$ ; „ 3.5-5  $\mu$ . (Figs. 51-53.)

Little Namaqualand. In dam at Rozynbosch; 9.1.09.

This form may possibly be identical with the one known as “var. *Nordstedtii*, Wittr., forma *pachydermatosporum*, (Nordst.) Hirn” (Cfr. Hirn, Monogr. *Edog.* 1900, p. 173, t. 27, f. 160). The wall of the ripe oospore is very dark brown and attains a thickness of 5  $\mu$ . The vegetative cells are, however, in exact agreement with the type (crass. 17-19  $\mu$ ). The antheridia sometimes consisted of as many as 10 cells.

151. *Edogonium Welwitschii*, W. & G. S. West.

Crass. cell. veget. 26-29  $\mu$ ; altit. 2-3-plo major;

„ oogon. 40-44  $\mu$ ; „ 36-44  $\mu$ ;

„ oospor. 37-43  $\mu$ ; „ 30-36  $\mu$ .

Little Namaqualand. At Rozynbosch, with the preceding species.

152. *Edogonium* sp. (sterile).

Crass. cell. veget. 16  $\mu$ ; cells 4-6 times as long as broad.

Great Namaqualand. Floating in sulphureous spring at Warmbad; 28.1.09. Temp. 35° C.

153. *Edogonium* sp. (sterile).

Crass. cell. veget. 21-23.5  $\mu$ ; cells very short (1-1½ times as long as broad).

Little Namaqualand. In pool at Aggenys; 6.1.09.

## DESCRIPTION OF PLATES.

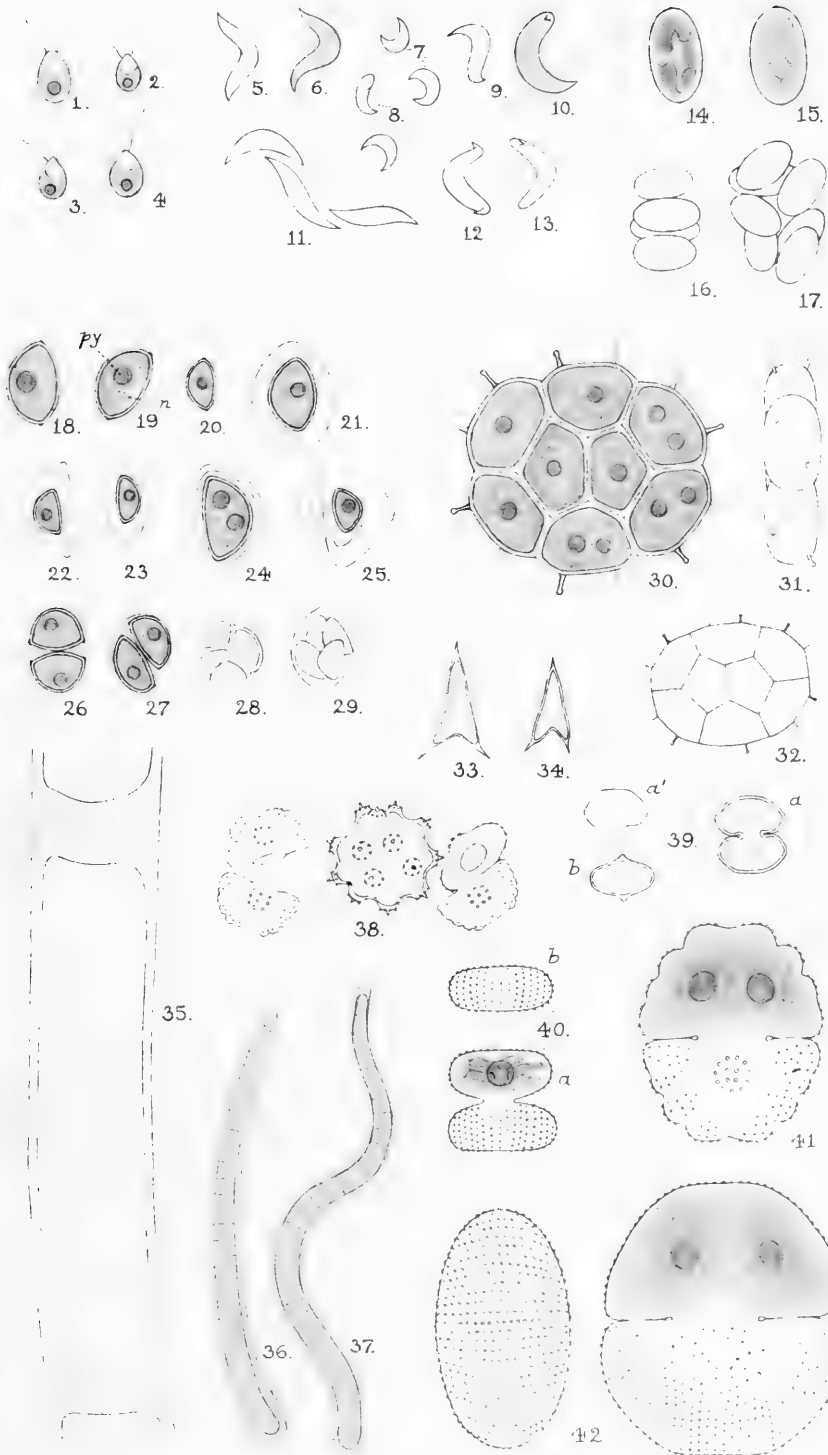
## PLATE I.

- FIGS.  
 1-4. *Chlamydomonas marina*, Cohn.  $\times 1000$ .  
 5-13. *Ankistrodesmus convolutus*, Corda.  $\times 1000$ .  
 14-17. *Oocystis elliptica*, W. West, var. *africana*, G. S. West, var. n.  $\times 1000$ .  
 Fig. 14 shows the lobed nature of the chloroplast; fig. 15 the completed division of the protoplast into 8 young autospores; fig. 16 a colony of 4 cells, and fig. 17 a colony of 8 cells. In figs. 16 and 17 the disappearance of the mother-cell-wall is shown.  
 18-29. *Ecdysichlamys obliqua*, G. S. West, gen. et sp. n.  $\times 800$ . Figs. 18-20, normal vegetative cells; 19, cell stained with hæmatoxylin to show the nucleus; 21-23, showing distention of outer layer of cell-wall; 24 and 25, showing the ecdysis of lamellæ from the wall; 26-29, autospore-formation. *n*, nucleus; *py*, pyrenoid.  
 30-32. *Pediastrum Pearsoni*, G. S. West, sp. n.  $\times 500$ . Fig. 31 is the side-view of a colony to show the oblique disposition of the marginal processes.  
 33-34. *Tetraëdron trigonum*, (Näg.) Hansg., var. *isoscelum*, G. S. West, var. n.  $\times 1000$ .  
 35. *Rhizoclonium hieroglyphicum*, Kütz., var. Single cell of filament.  $\times 500$ .  
 36-37. *Homocothrix africana*, G. S. West, sp. n.  $\times 500$ .  
 38. Zygospore of *Cosmarium subcostatum*, Nordst., forma *minor*, W. & G. S. West.  $\times 500$ .  
 39. *Cosmarium bireme*, Nordst., var. *crassum*, W. & G. S. West, forma.  $\times 500$ .  
 40. *Cosmarium Pappekülense*, G. S. West, sp. n.  $\times 500$ .  
 41. *Cosmarium alatum*, Kirchn., var. *æquatoriense*, Nordst., forma.  $\times 500$ .  
 42. *Cosmarium Pearsoni*, G. S. West, sp. n.  $\times 500$ .

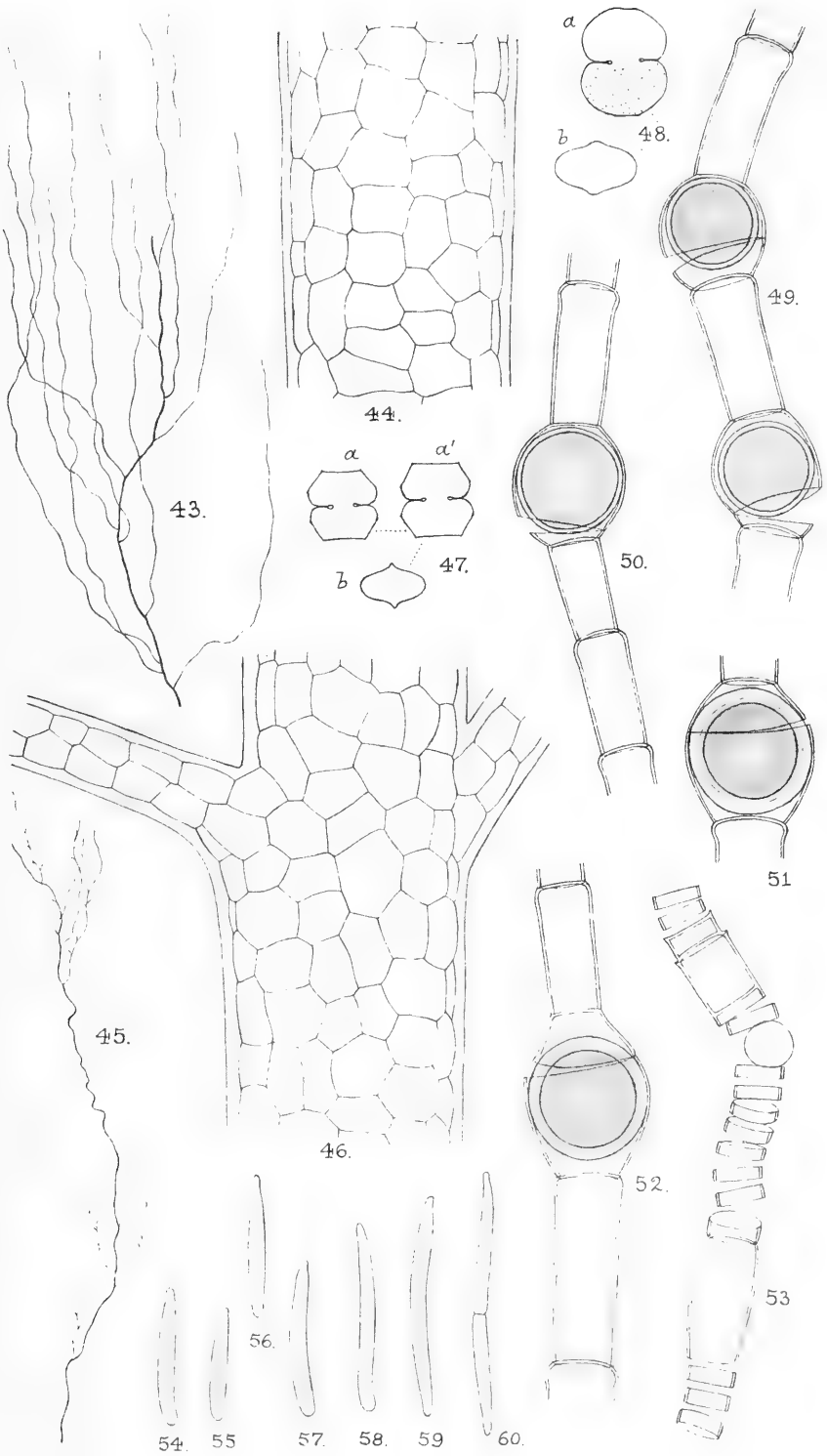
## PLATE II.

- 43-44. *Enteromorpha gracillima*, G. S. West, sp. n. Fig. 43, branched filaments, natural size; 44, small portion of branch showing outlines of cells.  $\times 500$ .  
 45-46. *Enteromorpha gracillima*, forma *breviramosa*, G. S. West. Fig. 45, filament, natural size; 46, small portion of branch showing bases of two ramuli and the outlines of the cells.  $\times 500$ .  
 47. *Cosmarium geometricum*, W. & G. S. West, var. *adoxoides*, G. S. West, var. n.  $\times 1000$ .  
 48. *Cosmarium læve*, Rabenh., var. *distentum*, G. S. West, var. n.  $\times 500$ .  
 49-50. *Edogonium inversum*, Witttr. A form.  $\times 500$ .  
 51-53. *Edogonium Pringsheimii*, Cramer, forma.  $\times 500$ . Fig. 51 is a male filament showing antheridial cells.  
 54-60. *Myzobactron hiruiforme*, G. S. West, sp. n.  $\times 1000$ . Fig. 60 shows the transverse division of the cell. The cell-contents are pale æruginous and quite homogeneous.















5.—*A Contribution to the Knowledge of the South African Proteaceæ.*  
 No. I.—By E. P. PHILLIPS, M.A., F.L.S.

(With 1 Text-fig.)

SINCE the publication of the monograph on the Proteaceæ in the "Flora Capensis," many species which are not completely known have been more fully examined; the majority of these were collected by the Percy Sladen Memorial Expedition, and full descriptions will be found in their next published Report. Besides the above-mentioned collection, the writer has been fortunate in describing from fresh material a species of *Protea* hitherto only known from a figure, and two albino varieties of the same genus which up to the present have not been recorded. We now know of 3 species of *Protea* which have albino varieties. I also found preserved in the herbarium of Dr. Marloth a species of *Serruria*, of which the type is probably lost and which is only known from Meisner's description in the Prodrômus (DC. Prodr. xiv. 297). These few facts seem of sufficient importance to have them recorded for future reference.

LEUCADENDRON, R. Br.

*Leucadendron cinerum*, R. Br., var. *glabrum*, Phillips. A typis foliis plane glabris differt.

*Bush* about 1 m. high. *Branches* terete, reddish, glabrous. *Leaves* of the male smaller than those of the female; the former .9–1.8 cm. long, 1.5–3 mm. broad above, linear-spathulate, obtuse, glabrous; the latter 2.2–3.5 cm. long, 3.5 mm. broad above, spathulate-linear, obtuse, glabrous. *Male inflorescence* 6 mm. long, 8 mm. broad, globose; receptacle 3 mm. long, cylindric. *Floral-bracts* 2 mm. long, lanceolate-linear, villous. *Perianth-tube* 2.5 mm. long, cylindric, pubescent above, glabrous below; segments 2.5 mm. long, pubescent or almost glabrous; limb 1 mm. long, oblong-linear, obtuse, glabrous. *Anthers* .75 mm. long, linear. *Style* 4.5 mm. long, filiform; stigma .5 mm. long, clavate. *Hypogynous-scales* 1.5 mm. long, filiform. *Female inflorescence* 1 cm. long, 1.3 cm. broad, globose; receptacle 7 cm. long, cylindric. *Bracts* 4 mm. long, 8 mm. broad, transversely oblong, villous. *Perianth-segments* 6.5 cm. long, villous, dilated and

glabrous at the base; lobes 1 mm. long, oblong, obtuse. *Ovary* 2 mm. long, elliptic in outline, villous; style 4 mm. long, filiform, very gradually widening above; stigma suboblique. Young *fruit* 4 mm. long, elliptic in outline, villous.

Cape Division: Kraaifontein, about 19 miles from Cape Town, *Phillips* in Herb. Mus. Austro-Afric. 3789. May, 1912.

PROTEA, R. Br.

*Protea ligulæfolia* (Sweet, Hort. Brit. ed. i. 346).

*Branches* finely pubescent. *Leaves* 10–13·5 cm. long, 1·2–1·3 cm. wide, narrow-strap-shaped, obtuse, glabrous, narrowed at the base, in the dry specimen the mid-rib is prominent above and beneath. *Capitulum* 11–12 cm. long, about 8 cm. in diameter. *Involucral-bracts* 10–12-seriate, those at the very base tomentose; outer oblong-ovate, obtuse, glabrous, sometimes finely ciliate; inner oblong or lanceolate-oblong above, subacuminate, obtuse, long clawed, silky pubescent, long-ciliate, exceeding the flowers. *Receptacle* convex. *Perianth* 10 cm. long; perianth-sheath 6·5 cm. long, slightly dilated 3-keeled and 7-nerved below, pubescent, becoming glabrous at the base; lip 3·5 cm. long, villous, 3-awned; lateral awns 2·5 cm. long, linear, long-villous, lower hairs whitish, upper dark-purple. *Fertile stamens* 3; anthers 6 mm. long, linear; apical glands 1 mm. long, ovate, subacuminate, subacute; barren stamen 6 mm. long, acute; filament 2·5 mm. long, filiform. *Ovary* 3 mm. long, oblong in outline, covered with reddish-brown hairs; style 6 cm. long, compressed, with a swelling at the base, pubescent; stigma 6 mm. long, flat on one side, ribbed and strongly convex on the other, conspicuously kneed and curved at the junction with the style.

The specimen agrees very well with the figure in Andrew's Botanists' Repository, the flower-head being slightly convex and the awns covered with reddish-purple hairs. A dried specimen is preserved in the herbarium of Mr. N. S. Pillans, who also collected a fresh specimen near Sir Lowry's Pass in August, 1912.

*Protea cynaroides*, Linn., var. *albiflora*, Phillips, var. nov. Involucra bractea albae.

*Branches* long, subflexuous, terete, glabrous, reddish. *Leaves* petioled; blade 8–10 cm. long, 4–6·8 cm. broad, broadly elliptic, obtuse, cuneate at the base, distinctly but not prominently veined, glabrous, punctate, with margins sometimes reddish; petiole 4·5–8 cm. long, terete, green or reddish, with a swollen reddish



base. *Capitulum* sessile or subsessile, 14–16 cm. long, about 10 cm. in diameter in half-opened flowers. *Receptacle* 2 cm. long, convex; palæ 3 mm. long, ovate, acute, concave. *Involucral-bracts* 11–13-seriate; the lowermost brown, subcoriaceous, ovate, glabrous, ciliate; outer ovate, acute, finely albo-pubescent, ciliate, white, becoming dark above with age; inner oblong-lanceolate, acuminate, acute, inflexed at the apex, finely albo-pubescent, white, exceeding the flowers. *Perianth-sheath* 9 cm. long, albo-pubescent without and within from the widened base upwards, dilated, 7-nerved, 3-keeled and glabrous below; lip 2.2 cm. long, albo-tomentose, produced into 3 tomentose or villous awns; lateral awns 9 mm. long; median awn 7 mm. long. *Stamens* all fertile, sessile; anthers 1.2 cm. long, linear; apical glands 2.5 mm. long, linear, slightly swollen and reddish at the tip. *Ovary* 2.5 mm. long, oblong in outline, covered with long white hairs 1 cm. long; style 8–8½ cm. long, curved, subterete, albo-pubescent in the upper half; stigma 1.1 cm. long, linear, subacute, with ragged margins, scarcely bent at the juncture with the style, red.

The specimen was bought in Adderley Street flower market, and came from Constantia, near Cape Town.

A specimen of *P. cynaroides* was collected by Mr. W. T. Saxton close to the stream just beyond Smith's Farm, about 4 miles from Cape Point, which had perfectly glabrous reddish involucral-bracts.

*P. pulchella*, Andr., var. *albiflora*, Phillips, var. nov. Involucris bracteæ albæ. Antheræ apice glandulis albis instructæ. Stigma album.

*Branches* tomentellous. *Leaves* 4–15½ cm. long, 7–1.5 cm. broad, linear to lanceolate-linear, acute, mucronate, narrowed at the base, with a distinct mid-rib, glabrous. *Capitulum* sessile, 9.5–10 cm. long, about 5 cm. in diameter, surrounded by the upper foliage leaves; receptacle 5 mm. high, convex; palæ ovate, acute, concave. *Involucral-bracts* 10–12-seriate; the lowermost tomentose or pubescent, ciliate; outer ovate, subacuminate, obtuse, glabrous, ciliate; inner oblong to oblanceolate, obtuse, narrowed into a long claw, glabrous, with a fringe of hairs round the apex, exceeding the flowers. *Perianth-sheath* 6.2 cm. long, villous, 7-nerved, 3-keeled and glabrous at the base; lip 1.1 cm. long, pubescent on the sides, more or less glabrous on the back, 3-awned; lateral awns 6 mm. long, filiform, villous; median awn 2 mm. long. *Fertile stamens* 3; anthers 4 mm. long, linear; apical glands 1 mm. long, sub-acute; barren anther acute, eglandular. *Ovary* 3 mm. long, oblong in out-

line, covered with long hairs; style 5 cm. long, slightly arcuate, compressed below, terete above; stigma 6 mm. long, slightly kneed at the junction with the style.

The leaves are green with pellucid margins, which are sometimes tinged with red; the mid-rib is light yellow in colour. The lowermost bracts are green with a dark-brown border, the rest of involucrel bracts are greenish-white. The apical glands of the stamens and the stigma are colourless, not pink as in the type.

Collected on the road to Jonker's Hoek, Stellenbosch Division, by Mr. S. Garside, who states that he only saw a single bush of the white variety growing among the type.

#### SERRURIA, Salisb.

*Serruria Zeyheri* (Meisn. in. DC. Prodr. xiv. 297). An erect plant.



*Branches* terete, scantily appressed pubescent above, at length becoming glabrous. *Leaves* 6-9.8 cm. long, bipinnately divided

in upper  $\frac{1}{2}$  or  $\frac{2}{3}$ , glabrous; ultimate leaf-segments 1–2.5 cm. long, long and acutely mucronate. *Capitula* solitary or racemose, axillary and terminal, 6–7 cm. long, about 1 cm. wide, surrounded by the upper leaves; peduncles 2.5–3.5 cm. long, terete, sulcate, minutely pubescent, bearing scattered ovate long-acuminate acute glabrous bracts. *Involucral-bracts* about 3-seriate, 4.5 mm. long, 2.5 mm. broad, ovate, acuminate, obtuse, faintly ciliate; floral bracts 4 mm. long, 1.5 mm. broad, lanceolate, acuminate, subacute, glabrous, ciliate. *Perianth segments* 6.5 mm. long, linear, widened slightly below, albo-villous except on the widened portion at the base; limb 1 mm. long, elliptic, obtuse, glabrous. *Anthers* .75 mm. long, oblong, with a swollen gland? at the base. *Ovary* 1 mm. long, oblong in outline, glabrous; style 6 mm. long, almost linear, very gradually narrowing above, glabrous; stigma globose. *Hypogynous-scales* 1 mm. long, linear, acuminate, acute.

Houw Hoek, Caledon Division, Marloth 4844.

The specimen agrees quite well with Meisner's description, and I have no hesitation in referring it to this species. It is allied to *S. anethifolia*, Kn., but the leaves are thinner and the limb of the perianth segment quite glabrous.

6.—*A List of the Phanerogams and Ferns collected by Mr. P. C. Keytel on the Island of Tristan da Cunha, 1908-1909.*—By E. P. PHILLIPS, M.A., F.L.S.

MR. KEYTEL during his stay of nearly a year on the Island of Tristan da Cunha collected 57 species of plants, of these 43 were phanerogams, comprising 21 orders and 34 genera, while 11 genera with 14 species were pteridophytes.

An enumeration of the plants from Tristan da Cunha (made from Thouars', Carmichael's, and Mosely's collections) shows 38 phanerogams and 27 ferns, out of which 14 of the former and 6 of the latter are endemic. Common cosmopolitan weeds were not numerous, only 11 being mentioned.\*

Mr. Keytel's collection contained 20 species which had been found by the above three collectors, the remainder being plants hitherto unrecorded from the island, though doubtless the majority have been introduced during the last 30 years. Of the endemic species, Mr. Keytel only found 7; 3 out of 6 dicotyledons, 1 out of 8 monocotyledons, and 3 out of 6 pteridophytes.

The geographical distribution of many of the species has been taken from Hemsley's account in the Report of the "Challenger" expedition, and also from Dr. Brown's account in the Report of the "Scotia" expedition.† My thanks are due to Dr. O. Stapf, F.R.S., who kindly checked my namings of the ferns and grasses.

## PHANEROGAMS.

### DICOTYLEDONS.

#### N. O. CARYOPHYLLACEAE.

*Cerastium trivale*, Link.

Distribution.—Europe, Asia, North Africa.

\* "Report of the Scientific Results of the Exploring Voyage of H.M.S. *Challenger*, 1873-1876," Botany, vol. i., p. 143, 1885.

† "Report on the Scientific Results of the Voyage of S.Y. *Scotia* during the years 1902, 1903, and 1904," Botany, vol. iii., 1912.

N. O. GERANIACEAE.

*Pelargonium australe*, Willd. var. *acugnaticum*, Thouars.

Distribution.—The species is native of Australia and New Zealand; the variety is probably peculiar to the Tristan group.

*Oxalis variabilis*, Linn.

Distribution.—South Africa.

*O. corniculata*, Lindl. Widely spread on the island.

Distribution.—Temperate and tropical countries.

*O.*, sp.

N. O. RHAMNACEAE.

*Phylica nitida*, Lam. The "Island tree."

Distribution.—Gough, Inaccessible and Nightingale Islands, Amsterdam, Reunion Islands and Mauritius.

N. O. LEGUMINOSAE.

*Trifolium repens*, Linn. Round the Settlement.

Distribution.—South Temperature Zone.

N. O. ROSACEAE.

*Acaena sanguisorbae*, Vahl.

Distribution.—Amsterdam Island, Australia, New Zealand and neighbouring islands, and the Tristan group.

N. O. UMBELLIFERAE.

*Hydrocotyle capitata*, Thouars.

Distribution.—Endemic to the Tristan group.

*H.*, sp., cf. *H. asiatica*. Mountain slopes.

*Apium australe*, Thouars.

Distribution.—Gough Island, Inaccessible Island and generally in the South Temperate Zone.

N. O. RUBIACEAE.

*Nertera depressa*, Gaertn. Mountain slopes. Fruit a red berry.

Distribution.—Gough and Inaccessible Islands and in the South Temperate Zone generally.

*Nertera*, sp., probably *N. assurgens*, Thouars. Occurs sparingly on the island.

## N. O. COMPOSITAE.

*Sonchus oleraceus*, Linn.

Distribution.—Cosmopolitan, probably introduced into the Tristan group.

*Senecio vulgaris*, Linn.

Distribution.—Cosmopolitan.

*Chrysanthemum leucathemum*, Linn. Common. Flowers December to March.

Distribution.—Europe and North Asia.

*Gnaphalium luteo-album*, Linn. Mostly on the northern slopes.

Distribution.—Temperate and tropical regions.

*Anthemis cotula*, Linn. Flowers from December to January.

Distribution.—Europe, North Africa, and Eastern.

*Crepis*, sp. Round the Settlement. Rare.

## N. O. PRIMULACEAE.

*Anagallis arvensis*, Linn. Round the Settlement.

Distribution.—Europe and Temperate Asia.

## N. O. SOLANACEAE.

*Solanum nigrum*, Linn. A common weed round the Settlement.

Distribution.—Widely distributed.

## N. O. CONVULVULACEAE.

*Calystegia soldanella*, R. Br. Sand-hills on the south-east side of the island. Not common.

Distribution.—Cosmopolitan in temperate regions.

*C. sepium*, R. Br. Sand-hills on the south-east side. Not common.

Distribution.—Cosmopolitan in temperate regions.

## N. O. VERBENACEAE.

*Verbena officinalis*, Linn. Near Settlement.

Distribution.—Widely distributed.

## N. O. SCROPHULARIACEAE.

*Verbascum virgatum*, Stokes. Near Settlement.

Distribution.—Europe.

N. O. PLANTAGINEAE.

*Plantago lanceolata*, Linn. Round the Settlement.

Distribution.—Europe and North Asia.

N. O. CHENOPODIACEAE.

*Chenopodium tomentosum*, Thouars. The “Island Tea.”

Distribution.—Endemic to group.

*C. murale*, Linn. A common weed.

Distribution.—Widely distributed.

N. O. POLYGONACEAE.

*Rumex frutescens*, Thouars.

Distribution.—Endemic to the Tristan group.

*R. acetocella*, Linn. Round Settlement.

Distribution.—Widely distributed.

*R. crispus*, Linn. A common weed.

Distribution.—Widely distributed.

N. O. EMPETRACEAE.

*Empetrum nigrum*, Linn. var. *rubrum*, Hemsl.

Distribution.—Europe and North Asia, Tristan group, Falkland Islands, and Tierra del Fuego.

MONOCOTYLEDONS.

N. O. IRIDACEAE.

*Romulea bulbocodium*, Seb. and Maur. Round the Settlement.

Distribution.—Mediterranean region.

N. O. JUNCACEAE.

*Juncus tenuis*, Willd. (= *J. tristanicus*, Hemsl.).

Distribution.—Western India and Australia.

N. O. CYPERACEAE.

*Scirpus cernuus*, Vahl. var. *subtilis*, C. B. Cl. Round the Settlement.

*S. sulcatus*, Thouars. Common on south-east side of island.

Distribution.—Endemic to the Tristan group.

*Marcissus congestus*, C. B. Cl. Common on south-east side of island. “Pickbiet.”

Distribution.—Australia, St. Helena, and Mediterranean region.

## N. O. GRAMINACEAE.

*Holcus lanatus*, Linn.

Distribution.—Europe.

*Polypogon monspeliensis*, Desf.

Distribution.—Temperate and tropical regions.

*Sporobolus indicus*, R. Br.

Distribution.—Australia.

*Poa pratensis*, Linn.

Distribution.—North Temperate Zone.

*Agrostis*, near *A. Bergiana*, Trin.

*Vulpia bromoides*, Gray.

Distribution.—Temperate region.

## PTERIDOPHYTES.

*Hymenophyllum acroginosum*, Carmich.

Distribution.—Endemic.

*Trichomanes tenerum*, Spreng.

Distribution.—Tropical America, Mexico, Peru, Brazil.

*Adiantum oethiopicum*, Linn.

Distribution.—Gough and Inaccessible Islands, Africa, Madagascar, New Zealand, Temperate and Tropical Australia, America.

*Pteris incisa*, Thunb.

Distribution.—Tropical America, Sandwich Islands, Fiji, Java, Queensland, Himalayas, Ceylon, Mascarene Islands, Cape Colony, St. Helena, Guinea Coast.

*Lomaria alpina*, Spreng.

Distribution.—South Brazil, Temperate South America, New Zealand, Van Diemen's Land, Alps of South Australia.

*Blechnum australe*, Linn.

Distribution.—South Africa, Madagascar.

*Asplenium obtusatum*, Forst.

Distribution.—Peru, Chili, Polynesian Islands, New Zealand, Australia, and the Tristan group.

*A.*, sp.

*Nephrodium molle*, Desv.

Distribution.—South America, Himalayas, Hong Kong, New Zealand, Australia, Mascarene Islands, Cape Colony, Tropical Africa, Madeira.

*N. aquilinum*, Hemsl.

Distribution.—Endemic.



*Gymnogramme cheilanthoides*, Kaulf.

Distribution.—Mauritius.

*Acrostichum conforme*, Sw.

Distribution.—South America, Sandwich Islands, Fiji, Java, Queensland, Himalayas, Ceylon, Mascarene Isles, Cape Colony, St. Helena, Guinea Coast.

*A.*, sp. nr. *A. squamosum*, Sw.

*Dicranium Billardieri*, Schwaegr.

PLANTS WHICH HAVE BEEN RECORDED FROM TRISTAN  
DA CUNHA BUT NOT COLLECTED BY MR. KEYTEL.

PHANEROGAMIA.

DICOTYLEDONS.

N. O. RANUNCULACEAE.

*Ranunculus*, sp.

N. O. CRUCIFERAE.

*Cardamine propinqua*, Carmich.

Distribution.—Endemic.

N. O. CARYOPHYLLACEAE.

*Polycarpon tetraphyllum*, Linn.

N. O. COMPOSITAE.

*Lagenophora commersonii*, Cass.

Distribution.—Temperate South America.

*Chevreulia stolonifera*, Cass.

Distribution.—Uruguay, Paraguay, Chili.

*Gnaphalium pyramidale*, Thouars.

Distribution.—Endemic.

*Cotula australis*, Hook.

Distribution.—Australia, New Zealand.

N. O. CHENOPODIACEAE.

*Atriplex plebeja*, Carmich.

Distribution.—Endemic ?

## N. O. CYPERACEAE.

*Scirpus Thoursianus*, Schult.

var. *bicolor*, Hemsl.

var. *virens*, Hemsl.

var. *pallescens*, Hemsl.

Distribution.—Endemic to Tristan group.

*Carex insularis*, Carmich.

Distribution.—Endemic to Tristan group.

*C. Thoursii*, Carmich.

Distribution.—Endemic.

*Uncinia brevicaulis*, Thouars.

var. *robusta*, Hemsl.

var. *gracilior*, Hemsl.

Distribution.—Endemic.

## N. O. GRAMINACEAE.

*Spartinia arundinacea*, Carmich.

Distribution.—Tristan group, Amsterdam and St. Paul's Island

*Agrostis ramulosa*, Carmich.

Distribution.—Endemic.

*A. media*, Carmich.

Distribution.—Endemic.

*Polypogon intermedius*, Carmich.

Distribution.—Endemic.

*Phlaris caespitosa*, Thouars.

Distribution.—Endemic.

## PTERIDOPHYTA.

*Lycopodium diaphanum*, Swartz.

Distribution.—Endemic.

*L. magellanicum*, Swartz.

Distribution.—South Temperate Zone.

*L. saururus*, Lam.

Distribution.—Widely spread.

*Lomaria boryana*, Spreng.

Distribution.—West Indies, South America, Tropical and South Africa, Mascarene Islands, Madagascar.

*Asplenium lunulatum*, Swartz.

Distribution.—Widely spread.

*A. pyramidatum*, Desv. ?

*A. monanthemum*, Linn.

Distribution.—America, Canaries, Africa.

*A. medium*, Hook.

Distribution.—Endemic.

*Nephrodium tomentosum*, Desv.

Distribution.—Mascarene Islands, Madagascar.

*Aspidium coriaceum*, Swartz.

Distribution.—Widely spread.

*Polypodium punctatum*, Thunb.

Distribution.—Widely spread.

*P. australe*, Mett.

Distribution.—South Temperate Zone.

*Vittaria stricta*, Carmich.

Distribution.—Endemic to the Tristan group.

*Acrostichum hybridum*, Bory.

Distribution.—South America, Africa, Mascarene Islands.

*A. succisaefolium*, Thouars.

Distribution.—Tristan group and Amsterdam Island.

*A. spathulatum*, Bory.

Distribution.—Tropical America, South Africa, Ceylon, and Mascarene Islands.

*Ophioglossum vulgatum*, Linn.

Distribution.—Generally diffused.

- 7.—*Descriptions of New Plants from the Gift Berg Collected by the Percy Sladen Memorial Expedition.*—By E. P. PHILLIPS, M.A., F.L.S.

## GERANIACEAE.

*Oxalis Lightfootii*, Phillips, sp. nov. *Stipes* elongatus, paullo 4-angulatus, glaber. *Stipulae*, 3 mm. longae, ovatae, acuminatae, glabrae. *Folia* 3-9-nata; petiolus, 0.9-2.5 cm. longus; laminae 5 mm. longae, 8 mm. latae, 3-foliatae. *Bractee* 2 mm. longae, lineares. *Calyx* 4.5-5 mm. longus; lobi ovato-lanceolati, apice obtusi, glabri. *Corolla* 1.6 mm. longus, glaber; lobi apice obtusi. *Ovarium* 2 mm. longum; stylus 1 mm. longus, teres, glaber; stigma capitatum.

**Cape Region.** Van Rhynsdorp Div.: Gift Berg Range, 1-2,000 ft. *Phillips* 7601 in Percy Sladen Memorial Expedition to the Khamiesberg, Gift Berg, and Oliphant's River Mountains, 1911.

*Corms* about 2 cm. long and 1.5 cm. wide, covered with long membranous pubescent tunics which separate. *Stems* elongated, somewhat 4-angled, glabrous, leafy. *Stipules* 3 mm. long, ovate, acuminate, glabrous. *Leaves* in groups of 3 to 9, scattered along the stem; petiole 0.9-2.5 cm. long, pilose; lamina 5 mm. long, 8 mm. broad, digitately 3-foliolate; leaflets 3-5 mm. long, lobed to below the middle, pilose below. *Bracts* 2 mm. long, linear, situated about half-way up the petiole. *Flowers* axillary, grouped at the end of the stems. *Calyx* 4.5-5 mm. long; lobes ovate-lanceolate, obtuse, glabrous, with reddish streaks near the apex. *Corolla* 1.6 cm. long, glabrous; lobes obtuse. *Stamens* diplostemonous, connate at the base; filaments of longer 6.5 mm. long, pilose; filaments of shorter 5 mm. long, glabrous; anthers oblong. *Scales* 3.5 long, linear, obtuse. *Gynaecium* shortly stalked; ovary 2 mm. long, about 5-ovulate, bearing 1-4 small red bodies above; styles 1 mm. long, terete, glabrous; stigma capitate.

Allied to *O. bifida*, Thunb., from which it is at once distinguished by the glabrous corolla.

The species is named after Mr. R. M. Lightfoot, of the S.A. Museum, who accompanied me to the Gift Berg.

LEGUMINOSAE.

*Aspalathus dianthopora*, Phillips, sp. nov. *Frutex* 1–1·5 m. altus. *Ramuli* pubescenti vel tomentosi, tandem glabri. *Folia* 4–9 mm. longa, teretia, apice apiculata, glabra. *Pedunculus* 0·4–1 cm. longus, teres, tomentosus. *Bracteae* 3 mm. longae, lineares. *Calyx* campanulatus, glaber; tubus 9 mm. longus; lobi 2·5 mm. longi, apice acuti. *Vexillum* 9 mm. longum, 1 mm. latum, pubescens; alae 7 mm. longae, oblongae, glabrae; carina 8 mm. longa, apice obtusa, glaber. *Ovarium* circa 5 mm. longum, basi paullo pubescens; stylus paullo compressus, apice angustatus, glaber; stigma capitatum.

**Cape Region.** Van Rhynsdorp Div.: Gift Berg Range, 1–2,000 ft. *Phillips* 7487 in Percy Sladen Memorial Expedition to the Khamiesberg, Gift Berg, and the Oliphant's River Mountains, 1911.

A bush 3–4 ft. high. *Branchlets* pubescent or tomentose, at length becoming glabrous; bark splitting. *Leaves* fascicled, 4–9 mm. long, terete, acutely apiculate, glabrous, tomentose on the leaf cushion. *Flowers* pedunculate, 2-nate, yellow. *Peduncle* 0·4–1 cm. long, terete, tomentose. *Bracts* 3 mm. long, linear. *Calyx* campanulate, glabrous; tube 9 mm. long; lobes 2·5 mm. long, triangular, acute. *Vexillum* 9 mm. long, 1 mm. broad, orbicular, subemarginate, pubescent, with an oblong deeply and broadly channelled claw 2 mm. long; alae shortly clawed, 7 mm. long, rounded above, glabrous; carina 8 mm. long, obtuse, glabrous, with a linear claw 3 mm. long. *Stamens* monodelphous. *Ovary* about 5 mm. long, 2-ovulate, slightly pubescent at the base on the ventral face, otherwise glabrous; style somewhat compressed, narrowing upwards, glabrous; stigma terminal, capitate.

This species differs from *A. subulata*, Thunb., which it very much resembles, by the pubescent vexillum.

DROSERACEAE.

*Drosera alba*, Phillips, sp. nov. *Herba* acaulescens. *Folia* inferne 0·9–1·2 mm. longa, 3 mm. lata, oblanceolata-linearia; superne 4·5 cm. longa, 1 mm. lata, linearia, apice obtusa, basi angustata. *Pedunculus* 5·5 cm. longus, teres, glandulosus. *Lobi calyci* 3·5 mm. longi, oblongi, apice obtusi, glandulosi. *Petala* 7 mm. longa, 6 mm. lata, obovata vel paullo orbiculata, apice rotunda, basi angustata, glabra. *Antherae* 1·5 mm. longae. *Ovarium* 2 mm. longum, ellipticum; stylus superne divisus; stigma capitatum.

**Cape Region.** Van Rhynsdorp Div.: Gift Berg Range, 1–2,000 ft. *Phillips* 7565 in Percy Sladen Memorial Expedition to the Khamiesberg, Gift Berg and the Oliphant's River Mountains, 1911.

An acaulescent herb with swollen roots. *Radical leaves* 0·9–1·2 cm. long, 3 mm. broad, oblanceolate-elliptic or oblanceolate-linear, covered with long glandular hairs; upper leaves 4·5 cm. long, 1 mm. broad, linear, obtuse, narrowed at the base, on the lowest quarter covered with short glandular hairs, otherwise covered with long glandular hairs. *Peduncle* 5·5 cm. long, terete, covered with short capitate glands. *Calyx* 5-partite; lobes 3·5 mm. long, oblong, obtuse, glandular with short capitate glands. *Corolla segments* 7 mm. long, 6 mm. broad, obovate or almost orbicular, rounded above, shortly narrowed at the base, glabrous, white. *Stamens* 5; anthers 1·5 mm. long; filaments 2·5 mm. long, linear. *Ovary* 2 mm. long, elliptic, unilocular, with parietal placentation; styles 6, free to the base, branched above, stigmas capitate.

This species approaches *D. pauciflora*, Banks, but differs in the longer and narrower leaves and the white flowers.

#### FICOIDEAE.

*Tetragonia saxatilis*, Phillips, sp. nov. *Rami* glabri. *Folia* 1·2–2·5 cm. longa, 3–5 mm. lata, oblanceolata, apice obtusa, basi angustata, glabra. *Lobi calyci* 2·5–3 mm. longi, ovato-elliptici, apice obtusi, glandulosi. *Stamina* circa 12; filamenta 1·5 mm. longa; antherae 1 mm. longae. *Ovarium* 1·5 mm. longum, obovatum, 4-angulatum, glandulosum; stylus 2·5 mm. longus, cylindricus; stigma laterale.

**Cape Region.** Van Rhynsdorp Div.: Gift Berg Range 1–2,000 ft. *Phillips* 7500 in Percy Sladen Memorial Expedition to the Khamiesberg, Gift Berg, and Oliphant's River Mountains, 1911.

*Branches* glabrous; the youngest branchlets sometimes covered with ovate acute membranous scales. *Leaves* 1·2–2·5 cm. long, 3–5 mm. broad, oblanceolate, obtuse, narrowed at the base, glabrous, usually with membranous outgrowths on the narrowed portion. *Inflorescence* racemose, 4–6 cm. long; axis glandular. *Flowers* solitary or 2-3-nate; pedicels 4 mm. long, terete, glandular. *Calyx* 4-lobed; lobes 2·5–3 mm. long, ovate-elliptic, obtuse, glandular, inflated on the inner surface. *Stamens* about 12; anthers 1 mm. long, cylindric, versatile; filaments 1·5 mm. long, filiform. *Ovary* inferior, 1·5 mm. long, obovate in outline, 4-angled, glandular, one locular with a single ovule; style 2·5 mm. long, cylindric; stigmatic surface lateral running the length of the style.

The fruit of this species has not been seen; the species is closely allied to *T. spicata*, L. fil., but is distinguished by the less dense inflorescence and the smaller flowers.

8.—*Note on a Leucadendron found on the Cape Peninsula.*—By  
E. P. PHILLIPS, M.A., F.L.S.

IN 1883 MacOwan distributed in the Herbarium Normale Austro-Africanum, under the number 786, male and female specimens of a *Leucadendron* found growing near Wynberg, and which he labelled *Leucadendron virgatum*, R. Br. var. Wolley-Dod found the same plant on the slopes of Miller's Point (Wolley-Dod, 2924), and last July while out collecting I took specimens which were growing on the mountain slopes above Smithwinkel Bay (Phillips in Herb. Musei Austro-Afric. 4297). Growing intermixed with my No. 4297 were plants of *L. salignum*, R. Br. (Phillips in Herb. Musei Austro-Afric. 4298), and there was no difficulty in at once distinguishing these two plants in the field by their habit and general appearance. I found that in the "Flora Capensis" \* MacOwan 786 and Wolley-Dod 2924 were quoted as examples of *L. salignum*, R. Br., although MacOwan, who also collected *L. salignum* on the Cape Peninsula (MacOwan in Herb. Norm. Austro-Afric. 787 = Phillips 4298), kept his No. 786 quite distinct, as evidenced by his distribution labels. This apparent confusion led me to make a detailed examination of all the specimens in our herbarium, with the result that I have come to the conclusion that the specimens as represented by MacOwan 786, Wolley-Dod 2924, and Phillips 4297, are quite distinct from *L. salignum*, R. Br., and for which I propose the name *L. MacOwanii*. Mr. J. Hutchinson, who collaborated with me in working the genus *Leucadendron* for the "Flora Capensis," and to whom I sent specimens of my No. 4297, reports: "As regards Phillips 4297 I am a little doubtful. It is exactly equal to MacOwan 786 and Wolley-Dod 2684, which we decided were states of *L. salignum*. The female bracts are not so hairy as in the typical form, but otherwise I think they may be identical or perhaps a var."

*Leucadendron MacOwanii*, Phillips, sp. nov. (Proteaceae-Proteae).  
*Frutex*, 1-1.5 m. altus. *Ramuli* villosi vel glabri. *Folia* 2-4.5 cm.

\* "Flora Capensis," vol. v., p. 519.

longa, 3-6 mm. lata, linearia vel oblanceolato-linearia, apice apiculata, basi angustata, glabra vel paullo villosa. *Inflorescentia*, ♂, 0.5-1.4 cm. longa, 0.7-1.1 cm. lata; bracteae 3 mm. longae, lanceolatae, apice obtusae, villosae. *Perianthii* tubus villosus. *Stylus* 3 mm. longus, glaber; stigma 0.75 mm. longum, clavatum vel ellipticum. *Inflorescentia*, ♀, 1.2-2.3 cm. longa, 0.8-1.4 cm. lata; bracteae 3.5 mm. longae, 9 mm. latae, glabrae vel inferne pubescentae. *Perianthii* segmenta villosa. *Stylus* 4-5 mm. longus, linearis, superne ellipticus, apice obtusus; stigma laterale; ovarium 1 mm. longum, trigonum, glabrum. *Fructus* 4 mm. longus trigonus.

CAPE DIVISION.—Near Wynberg, *MacOwan in Herb. Norm. Austro-Afric.* 786; slopes of Miller's Point, *Wolley-Dod* 2924; mountain slopes above Smithwinkel Bay, *Phillips in Herb. Musei Austro-Afric.* 4297.

*A bush* 3-4 feet high. *Branches* thinly to densely villous, sometimes almost glabrous. *Leaves* subequal in the sexes, those surrounding the inflorescences not perceptibly longer than those on the remainder of the shoot, and do not form a definite involucre and are narrowed at the base, 2.5-4.5 cm. long, 3-6 mm. broad, linear to oblanceolate-linear, produced into a long subulate apex, narrowed at the base, quite glabrous or sometimes slightly villous below and with hairy margins. *Male inflorescence* solitary and terminal, scattered along the branches on short axillary shoots, 0.5-1.4 cm. long, 0.7-1.1 cm. in diameter, ovoid, cylindric or subglobose; bracts 3 mm. long, lanceolate, obtuse, villous. *Perianth tube* 1.5 mm. long, cylindric, villous; lobes 3 mm. long, spathulate, obtuse, and incurved at the apex, glabrous. *Anthers* 1.75 mm. long, oblong. *Style* 3 mm. long, filiform, glabrous; stigma 0.75 mm. long, clavate or ellipsoid, emarginate at the apex. *Young female inflorescence* 1.2-2.3 cm. long, 0.8-1.4 cm. in diameter, ovoid or ellipsoid, surrounded at the base by an involucre of 4-6 ovate to ovate-lanceolate obtuse sometimes acuminate glabrous ciliate bracts, 0.7-1 cm. long; floral-bracts 3.5 mm. long, 9 mm. broad, transversely linear-oblong, glabrous or slightly pubescent below. *Perianth-segments* in young flowers 4-5 mm. long, spathulate-linear, rounded at the apex, the lateral segments densely villous, the anterior and posterior finely villous. *Style* 4-5 mm. long, linear, flattened and broadly elliptic above, obtuse; stigma lateral on the ventral face of the broadened upper portion of the style; ovary 1 mm. long, trigonous, glabrous. *Fruit* 4 mm. long, trigonous, faintly pilose,



black. *Fruiting cones* 2.5 cm. long, 2.5 cm. in diameter, subglobose; bracts glabrous, rounded above, not emarginate.

The following amended description of *L. salignum*, R. Br., should take the place of that given in the "Flora Capensis."

*L. salignum*, R. Br. A bush 3-4 feet high. *Branches* tomentose, pubescent or glabrous. *Leaves* subequal in the two sexes, those surrounding the inflorescences longer than those on the remainder of the shoot, are widened at the base, usually coloured and form a definite involucre, 2.5-5.5 cm. long, 2.5-5 mm. broad, linear to lanceolate-linear, produced into a long subulate apex, slightly narrowed at the base, silky pubescent with long adpressed hairs on both surfaces, at length glabrous. *Male inflorescence* solitary and terminal, 1.4 cm. long, 1 cm. in diameter, ellipsoid; bracts 2 mm. long, 1.5 mm. broad above, spatulate or obovate, obtuse, densely villous. *Perianth-tube* 2 mm. long, cylindric, glabrous; lobes 3 mm. long, linear-spatulate, inturred and obtuse at the apex, glabrous. *Anthers* 1 mm. long, oblong. *Hypogynous scales* 1.5 mm. long, linear. *Style* 3.5 mm. long, terete, swollen at the base, glabrous; stigma 0.75 mm. long, ellipsoid or clavate, obtuse. *Young female inflorescence* 1.6 cm. long, 1.2 cm. in diameter, ellipsoid. *Bracts* 3 mm. long, 1 cm. broad, transversely linear-oblong, emarginate at the apex, tomentose. *Perianth-segments* cohering, 3 mm. long, linear, obtuse, glabrous. *Style* 3 mm. long, linear, flattened, obtuse and emarginate at the apex, glabrous; stigma lateral; ovary 1.25 mm. long, 1.5 mm. broad, flattened, winged. *Fruit* 6 mm. long, 5 mm. broad, shortly winged, black. *Fruiting cone* 2-2.5 cm. long, about 1.5 cm. in diameter; bracts densely tomentose, emarginate at the apex.

As to specimens quoted in the "Flora Capensis," with the exception of *MacOwan, Herb. Norm. Austro-Afric.* 786 and *Wolley-Dod* 2924, and with the addition of *Phillips in Herb. Musei Austro-Afric.* 4298. Mountain slopes above Smithwinkel Bay.

Below is a table with a list of characters which separate the two species, and by which they are easily distinguished.

*L. MacOwanii*, Phillips.

1. Branches sometimes villous.

2. Leaves surrounding the inflorescences not forming a definite involucre, narrowed at the base and not perceptibly longer than those on the remainder of the shoot.

*L. salignum*, R. Br.

1. Branches sometimes tomentose or pubescent, never villous.

2. Leaves surrounding the inflorescences forming a definite involucre, broadened at the base and perceptibly longer than those on the remainder of the shoot.

*L. MacOwanii*, Phillips.

3. Male inflorescences scattered along the branches on short axillary shoots.
4. Floral-bracts of male flowers lanceolate, villous with long scattered hairs.
5. Male perianth-tube villous.
6. Floral bracts of female flowers usually glabrous, sometimes pubescent below, rounded above.
7. Female perianth-segments villous.
8. Female style broadly elliptic above and rounded at the apex.
9. Ovary trigonous.
10. Fruit trigonous.
11. Bracts in fruiting cones glabrous and rounded above.

*L. salignum*, R. Br.

3. Male inflorescences not scattered along the branches.
4. Floral bracts of male flowers obovate or spatulate and densely villous.
5. Male perianth-tube glabrous.
6. Floral bracts of female flowers tomentose, emarginate above.
7. Female perianth-segments glabrous.
8. Female style flattened above and emarginate at the apex.
9. Ovary flattened and winged.
10. Fruit compressed and narrowly winged.
11. Bracts in fruiting cones densely tomentose, emarginate above.

9.—*Contributions to the Flora of South Africa.* No. I.—By E. P. PHILLIPS, M.A., F.L.S.

#### CRUCIFERAE.

1. *Heliophila Lightfootia*, Phillips, sp. nov. *Herba* 20–30 cm. alta. *Rami* infra pubescenti, demum glabri. *Folia* 1–3·5 cm. longa; segmenta linearia, apice obtusa, pubescentia. *Inflorescentia* racemosa, axillaria vel terminalia. *Pediculus* 0·5–1 cm. longus, teres, paulo pubescens. *Segmenta calyci* 3 mm. longa, oblonga, apice obtusa, pubescentia. *Petala* 6·5 mm. longa, 3·5 mm. lata, obovata, apice rotunda, basi angustata. *Filamenta* 2–2·5 mm. longa, linearia; *antherae* 1·5 mm. longae, oblongae. *Ovarium* 2·5 mm. longum, glabrum; *stylus* 1 mm. longus, glaber; *stigma* globosum. *Fructus* 2·5–3 cm. longus, linearis, glaber.

Van Rhyndorp Division : Giftberg Range 1–2,000 ft., September. Phillips 7683 in Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and Oliphant's River Mountains, 1911.

A herbaceous plant 20–30 cm. high, branched from the base. *Stems* brownish and pubescent below, otherwise glabrous. *Leaves* 1–3·5 cm. long, simple or digitately tri-sect; simple leaves and leaf-segments linear, obtuse, pubescent. *Inflorescence* terminal or axillary, racemose, 5–12-flowered. *Pedicels* 0·5–1 cm. long, terete, scantily pubescent. *Buds* ellipsoid, obtuse. *Calyx-segments* 3 mm. long, oblong, obtuse, pubescent. *Corolla* blue, 6·5 mm. long; petals 3·5 mm. broad, obovate, rounded above, narrowed at the base. *Filaments* 2–2·5 long, linear; *anthers* 1·5 mm. long, oblong. *Ovary* 2·5 mm. long, terete, glabrous; *style* 1 mm. long, terete, glabrous; *stigma* globose. *Fruit* 2·5–3 cm. long, linear, sometimes slightly moniliform, glabrous.

Allied to *H. monticolor*, Sond., but differs in the stems being pubescent at the base, the calyx pubescent, and the filaments of the lateral stamens not toothed.

Named in honour of Mr. R. M. Lightfoot, of the S.A. Museum, who accompanied me to the Giftberg.

2. *H. pinnatisecta*, Phillips, sp. nov. *Herba* 10–17 cm. alta. *Rami* sulcati, paullo pilosi. *Folia* 0·6–2 cm. longa, pinnatisecta; segmenta 0·2–1 cm. longa, linearia, apice obtusa, interdum apice mucronata et recurva, pilosa. *Pedicelus* 1·3–1·7 cm. longus, paullo pilosus. *Segmenta calyci* 4 mm. longa, oblongo-linearia, pilosa. *Petala* 6 mm. longa, 4 mm. lata, obovata, apice rotunda, basi angustata, glabra. *Filamenta* 3 mm. longa, linearia, supra angustata, glabra; antherae 2 mm. longae, lineares. *Ovarium* 1·5 mm. longum, glabrum; stylus 0·5 mm. longus; stigma capitatum. *Fructus* 1–1·7 cm. longus, 1·5–2 mm. latus, linearis, glaber.

Van Rhynsdorp Division: Gifberg Range, 1–2,000 ft., September. Phillips 7580 in *Percy Sladen Memorial Expedition to the Khamiesberg, Gifberg, and the Oliphant's River Mountains*, 1911.

A simple or branched herb 10–17 cm. high. *Stems* furrowed, scantily pilose. *Leaves* 0·6–2 cm. long, pinnatisect; segments 0·2–1 cm. long, linear, obtuse or sometimes acute with a recurved mucro, pilose. *Inflorescence* racemose, terminal or axillary, 2–6 cm. long; axis scantily pilose. *Pedicels* 1·3–1·7 cm. long, elongating in fruit, scantily pilose. *Calyx-segments* 4 mm. long, oblong-linear, with a hyaline wing at the apex, pilose. *Petals* 6 mm. long, 4 mm. broad, obovate, rounded above, narrowed at the base, glabrous, pale blue, drying purple to almost white. *Stamens* of equal length; filaments 3 mm. long, linear, narrowing above, glabrous; anthers 2 mm. long, linear, versatile. *Ovary* 1·5 mm. long, terete, glabrous; style 0·5 mm. long, terete; stigma capitate. *Fruit* 1–1·7 cm. long, 1·5–2 mm. broad, linear, beaked, glabrous.

Near *H. sessilifolia*, Burch, but differs in being hairy, having longer pedicels and the corolla pale blue, not white or yellowish.

3. *H. trichinostyla*, Phillips, sp. nov. *Herba* 20–34 cm. alta. *Rami* sulcati, pilosi. *Folia* sessilia, 3–9·2 cm. longa, 2–6 mm. lata, plana, linearia, apice subobtusa, pilosa. *Inflorescentia* terminalia vel axillaria. *Pedicelus* 0·5–1 cm. longus, pilosus. *Segmenta calyci* 7 mm. longa, oblonga, apice obtusa sacculataque, pilosa. *Petala* 8 mm. longa, 5 mm. lata, obovata, apice obtusa, basi angustata, glabra. *Filamenta* 5 mm. longa, linearia, glabra; antherae 2 mm. longae, oblongae, basi sagittatae. *Ovarium* 4·5 mm. longum, lineare, glabrum; stylus 2 mm. longus, glaber; stigma capitatum. *Fructus* 3–6 cm. longus, 1–1·5 mm. latus, linearis, apice ovatus, sparse pilosus, raro glaber, superne glandulosus.

Van Rhynsdorp Division: Gifberg Range, 1–2,000 ft., September.

*Phillips* 7577, 7621 in *Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and Oliphant's River Mountains*, 1911.

A sub-simple or branched herb, 20–34 cm. high. Branches ribbed, pilose with simple hairs 2–3 mm. long. Leaves sessile, 3–9·2 cm. long, 2–6 mm. broad, flat, linear, subobtuse, entire, pilose. Inflorescence in terminal or axillary racemes, 12–20-flowered, elongated in fruit; axis glabrous. Pedicels from 5 mm. long, elongating in fruit up to 1·5 cm. long, pilose. Calyx-segments 7 mm. long, oblong, obtuse, hooded at the apex, pilose. Corolla blue; petals 8 mm. long, 5 mm. broad, obovate, obtuse, narrowed at the base, margins subdentate, glabrous. Stamens all the same length; filaments 5 mm. long, linear, glabrous; anthers 2 mm. long, oblong, sagittate at the base. Ovary 4·5 mm. long, linear, glabrous; style 2 mm. long, terete, glabrous; stigma capitate. Fruit 3–6 cm. long, 1–1·5 mm. broad, linear, ovate at the apex, scantily pilose, very rarely glabrous, bearing a number of glandular hairs on the swollen ovate portion.

Kew reports: “*Heliophila*, n. sp., near *H. pilosa*, but very distinct from that and all others at Kew, by the peculiar manner in which hairs are developed on the swollen apex of the (fruit E.P.P.) style.”

#### POLYGALACEAE.

*Muraltia Westi*, Phillips, sp. nov. Ramuli pilosi, demum pubescenti. Folia 5–7 mm. longa, 1–3 mm. lata, spathulata, obovata vel oblanceolata, apice mucronata recurvaque, glabra, ciliata. Segmenta calyci 2 mm. longa, 0·75 mm. lata, elliptico-lanceolata, apice acuta, glabra, ciliata. Petala 4·5–5 mm. longa, glabra. Stamina 1·5 mm. longa. Ovarium 2 mm. longum, oblongum, supra pilosum; stylus 2·5 mm. longus, linearis, glaber.

Catkin Peak, Drakensberg Range, 8,500–9,400 ft. *W. C. West*, in *Herb. Musci Austro-Afric.*, 4555.

Branchlets terete, green, pilose with coarse stiff hairs, at length becoming dark and pubescent. Leaves 5–7 mm. long, 1–3 mm. broad, spathulate, obovate or oblanceolate, mucronate, recurved at the apex, narrowed at the base, flat above, with a distinct midrib below, glabrous or almost so except for a few stiff hairs on the midrib, ciliate. Flowers pink, sessile in the axils of the leaves. Sepals 2 mm. long, 0·75 mm. broad, elliptic-lanceolate, acute, glabrous, ciliate. Lateral petals 4·5 mm. long, 1 mm. broad, linear, obtuse, glabrous; lower petal 5 mm. long, obovate, bifid at the apex, 2-crested; crests 2·5 mm. long, 3 mm. broad, broadly obovate, with crenate margins.

*Stamens* 1.5 mm. long. *Ovary* 2 mm. long, oblong in outline, 4-horned, pilose above; style 2.5 mm. long, linear, glabrous; stigma simple.

Near *M. reticulata*, Harv., but differs in having much larger flowers which are not hidden by the subtending leaves.

#### STERCULIACEAE.

*Hermannia pedunculata*, Phillips, sp. nov. *Suffrutex* 10–15 cm. altus. *Rami* stellato-pilosi, basi fere glabri. *Folia* 0.5–1.8 cm. longa, oblonga, linearia vel raro oblanceolato-linearia, apice truncata, 2–3-fida, raro apice acuta, basi angustata, paullo stellato-pilosa. *Pedunculus* 6.5–11 cm. longus, stellato-pilosus. *Bracteae* 2.5 mm. longae, ovatae, apice obtusae, stellato-pilosae. *Tubus calyci* 4 mm. longus; limbus 3 mm. longus, ovatus, apice obtusus. *Corolla* 1 cm. longa; limbus 6 mm. longus, 4 mm. latus, ovatus, apice obtusus, glaber. *Filamenta* 2 mm. longa, oblonga; antherae 2.5 mm. longae, ovatae, paullo pubescentes. *Ovarium* 7 mm. longum, globosum, stellato pilosum; stylus 4 mm. longus, glaber.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. Phillips 7377, 7379 in *Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and Oliphant's River Mountains*, 1911.

Small shrub 10–15 cm. high. *Stems* compact. *Branches* terete, covered with stellate hairs, becoming almost glabrous below. *Leaves* 0.5–1.8 cm. long, oblong, linear, rarely oblanceolate-linear, truncate, 2–3 toothed at the apex, rarely acute, narrowed at the base, sparsely covered with stellate hairs. *Peduncles* scape-like, 1–3-flowered, 6.5–11 cm. long, terete, covered with a stellate pubescence. *Bracts* 2.5 mm. long, ovate, obtuse, pubescent with stellate hairs. *Pedicels* 4 mm. long, terete, with stellate pubescence. *Calyx* membranous, 10-ribbed, with very distinct anastomosing veins when viewed by transmitted light; tube 4 mm. long, broadly campanulate, covered with stellate pubescence; lobes 3 mm. long, ovate, obtuse, covered with stellate pubescence. *Corolla* yellow; petals clawed, 1 cm. long; claw 4 mm. long, 2 mm. broad at the widest part, involute, ciliate above; limb 6 mm. long, 4 mm. broad, ovate, obtuse, glabrous. *Stamens* lying in the grooves of the ovary; filaments 2 mm. long, 1 mm. broad, oblong, 2-nerved; anthers 2.5 mm. long, erect, ovate, cells almost quite separate, finely pubescent. *Ovary* shortly stalked, 7 mm. long, 5 mm. broad, globose, 5-ribbed, densely stellate tomentose; style 4 mm. long, terete, glabrous, arising from between the upper lobes of the ovary, stigma simple.

Kew reports: "Very distinct from any species at Kew, in its compact stems and scape-like peduncles."

## GERANIACEAE.

*Oxalis fimbriata*, Phillips, sp. nov. Herba 4-7 cm. alta. Folia 3-4 cm. longa; petiolus 2-3 cm. longus, linearis, pilosus; foliola 0.7 cm. longa, superne 0.7 cm. lata, obcordata, basi angustata, glabra vel infra paullo pilosa, supra infraque punctata, ciliata. Pedunculus 4-5 cm. longus, linearis, pilosus; bractee 3 mm. longae, lineares. Segmenta calyci lanceolata, apice obtusa, paullo pilosa, ciliata. Petala 1.7 cm. longa, 8 mm. lata, obovata, apice obtusa, basi angustata. Filamenta 5-8 mm. longa; antherae 0.75 mm. longae, oblongae. Ovarium 2.5 mm. longum; styli 1 mm. longi, apice fimbriati.

Van Rhynsdorp Division: Giftberg Range, 1-2,000 ft., September. Phillips 7476, 7478 in Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and the Oliphant's River Mountains, 1911. A small acaulescent herb, 4-7 cm. high. Leaves all radicle, 3-4 cm. long; petioles 2-3 cm. long, linear, pilose with reflexed hairs; lamina 3-foliolate, 0.7 cm. long, 1.3 cm. broad; leaflets 0.7 cm. long, 0.7 cm. broad above, obcordate, cuneate at the base, glabrous or sparsely pilose below, punctate above and below, ciliate. Peduncle 4-5 cm. long, linear, pilose with reflexed hairs; bracts 3 mm. long, linear, inserted about  $\frac{3}{4}$  up the peduncle. Calyx 6 mm. long; segments lanceolate, obtuse, sparsely pilose, ciliate. Petals yellow or yellow and streaked with delicate reddish-brown lines, 1.7 cm. long, 8 mm. broad, obovate, obtuse, narrowed at the base. Stamens 10; filaments linear-filiform, those of the longer stamens 8 mm. long, those of the shorter 5 mm. long; anthers 4.75 mm. long, oblong. Ovary 2.5 mm. long; styles 5, free, 1 mm. long, fimbriated above.

This plant was found growing in a damp shaded place between rocks. Near *O. Uitenhagensis*, Sond. (Fl. Cap., I., 337), but differs in having dotted leaves pilose above and beneath.

## RUTACEAE.

*Euchaetis uniflora*, Phillips, sp. nov. Suffrutex circa 0.5 m. altus. Rami teres, glabri; ramuli pubescenti. Folia subsessilia, 0.8-1 cm. longa, 1 mm. lata, apice mucronata acutaque. Flores singuli, sessiles. Lobi calyci lanceolato-elliptici, obtusi, apice minute apiculati, glabri, infra breve ciliati. Petala 8 mm. longa, supra 3.5 mm. lata,

ovato-spathulata, apice obtusa, apiculata, infra ciliata. *Stamina* 5; filamenta 1.5 mm. longa, glabra; antherae 1.3 mm. longae, oblongae, apice glandulis instructae. *Ovarium* 0.75 mm. longum, globosum, glabrum; stigma sessile, capitatum. *Fructus* 3 mm. longus, glaber.

Riversdale Division: Near Albertina. *Dr. J. Muir* 899.

An *undershrub* about 0.5 m. high. *Branches* terete, glabrous, with almost black bark; branchlets pubescent. *Leaves* scattered, subsessile, 0.8–1 cm. long, 1 mm. broad, subulate, concave above, convex beneath, acutely mucronate, with hyaline margins and two rows of glands beneath. *Flowers* terminal and solitary, sessile. *Calyx* 4 mm. long, 5-partite; lobes lanceolate-elliptic, obtuse, minutely apiculate, glabrous, shortly ciliate in the lower half. *Petals* 8 mm. long, 3.5 mm. broad above, obovate-spathulate, obtuse, apiculate, clawed, bearded about the middle third. *Stamens* 5, fertile; filaments 1.5 mm. long, terete, narrowing above, glabrous; anthers 1.3 mm. long, oblong, with an erect gland at the apex. *Disc* adnate to the calyx. *Ovary* 0.75 mm. long, globose, glabrous; stigma sessile, capitate. *Fruit* 3 mm. long, glabrous, enclosed in the persistent calyx.

Allied to *E. ericoides*, Dümmer, in having solitary flowers, but the leaves are twice as long and acutely mucronate.

This plant has the appearance of an *Acmadenia*, but the shape of the petals, which are not distinctly clawed, and the very short stamens, would place it in the genus *Euchaetis* as understood in the "Flora Capensis."

1. *Agathosma Giftbergensis*, Phillips, sp. nov. *Frutex* 20–30 cm. altus. *Rami* minute pubescenti. *Folia* subsessilia, 3–6 mm. longa, 1 mm. lata, apice obtusa vel acuta. *Inflorescentia* umbellata, terminalia vel raro axillaria. *Pediculus* 6 mm. longus, teres, glaber. *Lobi calyci* 1 mm. longi, ovati, apice obtusi, glabri. *Petala* 3.5 mm. longa, circa 1 mm. lata, oblongo-obovata, apice obtusa, basi angustata, glabra. *Staminodia* 2 mm. longa, linearia, apice obtusa, ciliata. *Filamenta* 4 mm. longa, teretia, glabra; antherae 0.5 mm. longae, globosae. *Ovarium* 1 mm. longum, obtuse trigonum, glabrum.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. *Phillips* 7636 in *Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and the Oliphant's River Mountains*, 1911.

A small *shrub* 20–30 cm. high. *Branches* terete, minutely pubescent. *Leaves* subsessile, 3–6 mm. long, 1 mm. broad, flat above, keeled beneath, obtuse or acute, with or without a hair at the apex. *Inflorescence* umbellate, terminal or more rarely axillary,



about 12-flowered. *Pedicels* 6 mm. long, terete, glabrous. *Calyx* 1·5 mm. long; lobes 1 mm. long, ovate, obtuse, glabrous. *Petals* 3·5 mm. long, about 1 mm. broad, oblong-ovate, obtuse, narrowed at the base, glabrous. *Sterile filaments* 2 mm. long, linear, obtuse, broadened below, ciliate. *Filaments* of fertile stamens 4 mm. long, terete, glabrous; anthers 0·5 mm. long, globose. *Disc* cup-shaped, adnate to the calyx. *Ovary* 1 mm. long, obtusely 3-angled, each cell produced into a blunt fleshy horn, glabrous; style 3 mm. long, terete, glabrous; stigma simple. Fruit not seen.

Near *A. microphylla*, G. F. Mey, from which it differs by having glabrous pedicels.

2. *A. Muirii*, Phillips, sp. nov. *Frutex* circa 1 m. altus. *Ramuli* minute pubescenti. *Folia* breve petiolata; petiolus 0·75 mm. longus, glaber vel sparse pilosus; lamina 2·5 mm. longa, 2·5 mm. lata, ovata, apice obtusa, basi subcordata, infra glandulosa, glabra. *Inflorescentia* terminalia, umbellata. *Pediculus* 3·5 mm. longus. *Segmenta calyci* 1·5 mm. longa, 0·75 mm. lata, oblonga, apice obtusa, ciliata. *Petala* 3·5 mm. longa, obovata, apice obtusa, infra pilosa. *Stamina* 4 mm. longa; staminodia 3 mm. longa, villosa, apice globosis glandulis instructa. *Ovarium* 1 mm. longum, subglobosum, glabrum; stylus 2 mm. longus, glaber.

Riversdale Division: Hills above Still Bay. Shrub up to 3 ft. high. Flowers handsome. *Dr. J. Muir* 635.

A shrub up to 1 m. high. *Branches* terete, puberulus. *Leaves* shortly petiolate; petiole 0·75 mm. long, glabrous or with a few scattered hairs; lamina 2·5 mm. long, 2·5 mm. broad, ovate, obtuse, subcordate at the base, glandular below, glabrous. *Inflorescence* terminal, umbellate, many-flowered. *Pedicels* 3·5 mm. long, terete, glandular?. *Sepals* 1·5 mm. long, 0·75 mm. broad, oblong, obtuse, ciliate. *Petals* 3·5 mm. long, obovate, obtuse, clawed; claw pilose. *Fertile stamens* 4 mm. long; filaments terete, glabrous, except for a few hairs near the base; anthers oblong; sterile stamens 3 mm. long; filaments linear, villous; anthers abortive, represented by a globose gland. *Disc* cupular, the rim inturned and 5-fid. *Ovary* 1 mm. long, subglobose, 3-celled, with 2 ovules in each cell, glabrous; style 2 mm. long, terete, glabrous; stigma simple. Near *A. glandulosa*, Sond., but differs in having a glabrous style and ovary.

3. *A. rotundipetala*, Phillips, sp. nov. *Ramuli* glabri. *Folia* subsessilia, 4-5 mm. longa, supra plana vel sulcata, infra convexa vel carinata, apice subobtusa, glabra. *Pediculus* 3 mm. longus, glaber. *Segmenta calyci* 1·5 mm. longa, elliptica, apice obtusa,

glabra, supra sparse ciliata. *Petala* unguiculata; limbus 1·3 mm. longus, 1 mm. latus, orbiculatus, glaber. *Staminodia* 1 mm. longa, linearia, apice eglandulosa, inferne ciliata. *Stamina* 1 mm. longa; filamenta glabra. *Ovarium* 0·5 mm. longum, glabrum; stylus 1 mm. longus, glaber.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. *Phillips* 7537 bis in *Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and Oliphant's River Mountains*, 1911.

*Branches* glabrous. *Leaves* shortly petioled, 4–5 mm. long, flat or sulcate above, convex or keeled below, subobtuse, glabrous. *Flowers* in small terminal umbels. *Pedicels* 3 mm. long, terete, glabrous. *Calyx segments* 1·5 mm. long, elliptic, obtuse, glabrous, with 2–3 cilia in the upper half. *Petals* abruptly clawed; limb 1·3 mm. long, 1 mm. broad, orbicular, glabrous. *Fertile stamens* 5; filaments 1 mm. long, terete, glabrous; anthers 0·75 mm. long, subglobose. *Sterile filaments* 1 mm. long, linear, eglandular, ciliate near the base. *Disc* 5-lobed. *Ovary* 0·5 mm. long, glabrous; style 1 mm. long, terete, glabrous; stigma simple.

This species is very near *A. microphylla*, G. F. Mey, var. *staden-sis* (E. & Z. 899), but differs in the sterile filaments being eglandular at the apex and not widened in the middle; the corolla-limb is orbicular and abruptly clawed, not oblong and narrowed into a claw.

#### RHAMNEAE.

*Phylica pustulata*, Phillips, sp. nov. *Frutex* 1–1·3 m. altus. *Rami* sparse pilosi. *Folia* subsessilia, 1–2 cm. longa, linearia, apice obtusa vel subobtusa, infra sulcata, glabra, pustulata; junioria interdum pilosa; petiolus 1–2 mm. longus. *Inflorescentia* sessilia, 1 cm. longa, 1 cm. lata, globosa. *Bracteae* 3 mm. longae, lineares, apice obtusae, supra sulcatae, villosae. *Tubus calyci* 3 mm. longus, superne villosus, inferne glaber; lobi 2·5 mm. longi, ovati, acuminati, trigoni, apice subacuti, villosi. *Filamenta* 0·75 mm. longa, filiformia, glabra; antherae 1 mm. longae, oblongae. *Ovarium* 1 mm. longum, glabrum; stylus apice paullo trilobatus.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. *Phillips* 7681 in *Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and the Oliphant's River Mountains*, 1911.

A bush 1–1·3 m. high. *Branches* terete, scantily pilose. *Leaves* shortly petioled, 1–2 cm. long, linear, obtuse or subobtuse, with a short blunt mucro, channelled beneath, the younger leaves sometimes pilose, otherwise glabrous, pustulate; petiole 1–2 mm. long.

*Inflorescence* a compact spike, sessile, terminal, 1 cm. long, 1 cm. broad, globose. *Bracts* 3 mm. long, linear, obtuse, channelled above, villous; bracteoles similar but smaller. *Calyx-tube* 3 mm. long, obconical, villous above, glabrous below; lobes 2·5 mm. long, ovate, acuminate, trigonus, subacute, villous outside, glabrous within. *Corolla* wanting. *Filaments* 0·75 mm. long, filiform, glabrous; anthers 1 mm. long, oblong, curved. *Ovary* 1 mm. long, glabrous; style simple, faintly 3-lobed at the apex. *Fruit* not seen.

Resembles in habit *P. stipularis*, Linn., but differs by the absence of stipules. Allied to *P. montana*, Sond., but differs in having pilose branches; leaves not tomentose beneath; the calyx villous not tomentose, and the petals wanting.

## ANACARDIACEAE.

*Rhus Tysoni*, Phillips., sp. nov. *Rami* pubescenti. *Folia* petiolata, 2–2·5 cm. longa, petiolus 0·8–1·2 cm. longus, pubescens. *Foliala* 0·8–1·7 cm. longa, 0·6–1·3 cm. lata, obovata, obovato-cuneata, elliptica vel obovato-elliptica, mucronata, pubescentia. *Lobi calyci* 1 mm. longi, ovati, apice obtusi, pubescentes. *Fructus* 4 mm. latus, globosus, glaber, rogosus.

Griqualand East: In rupestribus apud "Sibis Kraal" pr. Matatiele, Jan., 1884, 5,200 ft. *Tyson* 1628.

Branches *terete*, pubescent. *Leaves* petiolate, 2–2·5 cm. long, 3-foliata. *Petiole* 0·8–1·2 cm. long, *terete*, pubescent. *Median leaflet* 1–1·7 cm. long, 0·7–1·3 cm. broad, obovate or obovate-cuneate, mucronate, acute at the base, pubescent above and beneath; lateral leaflets 0·8–1·1 cm. long, 6–8 mm. broad, elliptic or obovate-elliptic, mucronate, not narrowed so much at the base as the median leaflet, pubescent above and beneath. *Inflorescence* racemose, terminal or axillary. *Peduncles* *terete*, pubescent. *Pedicels* 3 mm. long, almost glabrous. *Calyx-lobes* 1 mm. long, ovate, obtuse, pubescent. *Corolla* and *stamens* not seen. *Fruit* 4 mm. in diameter, globose, glabrous, wrinkled when dry.

Near *R. glauca*, Desf., from which it differs in having pubescent leaves.

## LEGUMINOSAE.

*Podalyria Pearsonii*, Phillips, sp. nov. *Frutex* 0·3–1 m. altus. *Ramuli* pubescenti, demum glabri. *Folia* subsessilia, 0·9–2·5 cm. longa, 2–7 mm. lata, lanceolata vel elliptico-lanceolata, apice mucronata recurvaque, raro obovata et apice obtusa, supra glabra,

infra dense pubescentia. *Stipulae* 2 mm. longae, subulatae. *Flores* singuli, terminales vel axillares. *Pedunculus* 1 cm. longus, pubescens. *Tubus calyci* 2 mm. longus, villosus; lobi 5 mm. longi, villosi. *Vexillum* 1·2 cm. longum, 1·8 mm. latum, obovatum, glabrum; alae 1·4 cm. longae, 7 mm. latae, oblongo-ovatae, glabrae; carina 1·1 cm. longa, 4·5 mm. lata, glabra. *Filamenta* 1 cm. longa, linearia, supra angustata, glabra; antherae 1 mm. longae, oblongae. *Ovarium* 5 mm. longum, dense villosum; stylus 5 mm. longus, teres, superne angustatus; stigma capitatum.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. Phillips 7486 in Percy Sladen Memorial Expedition to the Kamiesberg, Giftberg, and Oliphant's River Mountains, 1911.

*Bush* 0·3–1 m. high. *Branchlets* terete, densely pubescent, at length becoming glabrous. *Leaves* subsessile, 0·9–2·5 cm. long, 2–7 mm. broad, lanceolate or elliptic-lanceolate, with a recurved mucro, rarely obovate and obtuse, glabrous above, densely silky beneath, the midrib prominent beneath, sunken above. *Stipules* 2 mm. long, subulate. *Flowers* solitary, terminal, or axillary. *Buds* 0·8–1 cm. long, ovate or elliptic, subobtuse, villous. *Peduncle* 1 cm. long, terete, pubescent. *Calyx-tube* 2 mm. long, 8 mm. wide, villous; lobes 5 mm. long, tapering from the base to the apex, villous. *Corolla* pink. *Vexillum* 2-lobed, 1·2 cm. long, 1·8 cm. broad, obovate, shortly clawed, glabrous; alae 1·4 cm. long, 7 mm. broad, oblong-obovate, rounded above, shortly clawed and oblique at the base, glabrous; carina 1·1 cm. long, 4·5 mm. broad, plano-convex in outline, oblique and clawed at the base, glabrous. *Filaments* 1 cm. long, linear, narrowing to the apex, glabrous; anthers 1 mm. long, oblong. *Ovary* 5 mm. long, densely villous, many ovulate; style curved, 5 mm. long, terete, narrowing above, villous below; stigma capitate. *Fruit* not seen.

Near *P. glauca*, DC., from which it differs in its more virgate habit and shorter peduncles.

Named in honour of Dr. H. H. W. Pearson.

*Argyrolobium humile*, Phillips, sp. nov. *Frutex* circa 15 cm. altus. *Rami* villosi. *Petiolus* 3–4 mm. longus, villosus. *Foliola* 0·9–2·3 cm. longa, 0·5–1·7 cm. lata, elliptica, apice acuta, basi acuta, supra infraque strigulosa, marginibus villosis. *Stipulae* 0·9–1 cm. longae, lanceolatae, acuminatae, apice acutae, strigulosae. *Segmenta calyci* lanceolata, apice acuta, membranacea, pilosa. *Vexillum* 1·3 cm. longum, 1·5 cm. latum, ovato-orbiculatum, apice obtusum, strigulosum, ciliatum; alae 1·1 cm. longae, 6 mm. latae, obovatae, apice obtusae, glabrae; carina 9 mm. longa, 5·5 mm. lata, glabra. *Stamina* 9 mm.

longa, glabra. *Ovarium* 6 mm. longum, lineare, dense villosum; stylus 4 mm. longus; stigma capitatum. *Fructus* 3·2 cm. longus, 0·5 cm. latus, linearis, brève mucronatus, basi subacutus, pilosus.

Griqualand East: Ad laterum montis Malowe, November, 1885. 4,000 ft. Tyson in *Herb. Norm. Austro-Afric.*, 1259.

A small shrub about 15 cm. high. *Branches* terete, villous. *Leaves* shortly petioled, 3-foliolate. *Petioles* 3–4 mm. long, villous. *Leaflets* 0·9–2·3 cm. long, 0·5–1·7 cm. broad, elliptic, very shortly acuminate, acute, acute at the base, strigose above and beneath, villous on the margins. *Stipules* 0·9–1 cm. long, lanceolate, acuminate, acute, strigose. *Peduncles* 1-flowered, terminal or axillary, 2–5·5 cm. long, terete, villous. *Bracts* 3, 5–8 mm. long, linear, acute. *Calyx* 1·4 cm. long; segments lanceolate, acute, membranous, pilose with stiff hairs. *Vexillum* 1·3 cm. long, 1·5 cm. broad, ovate-orbicular, obtuse, shortly clawed, strigose, ciliate; alae 1·1 cm. long, 6 mm. broad, obovate, obtuse, shortly clawed, glabrous; carina 9 mm. long, 5·5 mm. broad, plano-convex in outline, glabrous. *Stamens* 9 mm. long, curved above, glabrous. *Ovary* 6 mm. long, linear, densely villous; style 4 mm. long, curved; stigma capitate. *Fruit* 3·2 cm. long, 0·5 cm. broad, linear, shortly mucronate, subacute at the base, pilose, 4–5-seeded.

Near *A. stipulaceum*, E. and Z., but differs in the much smaller stipules which are not leaf-like.

#### CAMPANULACEAE.

*Lobelia Giftbergensis*, Phillips, sp. nov. *Herba* 10–20 cm. alta, minute pubescens. *Folia* 0·8–3 cm. longa, 0·2–1 cm. lata, obovato-spathulata, apice obtusa, basi angustata, dentata, glabra. *Lobi calyci* 2·5 mm. longi, lineares, glabri. *Tubus corollae* 6 mm. longus; lobi 3–4 mm. longi, elliptici vel lineares, obtusi vel subacuti, glabri. *Stamina* 5 mm. longa. *Ovarium* 4 mm. longum, oblongum; stylus 6 mm. longus, linearis; stigma 0·5 mm. longum, ellipticum.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. Phillips 7599 in *Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and the Oliphant's River Mountains*, 1911.

A herb 10–20 cm. high, with a simple stem or more rarely branched at the base. *Stems*, as seen under a lens, minutely pubescent. *Leaves* 0·8–3 cm. long, 0·2–1 cm. broad, obovate-spathulate, obtuse, attenuate at the base, dentate, glabrous. *Inflorescence* a lax raceme of 6–12 flowers. *Floral-leaves* 8 cm. long, linear, obtuse, dentate. *Pedicels* 0·8–2 cm. long, filiform-terete, glabrous. *Calyx*-

lobes 2.5 mm. long, linear, glabrous. *Corolla* blue with a white lip, drying purple, 1.1 cm. long; tube 6 mm. long, glabrous; lobes of upper lip 3 mm. long, elliptic, obtuse, glabrous; lobes of lower lip 4 mm. long, linear, subacute, glabrous. *Stamens* adnate to the corolla-tube; filaments 5 mm. long, linear; anthers 1 mm. long, oblong, the lower 2 bearded. *Ovary* 4 mm. long, oblong in outline; ovules numerous; style 6 mm. long, linear, slightly narrowed at the base; stigmas 0.5 mm. long, elliptic.

Allied to *L. Dregeana*, A.DC., but differs in having smaller flowers and a different-shaped calyx.

#### SCROPHULARIACEAE.

*Diascia glandulosa*, Phillips, sp. nov. *Herba* 10–21 cm. alta. *Rami* subangulati, infra glabri, supra glandulosi. *Folia* 0.6–3.5 cm. longa, elliptica, lanceolata vel linearia, apice obtusa, glabra. *Inflorescentia* racemosa, 2–8-flore. *Bracteae* 5–6 mm. longae, lineares, apice obtusae, glandulosae. *Pediculus* 0.6–2 cm. longus, glandulosus. *Segmenta calyci* 4 mm. longa, oblonga vel elliptico-oblonga, apice obtusa, dense glandulosa. *Corolla* 2 cm. lata, basi 2-saccata, superne villosa. *Stamina* 4; filamenta 2 mm. longa. *Ovarium* 1.5 mm. longum, ovatum, glabrum; stylus 0.5 mm. longus; stigma truncatum. *Fructus* 6 mm. longus, 7.5 mm. latus, ovatus, sparse glandulosus.

Var.  $\beta$ , *albiflora*, Phillips, var. nov. *Corolla* inferne ex rubro pallens superne alba, lacinia fusca.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. Phillips 7358 in *Percy Staden Memorial Expedition to the Khamiesberg, Giftberg, and the Oliphant's River Mountains*, 1911. Var.  $\beta$ , l. c., Phillips 7359.

A small herb, 10–21 cm. high, rarely branched at the base. *Stems* somewhat angular, glabrous below, with a few scattered capitate glands above, bearing 1–3 pairs of opposite leaves. *Radicle leaves* 1.2–3.5 cm. long, 3–5 mm. broad, elliptic, lanceolate or linear, obtuse, entire or remotely toothed; cauline leaves 0.6–3.5 cm. long, 1–2 mm. broad, linear, obtuse, entire or remotely toothed, glabrous. *Flowers* in terminal racemes; racemes 2–8-flowered; axis bearing capitate glands. *Bracts* 5–6 mm. long, linear, obtuse, bearing capitate glands. *Pedicels* 0.6–2 cm. long, glandular. *Calyx-segments* 4 mm. long, oblong or elliptic-oblong, obtuse, densely glandular. *Corolla* when flattened out 2 cm. wide; anterior lip truncate, produced into two pouches at the base, villous inside; lobes of the posterior lip 8 mm.

long, 5·5 mm. broad, oblong, obtuse. *Stamens* 4; filaments 2 mm. long, spirally coiled near the base, glabrous. *Ovary* 1·5 mm. long, ovate in outline, glabrous; style 0·5 mm. long; stigma truncate. *Fruit* 6 mm. long, 7·5 mm. broad, ovate in outline, almost truncate above, with the persistent style situated in a depression, scantily glandular.

This pretty little plant was found growing on bare patches. The corolla is a claret colour outside, blue inside with a dark blotch on the anterior lip.

Var.  $\beta$ , *albiflora*. The corolla is pinkish outside, white inside, with a dark blotch on the lip, otherwise as in the type. Only a single specimen of the variety was found, though the locality was well searched for further specimens.

In the same collection was a single plant (*Phillips* 7368) with unopened flowers. In the field I took this to be different to my No. 7358, and noted "corolla reddish brown, lip dark blue. Rare." But it is probably = No. 7358 with unopened flowers, as suggested by Mr. N. E. Brown.

*Manulea glandulosa*, Phillips, sp. nov. *Herba* acaulescens. *Folia* 3–6 cm. longa, 2–5 mm. lata, linearia, apice obtusa, basi attenuata, glandulosa. *Pedunculus* 40–60 cm. longus, teres, basi glandulosus, demum glaber. *Inflorescentia* 2–16 mm. longa. *Bracteae* 2 mm. longae, lineares, apice obtusae, glabrae. *Tubus calyci* 1 mm. longus, 5-costatus; lobi 1·5 mm. longi, lineares, apice obtusi. *Tubus corollae* 1 cm. longus, cylindricus, glandulosus; lobi 5 mm. longi, 1–1·5 mm. lati, lineares, apice obtusi, supra glabri, infra glandulosi. *Ovarium* 1 mm. longum, ellipticum, glabrum; stylus 3·5 mm. longus, glaber. *Fructus* 5 mm. longus, ellipticus, apice acutus, glaber.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. *Phillips* 7357, 7366 in *Percy Staden Memorial Expedition to the Khamiesberg, Giftberg, and the Oliphant's River Mountains*, 1911.

An acaulescent herb, with an underground woody rootstock. *Leaves* radicle, 3–6 cm. long, 2–5 mm. broad, linear, obtuse, long attenuated at the base, entire or more or less toothed in the upper half, glandular. *Peduncles* 40–60 cm. long, terete, naked or with 2–3 subulate bracts, glandular near the base or otherwise glabrous. *Inflorescence* a thyrsoid panicle, 2–16 cm. long. *Flowers* solitary or in clusters of 2–5. *Bracts* 2 mm. long, linear, obtuse, glabrous. *Calyx* subcampanulate, glabrous; tube 1 mm. long, prominently 5-ribbed; lobes 1·5 mm. long, linear, obtuse. *Corolla* orange-coloured; tube 1 cm. long, cylindric, slightly swollen above, glandular; lobes 5 mm. long, 1–1·5 mm. broad, linear, obtuse,

revolute, glabrous above, glandular beneath. *Stamens* didynamous, the lower pair situated on the broadened portion of the corolla; filaments 0·75 mm. long; anthers about 1 mm. long, oblong. *Ovary* 1 mm. long, elliptic in outline, glabrous; style 3·5 mm. long, terete, glabrous; stigma terminal. *Fruit* 5 mm. long, ellipsoid, acute, glabrous.

Kew reports as "near *M. leiostachys*, Benth.," but is distinguished from that species by the glandular leaves, calyx, and corolla.

### SELAGINEAE.

1. *Hebenstreitia glandulosa*, Phillips, sp. nov. *Herba* 6–16 cm. alta. *Rami* glanduloso-pubescenti. *Folia* sessilia, 1·4 cm. longa, 1–4 mm. lata, linearia, apice obtusa, glabra vel sparse glandulosa. *Inflorescentia* spicata, terminalia, 2–5 cm. longa. *Bractee* 8 mm. longae, ovatae, acuminatae, apice obtusae, glanduloso-villosae. *Segmenta calyci* 3·5 mm. longa, linearia, ciliata. *Corolla* 9–11 mm. longa, glabra; tubus cylindricus; lobi 1·5 mm. longi, oblongi, apice obtusi. *Filamenta* 0·75 mm. longa, glabra; antherae 1·5 mm. longae, lineares. *Ovarium* 1 mm. longum, oblongum, glabrum; stylus 5 mm. longus, teres, glaber. *Fructus* 2 mm. longus, oblongus, truncatus, glaber.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. Phillips 7355 in Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and the Oliphant's River Mountains, 1911. Clanwilliam Division: In arvenosi Sandkop et in mte. Ramskop. June–August. *C. L. Leipoldt* 557.

Simple or branched *herbs*, 6–16 cm. high. *Stems* terete, glandular-pubescent. *Leaves* sessile, 1–4 cm. long, 1–4 mm. broad, linear, rarely broadening above, obtuse, glabrous or with a few scattered glandular hairs, entire or rarely with 1–3 small teeth. *Inflorescence* spicate, terminal, 2–5 cm. long, many-flowered. *Bracts* 8 mm. long, ovate, long acuminate, obtuse, villous with glandular hairs. *Calyx segments* 2, 3·5 mm. long, linear, ciliate. *Corolla* white, 0·9–1·1 mm. long, split down to below the middle, glabrous; tube cylindric; lobes 1·5 mm. long, oblong, obtuse, the 2 middle lobes narrower than the lateral. *Stamens* 4, didynamous; filaments 0·75 mm. long, glabrous; anthers 1·5 mm. long, linear, versatile. *Ovary* 1 mm. long, oblong, glabrous; style 5 mm. long, terete, glabrous; stigma minute, terminal. *Fruit* 2 mm. long, oblong, truncate, glabrous.

Near *H. pubescens*, Rolfe, but differing by its very much smaller flowers.



2. *H. laxifolia*, Phillips, sp. nov. *Herba* 20–30 cm. alta. *Rami* glanduloso-pubescenti. *Folia* laxa, 1.3–4.5 cm. longa, 0.5–1 mm. lata, linearia, apice obtusa, glabra. *Inflorescentia* spicata, cylindrica, 4–8 cm. longa, circa 1 cm. lata. *Bracteae* calyce adnatae, 7 mm. longae, ovatae, acuminatae, apice acutae, glanduloso-pubescentiae. *Calyx* 5 mm. longus, ovatus, apice obtusus, membranaceus, glaber. *Corolla* 1.2 cm. longa, glabra; lobi 1.5–2 mm. longi, oblongi, apice obtusi. *Stamina* 1 mm. longa; filamenta, glabra. *Ovarium* 1 mm. longum, glabrum; stylus 3.5 mm. longus, linearis, glaber; stigma parvum.

Van Rhynsdorp Division: Giftberg Range, 1–2,000 ft., September. Phillips 7356 in Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and the Oliphant's River Mountains, 1911.

A simple herb, 20–30 cm. high. *Stems* terete, glandular-pubescent. *Leaves* opposite or subopposite below, alternate above, lax, 1.3–4.5 cm. long, 0.5–1 mm. broad, linear, obtuse, glabrous; internodes 2–2.5 cm. long below. *Inflorescence* spicate, terminal, cylindric, 4–8 cm. long, about 1 cm. in diameter. *Bracts* adhering to the calyx, 7 mm. long, ovate, acuminate, acute, glandular-pubescent, with membranous margins. *Calyx* spathaceous, 5 mm. long, ovate, obtuse, membranous, glabrous. *Corolla* white with a yellow blotch in the throat, 1.2 cm. long, split down to below the middle, glabrous; lobes 1.5–2 mm. long, oblong, obtuse, the outer pair broader than the inner. *Stamens* didynamous; filaments 1 mm. long, oblong. *Ovary* 1 mm. long, oblong, glabrous; style 3.5 mm. long, linear, glabrous; stigma small, terminal.

Near *H. dentata*, Linn., but the leaves much more lax.

#### IRIDACEAE.

*Syringodea linifolia*, Phillips, sp. nov. *Folia* 4–12 cm. longa, 1.5–3 mm. lata, linearia, apice acuta, glabra. *Tubus perianthii* angustato-cylindricus, 4–5 cm. longus; lobi 2–5 cm. longi, elliptici, apice subobtusii. *Filamenta* 5 mm. longa, linearia; antherae 6 mm. longae, lineares, basi sagittatae. *Ovarium* 9 mm. longum, 4 mm. latum, oblongum; stylus 5.5 cm. longus; rami 3 mm. longi, lineares, apice glandulosi.

Without Collector's name or locality in *Herb. Musei Austro-Afric.* (This may possibly be one of *Leipoldt's* specimens from Clanwilliam. —E. P. P.)

*Bulb* not seen. *Plant* about 7 cm. high. *Leaves* 6–8, 4–12 cm.

long, 1.5–3 mm. broad, linear, acute, membranous and clasping at the base, prominently 5-nerved, glabrous, the margins membranous near the base and sometimes crisped. *Perianth* 6 cm. long; tube narrow-cylindric, 4.5 cm. long; lobes 2.5 cm. long, elliptic, sub-obtuse. *Filaments* 5 mm. long, linear; anthers 6 mm. long, linear, sagittate at the base. *Ovary* 9 mm. long, 4 mm. broad, oblong, membranous; style 5.5 cm. long, linear-filiform; style-branches 3 mm. long, linear, slightly broadened above, papillose at the apex.

Quite distinct from any other species in the genus.

#### AMARYLLIDACEAE.

*Nerine Ridleyi*, Phillips, sp. nov. *Cormus* 3–4 cm. longus, 3–4 cm. latus, superne attenuatus. *Folia* 7–9 cm. longa, 1.3–2 cm. lata, lanceolata, apice obtusa, basi angustata, supra pustulata, glabra. *Pedunculus* circa 23 cm. longus, 3 mm. latus, glaber. *Pediculus* 3–4 cm. longus, 1.5 mm. latus, subtrigonus. *Segmenta perianthii* 3 cm. longa, 5 mm. lata, linearia, apice subobtusa recurvaque. *Filamenta* 2–2.5 cm. longa; antherae 6 mm. longae, oblongae. *Ovarium* 3 mm. longum, globosum; stylus 3.3 cm. longus, apice glandulosus.

Described from a fresh specimen cultivated in the Municipal Gardens, Cape Town, May, 1913. Locality unknown.

*Bulb* globose, 3–4 cm. long, 3–4 cm. in diameter, produced into a neck about 4 cm. long, covered with brown membranous tunics. *Leaves* 4–5, contemporary with the flowers, 7–9 cm. long above the neck, 1.3–2 cm. broad in the widest part, lanceolate, obtuse, narrowed at the base, pustulate above, glabrous, dark green above, lighter beneath. *Peduncle* about 23 cm. long, 3 mm. in diameter, terete, glabrous, purplish below, becoming green above. *Spathes* 3 cm. long, linear-oblong, acuminate, acute, pink. *Flowers* 5, dichinate. *Pedicels* 3–4 cm. long, 1.5 mm. in diameter, subtrigonus. *Perianth* segments about 3 cm. long, 5 mm. broad, the two anterior segments much wider apart than the others, linear, subobtuse, recurved, crisped, with a small glandular papilla at the apex, pale pink, with a prominent midrib beneath of usually a slightly deeper pink, and with a distinct red streak on the lower half of the inner face of the segments. *Stamens* unequal, almost horizontal, recurved upwards at the ends; filaments of shorter stamens 2 cm. long, those of the longer 2.5 cm. long, all

terete, pale pink; anthers 6 mm. long, oblong, purplish. Ovary 3 mm. long, globose, brown; style horizontal, recurved above, 3.3 cm. long, terete, pale pink, when mature 3-fid and papillose at the apex.

Near *N. flexuosa*, Herb., but differs in the much shorter and comparatively broader leaves and the fewer flowers in the umbel.

Named in honour of Mr. G. H. Ridley, the Curator of the Municipal Gardens, Cape Town.



10. LIST OF THE PLANTS COLLECTED IN THE PERCY SLADEN MEMORIAL EXPEDITIONS, 1908-9, 1910-11, SEPTEMBER, 1911, CONTINUED.

*Note on the localities visited by the Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and Oliphant's River Mountains, September, 1911.*—By H. H. W. PEARSON.\*

PLANTS collected during the expedition referred to in the title have not been included in the parts already published. Those of them which belong to the groups which follow will appear in their proper places, with those collected elsewhere in South-West Africa, south of the Swakop River.

The Khamiesberg is situated in Little Namaqualand. Its length from north to south is approximately 50 miles; its breadth is considerably less. Its southern end lies in the vicinity of Stinkfontein (south) and in the north it terminates a little south of Springbok. Its eastern boundary lies in Bushmanland; while in the west it drops into the narrow maritime sandbelt. The principal vegetative season occurs in August and September at the end of the period of winter-rains. Many of its plants, however, do not flower until the summer is advanced; a number of these were collected on the return of the expedition from the Orange River in January, 1911.† A number of its higher peaks reach an elevation exceeding 6,000 ft.; the greatest elevation attained is about 6,500 ft. The foothills of the Khamiesberg effect a junction in the south with the western extension of the Langeberg, to the south of which there lies the low, undulating and almost waterless "Knechtsvlakte," about 50 miles from north to south. The Matsiekamma tableland, about 2,000 ft. s.m., an eastern branch of the Giftberg, is structurally connected with the Bokkeveld and Oliphant's River Mountains. We have, therefore, in the Oliphant's River Mountains and the Giftberg, northern continuations of the mountains of the Cape System, so situated that their floras are likely in greater or less degree to be

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 28.

† Annals S.A. Museum, ix., p. 22.

modified by incursions from the Western Karroo and the Upper Region. The Khamiesberg, on the other hand, has no direct union with the Cape System—from which it is separated by the barren Knechtsvlakte—and its connection with the eastern tableland is by way of Bushmanland and the Upper Region.

In the Bokkeveld, the Matsiekamma and the Oliphant's River Mountains, the main outcrop is Table Mountain sandstone. Therefore both climatic and edaphic conditions in general favour the development of the Cape flora. The structure of the Khamiesberg, however, is very different and is less well known. I am indebted to my friend Dr. A. W. Rogers, F.G.S., for the following note on its geology:—

“The Khamiesbergen are made of gneiss, with quite subordinate masses of schists and granitites representing sedimentary and volcanic rocks in a highly altered condition. The general trend of the foliation and schistose structures is from east to west. These very ancient (archean) rocks have long been stripped of sediments of later date (Nama formation and the Karroo beds) which probably covered them formerly. It is quite uncertain whether the Cape formation also extended as far north-west as the Khamiesbergen. From a physical point of view, the region is a westerly extension of the Bushmanland plateau, deeply cut into by the streams which flow directly into the Atlantic or join the Buffels and Oliphant's Rivers.”

The occurrence of a pronounced element of Cape affinity at higher elevations in the Khamiesberg is therefore a matter of some geographical interest. It is even more remarkable than the presence of characteristic Cape genera on the Huilla plateau in South Angola; for the latter locality is geologically much more nearly allied to the mountains of the Cape System and its rainfall is probably much greater.

The distribution of the collecting parties was as follows: Miss R. Glover and Miss E. L. Stephens worked in the valley of the Oliphant's River in the vicinity of the Warm Baths springs. Mr. E. P. Phillips encamped and collected on the flat summit of the Matsiekamma. The writer crossed the Knechtsvlakte to the north of Van Rhynsdorp and visited various localities in the Khamiesberg, between 2,000 and 6,000 ft.

In this, as in the previously issued part, many of the determinations could not have been made in South Africa without the kind co-operation of the Director and Staff of the Royal Botanic Gardens, Kew, which I gratefully acknowledge. In the study of

the Khamiesberg flora I have received very valuable assistance from the Rev. W. M. Crampton, until recently in charge of the Wesleyan Mission Station at Leliefontein.

## ERICACEAE.\*†

*By Louisa Bolus.*

### 1. ERICA.

1. *E. Petiveri*, Linn., Diss. Erica, 50; Mant. alt. 235.

Cape: Top of Oliphant's River Mts., behind Warm Baths, 7309, 7041.

2. *E. Plukeneti*, Linn., Sp. Pl., ed. i., 356.

Cape: Giftberg, 1-2,000 ft., 7587. Khamiesberg: Elliottsberg, 7691. Upper western and upper southern slopes of Sneeuwkop, 5830. South-western slopes of Vogelklip, near the summit, 5929.

3. *E. curviflora*, Linn., var.  $\beta$ , *Burchellii*, Bolus, in Fl. Cap., iv., § i., p. 71.

Cape: Bed of Oliphant's River, near Warm Baths.

4. *E. dilatata*, Wendl. fil., ex Benth., in DC., Prodr., vii., 656.

Khamiesberg: Lower middle western slopes to summit of Sneeuwkop, 5827.

This is a most interesting rediscovery. Hitherto the species has been known only from what is probably a garden plant in the Berlin Herbarium, and a coloured drawing in Wendland's "Icones," published in 1823. Its habitat was quite unknown, and the advent of the fine collection from the Sneeuwkop not only elucidates what had long been obscure but allays the anxiety of those who feared the species had become extinct.

5. *E. caffra*, Linn., Sp. Pl., ed. 1, 353.

Cape: Growing below waterfall, Giftberg, 1-2,000 ft., 7589.

6. *E. bicolor*, Thunb., Diss. Erica, 36.

Cape: Slopes of Oliphant's River Mts., near Warm Baths, 7047.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 29.

† Contributed from the Bolus Herbarium, South African College.

7. *E. verecunda*, Salisb., in Trans. Linn. Soc., vi., 379.

Khamiesberg: Beaem Hill, 2 miles south-east of Leliefontein  
5,400 ft., 6355.

8. *E. quadrangularis*, Salisb., Prodr., 297.

Cape: Foothills Cold Bokkeveld Mts., opposite Warm Baths,  
Oliphant's River Valley, 7043. Common on banks of stream, Gift-  
berg, 7591. Growing in a large patch on path from Snortfontein  
Farm to Doorn River, Giftberg, 7590.

9. *E. bruniades*, Linn., Sp. Pl., ed. 1, 354.

Cape: Giftberg, 1-2,000 ft., 7586.

10. *E. imbricata*, Linn., Sp. Pl., ed. 2, 503.

Cape: Giftberg, 1-2,000 ft., 7588.

11. *E. calycina*, Linn., Sp. Pl., ed. 2, 507.

Khamiesberg: Elliottsberg, 7690.

12. *E. lucida*, Salisb., in Trans. Linn. Soc., vi., 337.

Cape: Foothills Cold Bokkeveld Mts., opposite Warm Baths,  
Oliphant's River Valley, 6898.

13. *E. cristaeiflora*, Salisb., var.  $\beta$ , *blanda*, Bolus, in Fl. Cap., iv., § 1,  
p. 301.

Cape: Summit of Oliphant's River Mts. behind Warm Baths,  
7048.

## 2. EREMIAS.

1. *E. totta*, Don, in Edinb. New Phil. Journ., xvii., 156, and Gen.  
Syst., iii., 828.

Cape: Near summit Oliphant's River Mts., above Pickenier's Pass,  
5124. Summit of Oliphant's River Mts., behind Warm Baths, 6891,  
7038.

## 3. GRISEBACHIA.

1. *G. velleriflora*, Klotzsch, in Linnaea, xii., 227.

Cape: Oliphant's River Valley, along road from Warm Baths to  
Modderfontein, 7042.



2. *G. Dregeana*, Benth., in DC., Prodr., vii., 701.

Cape: Giftberg, 1–2,000 ft., 7585.

Previously known only from a collection of Drège, without locality.

#### 4. SIMOCHEILUS.

1. *S. bicolor*, Benth., in DC., Prodr., vii., 703.

Cape: Summit of Oliphant's River Mts., behind Warm Baths, 6858. Slopes of Oliphant's River Mts., near Warm Baths, 7046, 7045, 7040, 7039. On road from Snortfontein Farm to Doorn River, Giftberg, 1–2,000 ft., 7584.

#### 5. SCYPHOGYNE.

1. *S. glandulifera*, N. E. Brown, in Fl. Cap., iv., § 1, p. 411.

Cape: Oliphant's River Valley, near Warm Baths, 7780.

## OLEACEAE.\*†

*By Louisa Bolus.*

#### 1. OLEA.

1. *O. verrucosa*, Link, Enum. Hort. Berol., i., 33.

Cape: Common on eastern side of Pickenier's Pass, 2,000 ft., 5226, 5153. Namaqualand: Common on middle granite slopes a little north of Middlekraal, 5669. High up on slopes of Rattelpoort Mt., 2966.

#### 2. JASMINUM.

1. *J. glaucum*, Ait., Hort. Kew, ed. 1, i., 9.

Cape: Dry river-bed at outspan, Hex River, 5271.

#### 3. MENODORA.

1. *M. juncea*, Harv., Gen. S. Afr. Pl., ed. 2, 220.

Namaqualand: In steep kloof on south-western side of mountain, 3 miles north-east from Stinkfontein, 5639.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, No. 30.

† Contributed from the Bolus Herbarium, South African College.

**MYOPORINEAE.\*†***By Louisa Bolus.***OFTIA.**

1. *O. africana*, Bocq., ex Baill. Adansonia, ii., 11.

Cape: Near Warm Baths, Oliphant's River Valley, 7257, 6881. Sand near outspan, top of Pickenier's Pass, 5112. On sanddunes at foot of Giftberg on western side, Doorn River Bridge, 5394. Karroo: Between Karrooport and Zoutpansdrift, 2,000 ft., 5014.

2. *O. revoluta*, Bocq., ex Baill. Adansonia, ii., 12.

Khamiesberg: Upper and lower plateau, south-eastern slopes Vogelklip, 5919. On southern slopes of Sneeuwkop, 5859. Lower middle western slopes of Sneeuwkop, 5779. Beaem Hill, 2 miles south-east of Leliefontein Mission Station, 6357. Namaqualand: Northern slopes of ridge opposite Klipfontein, 5956.

**MYRSINEAE\*†.***By Louisa Bolus.***MYRSINE.**

1. *M. africana*, Linn., Sp. Pl., ed. 1, 196.

Cape: Foothills of Cold Bokkeveld Mts., opposite Warm Baths, Oliphant's River Valley, 7314. Foot of Oliphant's River Mts., near Warm Baths, 7308.

**PRIMULACEAE.\*†***By Louisa Bolus.***1. ANAGALLIS.**

1. *A. arvensis*, Linn., Sp. Pl., ed. 1, 148.

Cape: Stream-bed at Leeuwfontein, 3195.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 31, 32.

† Contributed from the Bolus Herbarium, South African College.

2. SAMOLUS.

1. *S. Valerandi*, Linn., Sp. Pl., ed. 1, 171.

Cape: Attis River-bed, in damp spots, 5385. Namaqualand: Damp ledges overhanging brak water-pools, south bank of Orange River near Bethany Drift, 6095.

**LOGANIACEAE.\*†**

*By Louisa Bolus.*

1. GOMPHOSTIGMA.

1. *G. scoparioides*, Turcz., in Bull. Soc. Nat. Mosc., xvi., 53.

Cape: Dry river-bed, Doorn River Bridge, 5401. Bushmanland: Wet mud, Orange River, near Abbasis, 2994.

2. BUDDLEIA.

1. *B. salvifolia*, Lam., Encycl., i., 513.

Khamiesberg: Lower and middle slopes Sneeuwberg, 5806.

**LAURINEAE.\*†**

*By Louisa Bolus.*

CASSYTHA.

1. *C. ciliolata*, Nees, Syst. Laur., 646.

Cape: Summit of Oliphant's River Mts., behind Warm Baths, 7259.

**BIGNONIACEAE.\*†**

*By Louisa Bolus and E. P. Phillips.*

1. CATOPHRACTES.

1. *C. Alexandri*, D. Don, in Ann. Nat. Hist., ii. (1839), 375.

Great Namaqualand: Holoog, 4129. Dry water-courses near Gründoorn, 3146.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 33, 34, 35, 36.

† Contributed from the Bolus Herbarium, South African College.

## 2. RHIGOZUM.

1. *R. obovatum*, Burch., Trav., i., 389.

Great Namaqualand: Kopje between Dabaigabis and Gründoorn, 4,200 ft., 3155.

2. *R. trichotomum*, Burch., Trav., i., 299.

Great Namaqualand: Common on banks of dry river-course, 20 km. North of Raman's Drift, 2,400 ft., 4537. Bushmanland: Pella, 2595, 3547. Stony ground near outspan at Groot Rozynbosch, 2,800 ft., 3830, 3839. Common in patches on sand between Wortel and Dabainoris, 3035.

## PEDALINACEAE.\*†

*By Louisa Bolus.*

## 1. HARPAGOPHYTUM.

1. *H. procumbens*, DC., Prodr., ix., 257.

Great Namaqualand: Sand dunes Sandverhaar, 4436. Dry sand 25 km. North of Warmbad, 4466, 4364.

## 2. ROGERIA.

1. *R. longiflora*, J. Gay, in Ann. Sc. Nat., 1re sér. i., 457.

Bushmanland: Sandy river-bed leading down to Orange River, 4074.

## 3. SESAMUM.

1. *S. capense*, Burm. fil., Fl. Cap., Prod., 17.

Great Namaqualand: Banks of dry stream-bed on flat 12 km. West of Sandverhaar, 4349. Sandy plain North of Schakalskuppe Station, 4224. Sandy plains 25 km. North of Warmbad, 4289. At base of kopje on sandy plain about 30 km. South of Gründoorn, 3,900 ft., 4551. Middle slopes of kopje above pass leading down to Gründoorn, 4349.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 37.

† Contributed from the Bolus Herbarium, South African College.

## DIPSACEAE.\*†

*By Louisa Bolus.*

### SCABIOSA.

1. *S. Columbaria*, Linn., Sp. Pl., 143.

Cape : Damp spots southern aspect above Pickenier's Pass, 2,000 ft., 5176. Roadside between Hottentots' Kloof and Karroo-poort, 4816. Khamiesberg : In dense vegetation in river-bed Khamiesberg plateau, 6247. Dry stream bed south-eastern slopes of Sneeuwkop above Modderfontein, 5876. Among low bushes in 1st plateau Vogelklip, 5938. Namaqualand : Northern slopes of Rietkloof Mts., 2,600 ft., 5711.

## APOCYNACEAE.\*†

*By Louisa Bolus.*

### CARISSA.

1. *C. Arduina*, Lam., Encycl., i., 555.

Namaqualand : Middle southern slopes TcAlee Mts., 6020, 6143.

## NYCTAGINEAE.\*†

*By Louisa Bolus.*

### 1. BOERHAAVIA.

1. *B. repens*, var. *diffusa*, Hook f., Fl. Brit. Ind., iv., 709.

Great Namaqualand : Buchholzbrunn, 3664, 3046. Prostrate in sand, bed of Fisch River at Seeheim, 2,300 ft., 3724. Schaf River-bed, Seeheim, 3732.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 38, 39, 40.

† Contributed from the Bolus Herbarium, South African College.

## 2. PHAEOPTILUM.

1. *P. spinosum*, Radlk., in Abhandl. Naturw. Ver. Bremen, viii., 436.

Great Namaqualand: Sandy plains 25 km. North of Warmbad, 4308, 4375. Sandy river-bed at Sandverhaar, 3,100 ft., 4643. About 30 km. North of Raman's Drift, 4049.

## ORCHIDACEAE.\*†

*By Louisa Bolus.*

## 1. HOLOTHRIX.

1. *H. aspera*, Reichb. f., Otia Bot. Hamb. (1881), 119.

Cape: Giftberg, 1-2,000 ft., 7562, 7641.

2. *H. villosa*, Lindl., in Comp. Bot. Mag., vol. ii., p. 207 (1836).

Cape: Giftberg, 1-2,000 ft., 7625. Oliphant's River Mts. near Warm Baths, 7787.

3. *H. secunda*, Reichb. f., Otia Bot. Hamb. (1881), 119.

Cape: Damp places, Giftberg, 1-2,000 ft., 7556.

4. *H. condensata*, Sond., in Linnæa, xix.

Cape: Damp places high up on cliffs, Ceres, 3535.

## 2. SATYRIUM.

1. *S. pumilum*, Thunb., Prodr. Plant. Cap. (1794), 6.

Cape: Damp place, Giftberg, 1-2,000 ft., 7555.

2. *S. erectum*, Swartz, in Kongl. Vetensk. Acad. Handl., xxi. (1800), p. 216.

Cape: Giftberg, 1-2,000 ft., 7642, 7557. Oliphant's River Valley near Warm Baths, 7089.

3. *S. Lindleyanum*, Bolus, in Journ. Linn. Soc., Bot., xx. (1884), 474.

Cape: Oliphant's River Valley near Warm Baths, 7784.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 41.

† Contributed from the Bolus Herbarium, South African College.

4. *S. coriifolium*, Swartz, in Kongl. Vet. Acad. Handl., xxi. (1800), p. 216.

Cape: Oliphant's River Valley near Warm Baths, 7088.

5. *S. stenopetalum*, Lindl., Gen. and Sp. Orch., p. 336.

Cape: Oliphant's River Valley near Warm Baths, 5368.

6. *S. ochroleucum*, Bolus, in Journ. Linn. Soc., Bot., xxii. (1885).

Cape: Leeuwfontein, 3219.

### 3. DISA.

1. *D. tenella*, Swartz, in Kongl. Vet. Acad. Handl., xxi. (1800), p. 212.

Cape: Giftberg, 1-2,000 ft., 7560.

2. *Disa Harveyana*, Lindl., in Hook. Lond. Journ. Bot., i. (1842).

Cape: Shade of rocks on summit Oliphant's River Mts. above Pickenier's Pass.

3. *D. micrantha*, Bolus, in Journ. Linn. Soc., Bot., xxv. (1890), 196.

Cape: Oliphant's River Valley near Warm Baths, 5180, 7085.

### 4. SCHIZODIUM.

1. *S. flexuosum*, Lindl., Gen. and Sp. Orch. (1838), p. 359.

Cape: Giftberg, 1-2,000 ft., 7561.

### 5. DISPERSIS.

1. *D. circumflexa*, Dur. and Schinz., var.  $\beta$ , *aemula*, Schltr., in Bull. Herb. Boiss., vi. (1898), 923.

Cape: Giftberg, 1-2,000 ft., 7640. Oliphant's River Valley near Warm Baths, 7788.

### 6. PTERYGODIUM.

1. *P. orobanchoides*, Schltr., in Bull. Herb. Boiss., vi. (1898), 848.

Cape: Growing in sand at side of cultivated lands, Giftberg, 1-2,000 ft.; Oliphant's River Valley near Warm Baths, 7328, 7326.

2. *P. catholicum*, Swartz, in Kongl. Vet. Acad. Handl., xxi. (1800), 218.

Cape: Giftberg, 1–2,000 ft., 7554, 7564. Oliphant's River Valley near Warm Baths, 7084, 7329.

3. *P. caffrum*, Swartz, *l. c.*, p. 218.

Cape: Oliphant's River Valley near Warm Baths, 7786.

4. *P. crispum*, Schltr., *l. c.*, p. 849.

Cape: Oliphant's River Valley near Warm Baths, 7327. Sand flats between Driefontein and Heeren Logement, 6753.

5. *P. alatum*, Swartz, in Kongl. Vet. Acad. Handl., xxi. (1800), 218.

Cape: Giftberg, 1–2,000 ft., 7559.

## FICOIDEAE.\*†

*By Louisa Bolus.*

### 1. MESEMBRIANTHEMUM.

1. *M. minutum*, Haw., Obs. 126, Syn. 202.

Namaqualand: Northern slopes, Stinkfontein, 5574. Flowered in Mr. N. S. Pillans' garden, Rosebank, near Cape Town.

2. *M. minimum*, Haw., Obs. 126, Syn. 203.

Cape: Giftberg, growing on rocks, 1–2,000 ft., 7644.

3. *M. obconellum*, Haw., Misc. 21, Syn. 203.

Namaqualand: Northern slopes, Stinkfontein, 5574*b*. Flowered in Mr. N. S. Pillans' garden, Rosebank, near Cape Town.

4. *M. calculus*, Berger, in Mes. und Portulac. (1908), p. 289.

Karoo: Summit of ridge  $4\frac{1}{2}$  miles South-east of Bakhuis, 5479. Upper western slopes of hill above Nieuwerust, 5515. Flowered in Mr. N. S. Pillans' garden, Rosebank, near Cape Town.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 42.

† Contributed from the Bolus Herbarium, South African College.



5. *M. Wettsteinii*, Berger, *l. c.*, p. 285.

Flowered in Mr. N. S. Pillans' garden, Rosebank, near Cape Town, 7785.

6. *M. nanum*, Schltr., in Engl. Bot. Jahrb., xxvii., p. 128.

Namaqualand: Barren slopes north of Daunabis, 6063.

7. *M. bilobum*, Marloth, in Trans. S.A. Phil. Soc., xviii. (1907), p. 44, t. V., fig. 2.

Namaqualand: Plains between Stinkfontein and Chubiesis, 6203. Flowered in Mr. N. S. Pillans' garden, Rosebank, near Cape Town.

8. *M. gracilistylum*, sp. nov., ad *M. bilobo*, Marloth, affine, sed floribus 4meris pedunculatis, pedunculo 2bracteato, petalis roseis, facile distinguitur.

Acaulescens, omnino glabrum, 3·5–4 cm. altum; folia ad dimidium vel ultra connata, lateraliter compressa, oblique 3quetra, obtusa glauca, 0·5–0·7 cm. lata, 0·7–1·1 cm. diam.; flores 4meri pedunculati, pedunculo tereti, infra medium 2bracteato, 0·5–0·6 cm. longo; calycis tubum ultra ovarium productum, exsertum hyalinum, segmentis inter se subaequalibus linearibus, acutis vel subobtusis, 0·2–0·3 cm. longis; petala ultra medium in tubum connata, 2seriata linearia subacuta, 0·8–1 cm. longa; stamina 4–5seriata, extima in corollae fauce manifesta; ovarium inclusum suboblongum, supra concavis, glandulis viridibus conspicuis, stylis erectis gracillimis capillaceis, 0·7–0·9 cm. longis.

Namaqualand: Summit of hill  $1\frac{1}{2}$  miles South of Stinkfontein, 5572.

Acaulescent, quite glabrous, 3·5–4 cm. high; leaves connate for half their length or more, laterally compressed, obliquely 3quetrous, obtuse, glaucous, 0·5–0·7 cm. wide, 0·7–1·1 cm. in diam.; flowers 4merous pedunculate, the peduncle terete, 2bracteate below the middle, 0·5–0·6 cm. long; calyx-tube produced beyond the ovary, exserted hyaline, the segments almost equal, linear, acute or somewhat obtuse, 0·2–0·3 cm. long; petals connate beyond the middle into a tube, 2seriate linear somewhat acute, 0·8–1 cm. long; stamens 4–5seriate, the outermost just visible in the throat of the corolla; ovary enclosed within the leaves, suboblong, the glands green, conspicuous, the styles erect, very slender, capillaceous, 0·7–0·9 cm. long.

Allied to *M. bilobum*, Marloth, but readily distinguished by the

tetramerous pedunculate flowers with rosy petals and the presence of bracts.

The description was made from a plant which flowered in Mr. N. S. Pillans' garden, Rosebank, near Cape Town.

Plate III. A. Fig. 1, branch; 2, transverse section of one of the leaves, nat. size; 3, flower, with peduncle and bracts; 4, corolla, laid open, with stamens; 5, corolla; 6, gynoeceium, with glands—all the latter variously enlarged.

9. *M. Pearsonii*, N. E. Brown, in Kew Bull. (1912), p. 277, Bot. Mag. t. 8463.

Karoo: Eastern slopes of ridge 4 miles South-east of Bakhuis, 5482.

10. *M. robustum*, Haw., Misc. 28, Syn. 211.

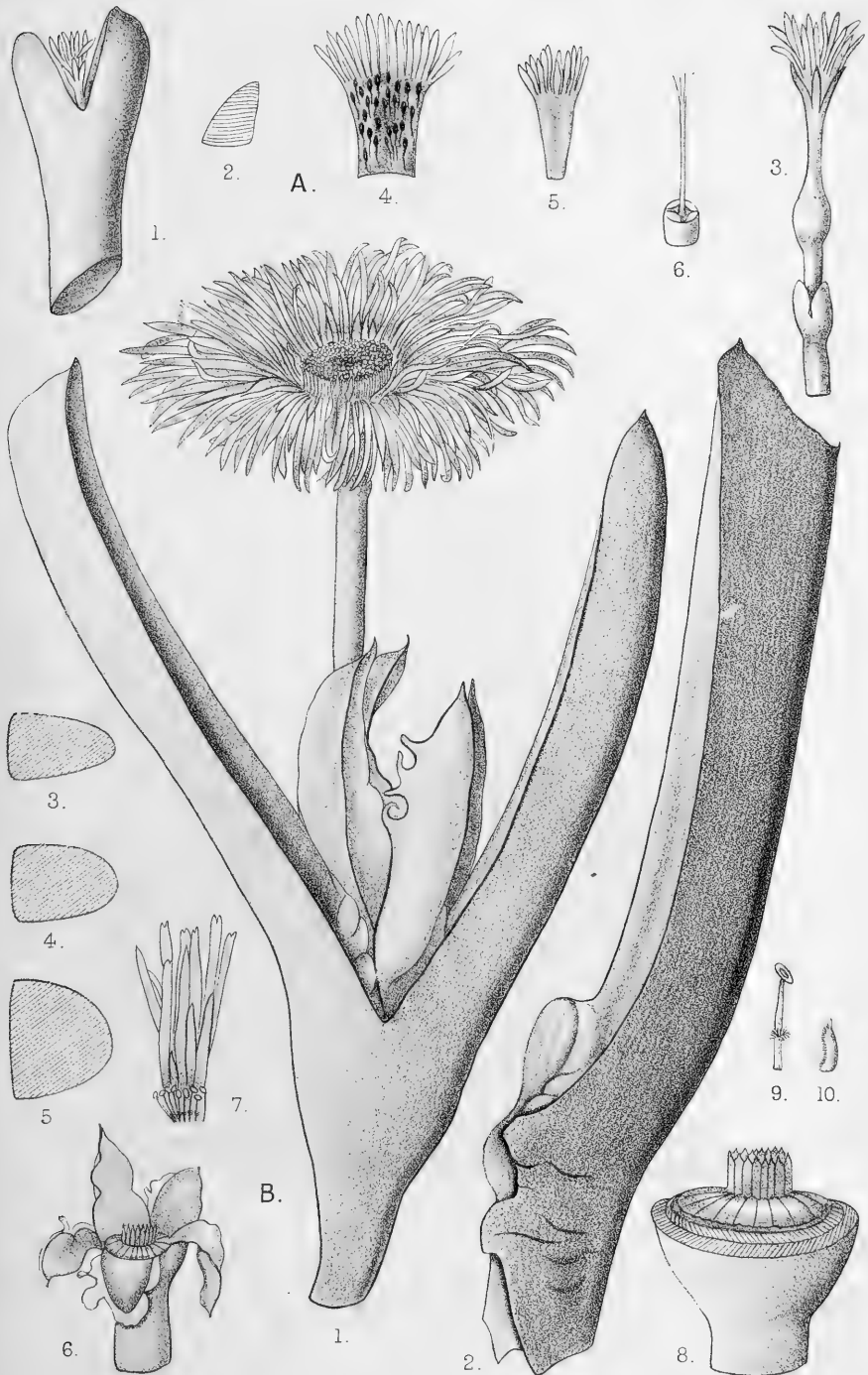
Khamiesberg: Bailey's Vlakte, damp ground, 6440. Naras Ravine in wet sand, 6435.

11. *M. denticulatum*, Haw., var.  $\gamma$ , *candidissimum*, Haw., Obs. 149.



MESEMBRIANTHEMUM DENTICULATUM, Haw., var.  $\gamma$ , CANDIDISSIMUM.

Namaqualand: Stinkfontein, 6432, 5586. Little Bushmanland: Eenriet, lower sandy slopes, 4072, 4068.



A. A.M. Tugwell del.  
B. M.W. Glover "

West, Newman lith.

A. MESEMBRIANTHEMUM GRACILISTYLOM, L. Bolus.  
B. " DENTICULATUM, Haw.  
var. γ, CANDIDISSIMUM.



Plate III. B. Fig. 1, branch; 2, leaf from another branch, largest seen; 3, transverse section of same near the apex; 4, ditto, in the middle; 5, ditto, near the base; 6, calyx and gynoeceium; 7, portion of corolla and androecium—all nat. size; 8, gynoeceium with glands; 9, one of the stamens; 10, one of the styles.

The drawing was made partly from the dried specimens, and partly (the flower of Fig. 1, and the rest of the Figs.) from those which flowered in Mr. N. S. Pillans' garden at Rosebank.

12. *M. rostratum*, Linn., var.  $\beta$ , *brevibracteatum*.

Namaqualand: Between Bitterfontein and Stinkfontein, 5562, 5563.

13. *M. sp.*, ad *M. mustellino*, Salm-Dyck proxime affine, sed foliis griseo-pubescentibus, pedunculo calyceque fructifero pilis retrorsis albis hispidis praeditis differt. Flores desunt.

Little Bushmanland: Eenriet upper slopes, 4071.

Very closely allied to *M. mustelinum*, Salm-Dyck, but differs in having grey-pubescent leaves, and the fruiting peduncle and calyx furnished with retrorse white hispid hairs. The specimens collected are not in flower.

14. *M. digitatum*, Ait., Hort. Kew, 2, 181. (= *M. digitiforme*, Thunb.)

Karoo: Northern slopes of ridge next road 3 miles South of Bakhuis, 5453.

15. *M. macradenium*, sp. nov., *M. calamiformi* affine, sed floribus minoribus, petalis flavis, stylis longioribus gracilioribus differt.

Caulis decumbens lignosus, ramis adscendentibus, basi vestigiis foliorum delapsorum vestitis, apice 4-6foliatis; folia subaequalia, basi connata, semi-teretia, apice turgide 3quetra, obtusa vel subacute, viridia laevia, 2.5-6 cm. longa, 0.6-0.8 cm. diam.; flores 5meri pedunculati, pedunculo solitario ebracteato subcompresso, foliis paullo brevioribus; calyx turbinatus, segmentis foliaceis carinatis lanceolatis obtusis, duobus parum longioribus, 0.8-1.3 cm. longis; petala 2seriata linearia obtusa flava, calycis segmenta vix excedentia; stamina pluriseriata, basi copiose barbata, extima petalis paullo breviora; disci glandulae maximae lunatae distinctae virides;

ovarium supra planum vel subconcauum, 0·9 cm. diam. ; styli 5 semi-teretes setaceo-acuminati, staminibus longiores.

Karoo : About 9 miles along Beukesfontein Road, 3693.

Stem decumbent woody, the branches ascending, clothed at the base with the remains of fallen leaves, bearing 4-6 leaves at the apex ; leaves nearly equal, connate at base, semi-terete, turgidly 3quetrous at the apex ; obtuse or subacute, green smooth, 2·5-6 cm. long, 0·6-0·8 cm. diam. ; flowers 5merous pedunculate, the peduncle solitary ebracteate subcompressed, a little shorter than the leaves ; calyx turbinate, the segments foliaceous carinate lanceolate obtuse, two a little longer than the rest, 0·8-1·3 cm. long ; petals 2seriate linear obtuse yellow, scarcely exceeding the calyx-segments in length ; stamens in several rows, copiously bearded at the base, the outermost a little shorter than the petals ; glands of the disk very large, lunate distinct green ; ovary flat or somewhat concave above, 0·9 cm. diam. ; styles 5 semi-terete.

16. *M. diversifolium*, Haw., Misc. 38, Syn. 230.

Cape : Giftberg 1-2,000 ft., 7662. Namaqualand : Common at Grauwater, 3272.

17. *M. laeve*, Thunb., Nov. Act. Nat. Cur., v., 8, p. 16, App.

. Cape : Giftberg, 1-2,000 ft., 7505.

18. *M. validum*, Haw., Phil. Mag., Nov., 1826, 329.

Namaqualand : Common between Bitterfontein and Stinkfontein, 5576. Karroo : Ridge  $4\frac{1}{2}$  miles South-east of Bakhuis, 5487.

19. *M. elongatum*, Haw., Obs. 236, Syn. 223.

Cape : In sand near Pickenier's Pass, 5262*b*.

20. *M. pugioniforme*, Linn., Sp. Pl., 699.

Khamiesberg : Tweerivieren, common in sandy ground, 6438.

21. *M. rigidicaule*, Haw., Rev., 116.

Cape : Summit of Oliphant's River Mts. behind Warm Baths, 7319.

22. *M. sarmentosum*, Haw., Syn. 238.

Cape : Giftberg, 7499.

23. *M. geminiflorum*, Haw., Rev. 114, var. *gracile*, nov. var., a forma typica habitu graciliore, foliis brevioribus differt.

Khamiesberg: Bailey's Vlakte, Leliefontein, 6442.

Differs from the typical form by the more slender habit and shorter leaves.

24. *M. gracile*, Haw., Rev. 144.

Cape: Dry ground, Boontjes Rivier, 5170.

25. *M. glaucum*, Linn., Sp. Pl., 696.

Cape: Giftberg, 7668, 7663, 7666, 7504.

26. *M. blandum*, Haw., Suppl. 95, Rev. 147.

Namaqualand: Jackal's Mt., Sendling's Drift.

27. *M. falcatum*, Linn., Sp. Pl., 694.

Cape: Foothills Cold Bokkeveld Mts. opposite Warm Baths, 7324. Southern slopes above Pickenier's Pass, 5181.

28. *M. lunatum*, Willd., Enum. 538.

Cape: In rock fissures upper north-eastern slopes above Pickenier's Pass, 5131. Giftberg, 7651, 7665. Locality uncertain, 3689. Mountain-tops near Hottentots' Kloof, 3913.

29. *M. perfoliatum*, Haw., var. *integrifolium*, L. Bolus.

Little Bushmanland: Common on slopes between Kamabies and Tweefontein, 3045.

30. *M. uncinatum*, Will., Dict., ed. 8, n. 18.

Upper Region: Plateau on top of Blaukrantz Pass, 3911.

31. *M. uncinellum*, Haw., Rev. 125.

Great Namaqualand: Among rocks between Dabaigabis and Gabis, 4441. Near river-beds on sandy plain one day South of Gründoorn, 4445. Sandy plains around Schakalskuppe, 4163.

32. *M. lineolatum*, Haw., Rev. 130, forma.

Namaqualand: Between Bitterfontein and Stinkfontein, 5575.

33. *M. mucronatum*, Haw., Misc. 73, Syn. 297.

Karoo: Between Zoutpansdrift and Beukesfontein, 2,000 ft., 3690.

34. *M. Rostellum*, Salm Dyck, fasc. 2, t. 18.

Cape: Leeuwfontein, on burnt veld, 5040.

35. *M. multiflorum*, Haw., Misc. 96, Syn. 285.

Cape: Roadside between Hottentots' Kloof and Karroopoort, 4829. Karroo: Common on stony plains at Beukesfontein, 1,200 ft., 3914.

36. *M. tumidulum*, Haw., Syn. 286.

Namaqualand: Klipplaat, common bush on sandy plains, 3048. Little Bushmanland: Common on sand near Tweefontein, 3047. Namaqualand: Between Alewyn's Fontein and Kamabies.

37. *M. umbellatum*, Linn., Sp. Pl., 481.

Namaqualand: Near summit of mountain 3 miles North-east of Stinkfontein, 5633.

37A. *M. umbellatum*, Linn., forma.

Khamiesberg: Beacon Hill, 2 miles South-east of Leliefontein Mission Station, 6368.

38. *M. croceum*, Jacq.

Namaqualand: Under bushes at Koets, 5743.

39. *M. cradockense*, O. Kuntze.

Upper Region: Very common bush on plateau on top of Blaukrantz Pass, 3909. Bushmanland: Common on granite slopes at Kweekfontein, 3,000 ft., 3579.

40. *M. sessile*, Thunb., Nov. Act. Nat. Curios., viii., p. 14, App.

Little Bushmanland: Common on gneissic kopje towards Bitterfontein, 3054. Common on sand and granite kopjes near Rietfontein, 3040. Namaqualand: Common on sandy plains North of Alewyn's Fontein, 3067.

41. *M. trichotomum*, Thunb., ? *l. c.*

Great Namaqualand: Between 21 and 30 km. North of Raman's Drift, 4430.

42. *M. defoliatum*, Haw., Misc. 83.

Upper Region: Very common between Karieboomfontein and Calvinia on sand, 2,500 ft., 3391. Karroo: Between Zoutpansdrift and Beukesfontein, 2,000 ft., 3688. Namaqualand: Plaatklip in



sand, 3064. Little Bushmanland: Dry sand 8 miles South-west of Bitterfontein, 3066.

43. *M. noctiflorum*, Linn., Sp. Pl., 689.

Namaqualand: Sandy plains near Nieuwefontein, 3050, 3357. Saline flat at Gawachab, 4449.

44. *M. junceum*, Haw., Misc. 175, Syn. 255.

Cape: Western aspect between Clanwilliam and Langkloof, 5331. Karroo: Zoutpansdrift, 2,000 ft., 3691. Saline vlei near Stompiesfontein, 800 ft., 3918. Between Zoutpansdrift and Beukesfontein, 2,000 ft., 3693. Bushmanland: Common on sand at Aus, 2,900 ft., 4719. Common on stony ground at Groot Rozynbosch, 2,800 ft., 3846. On sand about 8 miles South-west of Bitterfontein, 3062. Namaqualand: Doorn River-bed, 4879. River-bed between Loeriesfontein and Grauwater, 3273. River-bed near Sabiesis Water-hole, 4446. Schakalskuppe, 4,500 ft., 3364. River-bed at Gabies, 2,800 ft., 4443. Sandy plains around Schakalskuppe, 4164.

45. *M. simile*, Sond., in Fl. Cap., ii., p. 435.

Namaqualand: Plaatklip in sand, 3063.

*M. simile*, Sond., var. *namaquense*, Sond., in Fl. Cap., ii., p. 435.

Namaqualand: Doornpoort Ravine, 6127.

46. *M. Schlichtianum*, Sond., in Fl. Cap., ii., p. 435.

Damaraland: Common in narrow ravines of the Khan River Valley near Welwitsch, 3365.

47. *M. ciliatum*, Thunb., *l. c.*, p. 11, App.

Bushmanland: On red sand about 8 miles South-west of Bitterfontein, 3941. Karroo: Sand between Gansfontein and Pappekuil, 1,000 ft., 3687.

48. *M. salicornioides*, Pax, in Engl. Bot. Jahrb., vol. xix. (1895), p. 133.

Bushmanland: Common in indurated sand at Aus, 2,900 ft., 4700. Namaqualand: Upper end of lateral valley 10-15 km. North of Raman's Drift, 4641. At outspan between Modderfontein and Doornpoort.

49. *M. spiniforme*, Haw., Misc. 87, Syn. 291.

Namaqualand?: Loc. uncertain, 6282.

50. *M. glomeratum*, Linn., var.  $\beta$ , *majus*, Sond., in Fl. Cap., ii., p. 439.

Cape : Foot of Oliphant's River Mts. near Warm Baths, 7167.

51. *M. parvifolium*, Haw., Rev. 184.

Karoo : Slope South of and facing Nieuwerust, 5530.

52. *M. brevifolium*, Ait., Hort. Kew, vol. 2, 188.

Great Namaqualand : Abundant from middle slopes to tops of highest hills near Schakalskuppe. Stony ground about 40 km. North of Warmbad, 4442.

53. *M. collinum*, Sond., in Fl. Cap., ii., p. 443.

Cape : Among bushes at Hottentots' Kloof, 4903.

54. *M. calycinum*, Haw., Rev. 187.

Cape : Pickenier's Pass, eastern slopes, 5150.

55. *M. floribundum*, Haw., Syn. 274.

Karoo : Common in river-bed between Stompiesfontein and Schuurkraal about 1,000 ft., 3919.

56. *M. striatum*, Haw., Syn. 275.

Cape : Foot of Oliphant's River Mts. behind Warm Baths, 6894. Foot of Cold Bokkeveld Mts. opposite Warm Baths, Oliphant's River Valley, 7170. Slopes of Oliphant's River Mts., near Warm Baths, 7177.

57. *M. mirabile*, N. E. Br., in Gard. Chron. (1903), ii., 131.

Namaqualand : Northern slopes Stinkfontein, 5574c.

58. *M. oculatum*, N. E. Br., in Kew Bull. (1911), p. 313.

Namaqualand : Flowered at Kew in June, 1911.

59. *M. pisiforme*, Haw., Misc. 23, Syn. 207.

Karoo ; Bakhuis, 5452.

60. *M. crassulinum*, DC., Prodr., iii., p. 445.

Karoo : Grauwater, 3270.

61. *M. geniculiflorum*, Linn., Sp. Pl., 688.

Karoo : Sand a few miles North of Nieuwerust, 5544.

62. *M. criniflorum*, Houtt., Pfl. Syst., 2, D. t. 53.

Karoo : Sandy flats between Dreefontein and Heerenlogement, 6437. Khamiesberg : Sandy places in Khamsoap Ravine, 6551. Cape : Warm Baths, Oliphant's River Valley, 7165. Alluvial sand, Oliphant's River Valley near Warm Baths, 7331.

63. *M. anatomicum*, Haw., Syn. 249.

Khamiesberg : Khom's ravine below 4,000 ft., 6434. Namaqualand : Common on kopje near Nieuwefontein, 3068.

64. *M. tortuosum*, Linn., *l. c.*, 697.

Namaqualand : Among boulders in valley of Khamsoap River 1 day South of Kamabies. Karoo : Schuurkraal, 1,100 ft., 3916.

65. *M. Tripolium*, Linn., *l. c.*, 690.

Cape : Sandy soil, Oliphant's River Valley near Warm Baths, 7330. Damp spot among grass near road Pickenier's Pass, 5209.

66. *M. pomeridianum*, Linn., *l. c.*, 698.

Cape : Alluvial sand Oliphant's River Valley near Warm Baths, 7175, 7173, 7330. Along road from Warm Baths to Modderfontein Farm, Oliphant's River Valley, 7168. Slopes of Oliphant's River Mts. near Warm Baths, 7169. Sandy slopes South-east side of road through Pickenier's Kloof, 5138.

67. *M. resurgens*, Kensit, in Trans. Royal Soc. of S.A., vol. i. (1909), p. 154.

Khamiesberg : Bailey's Vlakte, damp ground, 6441.

68. *M. Barklyi*, N. E. Brown, in Hook. Ic. Pl., vol. xix., t. 1820.

Karoo : Karroid plain between Bakhuis and Nieuwerust, 5438.

69. *M. apiculatum*, Kensit, in Trans. Royal Soc. of S.A., vol. 1 (1909), p. 154; var. *muticum*, nov. var., a forma typica caulibus procumbentibus radicanibus, foliis muticis brevioribus, differt.

Cape : Giftberg, 7664.

Differs from the typical form in having procumbent stems rooting at the nodes, and muticous shorter leaves.

This variety was also collected by Dr. R. Schlechter (No. 10817), on the Packhuisberg in Aug., 1897.

70. *M. sp.*

Cape : Giftberg, 7667.

71. *M. sp.*

Namaqualand: High plateau on western side TcAlee Mts., 5988.

72. *M. sp.*

Namaqualand: Quartzite slopes between Brakwater and Hell's Kloof, 6071.

73. *M. crystallino-papillosum*, ad 23 cm. altum, e basi ramosum, ramis adscendentibus, basi reliquis foliorum delapsorum dense vestitis, apice pedunculoideis; pedunculis teretibus, ad 17 cm. longis, bracteis sparsis angustis, ad 5 cm. longis, ornatis, e medio floriferis, floribus subracemosis; foliis basi connatis, lanceolatis, longe acuminatis, ad 6 cm. longis; calycis segmentis 5, longe acuminatis, ad 2 cm. longis.

Namaqualand: Quartzite Hills, North of Stinkfontein, 6158.

A crystalline-papillose herb, attaining 23 cm. in height, branched from the base, the branches ascending, closely covered at the base with the remains of fallen leaves, pedunculoid at the apex; peduncles terete, up to 17 cm. long, furnished with scattered narrow bracts, up to 5 cm. long, bearing flowers from the middle, the flowers arranged racemously; leaves connate at base, lanceolate, long acuminate, up to 6 cm. long; calyx-segments 5, long acuminate, up to 2 cm. long.

A very distinct-looking plant with the habit of the § *Helianthoidea*, and the leaves persisting after the manner of those in *M. anatomicum*, Haw., and *M. tortuosum*, Linn., to protect the next season's shoot. The two specimens collected show the early stages of the new growth, but the notes given above are drawn up entirely from the remains of the previous season's growth.

74. *M. pumilum*, circa 5 cm. altum; caule robusto, ad 1.5 cm. diam., ramoso, ramulis vestigiis foliorum delapsorum vestitis; foliis 3quetris acutis, 1 cm. longis; pedunculis solitariis terminalibus, basi 2bracteatis; fructus valvis 5.

Karoo: Schuurkraal, 1,100 ft., 3917.

Allied to *M. rostellum*, Haw., and *M. pygmaeum*, Haw., and most probably a new species.

The specimens collected are in their winter or resting state, and appear to behave in exactly the same manner as does *M. pygmaeum*—viz., that from the axil of each of the fully-developed foliage leaves, which are quite free or only slightly connate at base, springs a shoot comprised of one or two pairs of leaves, united for more than

three-fourths of their length, membranous and dry, the tip alone being foliaceous. Protected within the upper pair of these are enclosed the foliage leaves of the next season's growth. These are 3quetrous acute, about 1 cm. long, and in a considerably hardened and dried condition remain on the plant for apparently several seasons; the persistent peduncles are situated between the two winter or resting shoots and are 2bracteate at base; fruiting valves 5; main stem stout, attaining 1.5 cm. in diam. with numerous short woody branches forming a dense tuft, about 5 cm. in height.

75. *M. annum papillosum* (?), *flavescens*, e basi ramosum, ramis decumbentibus vel erectis, laxe foliatis; foliis teretibus (?) obtusis, basi ampliatis connatisque, 1-4.5 cm. longis; floribus solitariis vel 3natis, 3-4 cm. diam.; calycis segmentis valde inaequalibus, 3 foliaceis longioribus, 2 membranaceo-marginatis; petalis filiformibus albis, ad 2.5 cm. longis.

Namaqualand: Sandy river-bed between Modderfontein and Doornpoort, 5986. Common from Chubiessis outspan to Daunabis.

An annual herb, apparently papillose, yellowish in the dried state, branched from the base, the branches decumbent or erect, laxly leafy; leaves terete (?) obtuse, widened and connate at the base, 1-4.5 cm. long; flowers solitary or ternate, 3-4 cm. in diam.; calyx segments very unequal, 3 foliaceous longer, 2 with membranous margins; petals filiform white, up to 2.5 cm. long.

This is most probably a new species, but until fresh material is available it seems advisable not to name it. The same species was collected at Schakalswater, Little Bushmanland, by M. Schlechter (No. 7).

76. *M. frutescens*, sp. nov., foliis basi connatis, semi-teretibus vel interdum turgide 3quetris; floribus 5meris, in cymas apertas 4-5 furcatas dispositis; petalis albidis.

Frutex glaber, ad 2.5 met. altus; rami erecti rigidi glauci laeves, 0.6 cm. diam., ramulis ultimis rubescentibus; folia basi connata, patenti-incurva, deinde patula, semi-teretia vel interdum turgide 3quetra, obtusa vel subacuta, mucronulata glauca, inconspicue viridi-maculata, ad 5.5 cm. longa, 1.2 cm. diam.; flores 5meri, in cymas terminales apertas 4-5furcatas dispositi; pedunculi subcompressi, 0.5-1 cm. longi, lateralibus, 2 bracteatis; calyx turbinatus, segmentis inter se subaequalibus acutis, tribus membranaceo-marginatis, 0.5-0.6 cm. longis; petala albida, sepalis paullo

longioribus; stamina pluri-seriata; ovarium subconicum, stylis 5, subulatis setaceo-acuminatis; capsula circ. 1 cm. diam.

Namaqualand: Last outspan before Garies, 6433.

A glabrous shrub, attaining 2.5 met. in height; branches erect rigid glaucous smooth, 0.6 cm. in diam., the ultimate branchlets reddish; leaves connate at base, spreading-incurved, finally widely spreading, semi-terete or sometimes turgidly 3quetrous, obtuse or subacute, mucronulate glaucous, inconspicuously dotted with green, up to 5.5 cm. long, 1.2 cm. in diam.; flowers 5merous, arranged in open terminal 4-5branched cymes; peduncles somewhat compressed, 0.5-1 cm. long, the lateral ones 2bracteate; calyx turbinate, the segments almost equal acute, three with membranous margins, 0.5-0.6 cm. long; petals whitish, a little longer than the sepals; stamens pluri-seriate; ovary somewhat conical, the styles 5, subulate setaceo-acuminate; capsule about 1 cm. in diam.

Described from excellent specimens received in a living state. This is a very distinct species and with no close affinity to any *Mesembrianthemum* known to me. Its stature, large semi-terete leaves, spreading cymose inflorescence, and whitish petals exclude it from the sections *Verruculata*, *Haworthiana*, and *Tumidula*.

The same plant was collected in 1883 at Port Nolloth by H. Bolus (No. 9539), and again in 1897 at Oorkraal by R. Schlechter (No. 10998), but without living material it has hitherto been impossible to deal with it satisfactorily.

77. *M. Sladenianum*, sp. nov., annum glaberrimum, foliis connatis, late ellipticis, valde concavis, floribus 4meris, sepalis connatis per anthesin marcescentibus.

Herba annua glaberrima glauca ramosa, ramis decumbentibus elongatis pallidis, ad 0.6 cm. diam., internodiis 2-5 cm. longis, ramulis adscendentibus; folia basi connata, erecto-patentia, demum reflexa, marcescentia persistentia, late elliptica, interdum apiculata, valde concava, margine saepe rubicunda, 1.5-5.5 cm. longa; flores 4meri pedunculati, pedunculis 3natis, 0.7-1.2 cm. longis, lateralibus 2bracteatis; calyx clavatus, segmentis primo inter se valde inaequalibus, duo exterioribus bene evolutis, omnino ceteras partes floris obtegentibus, per anthesin marcescentibus, foliaceis, late ellipticis vel suborbicularibus, acutis, 1-1.5 cm. longis, interioribus demum aequilongis, angustioribus; petala alba, ad 1.5 cm. longa; stamina staminodiaque multi-seriata, antheris minimis; ovarium convexum, 0.5 cm. altum, stylis 4, linearibus acutis.

Namaqualand : Doornpoort Ravine, very abundant, 6132. Lower southern and western slopes of TeAlee Mts., 6019.

An annual, entirely glabrous, glaucous branched herb, the branches decumbent elongate pallid, up to 0·6 cm. diam., the internodes 2–5 cm. long, the branchlets ascending ; leaves connate at base, erect-spreading, finally reflexed, persistent in a withered membranous condition, broadly elliptical, sometimes apiculate, strongly concave, often pink on the margin, 1·5–5·5 cm. long ; flowers 4merous pedunculate, the peduncles 3nate, 0·7–1·2 cm. long, the lateral ones 2bracteate ; calyx clavate, the segments at first very unequal, the two outer ones well developed long before the others, entirely enclosing the rest of the flower between them, withering during the flowering period, leaf-like, broadly elliptical or sub-orbicular, acute, 1–1·5 cm. long, the interior pair finally as long but narrower ; petals white, up to 1·5 cm. long ; stamens and staminodes in many rows, the anthers very small ; ovary convex, 0·5 cm. high, the styles 4, linear acute.

Described from copious dried material and from living specimens grown in Mr. N. S. Pillans' garden, Rosebank, near Cape Town. It is easily distinguished from all the other species belonging to the § *Platyphylla* by its tetramerous flowers, and is remarkable for the way in which the outer pair of calyx-segments develop precociously, enclosing the rest of the flower, and exactly simulating bracts. As far as I know this very distinct species has never been collected before, and it therefore seems fitting to name it in honour of the man in whose memory the expedition was made.

78. *M. amplexans*, sp. nov., ramis articulatis, foliis e medio conspicue dilatatis, internodia vaginantibus, floribus solitariis, petalis dilute stramineis.

Herba perennis glabra, ad 15 cm. alta, ramosa, ramis adscendentibus articulatis, foliorum vaginis omnino vestitis ; folia saepe alterna distincta, semi-teretia vel interdum turgide 3quetra, obtusa, e medio conspicue dilatata, internodia vaginantia, vaginis persistentibus membranaceis, 1·5–3·5 cm. longa ; flores terminales solitarii, 4-vel interdum 5meri, breviter pedunculati, pedunculis omnino foliis supremis inclusis ; calyx globoso-turbinatus papillosum, segmentis inter se valde inaequalibus, 2 foliaceis, petala excedentibus, 2 late membranaceo-marginatis, 0·9–3 cm. longis ; petala 2–3 seriata, acuta, dilute straminea, ad 2 cm. longa ; stamina staminodiaque multiseriata, filamentis glabris ; ovarium conicum, 0·5 cm. diam., stylis 4–5 subulatis acuminatis, 0·5 cm. longis.

Karoo: Upper western slopes of hill above Nieuwerust, 5515.  
 Namaqualand: Stony western slope North of Daunabis, 6064.

A perennial herb, attaining 15 cm. in height, branched, the branches ascending jointed, completely covered by the sheaths of the leaves leaves often alternate distinct, semi-terete or sometimes turgidly 3quetrous, obtuse, conspicuously dilated from the middle, sheathing the internodes, the sheathing portion persistent membranous, 1.5-3.5 cm. long; flowers terminal solitary, 4- or sometimes 5merous, shortly pedunculate, the peduncles altogether enclosed within the uppermost pair of leaves; calyx globose-turbinate papillose, the segments very unequal, 2 foliaceous, exceeding the petals, 2 broadly membranous-margined, 0.9-3 cm. long; petals 2-3 seriate acute, pale straw-coloured, up to 2 cm. long; stamens and staminodes in many rows, the filaments glabrous; ovary conical, 0.5 cm. diam., the styles 4-5, subulate acuminate, 0.5 cm. long.

Described from living specimens which flowered in Mr. N. S. Pillans' garden, Rosebank, near Cape Town.

79. *M. mitratum*, Marl., in Trans. Roy. Soc. of S.A., vol. ii., pt. 1, p. 35.

Namaqualand: Upper slopes above Daunabis, 6116.

## 2. TETRAGONIA.

1. *T. microptera*, Fenzl., in Fl. Cap. ii., p. 461.

Upper Region: River-bed at Loeriesfontein, 4845.

2. *T. nigrescens*, E. and Z., Enum. 323.

Cape: Sandy soil, Oliphant's River Valley near Warm Baths, 7244.  
 Khamiesberg: Wilgehout Ravine, 6807.

3. *T. galenioides*, Fenzl., in Fl. Cap., ii., p. 461.

Cape: Upper southern slopes above Kradoww Krantz, 5325.

4. *T. fruticosa*, Linn., Sp. Pl., 687.

Sand flats between Driefontein and Heeren Logement, 6784.

5. *T. arbuscula*, Fenzl., in Fl. Cap., ii., p. 467.

Great Namaqualand: Top of hill at Schakalskuppe, 5,600 ft., 4251. On sandy plains South of Schakalskuppe Station, 4,700 ft., 4772. Dry stream-bed in sandy plains West of Ganus, 4490. Sandy river-bed near Dabaigabis, 4314.



6. *T. virgata*, Schltr., in Engl. Bot. Jahrb., xxvii. (1899), p. 125.

Khamiesberg: Lower slopes of Zuurberg, 6274. Namaqualand: Sandy veld between Bitterfontein and Stinkfontein.

7. *T. rosea*, Schltr., in Engl. Bot. Jahrb., xxvii. (1899), p. 124.

Cape: Oliphant's River Valley near Warm Baths, 7789.

### 3. ANISOSTIGMA.

1. *A. Schenckii*, Schinz., in Bull. Herb. Boiss., v. (1897), App. iii., 79.

Great Namaqualand: Common on sand dunes and sandy flats South of Löwens River, Gawachab, 4084, 4337. Sabiesis lower slopes, 3,300 ft., 4578.

### 4. AIZOON.

1. *A. paniculatum*, Linn., Sp. Pl., 700.

Cape: Alluvial sand, Oliphant's River Valley, 7174, 7301.

2. *A. Burchellii*, N.E. Br., in Kew Bull. (1908), p. 290.

Bushmanland: On stony ground, Groot Rozynbosch, 2,800 ft., 3831. In sand of stream-bed, Aggenys, 3,000 ft., 2941. Wortel, 2,700 ft., 3616.

3. *A. fruticosum*, Schellenb., in Engl. Bot. Jahrb., xlvi. (1912), p. 492.

Great Namaqualand: Kopje 12 km. West from Sandverhaar, 3,600 ft., 4633. Stony places on plains West of Ganus, 4484. Sandy valley North of Sabiesis, 4108. On sandy plains between Keetmanshoep and Seeheim, 4348. Sandy river-bed 25 km. North of Warmbad, 4298.

### 5. GALENIA.

1. *G. sarcophylla*, Fenzl., in Fl. Cap., ii., p. 475.

Bushmanland: On sandy patches near Nieuwfontein, 3356. Karroo: Dried-up irrigated land near Schuurkraal, 1,100 ft., 3074.

2. *G. papulosa*, Sond., var., in Fl. Cap., ii., p. 475.

Great Namaqualand: Buchholzbrunn, 3,250 ft., 3385.

3. *G. crystallina*, Fenzl., in Fl. Cap., ii., p. 477.

Upper Region: Ravines at Loeriesfontein, 2,500 ft., 4855.

4. *G. fruticosa*, Sond., in Fl. Cap., ii., p. 477.

Bushmanland : Upper middle slopes of Koeberg, 6221.

5. *G. africana*, Linn., Sp. Pl., 515.

Cape : Foot of Oliphant's River Mts. near Warm Baths, 7260. Pickenier's Pass, eastern slopes, 5146. Pendent from top of steep clay bank overhanging small river-bed between Ceres and Leeufontein, 3244. Roadside between Hottentots' Kloof and Karroopoort, 4814. Karroo : Zoutpansdrift, 2,000 ft., 5013.

#### 6. TRIANTHEMA.

1. *T. crystallina*, Vahl., Symb., i., 32.

Bushmanland : Groot Rozynbosch, 2,800 ft., 3826. Great Namaqualand : Sand at Gabis, 4330. Near stream-bed on plain 12 km. West of Sandverhaar, 4270. High plateau on western side of TeAlee Mts.

2. *T. hydaspica*, Edgew., in Journ. Linn. Soc., vi. (1862), 203. (*Diplochonium sesuvioides*, Fenzl.)

Namaqualand : Prostrate in sand of dry river-bed, Doornpoort, 6027.

#### 7. ORYGLIA.

1. *O. decumbens*, Forsk., Fl. Aegypt. Arab., 103.

Great Namaqualand : Aub River-bed and slopes West of Gobas Station, 2,900-4,200 ft., 3755, 3750.

#### 8. MOLLUGO.

1. *M. Cerviana*, Seringe, in Fl. Cap., i., p. 138.

Bushmanland : Sand banks in dry river-bed near Dabainoris, 3019. Raman's Drift, 4077. Great Namaqualand : In sandy valley North of Sabiesis, 4115. Holog, 3603. Sandy river-bed 25 km. North of Warmbad, 4296. Sandy plains, Schakalskuppe, 4,500 ft., 4789. In sand a little North of Ganus, 3,000-3,200 ft., 4496. Doornpoort Ravine, 6133. Dry sandy river-bed on South side of pass between Daunabis and Bethany Drift, 6033. Sandy bank of Orange River at Bethany Drift, 6037.

#### 9. PHARNACEUM.

1. *P. incanum*, Linn., Sp. Pl., 272.

Cape : Mountain slopes near Warm Baths, 6880, 6883, Damp

places in bed of stream on East side of Pickenier's Pass. Oliphant's River, 5254. Khamiesberg: Tweerivieren, 6774.

2. *P. reflexum*, E. and Z., Enum. 285.

Khamiesberg: Tweerivieren, 6771. Bushmanland: Kopje near Nieuwfontein, 3351. Eight miles South or South-west of Bitterfontein, 3414. Namaqualand: Schakalskuppe, 5,200–5,600 ft., 4227. On mountain-slopes a little South of Tweefontein, 2,900 ft., 3787.

3. *P. verrucosum*, E. and Z., Enum. 286.

Bushmanland: Sandy plains about 30 km. North of Raman's Drift, 4063, 4527; Ougrabies, 3571. About 8 miles South or South-west of Bitterfontein, 3412. Namaqualand: Common in sand near Alewyn's Fontein, 3336. Hilltops at Schakalskuppe, 5,600 ft., 4236. About 10 miles North-east of Klipplaat, 3402. Klipplaat, 3398. Valley below Corkscrew Mt.—Koets, 5731. At the railway station 122 km. (18 km. West of Aus.).

## 10. ADENOGRAMMA.

1. *A. galioides*, Fenzl., in Fl. Cap., i., p. 150.

Cape: Summit of Oliphant's River Mts. behind Warm Baths, 7162, 7163. Mountain-slopes Oliphant's River Valley near Warm Baths, 7164. Alluvial sand, Oliphant's River Valley near Warm Baths, 7305. Khamiesberg: In dry sandy ground, Namaroep.

## 11. GISEKIA.

1. *G. Miltus*, Fenzl., in Fl. Cap., i., p. 156.

Great Namaqualand: Sand at Sandverhaar, 4681. Plains about 30 km. North of Raman's Drift, 3742. Sand of Schaf River-bed at Seeheim, 2,300 ft., 3737. In sand between Sabiesis and Holog, 4099. Bushmanland: Wortel, 3618. Damaraland: Ravine in Khan River basin near Welwitsch, 4284.

## 12. SEMONVILLEA.

1. *S. fenestrata*, Fenzl., Nov. Stirp. Dec. Mus. Vind., 5, p. 42.

Namaqualand: Sandy plains South of Schakalskuppe Station, 4,700 ft., 4775. Sand at Sandverhaar, 3,100 ft., 4659, 4280.

## 13. LIMEUM.

1. *L. capense*, Thunb., Prod. Pl. Cap., 68.

Upper Region: Near outspan at Loeriesfontein, 2,800 ft., 4872. Nieuwfontein, 3473.

2. *L. aethiopicum*, Burm., Prod., p. 11.

Great Namaqualand: Among quartzite blocks, Akam River basin, 4743. Near shallow stream-bed on stony plains 12 km. West of Sandverhaar, 3,200 ft., 4608. Sandy valley 20 km. North of Raman's Drift, 4523. Sandstone and sand at Sandverhaar, 3,100 ft., 4667. Upper Region: Sandy flat, Alewyn's Fontein, 3343. Kopjeskraal on face of ravine, 2,200 ft., 4869. Bushmanland: Wortel.

3. *L. africanum*, Burm., Prod. Fl. Cap., p. 11.

Cape: Foot of Oliphant's River Mts. near Warm Baths, 7171, 7166. Namaqualand: Brakdam, 5599. Khamiesberg: Wilgehout Ravine, 6803. Sand flats between Driefontein and Heeren Logement, 6813.

4. *L. viscosum*, Fenzl., Nov. Stirp. Dec. Mus. Vind., 5, p. 42.

Great Namaqualand: Stream-bed on stony plains 12 km. West of Sandverhaar, 3,200 ft., 4616. Sand dunes, Sandverhaar, 3,100 ft., 4691. Saline flat, Gawachab, 4335. Sandy river-bed, Buchholzbrunn, 3660. In sand a little North of Ganus, 3,200 ft., 4494. Prostrate on sand, Gabis, 4325. South of Warmbad, 4037. Sandy flats recently washed by rain South of Warmbad, 4029. Kopje on pass leading down to Gründoorn, 3133. Bushmanland: Dry water-courses on sandy plains about 30 km. North of Raman's Drift, 4061.

## MALVACEAE.\* †

*By Ruth Glover.*

## 1. MALVA.

1. *M. parviflora*, Linn., Diss. Dem. Pl. Nov.

A starved form.

Loeriesfontein. common at outspan, 3260. Alewyn's Fontein, 3322. Near Nieuwfontein, 3323. Kweekfontein, in sand near

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 43.

† Contributed from the Bolus Herbarium, South African College.

outspan, 3809. Dry sandy river-bed South of Bakhuis, 5449. Cape: Foot of Cold Bokkeveld Mts., opposite Warm Baths, Oliphant's River Valley, 7227.

## 2. MALVASTRUM.

1. *M. grossulariaefolium*, Gray and Harv., in Fl. Cap., ii., p. 161.  
Khamiesberg: Khamsoap Ravine, 6537.

2. *M. asperrimum*, Gray and Harv., in Fl. Cap., ii.; p. 161.

Cape: Western slopes, Nardouw Kloof, 5416. Khamiesberg: Upper middle slopes Zuurberg (Anegas), 6265. Beacon Hill, 2 miles South-east of Leliefontein Mission Station, 6366. Namaqualand: On summit granite kopje at Brakdam, 5661.

## 3. SPHAERALCEA.

1. *S. elegans*, Don, Dict., i., p. 465.

Cape: Roadside between Hottentots' Kloof and Karroopoort, 4820. Karroo: River-bed at Draaikraal, 4998.

## 4. ABUTILON.

1. *A. pycnodon*, Hochr., in Bull. Herb. Boiss., ii. (1902), p. 1001.

Var. *longipetala*, nov. var., inflorescentia demum panicula efoliata, foliis delapsis, petalis calyce 2 plo longioribus.

Namaqualand: Upper slopes TcAlee Mts., 6149. Also collected by M. Schlechter at Naroep, Great Bushmanland, 54, Dec. 14, 1897.

This variety differs from the type in having the inflorescence at first simple but at length a leafless panicle, and by the petals being twice as long as the calyx.

## 5. PAVONIA.

1. *P. macrophylla*, E. Mey., in Fl. Cap., i., p. 169.

Great Namaqualand: A little above high-water mark, Löwens River at Gawachab, 2,100 ft., 4087.

## 6. HIBISCUS.

1. *H. urens*, Linn. f., Suppl. 309.

Karroo: In irrigated land between Stompiesfontein and Schuur-

kraal, 3071. Between Pappekuil and Stompiesfontein, 4969. Namaqualand: Dry river-bed South of pass between Grauwater and Klipplaat, 3277.

2. *H. Engleri*, Schum., in Engl. Bot. Jahrb., x., p. 47.  
Bushmanland: Pella, 3542.

3. *H. Elliottiae*, Harv., in Fl. Cap., ii., p. 587.

Great Namaqualand: Barren hill about 400 ft. above the river at Raman's Drift, 4078. Sandy valley North of Raman's Drift, 3605. Kopjes South of Warmbad, 4000. Lower granite slopes West of Aus, 4209. Wortel, 3611. Stony ground near Holoog, 4125. Two miles South of Tweefontein, 3554.

## FRANKENIACEAE.\* †

*By Louisa Bolus.*

### 1. FRANKENIA.

1. *F. capitata*, Webb. and Berth., Fl. Canar., i., p. 131, t. 16.

Cape: Dried-up pools between Clanwilliam and Lang Kloof, 5343. Namaqualand: River-bed, Stinkfontein, 5967. Dry sandy river-bed, Kamabies, 3955. Bushmanland: Sabies, 4704. Nieuwfontein, 3467.

2. *F. pulverulenta*, Linn., Sp. Pl., 332.

Cape: Attis River-bed, 5381. Karroo: Pappekuil, 3985. Namaqualand: Bed of Brak River, 4868, 4864. Kopje's Kraal, 4886. River-bed North of Gansfontein, 3984. On side of dam, Kamabies, 3462.

## BIXACEAE.\* †

*By Louisa Bolus.*

### 1. KIGGELARIA.

1. *K. ferruginea*, E. and Z., Enum., No. 118.

Khamiesberg: Rooted under granite block at 3,000 ft. in Khamiesberg plateau, 6237. Beacco Hill, 2 miles South-east of Leliefontein, 6367. Southern slopes of Sneeuwkop, 5867. Upper middle rocky slopes, Vogelklip, 5911.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 44, 45.

† Contributed from the Bolus Herbarium, South African College.

**TAMARICACEAE.\* †**

*By Ruth Glover.*

1. TAMARIX.

1. *T. articulata*, Vahl, Symb., 2, p. 48, t. 32.

Khamiesberg: In Buffel's River-bed between Arkoep and Mesklip, 5903. Little Namaqualand: Bed of Doorns River South of Brak River, 3893.

**RESEDACEAE.\* †**

*By Ruth Glover.*

1. OLIGOMERIS.

1. *O. capensis*, Thunb., Cap., p. 402.

Great Namaqualand: Gabis, 4328. Sandverhaar, sandy river-bed, 4646.

**CONVOLVULACEAE.\* †**

*By Louisa Bolus.*

1. IPOMOEA.

1. *I. adenioides*, Schinz, in Verhandl. Bot. Ver. Brandenb., xxx., 270.

Great Namaqualand: 12 km. West of Sandverhaar, 4456, 4269. On sandstone on mountain-top, Sabiesis, 4577. Sandy plains South of pass leading to Gründoorn, 4356.

2. CONVULVULUS.

1. *C. inconspicuus*, Hallier. f., in Engl. Bot. Jahrb., xviii., 106.

Namaqualand: Roadside Brakdam, 5605.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 46, 47, 48.

† Contributed from the Bolus Herbarium, South African College.

2. *C. capensis*, Burm. f., Prod., Cap. 5.

Cape: Alluvial sand bottom, Oliphant's River Valley near Warm Baths, 7252.

### 3. CUSCUTA.

1. *C. angulata*, Engelm., in. Trans. Acad. Sc. St. Louis, i., 474.

Cape: Dry hillsides between Hex River and Kradouw Krantz, 5248.

## POLYGONACEAE.\* †

By Louisa Bolus.

### 1. POLYONUM.

1. *P. aviculare*, Linn., Sp. Pl., ed. 1, 362.

Bushmanland: Wet mud, Orange River near Abbasis, 2997.  
Karoo: Nieuwrust, 5510.

### 2. RUMEX.

1. *R. sagittatus*, Thunb., Prodr., 67.

Khamiesberg: Shady places among rocks, Namaroup, 6579.

2. *R. cordatus*, Desf., Cat. Hort. Par., ed. 2, 40.

Cape: Foot of Oliphant's River Mts., near Warm Baths, 7300.

3. *R. Ecklonianus*, Meisn., in Linnaea, xiv., 493.

Karoo: About 9 miles along Beukesfontein road in dry river-bed North of Zoutpansdrift, 5003. Namaqualand: Dry sandy river-bed at Kamabies, 3952. Kweekfontein, in clumps in sandy river-bed, 3790. Kamabies, 3464. Two miles South of Tweefontein, 3458. Upper: Brakrivier, river-bed, 4865.

### 3. EMEX.

1. *E. australis*, Steinh., in Ann. Sci. Nat., 2<sup>me</sup> sér. ix., 195, t. 7.

Namaqualand: Cornfield weed, Koets.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 49.

† Contributed from the Bolus Herbarium, South African College.



**SALICINEAE.\* †**

*By Louisa Bolus.*

1. SALIX.

1. *S. capensis*, Thunb., Fl. Cap., i., 139.

Cape: Streamside between Ceres and Leeuwfontein, 3255.  
Namaqualand: River-bed South of Tweefontein, 3759. Near  
water-edge, Orange River, at Raman's Drift, 3111.

**PLANTAGINEAE.\* †**

*By Louisa Bolus.*

1. PLANTAGO.

1. *P. capillaris*, E. Mey, E. Decne, in DC., Prod., xiii, i., 719.

Khamiesberg: Tweerivieren, 6832. Varsche River, dry, stony  
hills, 6506.

**ILLECEBRACEAE.\* †**

*By Louisa Bolus.*

1. POLLICHIA.

1. *P. campestris*, Soland., in Ait., Hort. Kew, ed. 1, i., 5.

Namaqualand: Fissures in granite upper southern slopes TeAlee  
Mts., 6147. Rock crevices low kopje opposite Bowesdorp, 5844.

2. CORRIGIOLA.

1. *C. litoralis*, Linn., Sp. Pl., ed. 1, 271.

Namaqualand: Cornlands by roadside between Brakdam and  
Rietkloof, 5671.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa,  
Nos. 50, 51, 52.

† Contributed from the Bolus Herbarium, South African College.

**PHYTOLACCACEAE.\* †***By Louisa Bolus.*

## 1. MICROTEA.

1. *M. Burchellii*, N. E. Br., in Kew Bulletin, 1909, 135.

Namaqualand: Sandy valley North of Sabies, 4109. Common in dry, sandy river-bed on South side of pass between Dannabis and Bethany Drift, 6029. Bushmanland: Common in dry bed of river, Aggenys, 3563, 3589.

**LABIATAE.\* †***By Louisa Bolus.*

## 1. MENTHA.

1. *M. longifolia*, Huds., subsp. *capensis*, Briq.

Khamiesberg plateau: River-bed, 6236, 6795. Little Namaqualand: River-bed South of Tweefontein, 3760. River-bed West of Garies, 5641. Locality uncertain, 3461.

## 2. SALVIA.

1. *S. garipensis*, E. Mey., Comm. 232.

Great Namaqualand: Crevices in granite hills 18 km. West of Aus, 4211. Stream-courses at base of hills at Schakalskuppe, 4246.

2. *S. africana*, Linn., Sp. Pl., ed. 2, 38, excl. Plukenet.

Cape: Pickenier's Pass, eastern slopes, 5156.

3. *S. dentata*, Ait., Hort. Kew, ed. 1, i. 37.

Khamiesberg: Wilgehout Ravine, marshy ground, 6384. Nama-rourp hills, 6590. Namaqualand: At foot of granite slopes a little South of Brakdam, 5623, 3478. Summit of Rattelpoort Mountain, 2953. Bushmanland: Kweekfontein, 3798.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 53, 54.

† Contributed from the Bolus Herbarium, South African College.

4. *S. nivea*, Thunb., Prodr., 96.

Cape: Pickenier's Pass, eastern slopes, 5151. On the road from Warm Baths to Modderfontein, Oliphant's River Valley, 7280. Namaqualand: By the roadside a little South of Brakdam, 5622.

5. *S. rugosa*, Thunb., Prodr., 97.

Irrigated land near Schuurkraal, 3073. Namaqualand: Hantam's River-bed near Brakrivier, 4896. Very common in bed of Brak River, 3897.

### 3. ACROTOME.

1. *A. pallescens*, Benth., in DC., Prodr., xii., 426.

Namaqualand: In crevices of gravelly cliffs below Doornpoort, 6014.

### 4. STACHYS.

1. *S. aethiopica*, Linn., Mant., i., 82.

Cape: Common on hillsides at Leeuwfontein, 3217. Foot of Oliphant's River Mts., near Warm Baths, 7282, 7283. Foothills of Cold Bokkeveld Mts. opposite Warm Baths, Oliphant's River Valley, 7281.

2. *S. rugosa*, Ait., Hort. Kew, ed. 1, ii. 303.

Cape: Slopes of Oliphant's River Mts. near Warm Baths, 6871. Ravine at Loeriesfontein, 4835. Khamiesberg: Dry slopes Khoms Ravine, 6483. Hills at Namaroup, 6588.

3. *S. multiflora*, Benth., in DC., Prodr., xii., 492.

Namaqualand: Sandy ravine North of Doornpoort, 6018. Upper and middle slopes TcAlee Mts., 6139. Sandy river-bed at Kamabies, 3954. Quartzite slopes above Modderfontein facing South-west, 5963. Great Namaqualand: Lower mountain-slopes East of Aus, 4713.

4. *S. flavescens*, Benth., in E. Mey., Comm. 241.

Khamiesberg: Upper and lower plateau, south-eastern slopes, Vogelklip, 5920. Common on kopje South-west of Leliefontein Mission Station, 6813. Beacon Hill, 2 miles South-east of Leliefontein, 6360. Namaqualand: Common at all elevations on northern slopes of Rietkloof Mt., 5694. Summit of granite kopje at Brakdam, 5662a.

5. *Stachys Zeyheri*, Skan, in Fl. Cap., vol. v., § 1.  
Namaqualand: Near Klipplaat, 3393.

#### 5. BALLOTA.

1. *B. africana*, Benth., Lab. 594.

Cape: Stream-bed in pass above Leeuwfontein, 3197. Ravine at Loeriesfontein, 4844. Roggeveld, above Blaukrantz Pass near stream-bed, 4981. Namaqualand: In shade of rocks on southern upper slopes, Rietkloof Mt., 5699. Kloof between Middlekraal and Brakdam, 5625. Alewyn's Fontein, by roadside, 3319.

#### 6. LEONOTIS.

1. *L. Leonurus*, R. Br., in Ait., Hort. Kew, ed. 2, iii., 410.  
Cape: Sand-banks in river-bed below Kradouw Krantz, 5373.

## SELAGINEAE.\* †

*By Louisa Bolus.*

#### 1. HEBENSTREITIA.

1. *H. fruticosa*, Sims, in Bot. Mag., t. 1970.  
Khamiesberg: Sneeuwkop, upper and western slopes.

2. *H. dentata*, Linn., Sp. Pl., ed. 1, 629; ed. 2, 878.

Cape: Alluvial soil, Oliphant's River Valley near Warm Baths, 6492. Slopes of Oliphant's River Mts. near Warm Baths, 6895. Bushmanland: Bitterfontein, 6492.

3. *H. dentata*, Linn., var.  $\beta$ , *integrifolia*, E. Mey., Comm. 247, partly, excl. syn.

Cape: Sand flats between Driefontein and Heeren Logement, 6797. Khamiesberg: Hillsides at Namaroup, 6701. Slopes of 1st plateau, 5634.

4. *H. hamulosa*, E. Mey., Comm. 249.

Khamiesberg: Southern slopes of Sneeuwkop, 5856.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa. No. 55.

† Contributed from the Bolus Herbarium, South African College.

5. *H. stenocarpa*, Schltr., in Engl. Bot. Jahrb., xxvii., 186.

Khamiesberg : Twee Rivieren, hillsides, 6775.

6. *H. lanceolata*, Rolfe, in Fl. Cap., v., § 1, p. 109.

Cape: Foot of Oliphant's River Mts. near Warm Baths, 7790, 7276.

7. *H. sp.* Material too poor for identification.

Bushmanland : Koeberg, 6220.

## 2. SELAGO.

1. *S. tephrodes*, E. Mey., Comm. 264, partly.

Cape: Foothills of Cold Bokkeveld Mts. opposite Warm Baths, 7243. Kloof behind Warm Baths, Oliphant's River Valley, 7270, 7271, 7279, 7272, 7268.

2. *S. namaquensis*, Schltr., in Engl. Bot. Jahrb., xxvii., 189.

Khamiesberg : Hillsides at Namaroup, 6703, 6707.

3. *S. albida*, Choisy, in DC., Prodr., xii., 18.

Great Namaqualand : Schakalskuppe, 4237, 4255. Sandy river-bed 25 cm. North of Warmbad, 4305. Crevices in granite near top of hills North of Rotkuppè Station, 4469. River-bed below railway station, Buchholzbrunn, 3680.

4. *S. minutissima*, Choisy, in Mém. Soc. Phys. Genève., ii., ii., 100, t. 3.

Cape: Oliphant's River Valley near Warm Baths, 7278, 7275. Khamiesberg: Wilgehout Ravine, 6801.

5. *S. scabrida*, Thunb., Prodr., 99.

Cape: Upper south-western slopes above Pickenier's Pass, 5117.

6. *S. stricta*, Berg., Pl. Cap., 155.

Cape: Summit of Oliphant's River Mts. behind Warm Baths, 6851.

7. *S. spuria*, Linn., Sp. Pl., ed. 1, 629.

Cape: Pickenier's Pass, eastern slopes, among grass in damp places, 5148. Upper southern slopes above Kradouw Krantz, 5310.

8. *S. lamprocarpa*, Schltr., in Fl. Cap., v., p. 170.

Cape: Hillsides at Leeuwfontein, 3218. Hill-slopes above Hot-tentots' Kloof, 4944.

9. *S. triquetra*, Linn. fil., Suppl. 284.

Cape: Roadside between Ceres and Leeuwfontein, 3218.

10. *S. glutinosa*, E. Mey., Comm. 255.

Khamiesberg: North-western slopes of Sneeuwkop, near summit, 5785. Namaqualand: Among granite blocks on 1st plateau of mountain 3 miles North-east of Stinkfontein, 5636.

11. *S. hispida*, Linn. fil., Suppl. 284.

Cape: Upper south-western slopes above Pickenier's Pass, 5127.

12. *S. curvifolia*, Rolfe? Undeveloped.

Cape: Kloof below Warm Baths, Oliphant's River Valley, 7273.

### 3. AGATHELPIS.

1. *A. angustifolia*, Choisy, in Mém. Soc. Phys. Genève., ii., ii., 95.

Cape: Upper southern slopes above Pickenier's Pass, 5181a. Khamiesberg: Beacon Hill, 2 miles South-east of Leliefontein, 6356. South-eastern slopes of Sneeuwkop, 5877. Namaqualand: Among bushes near summit on northern slopes Rietkloof Mt., 5710.

## AMARANTACEAE.\* †

By Louisa Bolus.

### 1. HERMBSTAEDTIA.

1. *H. glauca*, Moquin, in DC., Prodr., xiii., ii., 247.

Namaqualand: Near base of kopje, Ookiep, 3452. Rocky slopes at Eenriet, 3095. Bushmanland: Dry river-bed between Wortel and Dabainoris, 3029. Ougrabies, 3576. Upper mountain-slopes at Kweekfontein, 3819. Namaqualand: Slopes between Annenous and

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Chubiesis, 5282. Sandy ravine below Doornpoort, 6013. Krantz, 1 mile South of Buffel's River, between Arkoep and Mesklip, 5895, 5901.

## 2. MARCELLIA.

1. *M. Bainesii*, C. B. Cl., in Dyer, Fl. Trop. Afr., vi., i., 51.

Great Namaqualand: Common among quartzite blocks Akam Rivier, 4731. Sandstone at Sandverhaar, 4665. Gobas, sandstone slopes, 3748a. Stony slopes on kopje near Gründoorn, 3141.

## 3. SERICOCOMA.

1. *S. pungens*, Fenzl., in Linnaea, xvii., 326.

Great Namaqualand: Among quartzite blocks, Akam River basin, 4753. Bushmanland: Above Raman's Drift, South side, 4075.

2. *S. avolans*, Fenzl., in Linnaea, xvii., 328.

Great Namaqualand: Stony slopes of kopjes near Gründoorn, 3144. Common in sand 20 km. North of Raman's Drift, 4541. Kopje between Dabaigabis and Gründoorn, 3156. Sandy river-bed at Sandverhaar, 4650.

## 4. SERICOREMA.

1. *S. remotiflora*, Lopr., in Engl. Bot. Jahrb., xxvii., 39.

Great Namaqualand: Among quartzite blocks, Akam River basin, 4755.

## 5. CALICOREMA.

1. *C. capitata*, Benth. and Hook.

Namaqualand: Sandy ground opposite Sendling's Drift, 6112. Orange River: Common along bank of Orange River between Abbasis and Raman's Drift, in dry sand, 3110. Great Namaqualand: Common on stony slopes nr. Gründoorn, 3147. Damaraland: Ravines of Khan River nr. Welwitsch, 4146.

## 6. AMARANTHUS.

1. *A. Thunbergii*, Moquin, in DC., Prodr., xiii., ii., 262.

Upper Region: On banks of water conduit at Karie Boemfontein, 3923. Great Namaqualand: Shady places in dry river-bed, sandy plains West of Ganus, 4482.

2. *A. Blitum*, Linn., Sp. Pl., ed. 1, 990.

Great Namaqualand : Under shade of large Commiphora in dry river-bed South of Warmbad, 4025. Sandy valley 20 km. North of Raman's Drift, 4519. Sandy valley North of Sabiesis, 4114. Crevices in kopje between Dabaigabis and Gründoorn, 3173. Shady places in dry river-bed, sandy plains West of Ganus, 4480.

## ZYGOPHYLLACEAE.\* †

By Ruth Glover.

### 1. TRIBULUS.

1. *T. terrestris*, Linn., Sp. Pl., p. 554.

Great Namaqualand : Sand at Sandverhaar, 4675. Seeheim, 3725. Sand of river-bed at Seeheim, 3723. In sandy plain at Schakalskuppe, 4784. Bushmanland : Common on stony ground at Groot Rozybosch, 3833. Namaqualand : Sand at Stinkfontein, 5521.

2. *T. Zeyheri*, Sond., Fl. Cap., i., p. 353.

Namaqualand : Sandy slopes, Kamabies, 3780. Rietfontein, 3434.

3. *T. pterophorus*, Presl., Bot. Bem., p. 30.

Great Namaqualand : Dry river-bed near Holoog, 4120. Sand dunes at Sandverhaar, 4693. Bushmanland : Near Wortel, 3631.

4. *T. cristatus*, Presl., Bot. Bem., p. 30.

Namaqualand : Sandy river-bed leading down to Bethany Drift, 6053. Great Namaqualand : Sandy slopes at Dabainoris, 3015. Kopje between Dabaigabis and Gründoorn, 3154.

### 2. SISYNDITE.

1. *S. spartea*, E. Mey.

Sandy banks of Doorn Rivier, 3880. Bushmanland : Common in sand between Kweekfontein and Ougrabies, 3791. Great Namaqualand : Sand at Sandverhaar, 4653. Namaqualand : Sand in Annenous Valley, 5984. Annenous, 6413.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 57.

† Contributed from the Bolus Herbarium, South African College.



3. AUGEA.

1. *A. capensis*, Thunb.

Namaqualand: Abundant in sand in the vicinity of Klipplaat, 3944.

4. ZYGOPHYLLUM.

1. *Z. prismatocarpum*, E. Mey.

Namaqualand: Dry river-bed opposite Sendling's Drift, 6107. Common on sandy river-bed between foot of Modderfontein Pass and Doornpoort, 5991.

2. *Z. simplex*, Linn., Mant., p. 68.

Namaqualand: Dry river-bed on South side of pass between Daunabis and Bethany Drift, 6031. Barren places South of pass between Grauwater and Klipplaat, 3278. Great Namaqualand: Sandy plains, Schakalskuppe, 4425.

3. *Z. spinosum*, Linn., Sp. Pl., p. 552.

Cape: Sand flats between Dreifontein and Heeren Logement, 6783.

4. *Z. fulvum*, Linn., Sp. Pl., i., p. 386.

Cape: Oliphant's River Mts., near Warm Baths, 7229, 7248.

A form with the stem distinctly two-winged and with the filaments less than thrice as long as the scales.

5. *Z. Morgsana*, Linn., Sp. Pl., p. 551.

Namaqualand: Hills facing Brakrivier, 4894.

6. *Z. microcarpum*, Lichtenst. herb., Cham. and Schl.

Namaqualand: Doornpoort Ravine, 6130. Common in dry stream-bed between Modderfontein and Doornpoort, 5987. Sandy bed of Orange River, common South of Bethany Drift, 6044. Bushmanland: Orange River bank near Abbasis, 3004. Sand at foot of mountain between Wolftoon and Henkriesfontein, 3108. Dry river-bed between Wortel and Aggenys, 3030. Great Namaqualand: Sandy plains at Schakalskuppe, 4427.

7. *Z. foetidum*, Schrad. and Wendl., Sert. Han., p. 17, t. 9.

Cape: Attis River-bed, 5384.

8. *Z. retrofractum*, Thunb., Fl. Cap., p. 545.

Upper : Common on lower slopes above Loeriesfontein, 4854  
Great Namaqualand : River-bed at Dalbaigabis; 4317. Namaqua-  
land : Near Klipplaat, 3483. Doornport Ravine, 6128. Common  
on slopes at Eenriet, 3098. Stinkfontein, 5621. Alewyn's Fontein,  
3480.

In numbers 3483, 3480, 3098, and 6128 the capsule is very  
narrowly winged, and appears to be very different from the capsule  
of 4854 and 4317, which has 5 broad wings as described by Sonder  
in Fl. Cap., vol. i. On a specimen collected by Mr. Burt-Davy,  
however, there are both broad- and narrow-winged capsules.

9. *Z. tenue*, n. sp., affine *Z. retrofracto*, sed habitu graciliore, foliis  
lterioribus obovatis, capsula prismatica anguste alata distinguitur.

Fruticulus omnino glaberrimus, ad 30·5 cm. altus, ramosus, ramis  
patentibus vel suberectis strictis teretibus, pallidis vel demum  
griseis; internodiis 1–1·5 cm. longis; folia opposita petiolata, petiolo  
0·1–0·2 cm. longo, stipulata, stipulis ovatis acuminatis membranaceis  
0·5–0·1 cm. longis, bifoliolata, foliolis oblique obovato-oblongis, acutis  
vel obtusis, basi cuneatis, carnosis griseo-viridibus, 0·35 cm. longis,  
0·1–0·15 cm. latis; flores axillares solitarii pedicellati, pedicello 0·15  
longo; sepala obovato-oblonga, margine membranacea, 0·2–0·3 cm.  
longa, 0·1–0·15 cm. lata; petala unguiculata  $\pm$  0·3 cm. longa, lamina  
obovata, ungui tenuissimo aequilonga; squamis ad medium bifidis,  
dimidium filamenti aequantibus; stylis brevis; capsula prismatica  
anguste 5 alata, 0·5–0·6 cm. longa, 0·2–0·25 cm. lata.

Great Namaqualand : Sandy plains a little North of Ganus, 4500.  
Sandy plain at Schakalskuppe, 4257.

A small shrub, entirely glabrous, up to 30·5 cm. high, much  
branched; branches spreading or suberect straight terete, whitish  
or finally greyish; internodes 1–1·5 cm. long; leaves opposite  
petiolate, the petiole 0·1–0·2 cm. long, stipulate, the stipules ovate  
acuminate membranous 0·5–0·1 cm. long, bifoliolate, the leaflets  
obovate oblong oblique, acute or obtuse, cuneate at the base, fleshy,  
grey-green, 0·35 cm. long, 0·1–0·15 cm. broad; flowers axillary  
solitary pedicellate, the pedicel 0·15 cm. long; sepals obovate-oblong  
with a membranous margin, 0·2–0·3 cm. long, 0·1–0·15 cm. broad;  
petals unguiculate  $\pm$  0·3 cm. long, the blade obovate equalling the very  
slender claw; stamens equalling the petals; scales bifid to the middle,  
half the length of the filaments; style short; capsule prismatic  
narrowly 5winged, 0·5–0·6 cm. long, 0·2–0·25 cm. broad.

This species comes nearest *Z. retrofractum*, Thunb., from which it

may be distinguished by its more slender habit, by the much broader obovate leaves, and by the narrowly 5winged prismatic capsule.

10. *Z. Dregeanum*, Sond., in Fl. Cap., i., p. 365.

Bushmanland: Stony places towards Pella, 3581.

This plant has been named only from Sonder's description of Drège's plant in Fl. Cap., vol. i. Drège's plant, however, was collected at Tradouw.

11. *Z. suffruticosum*, Schinz, in Bull. herb. Boiss., ii., 188.

Great Namaqualand: A little West of Ganus, 4311. Sandy plains a little North of Ganus, 4500. Sandy places South of Warmbad, 4033. Sandstone at Sandverhaar, 4671. Among rocks in kopje near Dabaigabis, 4385. Namaqualand: At foot of mountain South side of Raman's Drift, 4073.

12. *Z. longicapsulare*, Schinz.

Namaqualand: Sandy valley leading down to Bethany Drift, 6950.

*Z. sp.*

Great Namaqualand: Tschauchab, common on lower mountain-slopes, 4471.

*Z. sp.*

Bushmanland: Sandy veld between Buil's Hoek and Doorn River, 5395.

*Z. sp.*

Khamiesberg: Kharkams, 6583.

*Z. sp.*

Great Namaqualand: Sandy places South of Warmbad, 4033.

*Z. sp.* Not in flower.

Common on kopje, Nieuwfontein, 3474.

*Z. sp.*

Karoo: Gansfontein, 3992.

*Z. sp.*

Great Namaqualand: Dry sand, 25-40 km. North of Warmbad, 4365.

## ROSACEAE.\*†

By Ruth Glover.

## 1. RUBUS.

1. *R. rigidus*, Sm., in Rees., Cycl. 30, No. 5.  
Cape: Damp spots Boontjes River, 5167.

## 2. ACAENA.

1. *A. latebrosa*, Ait., Hort. Kew, i., p. 16.  
Cape: Warm Baths, Oliphant's River Valley, 7126. Khamiesberg:  
Common among grasses near Leliefontein Mission Station, 6738.

## 3. CLIFFORTIA.

1. *C. ruscifolia*, Linn., Sp. Pl., 1469.  
Cape: Foot of Oliphant's River Mts. near Warm Baths, 7125.  
Common on hillsides at Leeuwfontein, 3182. Khamiesberg: Kham-  
soap Ravine, 6542. Slopes of kopje South-west of Leliefontein, 6314.  
Upper western slopes Sneeuwkop, 5826. Namaqualand: Common  
on upper middle slopes Rietkloof Mt., northern aspect, 5692.
2. *C. juniperina*, Linn. f., Suppl. 430.  
Cape: Among rocks near hilltops at Hottentots' Kloof, 4946.  
Namaqualand: Common on upper northern slopes Rietkloof  
Mt., 5702.

## 4. GRIELUM.

1. *G. humifusum*, Thunb., Cap. 509.  
Namaqualand: Brakdam, 6834.
2. *G. Marlothii*, Engler, Bot. Jahrb., x. (1889), 16.  
Great Namaqualand: Sandy places 20-30 km. South of Warmbad,  
374. Sandy places on plains about 30 km. North of Raman's Drift,  
4060. Sandy plains at Schakalskuppe, 4259. Broad sandy valley  
North of Sabiesis, 4133. Sand at Sandverhaar, 4686.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa,  
No. 58.

† Contributed from the Bolus Herbarium, South African College.

**MYRTACEAE.\*†**

*By Ruth Glover.*

1. METROSIDEROS.

1. *M. angustifolia*, Smith, Linn. Transact., 3, 268.

Cape: Along the Oliphant's River, Kradouw Pass, 5271. Boontjes Rivier, river-bed near bridge, 6410.

**HALORRHAGIDACEAE.\*†**

*By Louisa Bolus.*

1. SERPICULA.

1. *S. repens*, Linn., Mant. 124.

Cape: Sandy places along Oliphant's River, Kradouw Krantz, 5288.

2. GUNNERA.

1. *G. perpensa*, Linn.

Cape: By streamside between Ceres and Leeuwfontein, 3236. Khamiesberg: Under rocks in wet places close to stream, Khoms Ravine, 6593. Five miles South-east of Leliefontein, 6245.

**BRUNIACEAE.\*†**

*By Ruth Glover.*

BRUNIA.

1. *B. nodiflora*, Linn., Spec. Pl., p. 288.

Cape: Summit of Oliphant's River Mts. behind Warm Baths, 7234, 7231.

† Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 59, 60, 61.

§ Contributed from the Bolus Herbarium, South African College.

**DROSERACEAE.\*†***By Ruth Glover.***DROSERA.**

1. *D. trinervia*, Spreng., Anleit, i., p. 298.

Cape: Foothills Cold Bokkeveld Mts., opposite Warm Baths, Oliphant's River Valley, 7297. Slopes of Oliphant's River Mts. near Warm Baths, 7295.

2. *D. capensis*, Linn., Sp. Pl., 403.

Cape: In damp places on slopes of Oliphant's River Mts. near Warm Baths, 7298.

3. *D. cistiflora*, Linn., Amoen., 6, p. 85.

Cape: Foot of Oliphant's River Mts., near Warm Baths, 7299, 7296. Khamiesberg: In sand near Naauwpoort, 6488.

**LOASACEAE.\*†***By Ruth Glover.***1. KISSENIA.**

1. *K. spathulata*, R. Br., in Herb. Br. Mus.

Namaqualand: Sandy valley leading down to Bethany Drift, 6951. Bushmanland: Common on broken ground West of Pella, 3544. Great Namaqualand: Common on rocks on kopje near Gabis, 4323.

**RANUNCULACEAE.\*†***By Ruth Glover.***1. CLEMATIS.**

1. *C. Thunbergii*, Steud., Nom., ed. 2, i., 380.

Khamiesberg: In kloof on South side of pass between Bowesdorp and Groot Gans, 5880.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 62, 63, 64.

† Contributed from the Bolus Herbarium, South African College.

2. KNOWLTONIA.

1. *K. hirsuta*, DC., Syst., i., p. 220.

Cape: Oliphant's River Valley, 7286. Foot of Cold Bokkeveld Mts., opposite Warm Baths, Oliphant's River Valley, 7284.

2. *K. vesicatoria*, Curt., Bot. Mag. t. 775.

Cape: Foot of Cold Bokkeveld Mts., opposite Warm Baths, 7285.

3. RANUNCULUS.

1. *R. pubescens*, Thunb., Cap., p. 443.

Cape: Oliphant's River Valley near Warm Baths, 7730.

**PAPAVERACEAE.\*†**

*By Ruth Glover.*

1. CORYDALIS.

1. *C. vesicaria*, Pers., Syn., ii., 269.

Cape: Warm Baths, Oliphant's River Valley, 7028. Khamiesberg: Kharkams, 6682. Namaqualand: Between Bitterfontein and Stinkfontein, 6556.

**POLYGALACEAE.\*†**

*By Ruth Glover.*

1. POLYGALA.

1. *P. affinis*, DC., Prod., i., p. 322.

Khamiesberg: in Khamsoap Ravine, 6543.

2. *P. Lehmanniana*, E. and Z., Enum. 23.

Cape: Kloof below Warm Baths, Oliphant's River Mts., 7212. Khamiesberg, 7697.

3. *P. virgata*, Thunb., var.  $\epsilon$ , *genistoides*, Harv., Fl. Cap., i., p. 85.

Khamiesberg: Jutbosch Kloof, 6495.

\* Reports of the Percy Sladen Memorial Expeditions in South-West Africa, Nos. 65, 66.

† Contributed from the Bolus Herbarium, South African College.

4. *P. bracteolata*, Linn., Sp. Pl., 702.

Cape: Summit of Oliphant's River Mts. near Warm Baths, 6495, 7214.

5. *P. teretifolia*, Thunb., Prod., p. 120.

Khamiesberg: Jutbosch Kloof, 6794.

## 2. MUNDTIA.

1. *M. spinosa*, DC., Prod., i., p. 338.

Khamiesberg: Bailie's Vlakte, 6612.

## 3. MURALTIA.

1. *M. Heisteria*, DC., Prod., i., p. 335.

Cape: Oliphant's River Valley, along road near Warm Baths, 7726.

2. *M. divaricata*, E. and Z., Enum. 28.

Cape: Summit of Oliphant's River Mts. near Warm Baths, 7211, 6873, 6854.

3. *M. obovata*, DC., Prod., i., p. 337 (e descriptione).

Locality uncertain, probably Oliphant's River Valley, 7723.

# ASCLEPIADACEAE.\*

*By Louisa Bolus and N. E. Brown.*

## 1. CRYPTOLEPIS.

1. *C. decidua*, N. E. Brown.

Little Namaqualand: Dabainoris, on rocks, 3007. Great Namaqualand: Kopje 12 km. West of Sandverhaar, 4630. South of Warmbad, 4024. Sandstone hills at Seeheim, 3729. Little Bushmanland: Rocky ground on kopjes near Dabainoris, 3018. Damara-land: Crevices in granite at Welwitsch, 4414.

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 67.



2. ECTADIUM.

1. *E. latifolium*, N. E. Br.

Great Namaqualand: Rotkuppe, 4461. Locality uncertain, 5028.

2. *E. virgatum*, E. Mey., Comm. Pl. Afr.-Austr., 188.

Namaqualand: Orange River  $\frac{3}{4}$  mile South of Bethany Drift, 6043.

3. SECAMONE.

1. *S. Alpinii*, Schultes, Syst. Veg., vi., 125.

Cape: Summit of south-western slopes above Pickenier's Pass, 5129.

4. MICROLOMA.

1. *M. tenuifolium*, K. Schum., in Engl. and Prantl, Pflanzenfam., iv., ii., 222.

Cape: Hillsides Leeuwfontein, 3226. Mountain-slopes, Warm Baths, Oliphant's River Valley, 7294. Summit Oliphant's River Mts. near Warm Baths, 7292. Slopes above Pickenier's Pass, 5186.

2. *M. glabratum*, E. Mey., Comm. 222.

Cape: Sand flats between Driefontein and Heeren Logement, 6902. Khamiesberg: Kharkams, 6678.

3. *M. sagittatum*, R. Br., in Mem. Wern. Soc., i., 53.

Cape: Along road from Warm Baths to Modderfontein, Oliphant's River Valley, 7291. Namaqualand: By roadside between Brakdam and Rietkloof, 5666.

4. *M. incanum*, Dene. in D.C., Prodr., viii., 511.

Great Namaqualand: Gobas, 3635. Gründorn, 3136. Slopes at Schakalskuppe, 4234. Rocky places near Dabaigabis, 4408. Sand at base of kopje 20 km. North of Raman's Drift, 4549. On kopje 12 km. West of Sandverhaar, 4613a. Bushmanland: Rough ground at Groot Rozynbosch, 3843. Rietfontein, 3444. Upper mountain-slopes at Kweekfontein, 3813. Namaqualand: Dry river-bed South of Daunabis, 6007. Little Bushmanland: Rocky ground near Dabainoris, 3021.

*M. incanum*, Dene., var. *glabra*, nov. var.

Rami ramulique rigidi subspinescentes glabri, virides vel vetus-

tiores lutescentes; folia ad 0·6 cm. longa, vix 0·2 cm. lata; corolla 0·7 cm. longa, lobis haud vel obscure contortis, 0·2 cm. longis.

Great Namaqualand: Rotkuppe, 4462.

Branches and branchlets rigid subspinescent glabrous, green or the older ones becoming yellowish; leaves up to 0·6 cm. long, scarcely 0·2 cm. wide; corolla 0·7 cm. long, the lobes not or obscurely twisted.

5. *M. longituba*, Schlechter, in Bull. Herb. Boiss., iv., 445.

Great Namaqualand: Among rocks at Gabis, 4320. Sandy plains near Raman's Drift, 4054. Bushmanland: Kweekfontein, 3822.

6. *M. Massoni*, Schlechter, in Journ. Bot., 1896, 418.

Great Namaqualand: Sandy plains 18 km. West of Aus, 4205.

#### 5. XYSMALOBIUM.

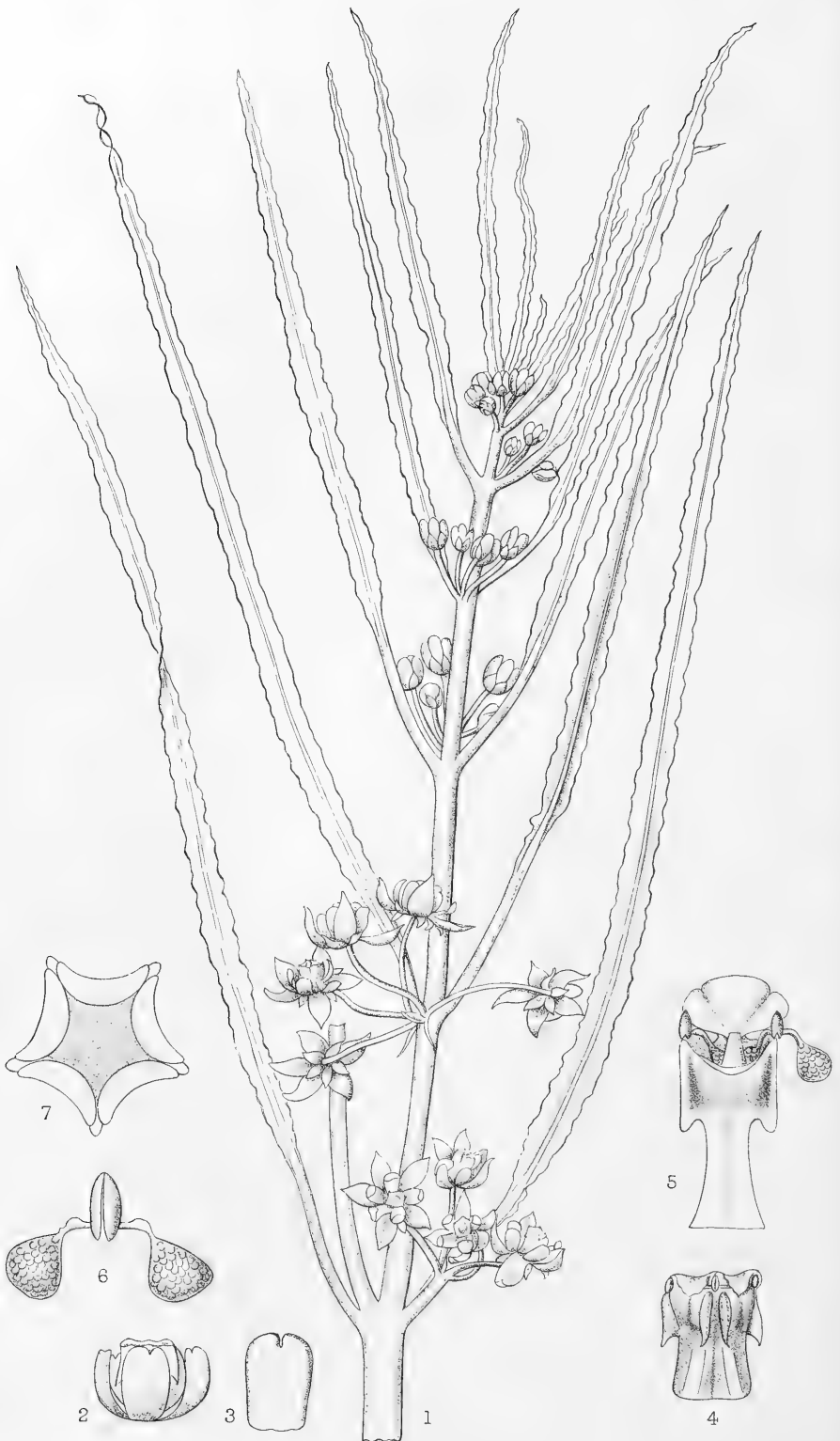
1. *Pearsonii*, n. sp. *X. carinato*, N. E. Br., affine sed foliis longioribus margine crispulatis, umbellis flores pauciores ferentibus, coronæ lobis dorsaliter planis, columna staminali duplo longiore distinguitur.

Herba perennis, ad 35 cm. alta, e basi ramosa, ramis elongatis subcompressis, novellis exceptis, glaberrimis; folia erecta vel adscendentia, petiolata, infima oblongo-lineararia, cetera anguste lineararia, acuta vel acuminata, apice interdum spiraliter contorta, basin versus gradatim in petiolum 1·5-6 cm. longum attenuata, margine scabrida crispulataque, ad 20 cm. (saepius 10-15 cm.) longa, 0·5-0·8 cm. lata; umbellae sessiles vel saepius pedunculatae, pedunculis ad 2·1 cm. longis; bractee lineari-filiformes, 0·2-0·4 cm. longae; pedicelli parce pilosi, 1·2-1·8 cm. longi; salycis segmenta oblongo-lanceolata acuta, extus parce pilosa, 0·4 cm. longa; corollae segmenta patentia oblongo-lanceolata, marginibus delicatule revoluta, 0·6 cm. longa; coronae lobi patenti-incurvi, e basi calumnae staminalis orientes et ei aequantes, dorsaliter plani, ecarinati oblongi, apice rotundati minuteque bifidi; columna staminalis cylindrica, medio constricta, 0·4 cm. longa; appendices antherarum ampliatae rotundatae, in apicem concavum styli inflexae; alae 0·2 cm. longae; pollinia oblique lateque obovata.

Khamiesberg: Khamiesberg plateau, alt. 5,000 ft., 6560.

A perennial herb, attaining 35 cm. in height, branched from the base, the branches elongate, somewhat compressed, quite glabrous





F. Bolus del. ex sicco.

West, Newman lith.

*XYSMALOBIIUM PEARSONII*, L. Bolus.

except on the young parts; leaves erect or ascending, petiolate, the lowest oblong-linear, the rest narrow-linear, acute or acuminate, sometimes spirally twisted at the apex, gradually attenuated towards the base into a petiole 1.5–6 cm. long, scabrid and crisped on the margin, up to 20 cm. (usually 10–15 cm.) long, 0.5–0.8 cm. wide; umbels sessile, or more often pedunculate, peduncles up to 2.1 cm. long; bracts linear-filiform, 0.2–0.4 cm. long; pedicels sparingly pilose, 1.2–1.8 cm. long; calyx-segments oblong-lanceolate acute, sparingly pilose without, 0.4 cm. long; corolla-segments spreading oblong lanceolate, the margins delicately revolute, 0.6 cm. long; coronal lobes spreading-incurved, springing from the base of the staminal column and equalling it in length, flattened at the back, ecarinate oblong, rounded and minutely bilobed at the apex; staminal column cylindrical, constricted in the middle, 0.4 cm. long; anther-appendages ample rounded, inflexed over the concave style-apex; wings 0.2 cm. long; pollinia obliquely and broadly obovate.

Allied to *X. carinatum*, N. E. Br., but readily distinguished from that species by its longer leaves with crisped margins, fewer flowered umbels, coronal lobes dorsally flattened, and the staminal column being twice the length.

Plate IV., Fig. 1, sketch of portion of a branchlet, nat. size; 2, coronal lobes and gynostegae; 3, one of the coronal lobes; 4, gynostegae; 5, one of the stamens viewed from within, the anther appendage tipped up; 6, pollinarium; 7, style-apex, viewed from above—all the latter variously magnified.

## 6. ASCLEPIAS.

1. *A. filiformis*, Benth. and Hook. f., Gen. Pl., ii., 753 and 754.

Great Namaqualand: Rocky places near stream-bed, a little South of Dabaigabis, 4409. Stony ridge about 8 miles South-west of Bitterfontein, 3871. Damaraland: Welwitsch, 4156, 4155.

2. *A. fruticosa*, Linn., Sp. Pl., ed. 1, 216.

Cape: Damp places, southern aspect above Pickenier's Pass, 5173.

3. *A. rotundifolia*, Mill., Dict., ed. 8, No. 15.

Cape: Foot of Oliphant's River Mts., near Warm Baths, 7293. Namaqualand: In fissures in granite blocks South of the town, Steinkop, 4711. Rock crevices at Koets, 5727. Bushmanland: kopjes, Nieuwfontein, 3432.

## 7. CYNANCHUM.

1. *C. orangeanum*, N. E. Br., in Fl. Cap., iv., § 1, p. 745.

Great Namaqualand: In sand near stream-bed, on plain 12 km. West of Sandverhaar, 4268. South of the railway line 20 km. West of Sandverhaar, 3652. Sandy stream-bed 1st outspan North of Gabis, 4474. Sand on flat 12 km. West of Sandverhaar, 4452. Sandy plain South of Schakalskuppe Station in river-course, 4774.

2. *C. africanum*, R. Br., Prodr., 463.

Khamiesberg: Namaroup, 6529.

3. *C. Meyeri*, Schltr., var. *angustifolia*, nov. var. Suffrutex 3-4 pedalis; folia saepissime lanceolata acuta mucronata, ad 1.3 cm. longa, 0.5 cm. lata, rarissime ovalia vel obovata; flores in racemos densissimos abbreviatis, simplicibus vel saepius 2-3 furcatis dispositi, racemis extra-axillaribus, breviter pedunculatis, pedunculis crassis, 0.2-0.3 cm. longis; bracteae persistentes minutae, axi florifero reliquis delapsorum pedicellorum conspicue notato.

Great Namaqualand: In sand and crevices in granite near top of hill North of Rotkuppe Station, 4466.

A shrublet 3-4 ft. high; leaves usually lanceolate acute mucronate, up to 1.3 cm. long, 0.5 cm. broad, very rarely oval or obovate; flowers arranged in very dense abbreviated, simple or more often 2-3 furcate, extra-axillary, shortly pedunculate racemes, the peduncles thick, 0.2-0.3 cm. long; bracts persistent minute, the flowering axis conspicuously marked by the remains of the fallen pedicels.

Plate V., Fig. 1, sketch of a branch, nat. size; 2, an inflorescence, showing the minute persistent bracts and scars of the fallen pedicels; 3, one of the flowers; 4, corolla, laid open; 5, corona, flattened; 6, gynostegae; 7, one of the stamens, separated from the staminal column, anterior view—all the latter variously magnified.

## 8. SARCOSTEMMA.

1. *S. viminalis*, R. Br.

Great Namaqualand: Akam River-bed, 4426.



F. Bolus del. ex sicco.

West, Newman lith.

*CYNANCHUM MEYERI*, Schltr. var. *ANGUSTIFOLIA*, L. Bolus.





9. PERGULARIA.

1. *P. garipeensis*, N. E. Br., in Fl. Cap., iv., § 1, p. 758.

Great Namaqualand: Sandy places and stream-beds South of Warmbad, 4035. River-bed between Dabaigabis and Gabis, 4368. Just above high-water mark Lowen's River, Gawachab. Namaqualand: Sandy bed of Orange River about  $\frac{3}{4}$  mile South of Bethany Drift, 6041. Bushmanland: Sand in broad valley leading down to Raman's Drift, 4703. Dabainoris in sand, 3008.

10. ORTHANTHERA.

1. *O. albidula*, Schinz, in Verhandl., Bot. Ver. Brandenb., xxx., 265.

Great Namaqualand: Among rocks near Holoog, 4121. Damara-land: Shallow ravine between Welwitsch Station and Kham River, 4141, 4142.

11. TRICHOCAULON.

1. *T. meloforme*, Marl., Trans. Roy. Soc. S.A., vol. ii, p. 239.

Great Namaqualand: Lower slopes of kopje above the pass leading down to Gründoorn, 4358.

2. *T.* sp., indeterminable without flowers.

12. HOODIA.

1. *H. Gordonii*, Sweet, Hort. Brit., ed. 2, 359.

Karoo: Near Schuurkraal, 3915. Little Namaqualand: South side of pass between Grauwater and Plaatklip, 3299.

13. CARALLUMA.

1. *C. Nebrownii*, Berger.

Great Namaqualand: Gründoorn, stony slopes, 4350.

**VERBENACEAE.\***

*By H. H. W. Pearson.*

BOUCHEA.

1. *B. glandulifera*, H. H. W. Pearson, in Fl. Cap., v., 204.

Bushmanland: In rocky places on the sides of the ravine at

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 68.

Groot Rozynebosch, 3624. Ougrabies, on rocky hillsides, 3574. Among rocks on hillsides near Henkriesfontein, 3089. Great Namaqualand: Common among rocks at Gabis, 4331.

Also occurs in Little Namaqualand.

2. *B. namaquana*, Bolus, e H. H. W. Pearson in Flor. Cap., v., 204, var. *latifolia*, nov. var., foliis basi subtruncata 0·5-1 cm. longa latioraque.

Bushmanland: Near wagon track, Groot Rozynebosch, 3838. Dabainoris, 3615.

3. *B. pumila*, Schauer, in DC., Prodr., xi., 560.

Bushmanland: Dry sandy plains between Wortel and Dabainoris, 3027. Ougrabies: Sand of dry river-bed, 2929. Great Namaqualand: Sandy plains 23-30 km. South of Warmbad, 5039. Dry sandy river-bed 20 km. North of Raman's Drift, 4522.

A small-leaved incomplete specimen (Little Namaqualand, 3280) may perhaps belong to this species.

4. *B. pinnatifida*, Schauer, in DC., Prodr., xi., 560.

Great Namaqualand: Schakalskuppe, 4239.

## PROTEACEAE.\*

*By E. P. Phillips.*

### 1. BRABIEUM.

1. *B. stellatifolium*, L.

Cape Region: Oliphant's River-bed near outspan, Nov. 26th, 5277.

The above locality is a new one for the species.

### 2. LEUCADENDRON.

1. *L. pubescens*, R. Br., in Trans. Linn. Soc., x., 6.

Coast Region: Sand flats between Driefontein and Heeren Logement. Bush 4-5 ft., 6802. At base of cliffs in Oliphant's River-bed between Lang Kloof and Nardouw Pass; bush 8-10 ft., 5347,

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 69.

5349. Near to Modderfontein, Oliphant's River Valley; flowers yellow, 6912, 6913 ♂, 6916 ♀. Right-hand mountain-side behind Warm Baths; shrub 2 ft., 6943. Giftberg Range, 1-2,000 ft.; bush 4-6 ft., 7419.

Hitherto only recorded from the Piquetberg and Tulbagh Divisions, and is the first time the female plant has been collected. A full description of the species follows.

*Bush* 1·3-3·3 m. high. *Branches* densely pubescent, almost tomentose. *Leaves* subequal in the two sexes, 2·1-4 in. long, ·35-1 cm. broad, oblanceolate, obtuse, narrowed at the base, glabrous or finely pubescent. *Male inflorescence* solitary at the end of the branches, 8 mm. long, 9 mm. in diameter, subglobose. *Involucral bracts* 2-4-seriate, 3·5 mm. long, 2-2·5 mm. broad, ovate, sub-acuminate, obtuse, tomentose, ciliate. *Floral-bracts* 3·5 mm. long, linear, concave, obtuse, villous. *Perianth-tube* 2·5 mm. long, cylindric, villous; segments 2 mm. long, linear, pilose; limb 1 mm. long, linear, obtuse, villous. *Anthers* ·75 mm. long, linear. *Style* 4·5 mm. long, terete, villous; stigma ·75 mm. long, clavate. *Fruiting female head* 3-3·5 cm. long, about 3 cm. in diameter, globose, not hidden by the upper foliage leaves. *Involucral bracts* 3-4-seriate, similar to those of the male. *Floral bracts* woody, 1·5 cm. long, 1·7 cm. broad, ovate, rounded above, strongly concave, tomentose, becoming densely villous on the upper half. *Perianth* 1·2 cm. long, 2·5 mm. broad, oblong, membranous, glabrous; in the upper half ·5 mm. broad, linear, villous. *Hypogynous scales* 3·5 mm. long, linear. *Ovary* 4 mm. long, obovate in outline, strongly keeled on the dorsal face, sparsely pilose; style 6 mm. long, linear, bulbous and villous at the base; stigma oblique. *Fruit* 1·2 cm. long, ·9 cm. broad, biconvex, obovate in outline, glabrous, except for a few hairs at the apex, dark, almost black.

2. *L. adscendens*, R. Br., in Trans. Linn. Soc., x., 61.

Cape Region: Top of mountains at Hottentots' Kloof; bush 2 ft., common, 4922, 5046. Top of Oliphant's River Mts. behind Warm Baths, 6918 ♀; Kloof below Warm Baths, 6942; bracts golden, 6856 ♂, 6941, 6939 ♀; Oliphant's River Mts.; common in patches; bracts yellow with very red heads, 6923; Oliphant's River Valley, near Modderfontein; bush 2½ ft., flowers silvery pink, 6915; Oliphant's River Mts. behind Warm Baths; bush 3½ ft., 6903. Giftberg Range, 1-2,000 ft.; bush 2-3 ft., common, 7410, 7412. Without precise locality, 5046.

This is a very common species widely distributed over the South-

Western Region of the Cape Province. It has also been found on the Zwartbergen in the Laingsburg Division at an altitude of about 4,000 ft.

3. *L. plumosum*, R. Br., in Trans. Linn. Soc., x., 53.

Cape Region: Mountain-tops at Hottentots' Kloof; bush, 1-3 ft., common, 4932, 4933. Oliphant's River Mts. behind Warm Baths, 6919 ♂, 6935 ♀, 6933 ♀, 6627 ♂, 6926.

A common species widely distributed over the South-Western Region of the Cape Province. Has also been recorded from the Zwartbergen in the Laingsburg Division at an altitude of about 4,000 ft.

4. *L. decurrens*, R. Br., in Trans. Linn. Soc., x., 59.

Cape Region: Oliphant's River Mts. behind Warm Baths; shrub 2-2½ ft., 6904, 6905, 6906, 6929, 6930, 6940, 6945; bush 4 ft., 6907; bracts greenish-brown cup, 6925; same locality, very common, covers mountain-sides with red in patches, 6922.

This species has been recorded from the Clanwilliam, Piquetberg, Tulbagh, Worcester, Caledon, and Ceres Divisions.

5. *L. lanigerum*, Buek., in Drège, Zwei Pfl. Documente, 198.

Coast Region: At base of cliffs on Oliphant's River between Lang Kloof and Nardouw Pass; bush 8-10 ft., common, 5347 ♀, 5349 ♂.

Hitherto only recorded from the Paarl, Stellenbosch, and Ceres Divisions.

6. *L. discolor*, Buek., in Drège, Zwei Pfl. Documente, 198.

Cape Region: Giftberg Range, 1-2,000 ft., growing near a stream, 7417.

This specimen has only once previously been collected, viz., by Drège on the Piquetberg.

7. *L. sessile*, R. Br., in Trans. Linn. Soc., x., 54.

Cape Region: Oliphant's River behind Warm Baths; shrub 2-3 ft., 6931.

The type specimen of this species preserved in the British Museum is very fragmentary. A more complete description than that in the "Flora Capensis" is given below.

*Frutex* 0.6-1 m. altus. *Ramuli* pubescentes. *Folia* 3.5-5.5 cm. longa, 0.5-2.7 cm. lata, lanceolata, apice obtuse-mucronata, basi

paullo angustata, glabra, rare ciliata. *Inflorescentia* ♂ terminalia, sessilia, solitaria, 1.3 cm. longa, circa 1 cm. lata. *Receptaculum* 5 mm. longum, conicum. *Involucri bracteae* 5-6 seriatæ, 9 mm. longæ, circa 5 mm. latae, oblongæ, acuminatæ, apice acutæ, glabræ, ciliatæ. *Bracteae floriferæ* 1.1 cm. longæ, lineares, paullo superne dilatatæ, apice acutæ vel subacutæ, sulcatæ, glabræ. *Perianthii tubus* 1 cm. longus, subteres, glaber; segmenta 1 cm. longa, linearia, glabra; limbus 4 mm. longus, lanceolato-linearis, apice obtusus. *Antheræ* 3 mm. longæ, lineares. *Stylus* 1.6 mm. longus, filiformis, glaber; stigma 1 mm. longum, cylindricum, apice obtusum. *Squamæ hypogynæ* 6 mm. longæ, lineares. *Inflorescentia* ♀ sessilia, solitaria, 4 cm. longa, circa 4 cm. lata, subglobosa, foliis circumdata. *Bracteae floriferæ* ovatae, apice obtusæ, concavæ, costatæ, dense tomentosæ; inferiores reflexæ. *Perianthii tubus* 1 mm. longus, plana, villosus; segmenta 2.5 mm. longa, linearia; limbus 1.5 mm. longus, ovatus, apice obtusus, glaber. *Stamodia* 0.75 mm. longa, oblonga, apice obtusa. *Stylus* 1 cm. longus, paullo inferne angustatus; stigma 1 cm. longum, oblique truncatum. *Fructus* 7 mm. longus, 9 mm. latus, obovatus vel oblongus, externus convexus, internus planus, rugosus, glaber.

8. *Leucadendron Roodii*, sp. nov. (Proteaceae-Proteeae) affinis *L. venoso*, R. Br., sed stylis ♂ villosis, et bracteis ♀ glabris differt.

*Frutex* 1-1.5 m. altus. *Ramuli* ♀ glabri; ramuli ♂ pilis debilibus villosi. *Folia* 1.8-4 cm. longa, 0.6-1.1 cm. lata, oblanceolata vel elliptico-oblanceolata, apice distincte callosomucronata, basi angustata, glabra, interdum pilis debilibus pilosa, et in ♂ apice ciliata. *Inflorescentia* ♂ sessilia, terminalia, solitaria, 1 cm. longa, circiter 1.3 cm. lata, foliis circumdata. *Receptaculum* 7 mm. longum, cylindricum. *Involucri bracteae* 2-3 seriatæ, 6-7 mm. longæ, 4-6 mm. latae, ovatae, apice obtusæ, interdum apice sacculatæ, glabræ, ciliatæ. *Bracteae floriferæ* 7 mm. longæ, lanceolatae, apice obtusæ, pilosæ. *Perianthii tubus* 4 mm. longus, glaber, compressus; segmenta spathulato-linearia, glabra; limbus 3 mm. longus, linearis, apice obtusus. *Antheræ* 2 mm. longæ, lineares. *Squamæ hypogynæ* 5 mm. longæ, lineares. *Stylus* 6 mm. longus, teres, villosus; stigma 2 mm. longum, cylindricum. *Inflorescentia* ♀ 1.3 cm. longa, circiter 1.3 cm. lata, globosa. *Receptaculum* 8 mm. longum, cylindricum. *Bracteae* 5 mm. longæ, 0.45-1.2 cm. latae, ovatae, subacuminatæ, apice obtusæ, glabræ; extimæ steriles, interdum basi minute ciliatæ. *Perianthii tubus* 7 mm. longus, compressus, laterale villosus, aliter glaber; segmenta 2.5 mm. longa, linearia;

limbus 1·3 mm. longus, linearis, apice obtusus; staminodia 1 mm. longa, linearia *Squamae hypogynae* 4 mm. longae, lineares, acuminatae. *Ovarium* 3·5 mm. longum, ovatum, glabrum; stylus 7 mm. longus, linearis, superne dilatatus, glaber; stigma clavatum, distincte bifidum.

Cape Region: Giftberg Range, 1–2,000 ft., 7411.

Named in honour of Mr. Rood, of Van Rhynsdorp, whose valuable assistance made the trip to the Gift Berg a success.

9. *L. Pearsonii*, sp. nov. *Frutex* 1·3–2 m. altus. *Ramuli* glabri. *Folia* 3–6 cm. longa, 1·5–2·7 cm. alta, oblanceolata, elliptico-oblanceolata vel elliptica, glabra. *Inflorescentia* ♂ 2·5 cm. longa, 3 cm. lata, globosa. *Involucris* bracteae 7-seriatae, convexae, 8 mm. longae, 8 mm. latae, apice obtusae, glabrae. *Bracteae* floriferae lineares, villosae. *Stylus* villosus. *Inflorescentia* ♂ 1·8 cm. longa, 2 cm. lata, subglobosa. *Involucris* bracteae 2–3-seriatae, 8 mm. longae, 7 mm. latae, glabrae. *Bracteae* floriferae 9 mm. longae, 1·5 cm. latae, albo-tomentosae. *Fructus* 7 mm. longus, 9·5 mm. latus, glaber.

A bush 1·3–2 m. high. *Branches* terete, glabrous. *Leaves* equal in the two sexes, 3–6 cm. long, 1·5–2·7 cm. wide, rarely only 1 cm. wide, oblanceolate, elliptic-oblanceolate or elliptic, apiculate at the apex, slightly narrowed at the base, glabrous, leathery. *Male inflorescence* hidden by the upper foliage leaves, 2·5 cm. long, 3 cm. in diameter, globose. *Involucral bracts* about 7-seriate, convex, 8 mm. long, 8 mm. broad, suborbicular, obtuse, shortly apiculate, glabrous. *Floral bracts* 9 mm. long, 1–1·5 mm. broad, linear, shortly acuminate, subobtuse, villous with long white hairs. *Perianth* 1·5 cm. long, villous at the base; limb 3·5 mm. long, linear, obtuse, villous. *Anthers* 3 mm. long, linear. *Hypogynous scales* 6 mm. long, filiform. *Style* 1·2 cm. long, terete, villous; stigma 3 mm. long, plano-convex in cross-section. *Female inflorescence* hidden by the upper foliage leaves, 1·8 cm. long, 2 cm. in diameter, subglobose. *Involucral bracts* 2–3-seriate, 8 mm. long, 7 mm. broad, suborbicular, apiculate, glabrous, slightly glutinose, with shortly ciliate margins. *Floral bracts* 9 mm. long, 1·5 cm. broad, transversely oblong, rounded above, densely albo-tomentose on the lower half. *Perianth* 1 cm. long, dorso-ventrally compressed, lateral segments slightly villous, otherwise glabrous; limb 1 mm. long, linear, obtuse. *Style* 8 mm. long, linear, looped and bulbous at the base; stigma shortly bifid at the apex. *Fruit* 7 mm. long, 9·5 mm. broad, transversely oblong in outline, double convex, glabrous, rugose, dark reddish brown.

Cape Region : Sandy flats between Driefontein and Heeren Logement. Bush 4-6 ft. high September 22nd, 1911, 6796.

Named in honour of Dr. H. H. W. Pearson.

### 3. PROTEA.

1. *P. marginata*, Thunb. in Hoffm. Phytogr. Blaett., i, 15.

Cape Region : Hilltops at Hottentot's Holland Kloof; tree 15 ft., 4915. Mitchell's Pass, near top; common; tree 10 ft., 5109. Oliphant's River Mts. near Warm Baths; shrub 5 ft., flowers silvery pink, bracts tipped with magenta hairs, 6909; shrub 8-9 ft. high, 6908; bracts bluish-pink, tipped with black hairs, 6934. Giftberg Range, 1-2,000 ft., 7629.

This species has also been recorded from the Tulbagh, Paarl, Swellendam, and Port Elizabeth (?) Divisions.

2. *P. grandiflora*, Thunb., Diss. Prot., 56.

Cape Region : Common on hillsides at Leeuwfontein, 2,500ft.; tree 12-15 ft. high, 3684. Top of Oliphant's River Mts. behind Warm Baths; 6-7 ft. high, heads yellowish-green, young shoots brilliant red, 6944. Giftberg Range, 1-2,000 ft.; tree 12-15 ft. high, common, 7418 bis.

A fairly widely distributed species, has been collected in the Paarl, Cape, Caledon, Swellendam, Humansdorp, and Ceres Divisions. This tree also grows plentifully on the Zwartbergen in the Laingsburg Division at an altitude of 4-5,000 ft.

3. *P. glabra*, Thunb., Diss. Prot., 42.

Cape Region : On edge of plateau on top of Nardouw Kloof, 5417. Giftberg Range, 1-2,000 ft.; tall bush, 4-5 ft., common, 7418.

Specimens of this species were collected by Drège and Schlechter in the Clanwilliam Division and by Drège in the Calvinia Division.

4. *P. scolymocephala*, Reich., Syst. Pl., i, 271.

Cape Region : Oliphant's River Valley near Modderfontein; small bush, bracts yellow, 6917.

Also recorded from the Paarl, Cape, and Stellenbosch Divisions.

5. *P. scabra*, R. Br., in Trans. Linn. Soc., x, 91.

Cape Region : Top of Oliphant's River Mts. behind Warm Baths, 6910.

The first record from this locality ; the species has only been known before from the Caledon, Swellendam, and Uniondale Divisions.

6. *P. acaulis*, Thunb., Diss. Prot., 56.

Cape Region : Oliphant's River Mts. behind Warm Baths ; straggling, very common, flowers pale green ; flowers cerise, 6928.

Also recorded from the Tulbagh, Paarl, Cape, Caledon, Bredasdorp, and Uitenhage Divisions.

7. *P. angustata*, R. Br., in Trans. Linn. Soc., x., 90.

Cape Region : Gift Berg Range, 1-2,000 ft., procumbent plant, bracts brown, 7414.

This plant has the same habit as *Leucospermum hypophyllum*, R. Br., the stem trails on the ground and all the leaves point skywards ; differs from any other *Protea* I have examined in that either all the perianth segments are free below the limb or two free and two fused below or all along. I took this to be a form of *P. acaulis*, Thunb., but Dr. Stapf, to whom a specimen was sent, reports : " I take it to be an anomalous state of *P. angustata*, as represented by Schlechter's No. 9539, which differs from the rest in the scantier tomentum of the perianth sheath." *P. angustata*, however, might possibly be an extreme, narrow-leaved state of *P. acaulis*. (See Fl. Cap., v., 604.)

A procumbent shrub. Branches trailing on the ground, glabrous, smooth, becoming rough when older. *Leaves* all turning skywards, 8-13 cm. long, 0.4-1.1 cm. broad, linear to lanceolate-linear, subacuminate, acute, attenuated at the base into a petiole, glabrous, with thickened margins, and a distinct mid-rib when dry. *Capitulum* subsessile at the end of the branches, slightly curved upwards, 3 cm. long, about 3-3.5 cm. wide ; receptacle 5 mm. high, conical. *Involucral bracts* 12-18 seriate ; the outer ovate, obtuse, glabrous, ciliate ; the inner more or less oblong and convex on the back ; the innermost spatulate, clawed, glabrous, ciliate, exceeding the flowers. *Perianth sheath* 1.8 cm. long, bent, dilated, and 7-nerved and 3-keeled below, villous in the uppermost third, otherwise glabrous, ciliate ; the posticous (adaxial) usually splitting into 2, sometimes 3, segments ; lip 5 mm. long, villous and slightly bearded. *Stamens* all fertile ; anthers 4.5 mm. long, linear ; apical glands 0.5 mm. long, ovate, obtuse ; filament 1 mm. long, flattened, grooved. *Ovary* 3 mm. long, obovate-oblong in outline, covered with long reddish-brown hairs, 6 mm. long. *Style* 2.5 cm. long, arcuate, tapering upwards, laterally compressed below, glabrous ; stigma 3 mm. long,



linear swollen at the apex, slightly swollen and curved at the junction with the style.

#### 4. LEUCOSPERMUM.

1. *L. ellipticum*, R. Br., in Trans. Linn. Soc., x., 98.

Cape Region : Upper slopes Pickenier's Pass ; bush up to 5 ft. high, spreading, perianth beetroot colour, bracts green below, bright red, styles orange in upper half, 5137.

Also recorded from the Clanwilliam and Tulbagh Divisions.

2. *L. tottum*, R. Br., in Trans. Linn. Soc., x., 97.

Cape Region : Top of Oliphant's River Mts. behind Warm Baths ; bracts reddish-pink, 6862. (Flowers immature, E.P.P.)

The above locality is a new record, the species only having been known from the Worcester and Ceres Divisions.

3. *L. candidans*, Loud, Hort. Brit., ed. 1, 36.

Cape Region : Sand Bay near Robertson ; bush 8 ft. high, flowers yellowish, 5108. Oliphant's River Valley, foothills of Cold Bokkeveld opposite Warm Baths ; flowers yellow, 6920 ; road to Modderfontein ; flowers yellow, 6914.

Also recorded from the Clanwilliam, Malmesbury, and Caledon Division.

4. *L. puberum*, R. Br., in Trans. Linn. Soc., x., 100.

Cape Region : Giftberg Range, 1-2,000 ft., 7386, 7416. Oliphant's River Valley, near Modderfontein, 6936.

A widely distributed species in the South-Western Region of the Cape, but has also been collected by Drège on the Bokkeveld Mts. in the Ceres Division, and has also been recently taken on the Zwartbergen in the Laingsburg Division at an altitude of 4-5,000 ft.

5. *L. cartilagineum*, Phill., in Fl. Cap., v., 636.

Western Region : Upper south-west slopes of Beacon's Hill, North-west of Leliefontein, 5,300(?) - 5,500 ft. ; round bushes, 2-4 ft. high, 6330.

Hitherto this species has only been collected by Drège, Niven, and Roxburgh, and was described by R. Brown in the Trans. of the Linn. Soc. as a *Leucadendron*.

## 5. SERRURIA.

1. *S. Aitonii*, R. Br.

Cape Region: Common on top of Oliphant's River Mts. beyond Warm Baths, 1-3 ft. high, 6938.

Formerly collected by Drège and Schlechter in the Piquetberg Division and by Drège in the Clanwilliam Division.

2. *S. millefolia*, Kn.

Cape Region: Giftberg Range, 1-2,000 ft.; spreading bush, 2-4 ft. high, flowers white, 7376.

A common species in the Van Rhynsdorp and Clanwilliam Divisions, but has also been recorded from the Paarl and Cape Divisions.

3. *S. fucifolia*, Kn.

Cape Region: In sand on plateau on summit of Nardouw Mts.; very common, bush 2-4 ft. high, 5424. Giftberg Range, 1-2,000 ft.; bush 1-2 ft., flowers white, 7420; bush 4-5 ft. (leaves only), 7413.

This species is only known from the Van Rhynsdorp, Clanwilliam, and Piquetberg Divisions.

4. *S. cygnea*, R. Br.

Cape Region: Top of Oliphant's River Mts. beyond Warm Baths; decumbent, flowers silvery pink, 6924.

Recorded also from the Tulbagh and Worcester Divisions.

## 6. NIVENIA.

1. *N. spicata*, R. Br., in Trans. Linn. Soc., x., 136.

Cape Region: Common on slopes above Pickenier's Kloof, 5189. Oliphant's River Mts. at Warm Baths; buds silvery grey, shrub 2-5 ft. high, 6937. Gift Berg Range, 1-2,000 ft.; spreading bush 2-2½ ft. high, 7415.





11.—LIST OF THE PLANTS COLLECTED IN THE PERCY SLADEN  
MEMORIAL EXPEDITIONS, 1908-9, 1910-11, CONTINUED.

**CARYOPHYLLACEAE.\***

*By Ruth Glover.†*

1. SPERGULARIA.

1. *S. media*, Pers., ex Griseb. Spicil. Fl. Rumel., i, 213.

Karoo: Sandy river-bed, Beukesfontein, 5004. East slopes of ridges at Attis, 5461. River-bed near Pappekuul, 3982. Sandy river-bed North of Gansfontein, 3986. Khamiesberg: Kharkams, 6700.

2. SPERGULA.

1. *S. arvensis*, Linn., Sp. Pl., 440.

Cape: Lower slopes Cold Bokkeveld Mts., opposite Warm Baths, Oliphant's River Valley, 7159.

3. STELLARIA.

1. *S. media*, Cyrill., Char. Comm. (1784), 36.

Cape: Foot of Oliphant's River Mts., near Warm Baths, 7161, 6689, 7157, 7156.

4. CERASTIUM.

1. *C. capense*, Sond., in Harv. and Sond., Fl. Cap., i, 131.

Cape: Oliphant's River Valley, foothills of Cold Bokkeveld Mts.,

\* Percy Sladen Memorial Expeditions in South-West Africa. Report No. 71 (*Caryophyllaceae-Gramineae*).

† Contributed by the Bolus Herbarium of the South African College.

opposite Warm Baths, 6888. Khamiesberg: Damp shady places near water. Khoms Ravine, 6490.

#### 5. SILENE.

1. *S. Burchellii*, Otth., in DC., Prod., i., 374.

Cape: Oliphant's River Mts., near Warm Baths, 7158.

2. *S. clandestina*, Jacq., Coll. Suppl., 111.

Khamiesberg: Foot of Giffberg, 6760. Cape: Nine miles along the Leeuwfontein Road, 3509.

3. *S. gallica*, Linn., Sp. Pl., 417.

Cape: Oliphant's River Mts., near Warm Baths, 7160.

4. *S. capensis*, Otth., in DC., Prod., i., 379.

Cape: Foot of Cold Bokkeveld Mts., opposite Warm Baths, Oliphant's River Valley, 7154, 7155, 6861. By roadside between Hottentots' Kloof and Karroopoort, 5007, 4831. Khamiesberg: Stream-side on South side of pass between Bowesdorp and Groot Gans, 5883. Among bushes near water, Khoms Ravine, 6582, 6652. Vogelklip facing South-east Khamiesberg, 5927.

#### 6. DIANTHUS.

1. *D. crenatus*, Thunb., Prod. Pl. Cap., 81.

Khamiesberg: Among bushes in dry stream-bed lower south-eastern slopes, Vogelklip, 5904. Roadsides and cornlands, Brakdam, 5604.

2. *D. caespitosus*, Thunb., *l. c.*, 81.

Khamiesberg: Summit of kopje South-west of Leliefontein, 6312.

3. *D. pectinatus*, E. Mey., ex Sond., in Harv. and Sond., Fl. Cap., i., 124.

Cape: In sand in crevices of rock, Oliphant's River-bed, North end Nardouw Kloof, 5334.

4. *D. incurvus*, Thunb., Prod. Pl. Cap., 81.

Cape: Common on burnt-out pasture, Leeuwfontein, 3180, 3189.

5. *D. scaber*, Thunb., *l. c.*, 81.

Cape: Roggeveld after Blauwkrantz Pass, 4984.

## PORTULACACEAE.

*By Ruth Glover.*

### 1. TALINUM.

1. *Talinum cafferum*, E. and Z., Enum., 282.

Great Namaqualand: Kopje above pass leading down to Gründoorn, 4448. Sandy plain leading down to Gründoorn, 4431. Sandy stream-bed near Ganus, 4584. Sandy plain near Ganus. Among stones on kopjes between Dabaigabis and Gabis, 4586. Fissures in rocks on kopjes near last outspan South of Gründoorn, 4338. Banks of dry stream-bed on flat 12 km. West of Sandverhaar, 4453. Sandy plains around Schakalskuppe, 4162. Rocky places 12 miles South of Raman's Drift, 4642.

## STERCULIACEAE.

*By E. L. Stephens, J. Hutchinson, and Ruth Glover.*

### 1. HERMANNIA.

1. *H. comosa*, Burch., Cat., 1633.

Great Namaqualand: Among quartzite blocks, Akam River basin, 4746.

2. *H. althaeifolia*, Linn., Sp. Pl., 673.

Locality uncertain, 5855.

3. *H. presliana*, Turcz, in Bull. Soc. Mosc., xxxii., 1, 259.

Cape: Mountain slopes, Oliphant's River Valley, near Warm Baths, 6875. Kloof below Warm Baths, Oliphant's River Valley, 7289, 7290.

4. *H. disermifolia*, Jacq., Hort. Schoenb., i., 65, t. 121.

Khamiesberg: Tweerivieren, above settlement on eastern side, 6602. Hill above Tweerivieren, 6772. Namaqualand: Doornpoort Ravine, 6129. Sand of river-bed near Brakwater dam below Modderfontein Pass, 5995.

5. *H. alnifolia*, Linn., Sp. Pl., 674.

Cape: Oliphant's River Valley near Warm Baths, 7287.

6. *H. pallens*, E. and Z., Enum. 47.

Khamiesberg: Naras Ravine, 6709.

7. *H. hirsuta*, Schrad. and Wendl., in Sert. Han., t. 4.

Cape: Foothills, Cold Bokkeveld Mts., opposite Warm Paths, Oliphant's River Valley, 7288. Khamiesberg: Between stones on middle south-eastern slopes Zuurberg, Anegas, 6259. Elliottsberg, 7702. Sneeuwkop, south-eastern slopes above Modderfontein, 5852. Among rocks on kopje South-west of Leliefontein Mission Station, 6311. Namaqualand: Between Middelkraal and Brakdam, 5613.

8. *H. denudata*, Linn. f., Suppl., 301.

Locality uncertain, 5387.

9. *H. brachypetala*, Harv., in Harv. and Sond., Flor. Cap., i., 202.

Bushmanland: On sand dunes, Aggenys, 2920. Namaqualand: Sandy slopes at Kamabies, 3774. Great Namaqualand: Sand dunes and river-bed, Sandverhaar, 4678, 4660.

10. *H. gariiepina*, E. and Z., Enum. 49.

Great Namaqualand: Sandy river-bed near Dabaigabis, 4394.

11. *H. paucifolia*, Turcz., in Bull. Mosc., 1858, 218.

Great Namaqualand: Railway embankment 18 km. West from Aus, 4218.

12. *H. trifurcata*, Linn., Sp. Pl., ed. 2, 942.

Cape: Oliphant's River Valley, near Warm Baths, 7201, 7200. Sand flats between Driefontein and Heeren Logement, 6747. Karroo: In river-bed, Pappekuil, 9683. Locality uncertain, 3683.

13. *H. spinosa*, E. Mey., in Drège, Zwei Pfl. Docum., 192.

Bushmanland: Exact locality unknown, 3614. Groot Roggebosch, 5033. Great Namaqualand: Quartzite blocks, Akam River basin, 4759. Sandy places about 25 km. South of Warmbad, 4028. Stream-courses at base of mts. at Schakalskuppe, 4248. 20 km. North of Raman's Drift, 4067.

14. *H. modesta*, Planch., ex Mast., in Oliv. Flor. Trop., i., 232.

Great Namaqualand: Sandy plain at Schakalskuppe, 4771. Akam River, 8 km. South of Kuibis, 4752.



15. *H. stricta*, Harv., in Harv. and Sond., Flor. Cap., i., 206.

Namaqualand: North slopes Rietkloof Mt., 5714. Great Namaqualand: Common in crevices on mountains South of Tschauhab Station, 4264. Common in rocky places near Dabaigabis, 4392.

16. *H. fruticulosa*, K. Schum., ex Schinz, in Verh. Bot. Ver. Brand., xxx., 233.

Great Namaqualand: Sandy river-bed and on sand dunes at Sandverhaar, 4649.

17. *H. amabilis*, Marloth, ex K. Schum., in Bot. Jahrb., x., 42.

Damaraland: Sand in deep ravines near Welwitsch, 4147.

18. *H. marna*, Schlechter.

Locality uncertain, 6108.

19. *H. gariepina*, E. and Z., Enum. 49.

Locality uncertain, 4394, 4528.

20. *H.* sp. Material insufficient.

Locality uncertain, 4938.

21. *H. heterophylla*, Thunb., Diss. Herm., 14.

Cape: Sand flats between Heeren Logement and Driefontein, 6748.

22. *H. pulchella*, Linn. f., Suppl., 302.

Bushmanland: In sand at foot of kopje, 8 miles South of Bitterfontein, 3310. Gneissic kopje near Bitterfontein, 3420. Namaqualand: River-bed, Nieuwfontein, 3358. Sandy flats near Alewyn's Fontein, 3337.

23. *H. bipinnata*, Glover, nov. comb. (*Mahernia bipinnata*, Linn. non Burch.).

Khamiesberg: Stinkfontein, 6486.

24. *H. grandiflora*, Ait., Hort. Kew, ed. 2, t. iv., 141.

Karoo: Among bushes 4 miles West of Nieuwerust, 6391. Bushmanland: Between Aggenys and Pella, 3585. On plains between Pella and Groot Roggebosch, 3840. Namaqualand: Sandy valley leading down to Bethany Drift, 6048. Great Namaqualand: Gabis, 4313. Broad sandy river-bed North of Sabiesis, 4124. 21-30 km. West of Raman's Drift, 4008. 21-30 km. North of Raman's Drift, 4015.

25. *H. Meyeriana*, Glover, nov. comb. (*Mahernia multifida*, E. Mey.).

Little Namaqualand: Sandy slopes at Kamabies, 3774. Locality uncertain, 3949, 3261.

26. *H.* sp. Material insufficient.

Locality uncertain, 5171.

27. *H. rigida*, Harv., in Harv. and Sond., Fl. Cap., i., 188 (e descriptione).

Namaqualand: Northern slopes of Rietkloof Mt., 5714.

28. *H. exstipulata*, E. Mey., in Drège, Zwei Pfl. Docum., 191.

Great Namaqualand: Sandy dry river-bed, Gorup, 4200.

## GERANIACEÆ.

*By Ruth Glover.*

### 1. MONSONIA.

1. *M. biflora*, DC., in Prod., i., 638.

Great Namaqualand: Middle slopes of kopje above pass leading down to Gründoorn, 4357. Gründoorn: Shady places on kopje East of the Farm, 4359. Dry stream-bed in broad valley North of Sabiesis, 4126. Flat top of limestone hills by Railway Station, Buchholzbrunn, 3673. Schakalskuppe, 4249. Common among quartzite blocks near Dabaigabis, 4398.

2. *M. umbellata*, Harv., in Harv. and Sond., Flor. Cap., i., 255.

Great Namaqualand: Sandy plains recently marshes by rain, 21–30 km. North of Raman's Drift, 4018. Sandy places about 20 km. South of Warmbad, 4373. Common near recent stream-beds in sandy valley North of Sabiesis, 4111. Stony ground, Holoog, 4128.

### 2. SARCOCAULON.

1. *S. Burmanni*, DC., in Prod., i., 638.

Khamiesberg: Varsche Rivier, 6820. Namaqualand: On lower arid slopes opposite Sendling's Drift, 6103. Common on slopes of granite hills between Gorup and Aus, 4168. Bushmanland: Granite slopes on banks of Daweep Rivier between Rietfontein and Kersbosch, 6232. Sandy slopes near Rötckuffe Station, 4470. Groot Rozynbosch,

3847. Gorup, 4176. Great Namaqualand : Base of kopje 20 km. North of Raman's Drift, 4378.

2. *S. Patersoni*, DC., *l. c.*

Great Namaqualand : 12 km. west of Sandverhaar, 4273. Sandy plains about 20 km. North of Raman's Drift, 4353. Sandy places near last outspan South of Warmbad, 4354.

3. *S. L'Heretieri*, DC., *l. c.*

Cape : Sandy flat between Driefontein and Heeren Logement, 6844. Khamiesberg : Tweerivieren, 6821.

4. *S. Marlothii*, Engl., Bot. Jahrb., x., 31.

Damaraland : Welwitsch, 3367.

### 3. ERODIUM.

1. *E. maritimum*, L'Hérit., ex Ait., Hort. Kew, ed. 1, ii., 416.

Cape : On recently burnt veld at Leeuwfontein, 3235.

2. *E. moschatum*, Willd., in Sp., iii., 631.

Upper : Between Blauwkrantz Pass and Karieboemfontein, 4974. Khamiesberg : Forming a turf in shady places at Namaroup, 6591. Khoms Ravine, upper end near stream, 6586.

### 4. PELARGONIUM.

1. *P. longijolium*, Jacq., in Ic. Rar., t. 518.

Cape : Dry hillside a little North of Hex River, 5249. Sandy spots, Biesjes Rivier, 5242. Namaqualand : Roadside between Brakdam and Rietkloof, 5678. Summit of pass between Garies and Middelkraal, 5667.

2. *P. moniliforme*, E. Mey., in Drège, Zwei Pfl. Docum., 209.

Khamiesberg : Eenkoker, 6751.

3. *P. roseum*, Ait., in Hort. Kew, ed. 2, iv., 161.

Khamiesberg : Namaroup, 6589. Bushmanland : Among bushes between Bitterfontein and Stinkfontein, 6523.

4. *P. pinnatum*, L'Hérit., Geran., t. 8.

Cape : Common on hillsides at Leeuwfontein, 3230, 3177.

5. *P. rapaceum*, Jacq., in Ic. Rar., t. 510.

Cape : Sandy spots, Biesjes Rivier, 5241. Lower slopes Corkscrew

Mt. in sand, 5732. Bushmanland: Among bushes, 4 miles North of Nieuwefontein, 6390. Khamiesberg: Under rock on face of Beaem Hill, North-west of Leliefontein, 6340.

6. *P. Barklyi*, Scott-Elliott, in Journ. Bot., xxix., 68

Khamiesberg: Tweerivieren, in bush on side of hill, 6494.

7. *P. flavum*, Ait., in Hort. Kew, ii., 418.

Cape: Alluvial soil, Oliphant's River Valley, near Warm Baths, 7051. Slopes and summit of Oliphant's River Mts., near Warm Baths, 7062, 7054.

8. *P. triste*, Ait., l. c.

Cape: Alluvial soil, Oliphant's River Valley, near Warm Baths, 7058.

9. *P. dasyphyllum*, E. Mey, in Drège, Zwei Pfl. Docum., 209.

Khamiesberg: Tweerivieren, 6285. Bushmanland: A few miles East of Nieuwfontein, 3495. Alewyn's Fontein, 3475. Kweekfontein; 3794. Namaqualand: Upper middle slopes on northern side of Rietkloof Mt., 5695. About 10 miles North-east of Klipplaat, 3309.

10. *P. ferulaceum*, Willd., in Sp., iii., 687.

Cape: Ridges, eastern aspect, left bank of Oliphant's River at Kradouw Pass, 5301. Bushmanland: Common among bushes between Bitterfontein and Stinkfontein, 6487.

11. *P. pulchellum*, Curt., in Bot. Mag., t. 524.

Khamiesberg: Tweerivieren, 6824.

12. *P. abrotanifolium*, Jacq., in Hort. Schoenb., t. 136.

Bushmanland: Common between Bitterfontein and Stinkfontein, 6524.

13. *P. ramosissimum*, Willd., in Sp., iii., 688.

Khamiesberg: Sand on lower plateau of Vogelklip, south-eastern aspect, 5906.

14. *P. quinatum*, Sim, in Bot. Mag., t. 547.

Khamiesberg: Tweerivieren, hillsides and 400 ft. above settlement facing West, 6496, 6604. In rock crevices, Sneeuwkop, middle slopes, western aspect, third kloof above Bowesdorp, 5834. Sandy

ground South side of pass leading to Rietkloof; middle slopes Rietkloof Mt., 5683.

15. *P. myrrhifolium*, L'Hérit., in Ait., Hort. Kew, ed. 1, ii., 421.

Cape: On lower slopes Oliphant's River Mts. near Warm Baths, 7063. Overhanging stream on eastern side of Pickenier's Pass, 5220.

16. *P. senecioides*, L'Hérit., in Ger., t. 11.

? Cape: Oliphant's River Mts., 7733.

17. *P. grossularioides*, Ait., in Hort. Kew, ed. 1, ii., 42.

Cape: Slopes and summit of Oliphant's River Mts., near Warm Baths, 7053, 7060. Among grasses and dense bush on edge of small stream on eastern side of Pickenier's Pass, 5215. Khamiesberg: Stream-side on south side of pass between Bowesdorp and Groot Gans, 5870. Khamiesberg Plateau, in marshy ground, 6323. Elliottsberg, 7689.

18. *P. althaeoides*, L'Hérit., in Ger., t. 10.

Khamiesberg: Elliottsberg, 7730.

19. *P. chamaedryfolium*, Jacq., in Ic. Rar., t. 523.

Cape: Slopes of Oliphant's River Mts., near Warm Baths, 7339.

20. *P. Oenotherae*, Jacq., *l. c.*, t. 525.

Cape: Oliphant's River Valley near Warm Baths, 7055.

21. *P. capillare*, Willd., in Sp., iii., 660.

Cape: Ceres, 3526.

22. *P. alchemilloides*, Willd., *l. c.*, 656.

Cape: Slopes of Oliphant's River Mts, near Warm Baths, 6872. Upper South-west slopes above Pickenier's Pass, 5116, 5207. Overhanging stream on east side of Pickenier's Pass, 5221.

23. *P. laevigatum*, Willd., *l. c.*, 685.

Cape: Among rocks near hill-top above Hottentots' Kloof, 4945.

24. *P. echinatum*, Curt., in Bot. Mag., t. 309.

Khamiesberg: Among rocks on hill-tops round Namaroup, 6631.

25. *P. crassicaule*, L'Hérit., *l. c.*, t. 26.

Great Namaqualand: Rock crevices near top of hill North of Rotkuppe Station, 4467.

26. *P. capitatum*, Ait., *l. c.*, 425.

Cape: Dry river-bed near Kradouwkrantz, 5270.

27. *P. scabrum*, Ait., *l. c.*, 430.

Cape: Slopes and foot of Oliphant's River Mts., near Warm Baths, 7052, 7059, 7061. Pickenier's Pass, 5174. Khamiesberg: Common on Beaem Hill, North-west of Leliefontein, 6332. Outspan at foot of Wilgehout Ravine, 6732. Namaqualand: Plateau south side of summit of ridge opposite Klipfontein Hotel, 5952. Sand, near Toll, 5106.

28. *P. xerophyton*, Schltr., in Engl. Pflanzenreich, iv., 383, t. 51.

Bushmanland: Wortel, 3608. Great Namaqualand: Hill-slopes, 5000-6000 ft., Schakalskuppe, 4229.

29. *P. Leipoldtii*, R. Knuth, *l. c.*, 342, t. 44.

Bushmanland: Sand between Nieuwerust and Bitterfontein, 5541. Namaqualand: Northern slopes Rietkloof Mt., 5703.

##### 5. OXALIS.

1. *O. Dregei*, Sond., in Harv. and Sond., Flor. Cap., i., 318.

Khamiesberg: Wet ground, Bailey's Vlakte, 6610.

2. *O. glabra*, Thunb., Dissert., No. 17, f. 2.

Cape: Oliphant's River Valley, near Warm Baths, 7734.

3. *O. namaquana*, Sond., *l. c.*, 325.

Khamiesberg: In wet sand, Jutbosch Kloof, 6493.

4. *O. Meyeri*, Sond., *l. c.*, 328.

Khamiesberg: Wet ground, Bailey's Vlakte, 6538. Khamsoap Ravine, 6549.

5. *O. variabilis*, Lindl., in Bot. Reg., t. 1505.

Cape: Alluvial sand, Oliphant's River Valley, near Warm Baths, 7056.

6. *O. obtusa*, Jacq., Oxal., 106, t. 79, f. 1.

Cape: Mt. slopes, Oliphant's River Valley, near Warm Baths,

7049. Khamiesberg : Under bushes at Kharkams, 6676. Among bushes at head of Khoms Ravine, 6645. Sandy ground, Draaiklip, 6479. Naras Ravine, 6674.

*O. obtusa*, Jacq., var.

Khamiesberg : Under rocks at Kharkams, 6675.

7. *O. heterophylla*, DC., Prod., i., 694.

Cape : Slopes of Oliphant's River Mts., near Warm Baths, 7735.

8. *O. sericea*, Linn. f., in Suppl., 243.

Cape : Sand flats between Driefontein and Heeren Logement, 6752.

9. *O. cernua*, Thunb., Dissert. No. 12, t. 2.

Khamiesberg : In sand, Klipkalk, 6511. Dry stony hills, Varsche Rivier, 6513. Shady spot under granite block, Namaroup, 6827. Under rocks, about 5,000 ft., Tweerivieren, 6828.

10. *O. semiloba*, Sond., l. c., 350.

Great Namaqualand : In shade of rocks on kopjes near Gründoorn, 4370. In shade of rocks on mountain slopes at Schakalskuppe, 4223.

11. *O. Lightfootii*, Phillips, in Ann. S.A. Mus., ix., 104.

Khamiesberg : Common on Beaem Hill, 6679.

12. *O.* sp. Material incomplete.

Khamiesberg : Near water at foot of Khoms Ravine, 6677.

## RUTACEAE.

*By Ruth Glover.*

### 1. MACROSTYLIS.

1. *M. barbiger*a, B. and W., in Beitr. zur Bot., i. (1824).

Cape : Slopes of Oliphant's River Mts., near Warm Baths, 7115, 7118.

### 2. DIOSMA.

1. *D. vulgaris*, Schl., in Linnaea, vi., 201.

Cape : Lower slopes of Oliphant's River Mts., near Warm Baths, 6882, 7112. Khamiesberg : Common near summit of Vogelklip, 5924. Extremely abundant on middle and upper slopes of Zuurberg, 6270. Khamsoap Ravine, 6436. Common on dry slopes in Groene Kloof, 6439. Namaqualand : Summit of conical hill  $1\frac{1}{2}$  miles South

of Stinkfontein, 5554. Near summit of Mt. 3 miles North-east of Stinkfontein, 5629.

2. *D. ramosissima*, Bart. and Wendl. f., Diosm., 48.

Namaqualand : Common at top of Rattelpoort Mt., 2982.

3. *D. virgata*, G. F. W. Mey., ex Bart. and Wendl. f., Diosm., 46.

Cape : Lower slopes of Oliphant's River Mts., near Warm Baths, 7111.

### 3. ADENANDRA.

1. *A. uniflora*, Willd., in Enum. 256.

Cape : Slopes of Oliphant's River Mts., near Warm Baths, 7117.

### 4. BAROSMA.

1. *B. betulina*, Bart. and Wendl. f., Diosm., 102.

Cape : Slopes of Oliphant's River Mts., near Warm Baths, 7116.

2. *B. Niveni*, Sond., in Harv. and Sond., Flor. Cap., i., 398.

Khamiesberg : Summit of Sneeuwkop, 5787.

### 5. AGATHOSMA.

1. *A. variabilis*, Sond., in Harv. and Sond., Flor. Cap., i., 433.

Cape : Oliphant's River Mts., near Warm Baths, 7737, 7738.

2. *A. asperifolia*, E. and Z., Enum. 111.

Cape : Slopes of Oliphant's River Mts., near Warm Baths, 7736.

3. *A. Sladeniana*, n. sp. *A. asperifoliae*, E. and Z. affinis sed foliis longioribus linearibusque, sepalis longioribus oblanceolato-spathulatisque, staminodiis magis petaloideis distinguitur.

Fruticulus circa 23 cm. altus, ramis teretibus, novellis pubescentibus, deinde glaberrimis; folia lineari-lanceolata, supra canaliculata, infra convexa, apice gibbosa, subsessilia, marginibus carinisque ciliata, circa 0.5 cm. longa, 0.1 cm. lata; umbellae ad apices ramulorum aggregatae capituliformes, sessiles, globosae, circa 0.5 cm. in diam.; bractee obovatae, obtusae, mucronatae, apice foliaceae aliter membranaceae, ciliatae, circa 0.3 cm. longae, 0.125 cm. latae; pedicelli glabri, 0.1 cm. longi; sepala oblanceolata, obtusa, apicem versus ciliata, circa 0.2 cm. longa; petala anguste obovato-cuneata, unguiculata, unguibus ciliatis, 0.5 cm. longa, 0.1 cm. lata; stamina glabra, 0.5 cm. longa; staminodia circa 0.25 cm. longa, pilosa praecipue medio, superne glabrescentia; ovarium



triloculare, apice pilosum; stylus filiformis, 0·6 cm. longus; fructus ignotus.

Cape: Slopes of Cold Bokkeveld Mts. opposite Warm Baths, Oliphant's River Valley, 7114.

Shrublet about 23 cm. high, stem terete, pubescent when young, becoming glabrous; leaves linear-lanceolate, appressed, channelled above, convex beneath, gibbose at the apex, subsessile, ciliate on the margin and keel, about 0·5 cm. long, 0·1 cm. wide; inflorescence subcapitate, aggregated at the ends of the branches, sessile, globose, about 0·5 cm. in diam.; bracts obovate, obtuse, mucronate, membranous, ciliate, 0·3 cm. long, 0·125 cm. broad; flowers shortly pedicellate; pedicels 0·1 cm. long, glabrous; sepals oblanceolate-spathulate obtuse, ciliate towards the apex, 0·2 cm. long; petals narrowly obovate-cuneate, unguiculate, claw ciliate, 0·5 cm. long, 0·1 cm. broad; fertile stamens equalling the petals, glabrous; staminodes about 0·25 cm. long, pilose especially towards the middle, becoming glabrous towards the apex; ovary 3-celled, pilose at the apex; style filiform about 0·6 cm. long; fruit unknown.

Plate VIII. B., Fig. 1, sketch of branch, nat. size; 2, leaf, dorsal view; 3, bract; 4, flower; 5, calyx; 6, petal; 7, staminode; 8, stamen; 9, gynaeceum—all the latter  $\times 4$ .

## BUSERACEAE.

*By Ruth Glover.*

### 1. COMMIPHORA.

1. *C. saxicola*, Engl., Bot. Jahrb., x., 283.

Damaraland: Common on Namib at Welwitsch, 4412, 4150.

2. *C. oblanceolata*, Schinz, in Bull. Herb. Boiss., Ser. ii., viii., 633.

Bushmanland: Mt. slopes at Ougrabies, 3567. Damaraland: Sides of ravines near Welwitsch, 4149.

## CELASTRACEAE.

*By Ruth Glover.*

### 1. GYMNOSPORA.

1. *G. peduncularis*, Sim, Forest Flora, p. 184, *probably*.

Cape: Summit of Nardouw Mt., 5430. Specimens incomplete.

2. *G. lanceolata*, nov. comb. (*Celastrus lanceolatus*, E. Mey.).

Bushmanland: Sandy banks of Orange River, near Abbasis, 3101.  
Sand of Zone 3 on South bank of Orange River, near Abbasis, 2998.  
Namaqualand: Sandy banks of Orange River, Sendling's Drift, 6097.

3. *G. integrifolia*, nov. comb. (*Celastrus integrifolius*, Linn. f.).

Namaqualand: Locally common between Bitterfontein and Stinkfontein, 5535. Nieuwerust, 5511.

4. *G. buxifolia*, Sim, l. c., p. 185.

Khamiesberg: Among rocks, near water, Khoms Ravine, 6644.  
Namaqualand: Roadside between Brakdam and Rietkloof, 5672.

5. *G. lawrina*, Bolus and W. Dod, List of Flowering Plants and Ferns of Cape Peninsula.

Cape: Alluvial sand, Oliphant's River Valley, near Warm Baths, 7258. Ceres, 3499, 3501. Leeuwfontein, 3229. Kradouw Krantz, first plateau, 5282. Khamiesberg: Middle and upper slopes of Zuurberg, 6254. Granite kopjes near Ezelfontein, 6317. In rock crevices overhanging stream, Khoms Ravine, 6648. Middle slopes, western aspect, Sneeuwkop, 3rd kloof above Bowesdorp, 5832. Bushmanland: Top of granite knoll at Kweekfontein, 3,300 ft., 5042. Namaqualand: Second plateau, mt. 3 miles North-east of Stinkfontein, 5635. Near summit of Rattelpoort Mt., 2969. Rattelpoort, 4722.

## 2. ELAEODENDRON.

1. *E. capense*, E. and Z., Enum. 127.

Cape: Eastern slopes of Pickenier's Pass, 5154.

## RHAMNACEAE.

By Ruth Glover.

### 1. ZIZYPHUS.

1. *Z. mucronata*, Willd., in En. Berl., 251.

Bushmanland: Groot Rozybosch, 3726. Pella, 3587. Little Bushmanland: Dry river-bed between Wortel and Dabainoris, 3031. Great Namaqualand: River-bed between Ganus and Gründoorn, 3,000-3,200 ft., 4510.

2. *Z. zeyheriana*, Sond., in Harv. and Sond., Flor. Cap., i., 476.

Great Namaqualand: Buchholzbrunn, 3657.

2. PHYLICA.

1. *P. stipularis*, Linn., in Mant., 208.

Cape: On road from Warm Baths to Modderfontein, Oliphant's River Valley, 7236.

2. *P. oleoides*, DC., in Prod., ii., 36.

Cape: Foot of Oliphant's River Mts., near Warm Baths, 7307. Common on dry hills North of Hex River, 5257. Eastern slopes Pickenier's Pass, 5155.

3. *P. lasiocarpa*, Sond., *l. c.*, 483.

Khamiesberg: Beaem Hill, 6393.

4. *P. cryptandroides*, Sond., *l. c.*, 484.

Cape: Plateau on summit of Nardouw Mt., 5419. Khamiesberg: Wilgehout Ravine, about 9,300 ft., 6350.

5. *P. villosa*, Thunb., in Flor. Cap., 202.

Cape: Kloof below Warm Baths, Oliphant's River Valley, 7302. 7228. Lower mt. slopes behind Warm Baths, 7222, 7224.

6. *P. cylindrica*, Wendl., in Collect., i., 7.

Cape: On road near Warm Baths, Oliphant's River Valley, 7238. Namaqualand: Near summit of Rietkloof Mt., 5691.

7. *P. montana*, Sond., *l. c.*, 492.

Khamiesberg: Beaem Hill, 6635. Middle and western slopes of Sneeuwkop, 5796.

8. *P. comosa*, Sond., *l. c.*, 497.

Cape: Mountain-top at Hottentots' Kloof, 4906.

9. *P. sp.* Material incomplete.

Khamiesberg: On upper slopes Vogelklip, steep ravine facing West, 5919.

**SAPINDACEAE.***By Ruth Glover.*

## 1. MELIANTHUS.

1. *M. major*, Linn., in Sp. Pl., 892.

Cape: Oliphant's River Valley, near Warm Baths, 7250.

2. *M. comosus*, Vahl, Symb., iii., 86.

Karoo: River-bed at Draaikraal, 4995. Near Pella, 3594.

3. *M. minor*, Linn., *l. c.*

Khamiesberg: Namaroup, 6596.

## 2. ERYTHROPHYSA.

1. *E. undulata*, E. Mey., Drège, Zwei Pfl. Docum., 183.

Khamiesberg: Common on hill-sides above Tweerivieren, facing East, 6498. Little Namaqualand: Locally common on granite slopes on both sides of pass north of Garies, 5624.

## 3. DODONAEA.

1. *D. Thunbergiana*, E. and Z., Enum. 54.

Cape: Hill-sides at Leeuwfontein, and in Mitchell's Pass, 3227. Oliphant's River Valley, near Warm Baths, 6863, 6874, 7230. Khamiesberg: Khamsoap Ravine, 6553. Bushmanland: About 800 ft. above road between Nieuwe Rust and Bitterfontein, 5548. Namaqualand: Near top of Rattelpoort Mt., 2988.

## 4. AITONIA.

1. *A. capensis*, Linn. f., in Suppl., 303.

Great Namaqualand: Sandstone hills at Seeheim, 2500 ft., 3720.

**TILIACEAE.***By Ruth Glover.*

## 1. GREWIA.

1. *G. cana*, Sond., in Linnaea, xxiii., 20.

Great Namaqualand: River-bed 25 km. North of Warmbad, 4297. River-bed, Gobas, 2,900 ft., 3746.

2. *G. occidentalis*, Linn., Sp. Pl., 964.

Great Namaqualand: Stream-beds, Holoog, 4132.

## MENISPERMACEAE.

*By Ruth Glover.*

### 1. ANTIZOMA.

1. *A. Miersiana*, Harv., in Harv. and Sond., Flor. Cap., i., p. 13.

Khamiesberg: Common at 500 ft. above Tweerivieren, facing West, 6476. Namaqualand: Granite cliff, Stinkfontein, 5522. Common among rocks in pass South-east of Klipplaat, 3396. Bushmanland: Common on kopjes near Nieuwefontein, 3347.

## ANACARDIACEAE.\*

### 1. RHUS.

1. *R. incisa*, Linn. f., in Suppl., 183.

Khamiesberg: Namaroup Hills, 6530.

2. *R. dissecta*, Thunb., in Flor. Cap., 267.

Cape: Slopes of Oliphant's River Mts., behind Warm Baths, 7123.

3. *R. viminalis*, Vahl, in Symb., iii., 50.

Namaqualand: Near Doornpoort Water Hole, 6135.

### 2. HEERIA.

1. *H. argentea*, Meissn., Gen. Comm., 55.

Cape: Slopes of Oliphant's River Mts., behind Warm Baths, 7255. Common at foot of Giftberg on western side between Doorn River and Windhoek, 5393.

## SAXIFRAGACEAE.

*By Ruth Glover.*

### 1. VAHLIA.

1. *V. capensis*, Thunb., in Flor. Cap., 246.

Cape: Sand of river-bed between Lang Kloof and Nardouw

\* The species enumerated here were included in Dr. Schönland's report in Annals of S.A. Museum, vol. ix., part ii., p. 45. The localities are additional.

Pass, 5351. Namaqualand: Cornfield weed—Koets, 5738. Great Namaqualand: Mud of Löwen's River-bed, Gawachab, 4083, 4097.

## ONAGRARIEAE.

*By Ruth Glover.*

### 1. MONTINIA.

1. *M. acris*, Linn. f., in Suppl., 427.

Cape: Oliphant's River Valley, near Warm Baths. Middle slopes, Kradouw Krantz, 5286. Khamiesberg: Sand, Windhoek, 6744, 6830. Tweerivieren, 6741. In ravine middle western slopes of Sneeuwkop, 3rd kloof above Bowesdorp, 5843. Namaqualand: Hills facing Brakrivier, 3892. Among gneissic rocks on mt. pass South of Klipplaat, 3872. From base to summit of Rietkloof Mt., 5089. Kopjes on the way from Kamabies to Tweefontein, 3776. Great Namaqualand: Stony bed of Akam River, 4260. Sandy valley 20 km. North of Raman's Drift, 4547. Shallow stream-courses 12 km. West of Sandverhaar, 4604. Bushmanland: Sand, near Wortel, 3618. Very common on broken ground at Groot Rozynbosch, 3828.

## CUCURBITACEAE.

*By Ruth Glover.*

### 1. TROCHOMERIA.

1. *T. debilis*, Hook. f., in Oliver, Flor. Trop. Afr., ii., 525.

Bushmanland: Sand dunes at Aggenys, 2949. Sand, between Kweekfontein and Ougrabies, 3793. Great Namaqualand: First outspan North of Gabis, 4473.

### 2. CUCUMIS.

1. *C. africana*, Linn. f. Suppl., 423.

Bushmanland: Sand South of sand dunes between Ougrabies and Aggenys, 2925, 2926. Namaqualand: Sandy bed of Brakrivier, 3898. In sand in valley leading down to Bethany Drift, 6047. About 10 miles to the North-east of Klipplaat, 3302. Great Namaqualand: Sand at Sandverhaar, 4654. Sand near wagon-track on sandy plain North of Ganus, 4503. Common in sand near wagon-track 20 km. North of Raman's Drift, 4550.

2. *C. rigidus*, E. Mey., ex Sond., in Harv. and Sond., Flor. Cap., ii., 497.

Namaqualand: Sandy valley leading down to Bethany Drift, 6049. Sandy ravine below Doornpoort, 6911.

3. *C. sp.* Material insufficient.

Great Namaqualand: South of Warmbad, 4023.

4. *C. sp.* Material insufficient.

Great Namaqualand: Hill East of Gobas Station, 3718.

### 3. KEDROSTIS.

1. *K. punctulata*, Cogn., in DC., Monog. Phan., iii., 643.

Little Bushmanland: Between Wortel and Dabainoris, 3034. Bushmanland: Sandy plains near Groot Rozybosch, 3841. Great Namaqualand: Stony places on plains West of Ganus, 4489. Sandy plains near Ganus, 4588. Near Gründoorn, 4579. Dry river-bed about half-way between Warmbad and Gründoorn, 4281. Mountain slopes at Schakalskuppe, 4166. Kopje between Dabai-gabis and Gründoorn, 3152. Schakalskuppe, 4240. Sandy stream-bed near pass leading down to Gründoorn, 4339.

### 4. CORALLOCARPUS.

1. *C. Welwitschii*, Hook. f., var. *subintegrifolia*, Cogn., in DC., Monog. Phan., iii.

Great Namaqualand: Hills South-west of Gründoorn, 4275.

2. *C. sp.* Material incomplete.

Little Bushmanland: Between Wortel and Dabainoris, 3032.

3. *C. sp.* Material incomplete.

Little Bushmanland: Between Dabainoris and Abbasis, 3009.

4. *C. sp.* Material incomplete.

Great Namaqualand: Sandy places South of Warmbad, 4282.

5. *C. sp.* Material incomplete.

### 5. COCCINEA.

1. *C. Rehmanni*, Cogn., in Bull. Herb. Boiss., iii., 418.

Bushmanland: On rocks and bushes in Wortel Valley, 3088.

Great Namaqualand : Saline flat at Gawachab, 4336. Plain 12 km. West of Sandverhaar, 4271.

2. *C. sp.* Material incomplete.

Great Namaqualand : Hill-tops at Schakalskuppe, 4254.

3. *C. sp.* Material incomplete.

Great Namaqualand : Kopje near last outspan before Gründoorn, 4351.

4. *C. sp.* Material incomplete.

Great Namaqualand : 12 km. West of Sandverhaar, 4195.

5. *C. sp.* Material incomplete.

Great Namaqualand : Hill East of Railway, Gobas, 3174.

6. *C. sp.* Material incomplete.

Namaqualand : Above British Police Camp, Raman's Drift, 4076.

## UMBELLIFERAE.

*By Ruth Glover.*

### 1. HYDROCOTYLE.

1. *H. Centella*, Cham. and Schlecht., var. *a*, *latifolia*, Cham. and Schlecht., in *Linnaea*, i., 275.

Cape : Hex River, 5269.

*H. Centella*, Cham. and Schlecht., var. *δ*, *linifolia*, Sond., in Harv. and Sond., *Fl. Cap.*, ii., 532.

Cape : Lower slopes of Oliphant's River Mts., near Warm Baths, 7337.

2. *H. virgata*, Linn. f., in *Suppl.*, 176.

Cape : Top of Oliphant's River Mts. behind Warm Baths, 7121, 6866. Namaqualand : On northern side of Rietkloof Mt., on rock near summit, 5723.

### 2. ARCTOPUS.

1. *A echinatus*, Linn., in *Spec. Pl.*, ed. 2, ii., 1512.

Cape : Foothills Cold Bokkeveld Mts. opposite Warm Baths, Oliphant's River Valley, 7246.



3. CONIUM.

1. *C. chaerophylloides*, E. and Z., Enum. 355.

Cape: Dry river-bed at roadside between Hottentots' Kloof and Karroopoort, 4830.

4. BUPLEURUM.

1. *B. Mundtii*, Cham. and Schlecht., in Linnaea, i., 384.

Khamiesberg: Among rocks in partial shade on western aspect of Sneeuwkop, 3rd kloof above Bowesdorp.

5. RHYTICARPUS.

1. *R. difformis*, Benth. and Hook., in Gen. Pl., i., 887.

Khamiesberg: On upper slopes of Zuurberg, 6264. Lower middle slopes of Sneeuwkop, 5783. Near summit of Vogelklip, 5927. Namaqualand: Banks of Doorn River, south of Brakrivier, 3887.

6. APIUM.

1. *A. graveolens*, Linn., in Spec. Pl., 379.

Cape: Very common in river-bed at Attis, 5330. Namaqualand: Damp place in stream-bed between Brakrivier and Kopje's Kraal, 5029.

7. PITURANTHOS.

1. *P. aphylla*, O. Kuntze, Revisio, part 3, p. 115.

Bushmanland: Sand at foot of mountains between Wolftoon and Henkriesfontein, 3106. Sandy bank of DawEEP Rivier-bed, east of Rietfontein, 6230. Near irrigated ground at Rietfontein, 3436. Namaqualand: With Tamarix in bed of river below Daunabis, 6003. In river-bed at outspan about 10 miles North-east of Klipplaat, 3407. Great Namaqualand: Sand of dry river-bed at Gorup, 4201.

8. CARUM.

1. *C. hispidum*, Benth. and Hook f., Gen., i., 891.

Cape: Sand flats between Driefontein and Heeren Logement, 6730. Sand between Windhoek and Attis, 5379. Oliphant's River Valley, near Warm Baths, 7233. Khamiesberg: Sandy slopes at Eenkoker, 6729.

## 9. PTYCHOTIS.

1. *P. didyma*, Sond., in Harv. and Sond., Fl. Cap., ii., 538.

Cape: Lower eastern slopes (left bank) Kradouw Krantz, 5324.

## 10. OEANTHE.

1. *O. filiformis*, Lam., in Diet., iv., 520.

Cape: Sandy river-bed among Restios between Lang Kloof and Nardouw Pass, 5352. Damp places on southern slopes above Pickenier's Pass, 5175.

2. *O. filiformis*, Lam., var.  $\beta$ , *humilis*, Sond., in Harv. and Sond., Fl. Cap., ii., 547.

Cape: Common on burnt veld at Leeuwfontein, 3190.

## 11. PEUCEDANUM.

1. *P. ferulaceum*, Thunb., ex Sond., in Harv. and Sond., Flor. Cap., ii., 556.

Cape: Sand at foot of Giftberg on western side between Doorn River and Windhoek, 5397.

2. *P.* sp. Material incomplete.

Khamiesberg: Lower middle slopes of Sneeuwkop, 5782.

## 12. CAUCALIS.

1. *C. capensis*, Lam., Encyc., i., 651.

Cape: Roadside between Hottentots' Kloof and Karroopoort, 4821.

**RUBIACEAE.**

*By Louisa Bolus.*

## 1. OLDENLANDIA.

1. *O. thymifolia*, Kuntze, Rev. Gen., 292.

Bushmanland: Wortel, 3087, 3604. Great Namaqualand: Common on broad sandy valley North of Sabiesis, 4105. Dry watercourses in sandy plains North of Raman's Drift, 4059. Sandy plains Schakalskuppe, 4500 ft., 4792. Lower slopes of kopje above pass leading down to Gründoorn, 3131.

2. *O. stricta*, Linn., Mant., ii., 200.

Bushmanland: Pella, 3593. Common on stony ground, Groot Rozynbosch, 2,800 ft., 3834. Namaqualand: Eenriet, 3096. Great Namaqualand: Schaf River-bed at Seeheim, 3731. Buchholzbrunn, 3671. Sandy river-bed near Dabaigabis, 4405. Sandy valley 20 km. North of Raman's Drift, 2,400 ft., 4543.

## 2. CROCYLLIS.

1. *C. anthospermoides*, E. Mey., Drège, Zwei Pfl. Docum., 176.

Namaqualand: Sand opposite Sendling's Drift, 6110. Sandy bed South of Daunabis, 6001. Sandy river-bed on North side of pass leading down to Bethany, 6055. Great Namaqualand: Sandy places South of Warmbad, 4038.

## 3. ANTHOSPERMUM.

1. *A. tricostatum*, Sond., in Harv. and Sond., Flor. Cap., iii., 28.

Khamiesberg: Summit of the Zuurberg, middle south-eastern slopes, 6263. Namaqualand: Common on upper northern slopes of Rietkloof Mt., 5701.

2. *A. ciliare*, Linn., in Sp. Pl., 1521.

Cape: Slopes of Oliphant's River Mts., near Warm Baths, 6870, 7120, 7122, 7124. Khamiesberg: Upper southern slopes of Sneeuwkop, 5790. Khamsoap Ravine, 6554.

*A. ciliare*, Linn., var.  $\beta$ , *papillatum*, Sond., l. c., 29.

Cape: Lower slopes, Kradouw Krantz, western aspect, 5284.

3. *A. Bergianum*, Cruse, Diss., 8.

Cape: Foot of Cold Bokkeveld Mts. opposite Warm Baths, Oliphant's River Valley, 7315.

4. *A. Dregei*, Sond., l. c., 29.

Cape: Foot of Oliphant's River Mts., below Warm Baths, 7119.

5. *A.* sp. (fruit only).

Khamiesberg: Upper slopes, Beaem Hill, North-west of Leliefontein, 5,400 ft., 6334.

## 4. NENAX.

1. *N. Dregei*, sp. nov., *N. microphyllae*, affinis sed foliis carinatis, marginibus haud revolutis, indumento pruinoso-velutino, fructibus majoribus differt.

Fruticulus rigidus robustus, intricate ramosus, ad 0·9 met. altus; rami cinerei, vel juniores purpurascens, ad 0·5 cm. diam., cum ramulis subvelutinis spinescentes, internodiis 0·5–1 cm. longis; folia quasi connata per stipulas confluentes, appressa, deinde patentia, ovata vel lineari-lanceolata acuta carinata, supra concava vel fere plana, pruinosa cinerea vel glauca, 0·2–0·8, saepissime 0·3 cm., longa, axillis gemmiferis; flores, praeter vetustiores foemineos, ignoti; fructus immaturus sessilis oblongus, 4, vel rarius, 5 calycis segmentis minutis rotundatis coronatus, pruinoso-velutinus, stylis 0·4 cm. longis, diu persistentibus; capsula globose inflata, rubro-purpurea, 0·6 cm. longa; semina ovali-oblonga, anguste membranaceo-marginata, 0·45 cm. longa 0·2 cm. lata.

Upper: Bot River-bed, between Calvinia and Holle Rivier, 3966. Namaqualand: Broken country 15 miles North of Alewyn's Fontein, 3930; common in dry sandy river-bed between Klipplaat and Bitterfontein, 3295; common in sand between Anenous and Chubiessis outspan, 5979.

In addition are the following collections of the same species:— Namaqualand: J'us, on hills, alt. 2,800 ft., fl. Sept., *R. Schlechter*, 11428. Locality uncertain, *Drège*, 2772. Great Namaqualand: Kl.-Karas, fl. Oct., *Dinter*, 3178.

A rigid robust subshrub, intricately branched, attaining a height of 0·9 met.; branches ashy-grey, or the younger ones purplish, up to 0·5 cm. diam., together with the rather velvety branchlets becoming spine-tipped, the internodes 0·5–1 cm. long; leaves, on account of the confluent stipules, as if connate, appressed, finally spreading, ovate or linear-lanceolate, acute carinate, concave above or almost flat, pruinose, ashy-grey or glaucous-green, 0·2–0·8 cm., usually 0·3 cm. long, the axils gemmiferous; flowers unknown, except rather advanced female ones; immature fruit sessile oblong, crowned by the 4, or, more rarely, 5 minute rounded calyx-segments, pruinose-velvety, the styles 0·4 cm. long, tardily deciduous; capsule globosely inflated, reddish purple, 0·6 cm. long; seeds oval-oblong, narrowly membranous-margined, 0·45 cm. long, 0·2 cm. wide.

Plate VI., A, Fig. 1, sketch of branchlet, nat. size; 2, portion of ditto,  $\times 2$ ; 3, one of the leaves, viewed ventrally,  $\times 2$ ; 4, another leaf, viewed dorsally,  $\times 2$ ; 5, female flower (advanced),  $\times 4$ ; 6, fruit,  $\times 3$ ; 7, one of the cocci,  $\times 3$ ; 8, seed,  $\times 4$ .

2. ? *N. sp.* Material insufficient.

Namaqualand: On granite slopes facing East, a little North of Middelkraal, 5615.

5. GALIUM.

1. *G. monticolum*, Sond., *l. c.*, 36.

Cape: Scrambling among débris, eastern slopes of Pickenier's Pass, 5177.

2. *G. capense*, Thunb., in *Prod.*, 30.

Cape: Scrambling among shrubs by roadside between Hottentots' Kloof and Karroopoort, 4818. Khamiesberg: Under rocks, kopje South-west of Liefontein and Ezelsfontein, 6319. Elliottsberg, 7699.

3. *G. asperum*, Thunb., in *Flor. Cap.*, 152.

Cape: Common in dry rock fissures, Ceres, 3522. Upper: Loeriesfontein Ravine, 2,500 ft., 4843. Namaqualand: Scrambling on bushes in dry river-bed at Stinkfontein, 5527.

4. *G. tomentosum*, Thunb., *l. c.*, 151.

Namaqualand: On bushes a little South of Brakdam, 5627. Sand in river-bed, near Brakrivier, 3899.

PLUMBAGINACEAE.

*By Louisa Bolus.*

1. STATICE.

1. *S. purpurata*, Linn., var.  $\beta$ , *longifolia*, Boiss., in DC., *Prodr.*, xii., 667.

Cape: In dry hills North of Hex River, 5253. Through Nardouw Kloof to Builshoek, 5356. In sandy river-bed between Lang Kloof and Nardouw Pass, 5685.

2. *S. equisetina*, Boiss., in DC., *Prodr.*, xii., 658.

Cape: Banks of Doorn Rivier, South of Brakrivier, 3885. Namaqualand: River-bed, Stinkfontein, 5637. Along the river-bed between Rattelpoort Railway Station and the mountain, 2979. River-bed at Kopje's Kraal, 3888. Bushmanland: Kamabies, 3956, 3955.

2. VOGELIA.

1. *V. africana*, Lam., *Ill.*, ii., 148, t. 149.

Namaqualand: Sandy ravine below Doornpoort, 6016. Krantz 1 mile South of Buffel's River between Arkoep and Mesklip, 5899.

Hills facing Brakrivier, 3900. Bushmanland: Foot of kopje at Alewyn's Fontein, 3340. Damaraland: Near Welwitsch, 4145. Great Namaqualand: River-bed between Railway Station and Buchholzbrunn, 3677. Kopje 12 km. West from Sandverhaar, 4615.

## LORANTHACEAE.

*By Louisa Bolus.*

### 1. LORANTHUS.

1. *L. namaquensis*, Harv., in Harv. and Sond., Fl. Cap., ii., 577.

Namaqualand: One mile South of Mesklip, 5896. Khamiesberg: About 6 miles North of Garies, 6386. Great Namaqualand: Sandverhaar, 4440. Bushmanland: Between Ougrabies and Kweekfontein, 3796. Orange River near Abbasis, 3005.

2. *L. ovalis*, E. Mey., in Drège, Zwei Pfl. Docum., 200.

Namaqualand: Between Bitterfontein and Stinkfontein, 5534. In sandy ravine below Doornpoort, 6010. Sandy plain 5 miles North of Anenous on the way to Chubiessis, 6185. In river-bed, Kuboos, 6070.

3. *L. kalachariensis*, Schinz., in Bull. Herb. Boiss., iv., App. iii., 53.

Great Namaqualand: Sandverhaar, 4694.

### 2. VISCUM.

1. *V. obscurum*, Thunb., Prod., Pl. Cap., 31.

Karoo: Granite knoll, Brakdam, 5656. Khamiesberg: Southern slopes of Sneeuwkop, 5851.

2. *V. capense*, Linn. f., Suppl., 426.

Karoo: Between Nieuwe Rust and Bitterfontein, 5546. Little Namaqualand: On Tamarix in Hantam's River-bed near Brakrivier, 4885. Klipfontein, 4721. Nieuwefontein, 3360. North of Raman's Drift, 4050.

3. *V. pauciflorum*, Thunb., *l. c.*

Bushmanland: Parasitic on shrub near the top of Ridge at Aggenys, 2948. Great Namaqualand: 20 km. North of Raman's Drift, 4536.

## OROBANCHACEAE.

By Louisa Bolus.

### 1. OROBANCHE.

1. *O. ramosa*, Linn., Sp. Pl., 633.

Cape: Cold Bokkeveld Mts., lower slopes opposite Warm Baths, Oliphant's River Valley, 7099.

## EBENACEAE.

By Louisa Bolus.

### 1. EUCLEA.

1. *E. multiflora*, Hiern, in Trans. Cambr. Phil. Soc., xii., 100, t. 3.

Cape: Lower ridges left bank of Oliphant's River at Kradouw Krantz, 5302.

2. *E. tomentosa*, E. Mey., ex Drège, Cat. Pl. Exsicc. Afr. Austr.

Cape: Overhanging the road in Nardouw Pass, 5329. Dry ground, Boontjes Rivier, 5169. Namaqualand: Common on rocky slopes at Koets, 5735. Locally common between Nieuwe Rust and Bitterfontein, 5540, 5539. Khamiesberg: Tweerivieren, 6750.

3. *E. linearis*, Zeyher, in Linnaea, xx., 192.

Cape: Near the top of western slopes, Nardouw Kloof, 5427.

4. *E. undulata*, Thunb., Nova Gen. Pl., 85.

Khamiesberg: Wilgehout Ravine, 6387.

5. *E. Pseudebenus*, E. Mey., ex Drège, Cat. Pl. Exsicc. Afr. Austr. 7.

Khamiesberg: Upper slopes of Zuurberg, Anegas, 6269. Namaqualand: Northern slopes of Rietkloof Mt., near the summit, 5707, 5716. Orange River near Abbasis, 3010. Great Namaqualand: Löwen's River, Gawachab, 4093. Bushmanland: River-bed at Groot Rozybosch, 3825.

6. *E. lancea*, Thunb., Prodr., 85.

Namaqualand: Kloof on South side of pass between Bowesdorp and Groot Gans, 5857. Upper slopes of Zuurberg, Anegas, 6258.

## 2. ROYENA.

1. *R. glabra*, Linn., Sp. Pl., ed. 1, 397.

Cape: Upper South-western slopes above Pickenier's Pass, 5123.

2. *R. hirsuta*, Linn., *l. c.*, 397.

Cape: Nine miles along the Leeuwfontein Road, 3513. Nardouw Kloof, western aspect, 5412. Sand flats between Driefontein and Heeren Logement, 6757. Karroo: Blauwkrantz Pass, 4959. Khamiesberg: Common on lower slopes of rocks in Khamiesberg Plateau, 6244. Common on southern slopes of Sneeuwkop, 5887. Namaqualand: In fissures in granite at Eenriet, 3085. On lower western slopes of TeAlee Mts., 6162. Nieuwfontein, 3331. Bushmanland: Common on upper slopes of Koeberg, 6222. Mountains near pass between Kamabies and Tweefontein, 3778. Ravines on upper slopes of mountain, Kweekfontein, 3812. Broken country 15 miles North of Alewyn's Fontein, 3936. Near summit of Rattelpoort Mountain, 2954. Great Namaqualand: Crevices in granite hills 18 km. West of Aus, 4212.

3. *R. pallens*, Thunb., Prodr., 80.

Great Namaqualand: Dry river-bed about 12 miles North of Ganus, 3700. Near stream-bed a little South of Dabaigabis, 4411. Orange River near Abbasis, 3003.

## HYDROPHYLLACEAE.

*By Louisa Bolus.*

## 1. CODON.

1. *C. Schenkii*, Schinz., in Verhandl. Bot. Ver. Brandenb., xxx., 173.

Great Namaqualand: Stream-course at base of mountain North of Schakalskuppe, 4247.

2. *C. Royeni*, Linn., Syst., ed. 12, 292.

Karroo: Near Pappekuul on stony ground, 3993. Namaqualand: Hills South of Brakrivier, 3894. River-bed South of steep pass between Chubiessis and Stinkfontein, 5972. In valley 2 miles South-west of Garies, 5642.



## BORAGINACEAE.

By Louisa Bolus.

### 1. ANCHUSA.

1. *A. riparia*, DC. Prod., x., 43.

Kamiesberg Plateau, 6347, 6248.

2. *A. capensis*, Thunb., Prodr., 34.

Khamiesberg: Middle western slopes of Sneeuwkop, western aspect, 3rd kloof above Bowesdorp, 5840, 5781.

### 2. HELIOTROPIUM.

1. *H. ovalifolium*, Forsk., Fl. Aegypt.-Arab., 38.

Namaqualand: Sandy bank of Orange River at Bethany Drift, 6035. Great Namaqualand: Gawachab, among scrub a little above high-water mark, Löwen's River, 4088. Damaraland: Angola, 3377.

2. *H. curassavicum*, Linn., Sp. Pl., ed. 1, 130.

Cape: Moist places in Doorn River-bed, 5408. Namaqualand: Brakrivier, 4866. Two miles South of Tweefontein, 3459. Damaraland: Angola, 3384.

3. *H. tubulosum*, E. Mey., in Drège, Zwei Pflanzengeogr. Documente, 93.

Great Namaqualand: Near shallow stream-bed on stony plains, 12 km. West of Sandverhaar, 4610, 4618, 4687.

### 3. TOURNEFORTIA.

1. *T. tuberculosa*, Cham., in Linnaea, iv., 467.

Great Namaqualand: Sandy river-bed at Sandverhaar, 4645. Sandy places South of Warmbad, 4036. Sandy plains at Sehakalskuppe, 4256. Bushmanland: Sandy ground between Wortel and Dabainoris, 3036. Pella, 3591. Sandy plains South of sand dunes between Ougrabies and Aggenys, 2923.

### 4. EHRETIA.

1. *E. hottentotica*, Burch., Trav., ii., 147.

Great Namaqualand: Slopes West of Gobas Station, 3748. Near Dabaigabis, 4401, 4399. Bushmanland: Wortel, 3602.

## 5. TRICHODESMA.

1. *T. angustifolium*, Harv., Thes. Cap., i., 26, t. 40.

Great Namaqualand : Buchholzbrunn, 3674.

2. *T. africanum*, R. Br., Prodr., 496.

Karoo: River-bed at Draaikraal, 4993. River-bed just below Blauwkrantz, 4961. Namaqualand : Stream-bed opposite Sendling's Drift, 6106. Great Namaqualand : Buchholzbrunn, 3676.

## 6. LOBOSTEMON.

1. *L. verrucosus*, Buek., Linnaea, xi., 138.

Cape: Roadside between Hottentots' Kloof and Karrooport, 4812. Namaqualand : Roadside between Brakdam and Reitkloof, 5662.

2. *L. fruticosus*, Buek., *l. c.*, 134.

Namaqualand : Roadside between Brakdam and Reitkloof, 5674.

3. *L. argenteus*, Buek., *l. c.*, 133.

Khamiesberg: Common on lower southern slopes of Sneeuwkop, 5890. Lower middle western slopes of Sneeuwkop, 5780. Upper end lower plateau Vogelklip, 5916.

4. *L. cinereus*, DC., Prod., x., 10.

Cape: Foothills Cold Bokkeveld Mts. opposite Warm Baths, 7215.

5. *L. Wurmbii*, DC., *l. c.*, 11.

Cape: Mountain slopes, Oliphant's River Valley near Warm Baths, 6877. On plateau on summit of Nardouw Mountain, 5422. Khamiesberg: Beaem Hill, 2 miles South-east of Leliefontein, 6369

6. *L. glaber*, Buek., *l. c.*, xi., 137.

Khamiesberg: Lower southern slopes of Sneeuwkop, 5889. Middle slopes of Zuurberg, 6271. Upper slopes of Vogelklip, 5009. Namaqualand : Northern slopes of Rietkloof Mountain, 5715.

7. *L. laevigatus*, Buek., *l. c.*, 139.

Cape: Upper western slopes of Nardouw Kloof, 5415.

8. *L. glaucophyllus*, Buek., *l. c.*, 138.

Cape: Among rocks near hill-top Nardouw Kloof, 4948. Hills at

Leeuwfontein, 3225. Sand flats between Driefontein and Heeren Logement, 6736. Lower mountain slopes near Warm Baths, Oliphant's River Valley, 7216.

#### 7. AMSINCKIA.

1. *A. angustifolia*, Lehm., Del. Sem. Hort. Hamb. (1831).  
Khamiesberg : Leliefontein, 7755.

### CYPERACEAE.

*By Louisa Bolus.*

#### 1. FIMBRISTYLIS.

1. *F. squarrosa*, Vahl, Enum. ii., 289.  
Little Bushmanland : Wet mud along the Orange River near Abbasis, 2996.

#### 2. CARPHA.

1. *C. glomerata*, Nees, in Linnaea, vii., 529.  
Cape : Oliphant's River Valley near Warm Baths, 7749.

#### 3. FUIRENA.

1. *F. coerulescens*, Steud., in Flora, 1829, 153.  
Cape : Damp places on eastern side of Pickenier's Pass, 5228.  
Khamiesberg : Wilgehout Ravine, 6381.

#### 4. FICINIA.

1. *F. bracteata*, Boeck., in Linnaea, xxxvii., 83.  
Cape : On rocks near the river, Ceres, 3503. Common on upper slopes Hottentots' Kloof, 4898. Slopes of Oliphant's River Mts. near Warm Baths, 7149.
2. *F.* sp.  
Khamiesberg : Groenekloof, on dry hill-slopes, 6627.
3. *F. gracilis*, Schrad., Anal. Fl. Cap., 44.  
Cape : Slopes of Oliphant's River Mts. near Warm Baths, 7137, 7150.

4. *F. lithosperma*, Boeck. *l. c.*, 72.

Cape: Oliphant's River Mts. near Warm Baths, 7751.

5. *F. brevifolia*, Nees, *l. c.*, ix., 292.

Cape: In rock fissures near the river, Ceres, 3515.

6. *F. setiformis*, Schrad., *l. c.*, 45.

Cape: Near the top of Pickenier's Pass, eastern side, 5230.

7. *F. aphylla*, Nees, in Endl. Prod. Fl. Nord., 23. Forma.

Locality uncertain, 5543.

8. *F. filiformis*, Schrad., *l. c.*, 46.

Cape: Common in dry rock fissures, Ceres, 3523.

9. *F. stolonifera*, Boeck., *l. c.*, xxxvii., 60.

Karoo: Karieboomfontein, 3906.

#### 5. CYPERUS.

1. *C. sphaerospermus*, Schrad., Anal. Fl. Cap., 8.

Cape: Damp spots, Oliphant's River Valley, 5274.

2. *C. marginatus*, Thunb., Prod., 18.

Cape: Wet river-bed between Ceres and Leeuwfontein, 3238.  
 Karroo: Stompiesfontein, near water-pit, 4971. Damp places in ravine at Loeriesfontein, 4852. Rock crevices in bed of Holle Rivier, 3975. Little Namaqualand: Sandy bed of Doorn Rivier, South of Brakrivier, 3882. Marshy ground brakwater pools, Kuboos, 6083. Dry river-bed, Stinkfontein, 5519. River-bed South of Tweefontein, 3757. Not far from water on middle slopes of Rattelpoort Mts., 2973. Bushmanland: Water conduit, Pella, 3837. Dry river-bed at Groot Rozynbosch, 3849. Great Namaqualand: Mud bank in bed of Löwen's River at Gawachab, 4091. Damara-land: Mouth of Swakop River and sand dunes over the Walfish Bay border, 3370.

3. *C. longus*, Linn., Sp. Plant, ed. 2, 67.

Cape: River-bed between Lang Kloof and Nardouw Pass, 5350.  
 Karroo: Damp crevices in shaly rocks in bed of Holle Rivier, 3973.  
 Namaqualand: Stream-bed on South of pass leading to Rietkloof, 5684. Little Bushmanland: Orange River near Abbasis, 3001.

*C. longus*, Linn., *l. c.* Forma.

Karoo: Bed of ravine at Loeriesfontein, 4857.

6. MARISCUS.

1. *M. riparius*, Schrad., in Goett. Gel. Anz., iii., 2067.

Cape : Foot of Oliphant's River Mts. near Warm Baths, 7141.

7. SCIRPUS.

1. *S. incomtus*, Boeck., in Linnaea, xxxvi., 693.

Cape : Common in moist soil in hollows in Table Mountain sandstone near river, Ceres, 3530. Oliphant's River Valley near Warm Baths, 7754. Khamiesberg : Damp places in shade of rocks upper middle slopes, Sneeuwkop, 5784.

2. *S. antarcticus*, Linn., Mant., 181.

Cape : Slopes of Oliphant's River Mts. near Warm Baths, 7148.

3. *S. nodosus*, Rottb., Descr. et Ic., 52, t. 8, fig. 3.

Cape : Roadside between Hottentots' Kloof and Karroopoort, 4806. Karroo : Rock crevices in bed of Holle Rivier, 3976. Roggeveld after Blauwkrantz Pass, 4979. Khamiesberg : Stream in ravine between Leliefontein Plateau and Ezelsfontein, 6321. By stream on South side of pass between Bowesdorp and Groot Gans, 5869. Namaqualand : Near dam, Kamabies, 3465. Bed of Doorn River south of Brakrivier, 3881.

4. *S. Holoschoenus*, Linn., Sp. Plant, ed. 2, 72.

Cape : Damp places on eastern side, Pickenier's Pass, 5224.

5. *S. spathaceus*, Hochst., in Flora, 759.

Cape : River-side between Ceres and Leeuwfontein, 3237.

6. *S. littoralis*, Schrad., Fl. Germ., i., 142, t. 5, fig. 7.

Locality uncertain, 5437.

8. JUNCELLUS.

1. *J. laevigatus*, C. B. Clarke, in Hook. f., Fl. Brit. Ind., vi., 596, Forma.

Karroo : Beukesfontein, forming turf in damp sand in river-bed near springs, 4916.

2. *J. laevigatus*, C. B. Clarke, *l. c.*

Little Namaqualand : In crevices near top of Rattelpoort Mt., 2990. Great Namaqualand : Among stones near warm spring at

Warmbad, 4379. Damaraland: Banks of Swakop River and sand dunes on the Walfish Bay border, 3380.

## JUNCACEAE.

*By Louisa Bolus.*

### 1. JUNCUS.

1. *J. bufonius*, Linn., Sp. Plant, 328.

Cape: Stream-side between Ceres and Leeuwfontein, 3252.  
Karoo: Kariboomfontein near water furrow, 4988.

2. *J. lomatoophyllus*, Spreng., Neue Entd., ii., 108.

Cape: Damp places on East side of Pickenier's Pass near the summit, 5236.

3. *J. acutus*, Linn., var. *Leopoldii*, Buchen., in Abhand. Naturw. Ver. Brem., iv., 421, t. 5.

Cape: Attis River-bed, 5388. Little Namaqualand: Banks of Brakrivier, 4880. Bushmanland: Common around the water-hole at Henkriesfontein, 3091.

4. *J. maritimus*, Lam., Encyc., iii., 264.

Karoo: Sandy river-bed at Beukesfontein, 5006. Namaqualand: In dried-up vlei opposite Sendling's Drift, 6109. River-bed between Bitterfontein and Stinkfontein, 5523. Marshy ground below brakwater pools, 6079.

### 2. PRIONIUM.

1. *P. Palmita*, E. Mey., in Linnaea, vii., 131.

Cape: Near Ceres, 3516.

## GRAMINEAE.

*By F. Bolus.*

### 1. ROTTBOELLIA.

1. *R. compressa*, Linn. f., Suppl. 114, var. *fasciculata*, Hack., in DC., Monogr. Phan., vi., 286.

Cape: In stream-bed eastern side Pickenier's Pass, 5217. Water-

edge, Doorn River, 5403. Damp places on edge of Oliphant's River, Kradouw Krantz, 5276. Among bush on edge of small stream on eastern side of Pickenier's Pass, 5216.

## 2. HETEROPOGON.

1. *H. contortus*, Roem. and Schult., Syst., ii., 836.

Great Namaqualand : Among stones in Akam River-bed, 4762.

## 3. CYMBOPOGON.

1. *C. marginatus*, Stapf.

Cape : Common on hill-sides among rocks at Leeuwfontein, 3222. Namaqualand : Rock crevices near summit of Rattelpoort Mountain, 2989.

2. *C. plurinodis*, Stapf.

Cape : Slopes of Oliphant's River Mts. behind Warm Baths, 7142. Great Namaqualand : Schakalskuppe hill-tops, 4252. Akam River-bed, 4764.

3. *C. excavatus*, Stapf.

Cape : Upper southern slopes above Kradouw Krantz, 5318. Namaqualand : Rock crevices near summit of Rattelpoort Mountain, 2989.

## 4. ANTHISTIRIA.

1. *A. imberbis*, Retz, in Obs., iii., 11.

Cape : Upper north-eastern slopes above Pickenier's Pass, 5185. Summit of Oliphant's River Mts. behind Warm Baths, 6857.

## 5. DIGITARIA.

1. *D. eriantha*, Steud., in Flora, 1829, 468.

Cape : Lower eastern slopes of Kradouw Krantz, 5295. Great Namaqualand : Sand near base of kopje 15 miles South-east of Gründoorn, 4556. Rock crevice in kopje between Dabaigabis and Gründoorn, 3168. Stony bed of Akam River, 4763.

## 6. PANICUM.

1. *P. mesocomum*, Nees, in Fl. Afr. Austr., 34.

Great Namaqualand : Sandy river-bed at Buchholzbrunn, 3679. In sandy river-bed 25 km. North of Warmbad, 4302. Dry river-

bed 20 km. North of Raman's Drift, 4544. In sandy valley 20 km. North of Raman's Drift, 4515.

2. *P. glomeratum*, Hack., in Verh. Ver. Prov. Brandenb., xxx., 141.

Great Namaqualand: Sandy river-bed at Buchholzbrunn, 3668. Sand dunes at Sandverhaar, 4657.

3. *P. coloratum*, Linn., in Mant., i., 30.

Great Namaqualand: Common in sandy places 21-30 km. North of Raman's Drift, 4013. Among dolerite blocks on face of hill East of Gobas Railway Station, 3719.

4. *P. minus*, Stapf, var.  $\beta$ , *planifolium*, Stapf, in Dyer, Fl. Cap., vii., 410.

Cape: Sand banks in river-bed below Kradouw Krantz, 5363. Great Namaqualand: Among quartzite blocks, Akam River-bed, 4749, 4741. Akam River-bed, 4767. Sandy places recently washed by rain, South of Warmbad, 4031. Sandy valley 20 km. North of Raman's Drift, 2400, 3625. Near the crossing of the Kalkfontein Railway track, 4570, 4573, 4569.

## 7. SETARIA.

1. *S. appendiculata*, Stapf, in Dyer, Fl. Cap., vii., 422.

Great Namaqualand: Lower slopes of kopje above pass leading down to Gründoorn, 3128. On kopje in partial shade, Gründoorn, 3137. Stream-bed at foot of mountain at Schakalskuppe, 4250. Schakalskuppe, 4244. Hill-tops at Schakalskuppe, 4253.

## 8. PENNISETUM.

1. *P. cenchroides*, Rich., in Pers. Syst., i., 72.

Cape: Dry river-bed of Doorn River, 5404. Great Namaqualand: Near high-water mark, Löwen's River, Gawachab, 4095. Among stones in river-bed at Buchholzbrunn, 3648. Among rocks at Dabaigabis, 4319. Crevices in kopje near crossing of the Kalkfontein Railway track, 4572. Dry stream-bed between Dabaigabis and Gründoorn, 3116. Among rocks in dry stream-bed near Dabaigabis, 4389. Dry stream-bed in sandy plains West of Ganus, 4477. Kopje near the crossing of the Kalkfontein Railway track, 4567. In sandy places recently washed by rain 20 km. South of Warmbad, 4032. Two miles South of Dabaigabis, 4389. Among quartzite blocks Akam River, 4730.



2. *P. macrourum*, Trin., in Gram. Pan., 64.

Cape: Near water-edge in deep sand at Ceres, 3514. Marshy ground eastern slopes above Pickenier's Pass, 5178. Near stream-bed between Ceres and Leeuwfontein, 3259. Khamiesberg: Among *Phragmites* in damp spots on middle western slopes of Sneeuwkop, 3rd kloof above Bowesdorp, 5841. Near water, 6276. Lower middle slopes of Sneeuwkop, near water-hole, 5831. Namaqualand: With *Arundo* overhanging brakwater pools at Klipfontein, 6084.

3. *P. Thunbergii*, Kunth, in Rév. Gram., i., 50.

Cape: Foothills of Cold Bokkeveld Mts., opposite Warm Baths, 7145.

#### 9. ANTHEPHORA.

1. *A. pubescens*, Nees, in Flor. Afr. Austr., 74.

Great Namaqualand: Middle slopes of kopjes above pass leading down to Gründoorn, 3126.

#### 10. TRICHOLAENA.

1. *T. capensis*, Nees, in Cat. Sem. Hort. Vratisl., 1835, and in Linnaea, xi., Litt. Ber., 130.

Great Namaqualand: Gabis, 4952. Dry stream-bed between Dabaigabis and Gründoorn, 3119.

#### 11. ACHNERIA.

1. *A. capillaris*, Stapf, in Hook. Icon. Plant, t. 2604.

Khamiesberg: Sandy slope at Eenkoker, 6761.

2. *A. setifolia*, Stapf, in Dyer, Fl. Cap., vii., 461.

Khamiesberg: In partial shade of rocks middle south-western slopes of Beaem Hill, 2 miles South-east of Leliefontein Mission Station, 6358.

#### 12. PENTASCHISTIS.

1. *P. eriostoma*, Stapf, in Dyer, Flor. Cap., vii., 489.

Cape: North-eastern slopes above Pickenier's Pass, 5136. Upper slopes at Hottentots' Kloof, 4943.

2. *P. aspera*, Stapf, *l. c.*, 500.

Cape : On rocks in damp hollows near river at Ceres, 3504.

3. *P. filiformis*, Stapf, *l. c.*, 505.

Khamiesberg : Upper middle western slopes of Sneeuwkop, 5765.  
Damp shady places, middle slopes of Sneeuwkop, western aspect,  
3rd kloof above Bowesdorp, 5836.

4. *P. brachyathera*, Stapf, *l. c.*, 507.

Namaqualand : Among boulders between Nieuwefontein and  
Alewyn's Fontein, 3333.

5. *P. Thunbergii*, Stapf, *l. c.*

Cape : Damp places on eastern side of Pickenier's Pass, 5223.  
South-western slopes above Pickenier's Pass, 5118. Locality un-  
certain, 5231.

6. *P. airoides*, Stapf, *l. c.*, 511.

Namaqualand : Bitterfontein, 6489.

### 13. DANTHONIA.

1. *D. lupulina*, Roem. and Schult., in Syst., ii., 690.

Cape : Common high up on cliffs at Ceres, 3529.

2. *D. stricta*, Schrad., in Schult. Mant., ii., 383.

Cape : Burnt-out veld at Leeuwfontein, 3213, 3214. Khamies-  
berg : Upper north-western slopes of Sneeuwberg, 5803.

3. *D. suffrutescens*, Stapf, in Dyer, Flor. Cap., vii., 533.

Great Namaqualand : Common on sand dunes at Gorup, 4196.  
Sand dunes at Sandverhaar, 4661, 3707, 4341.

### 14. CHAETOBROMUS.

1. *C. dregeanus*, Nees, Fl. Afr. Austr., 343.

Khamiesberg : Eenkoker, 6755.

### 15. PHRAGMITES.

1. *P. communis*, Trin., in Fund. Agrost., 134. Specimens incom-  
plete (probably this sp.).

Upper Region : Damp places on steep sides of ravine at  
Loeriesfontein, 4850.

16. POLYPOGON.

1. *P. monspeliensis*, Desf., in Fl. Atlant., i., 67.

Cape: Marshy spots on southern slopes of Pickenier's Pass, 5199.  
Upper Region: Rock crevices in bed of Holle River, 3974. Namaqualand: Banks of water furrow at Brakrivier, 3879.

2. *P. tenuis*, Brongn., in Duperr. Voy. Coq. Bot., 22.

Cape: On damp ledges overhanging brakwater pools, 6094.  
Upper Region: Damp places in ravines at Loeriesfontein, 4853.

17. AGROSTIS.

1. *A. bergiana*, Trin., in Gram. Unifl. and Sesquifl., 203.

Khamiesberg: West of Leliefontein, 6324.

*A. bergiana*, Trin., var. *glumis mucronatis*.

Cape: Sand banks in Oliphant's River-bed, Kradouw Krantz, 5296.

2. *A. lachnantha*, Nees, in Ind. Sem. Hort. Vratisl., 1834, and in Linnaea, x., 115.

Cape: Roadside between Hottentots' Kloof and Károopoort, 4828. By side of a stream between Ceres and Leeuwfontein, 3231. Between Ceres and Leeuwfontein, 3240. Khamiesberg: River-bed on Khamiesberg Plateau, 6233. Water-edge of small stream on South side of pass between Bowesdorp and Groot Gans, 5849.

3. *A.* sp. Nearest *A. polypogonoides*, Stapf.

Cape: Damp spots on edge of Oliphant's River, 5273.

18. ARISTIDA.

1. *A. Adscensionis*, Linn., in Sp. Pl., 82.

Bushmanland: Sand near river-bed at Dabeep, 6226. Broken ground at Pella, 3557. Great Namaqualand: Dry stream-bed between Dabaigabis and Gründoorn, 3118. Sand near kopjes between Dabaigabis and Gründoorn, 3160. Among quartzite blocks, Akam River basin, 4745. Among rocks near Holoog, 4136. Near stream-bed on stony plains 12 km. West of Sandverhaar, 4625. Sandstone at Sandverhaar, 4674. Near edge of sandy valley North of Sabiesis, 4118. Middle slopes of kopje above pass leading down to Gründoorn, 3129. By the side of the Railway between Gawachab and Seeheim, 4332. Stream-bed a little West of Ganus, 4490.

2. *A. angustata*, Stapf, in Dyer, Fl. Cap., vii., 556.

Namaqualand : In clumps on kopje at Rietfontein, 3768.

3. *A. congesta*, Roem. and Schult., in Syst., ii., 401.

Bushmanland : Sand at Pella, 3590.

4. *A. vestita*, Thunb., in Prod. Cap., 19.

Cape : Mountain-tops at Hottentots' Kloof, 4907. Southern slopes above Pickenier's Pass, 5185. River-bed, Lang Kloof, 5344. Bushmanland : Granite knoll South of Kweekfontein water-hole, 3803. Namaqualand : Upper northern slopes of Rietkloof Mt., 5719. Among gneissic boulders at Alewyn's Fontein, 3487. Great Namaqualand : Sandy valley 20 km. North of Raman's Drift, 4533. On kopje 12 km. West of Sandverhaar, 4612. Among quartzite blocks Akam River basin, 4765. Sand at base of kopje 30 km. South of Gründoorn, 4406, 4554. Top of mountain North of Schakalskuppe Station, 4801.

*A. vestita*, Thunb., var.  $\beta$ , *parviflora*, Trin. and Rupr., in Stip., 158.

Bushmanland : About 15 miles from Kamabies, and among boulders of gneiss near Alewyn's Fontein, 3487. Namaqualand : Rattel-poort, near top of mountain, East of Railway Station, 2952.

*A. vestita*, Thunb., var.  $\gamma$ , *schraderiana*, Trin. and Rupr., l. c.

Cape : Mountain-tops at Hottentots' Kloof, 4929.

5. *A. ciliata*, Desf., in Schrad., Neues. Journ., iii., 255.

Karoo : In river-bed South side of pass, Klipplaat, 3395. Common in dry sandy river-bed North of Gansfontein, 3983. River-bed between Pappekuul and Stompiesfontein, 4967. Bushmanland : Sand at foot of mountain between Wolftoon and Henkriesfontein, 3107. Near Ougrabies, 3564. Namaqualand : Common in dry sand of river-bed between Plaatklip and Bitterfontein, 3293. Sandy valley leading down to Bethany Drift, 6952. Great Namaqualand : In sand a little North of Ganus, 4495. Very common on sandy plains North of Schakalskuppe, 4800. In sandy river-bed 25 km. North of Warmbad, 4293, 4301. Sandy river-bed at Buchholzbrunn, 3638. Upper slopes of mountains behind Rotkuppe Station, 4183. Plains between Dabaigabis and Gründoorn, 3158, 3159. Damaraland : Ravine of the Khan River basin near Welwitsch, 4421, 4423. Slopes of barren hills in Khan River basin near Welwitsch, 4472.

*A. ciliata*, Desf., var.

Great Namaqualand : Tschauhab, 4949.

6. *A. capensis*, Thunb., *l. c.*

Cape: Eastern aspect (left bank) of Oliphant's River, Kradouw Krantz, 5304.

*A. capensis*, Thunb., var.  $\gamma$ , *macropus*, Trin. and Rupr., in Stip., 179.

Khamiesberg: Hill-side, Tweerivieren, 6499.

7. *A. namaquensis*, Trin., ex Steud., Nomencl., ed. 2, i., 131.

Cape: Sand veld on right bank of Oliphant's River between Builshoek and Doorn River, 5400. Karroo: Irrigated land on "The bosch near Schuurkraal," 3080. Schuurkraal, 4999. Shallow dry sandy river-bed North of Gansfontein, 3991. Bushmanland: In river-bed on veld, Aggenys, 2947. Namaqualand: Shaly banks of Doorn River, South of Brakrivier, 3883. Slopes above Buffels River between Arkoep and Mesklip, eastern aspect, 5898. Common in dry sandy river-bed near first day's outspan between Plaatsklip and Bitterfontein, 3298. Fissures in granite, Eenriet, 3082. Dry river-bed South of pass between Grauwater and Klipplaat, 3282. Common in sand at Brakrivier, 3901. Sandy flats Alewyn's Fontein, 3335. Dry sandy river-bed at Kamabies, 3953. Great Namaqualand: Common on sand dunes 18 km. West of Aus, 4217. Common on sand dunes at Sandverhaar, 3710, 3713, 4343. Sandy river-bed at Buchholzbrunn, 3645, 3644. Sandy valley 20 km. North of Raman's Drift, 4532. Sand dunes near top of granite mass South of Rotkuppe Station, 4189. Common on granite slopes 18 km. West of Aus, 4208. Sandy river-bed, Gabis, 4324. Locality uncertain, 3400.

8. *A. lutescens*, Trin. and Rupr., in Stip., 173.

Great Namaqualand: Sand dunes 18 km. West of Aus, 4203. Sand dunes on hills South of Gorup Station, 4202.

9. *A. obtusa*, Del., in Fl. Égypte, i., 175, t. 13, fig. 2.

Karroo: River-bed between Pappekuul and Stompiesfontein, 4965. Gansfontein, 3987. Bushmanland: In sand about 8 miles South-west of Bitterfontein, 3866. Namaqualand: Common in river-bed about 10 miles to North-east of Bitterfontein, 3406. Sandy slopes and flats at Kamabies, 3777. Dry sandy river-bed on plateau South of Daunabis, 6006. Common in sand at Brakrivier, 3902. Sandy flats at Alewyn's Fontein, 3334. Great Namaqualand: Sandy plains 25 km. North of Warmbad, 4292. A little West of Ganus, 4287. Sand about 30 km. North of Raman's Drift, 4053. Common in sand at Gabis, 4322. Common on sand, Gorup, 4197. Sandy river-bed

near Dabaigabis, 4382. About 20 km. South-south-east of Grün-doorn, 3158. Sand of river-bed at Buchholzbrunn, 3639. Sand dunes at Sandverhaar, 4663, 4676, 4688. Sandy plains North of Railway at Schakalskuppe, 4804. Dry river-bed in sandy plains North of Ganus, 4504. Common on sandy plain at Schakalskuppe, 4778. Common on sandy patches recently washed by rain 21–30 km. North of Raman's Drift, 4009.

10. *A. uniplumis*, Licht., in Roem. and Schult., Syst., ii., 401.

Great Namaqualand: Shallow steam-courses 12 km. West of Sandverhaar, 4603. Kopje about 25 km. South of Warmbad, 4027. Abundant in sandy valley North of Sabiesis, 4117. Among stones in river-bed at Buchholzbrunn, 3655. Sand at base of kopje 15 miles South of Gründoorn, 4555. Rocky ground near Dabaigabis, 4381. Sandy stream-bed on stony plains 12 km. West of Sandverhaar, 4620. Sandstone at Sandverhaar, 4673. Sand dunes at Sandverhaar, 3711. Sandverhaar, 3704.

11. *A. dregeana*, Trin. and Rupr., *l. c.*, 169.

Great Namaqualand: Common on granite slopes 18 km. West of Aus, 4213.

12. *A. geminifolia*, Trin. and Rupr., *l. c.*

Bushmanland: In sand about half-way between Klipplaat and Bitterfontein, 3869. Namaqualand: Common grass on sandy flat South of Tweefontein, 3781. Great Namaqualand: Near stream-bed on plains 12 km. West of Sandverhaar, 4600.

13. *A. brevifolia*, Steud., in Nomencl., ed. 2, i., 130.

Little Bushmanland: Sand between Dabainoris and Abbasis, 3011. Bushmanland: Wortel, 3601. Common in sand near Wortel, 3634, 3626. Sandy places in pass above Wortel water-hole, 3632. Namaqualand: About 10 miles to the North-east of Bitterfontein, 3405. Great Namaqualand: Common grass on sandy plains between Keetmanshoep and Seeheim, 4590. On sandy plains 21–30 km. North of Raman's Drift, 4010. Common on sand 30 km. North of Raman's Drift, 4051. Sandy valley 20 km. North of Raman's Drift, 4535. Sandy plains 25 km. North of Warmbad, 4287.

14. *A. hochstetteriana*, Beck, ex Hack., in Verh. Bot. Ver. Prov. Brandenb., xxx., 144.

Bushmanland: River-bed at Aggenys, 4953. Namaqualand: Locality uncertain, 7798. Great Namaqualand: Common on sandy

plains between Keetmanshoep and Seeheim, 4347. Locality uncertain, 4605. Damaraland: Sandy ravine Khan River basin, near Welwitsch, 4468.

15. *A. sp.* Nearest *A. uniplumis*, Licht.

Great Namaqualand: Shallow stream-courses on plains 12 km. West of Sandverhaar, 4602.

16. *A. sp.* Nearest *A. plumosa*, Linn.

Damaraland: Sandy ravines of Khan River basin near Welwitsch, 4422.

17. *A. sp.* Nearest *A. plumosa*, Linn.

Damaraland: Welwitsch, sandy bottom of ravine of Khan basin, 4418.

18. *A. sp.* Nearest *A. plumosa*, Linn.

Damaraland: Rock crevices at Welwitsch, 4416.

19. *A. sabulicola*, Pilger, in Engl. Bot. Jahrb., vol. 40, p. 81 (1907),

Great Namaqualand: Sand dunes near top of mountain behind Rotkuppe Station, 4185.

20. *A. sp.*

Great Namaqualand: Sandy river-bed 25 km. North of Warmbad, 4290.

#### 19. TRAGUS.

1. *T. racemosus*, All., in Fl. Pedem., ii., 241.

Great Namaqualand: Among quartzite blocks on flats bordering Akam River-bed, 4735. Sandy plains at Schakalskuppe, 4788.

#### 20. SPOROBOLUS.

1. *S. ioclados*, Nees, in Fl. Afr. Aust., 161.

Cape: Locality uncertain, 7747, 7748.

2. *S. fimbriatus*, Nees, *l. c.*, 156.

Great Namaqualand: Among quartzite blocks in Akam River-bed, 4724.

3. *S. indicus*, R. Br., in Prodr., 170.

Cape: Sandy spots in Boontjes River, 5246.

4. *S. pungens*, Kunth, in Rév. Gram., i., 68.

Cape: Dry river-bed between Bitterfontein and Stinkfontein, 5530. Damaraland: Mouth of Swakop River and sand dunes over Walfisch Bay, 3381.

5. *S. Sladenianus*, sp. nov., *S. ioclado* affinis, sed laminis angustioribus, nervio medio minus prominente, ramulis paniculae solitariis vel interdum subgeminatis, spiculis angustioribus, glumis subaequalibus differt.

Perennis, rhizomate obliquo, ortibus sterilibus et reliquiis mortuorum dense vestito; culmi erecti vel adscendentes, glabri laeves, circa 2-nodi, nodis omnino in vaginis inclusis (? deinde exsertis), 12·5–20 cm. alti; vaginae inferiores latae firmae pallidae glabrae laeves; ligula e fimbria densa capillorum perbrevum composita; laminae lineares, longe tenuissimeque attenuatae, planae vel setaceo-convolutae, glabrae subglaucae laeves, 2·5–5 cm. longae, 0·1–0·25 cm. latae; panicula ovalis, 7·5–15 cm. longa, 5 cm. diam., ramis adscendentibus (ramulis patentibus), solitariis vel subgeminatis, simplicibus per tertiam vel dimidium longitudinis, filiformibus vel capillaribus, strictis vel subflexuosis, laevibus, inferioribus distantibus, ad 7·5 cm. longis, superioribus approximatis, pedicellis lateralibus brevissimis; spiculae sature griseo-olivaceae, lanceolatae acutissimae, 0·15–0·17 cm. longae; glumae subaequales, inferiore ovato-lanceolata acuta, spicula tertio minore, superiore ovata acuta 1-nervia, valva paullo brevior; valva late elliptica, subacuta 1-nervia; palea late oblonga, valva paullo brevior; stamina 3, antheris 0·1 cm. longis.

Great Namaqualand: Sandy plains at Schakalskuppe, 4779. Great Karasberg: High plateau between Narudas Süd and Krai Klufft, 8103.

Perennial; rhizome oblique, densely beset with barren shoots and the basal portions of dead shoots; culms erect or ascending, glabrous smooth, about 2-noded, the nodes wholly enclosed in the sheaths (? at length exserted), 12·5–20 cm. high; lower sheaths broad, firm, pallid, glabrous, smooth; ligule a dense fringe of short hairs; blades linear, tapering to a long fine point, flat or setaceously convolute, glabrous subglaucescent, smooth, 2·5–5 cm. long, 0·1–0·25 cm. broad; panicle oval, 7·5–15 cm. long, by 5 cm. broad, branches ascending (the branchlets spreading), solitary or subgeminat, unbranched from  $\frac{1}{3}$  to  $\frac{1}{2}$  their length, filiform or capillary, straight or subflexuous, smooth, the lower distant, up to 7·5 cm. long, the upper approximate, the lateral pedicels very short; spikelets dark olive-



grey lanceolate, very acute, 0.15–0.17 cm. long; glumes subequal, the lower ovate-lanceolate, acute, about  $\frac{2}{3}$  of the spikelet, the upper ovate, acute, 1-nerved, a little shorter than the valve; valve broadly elliptic, subacute, 1-nerved; pale broadly oblong, a little shorter than the valve; stamens 3, anthers 0.1 cm. long.

Allied to *S. ioclados*, but differs in having the blades narrower, with the midrib less prominent, branches of the panicle solitary or sometimes subgeminate, spikelets narrower and glumes subequal.

Plate VIII., A, Fig. 1, sketch of portion of plant nat. size; 2, branch of the panicle,  $\times 6$ ; 3, spikelet; 4, floret; 5, lower glume, side view; 6, ditto, flattened; 7, upper glume, side view; 8, ditto, flattened; 9, valve, side view; 10, ditto, flattened; 11, pale, side view—all  $\times 20$ .

## 21. DIPLACHNE.

1. *D. fusca*, Beauv., in Agrost., 163.

Cape: In dry sand in river-bed of Doorn River, 5402.

2. *D. paucinervis*, Stapf, ex Rendle, in Cat. Afr. Pl. Welw., ii., 232.

Locality uncertain, 3372. Little Bushmanland: Dry banks of water-pit at Dabainoris, 3012.

## 22. ERAGROSTIS.

1. *E. porosa*, Nees, l. c. 401.

Great Namaqualand: Among quartzite blocks in Akam River-bed, 4742. Akam River, 4734. On kopje near Gründoorn, 3138. Sand near base of kopje 15 miles South-east of Gründoorn, 4561, 4558, 4557. Sandy stream-bed on stony plains 12 km. West of Sandverhaar, 4622.

2. *E. bicolor*, Nees, l. c., 407.

Great Namaqualand: In sand near Kuibis Railway Station, 4761.

3. *E. micrantha*, Hack., in Bull. Herb. Boiss., iii., 389.

Great Namaqualand: Gawachab, near high-water mark on banks of Löwen's River, 4094.

4. *E. spinosa*, Trin., in Gram. Gen., 416, and in Mém. Acad. Petersb. Sér. 6, i., 416.

Karoo: In sand North of Zoutpansdrift, 5002. Upper Region: Holle Rivier, 3373. Bushmanland: Common in sand dunes between

Ougrabies and Kweekfontein, 3792. Great Namaqualand: Sand dunes near top of mountains at Rotkuppe, 4184.

5. *E. denudata*, Hack., *l. c.*, 392.

Bushmanland: Groot Rozybosch, 3696. Great Namaqualand: Rock crevices in kopje between Dabaigabis and Gründoorn, 3167. Sandy plains at Schakalskuppe, 4794. Common on mountain slopes at Schakalskuppe, 4242. Common in sand near base of kopje 15 miles South-east of Gründoorn, 4565. Among limestone blocks on hill-tops at Buchholzbrunn, 3671. Very common 18 km. West of Aus, 4216. Kopje near Gründoorn, 3145.

6. *E. chalcantha*, Trin., *l. c.*, 401, and *l. c.*, 401.

Great Namaqualand: Sandy plains South of Schakalskuppe Station, 4773.

7. *E. sarmentosa*, Trin., *l. c.*, 39, and *l. c.*, 398.

Cape: Moist ground at edge of Oliphant's River, 5272.

8. *E. annulata*, Rendle, in Journ. Bot., 1891, 72.

Great Namaqualand: Dry stream-bed between Dabaigabis and Gründoorn, 3117. Among quartzite blocks Akam River basin, 4757. Sandy stream-bed on stony plain 12 km. West of Sandverhaar, 4621. Sand of stream-bed a little West of Ganus, 4477.

9. *E. brizoides*, Nees, in Linnaea, vii., 328.

Cape: In moist spots, Boontjes River, 5245.

10. *E. brizantha*, Nees, in Fl. Afr. Austr., 411.

Great Namaqualand: River-bed near Dabaigabis, 4383.

11. *E. namaquensis*, Nees, in Ind. Sem. Vratisl., 1835, and in Linnaea, Litt. Ber., xi., 125.

Namaqualand: Locality uncertain, 7796.

12. *E. sp.* Nearest *E. minor*.

Great Namaqualand: In shade in dry stream-bed in sandy plain West of Ganus, 4487. Drying mud patches in sandy flat South of Löwen's River at Gawachab, 4080.

### 23. CYNODON.

1. *C. Dactylon*, Pers., in Syn., i., 85.

Cape: Damp places near summit of Pickenier's Pass on eastern

side, 5232. Upper Region: Rock crevices in bed of Holle Rivier, 3977. Little Bushmanland: Wet mud in Orange River, near Abbasis, 2999.

#### 24. TRIRAPHIS.

1. *T. ramosissima*, Hack., in Verhandl. Bot. Ver. Brandenb., xxx. (1888), 237.

Great Namaqualand: On stony plains 12 km. West of Sandverhaar, 4623, 4628. Dabaigabis, 4390. Kopje near the crossing of the Kalkfontein Railway track, 4566. Rock crevices in kopje between Dabaigabis and Gründoorn, 3171. Among rocks on bank of dry stream-bed at Buchholzbrunn, 3647.

2. *T. Fleckii*, Hack., in Bull. Herb. Boiss., iv., App., iii., 23, 24.

Great Namaqualand: Dry stream-bed between Dabaigabis and Gründoorn, 3120. Sandy river-bed 25 km. North of Warmbad, 4291. Sandy plains North of Railway at Schakalskuppe, 4803, 4802. Sandy plains at Schakalskuppe, 4796.

#### 25. ENNEAPOGON.

1. *E. brachystachyus*, Stapf, in Dyer, Fl. Cap., vii., 654.

Great Namaqualand: Sandy stream-bed in sandy plains West of Ganus, 4475. Sandy plains at Schakalskuppe, 4797. Crack in granite on hill South of Tschauchab Station, 4261.

2. *E. scaber*, Lehm., in Pug., iii., 41.

Bushmanland: Sandy places at Wortel, 3617. Pella, 3559, 3558. Great Namaqualand: Sandy valley North of Sabiesis, 4116. Sand of river-bed at Seeheim, 3722. Crevices in limestone at Buchholzbrunn, 3672. Sand near base of kopje 15 miles South-east of Gründoorn, 4559. Sand near base of kopje between Dabaigabis and Gründoorn, 3162. Kopje on pass leading down to Gründoorn, 3122. Kopje near Gründoorn, 3139, 3140. Common in dry river-course 21-30 km. North of Raman's Drift, 4006. Shallow stream-bed 12 km. West of Sandverhaar, 4607. Sandstone at Sandverhaar, 4672. On kopje 12 km. West of Sandverhaar, 4632. Crevices in sandstone on banks of river at Sandverhaar, 4647. Among dolerite boulders on hill East of Railway Station at Gobas, 3717. Near Dabaigabis, 4384. Common on stony ground near Dabaigabis, 4402. Sandy places at Schakalskuppe, 4790.

## 26. SCHMIDTIA.

1. *S. bulbosa*, Stapf, *l. c.*, 658.

Great Namaqualand: 20 km. North of Raman's Drift, 4514. Sand near base of kopje 15 miles South-east of Gründoorn, 4560. In dry water-courses 20 km. North of Raman's Drift, 4058. Sandy valley North of Sabiesis, 4110.

## 27. EHRHARTA.

1. *E. longiflora*, Sm., in Pl. Ic. Ined., t. 32.

Khamiesberg: Damp shady places in upper part of Khoms Ravine, 6649.

2. *E. capensis*, Thunb., in Vet. Acad. Handl. Stockh. 1779 216, t. 8.

Cape: Lower slopes Oliphant's River Mts. near Warm Baths, 7346. Foot of Oliphant's River Mts. at Warm Baths, 7153. Upper southern slopes above Kradouw Krantz, 5319.

3. *E. delicatula*, Stapf, in Kew Bull., 1897, 288.

Upper Region: Common in ravines at Loeriesfontein, 4839. Khamiesberg: In shade of rocks, Khoms Ravine, 6667. Dry stream-bed under shade of rocks on Sneeuwkop, western aspect, middle slopes, 3rd kloof above Bowesdorp, 5835. Damp shady places in Khoms Ravine, 6714. In shade of granite blocks 500 ft. above Tweerivieren facing West, 6477. Namaqualand: Bitterfontein, 6503. Last outspan before Garies, 6474.

4. *E. pusilla*, Nees, ex Trin. Phalar., 22.

Namaqualand: Between Plaatklip and Bitterfontein, 3292. Locality uncertain, 7794.

5. *E. calycina*, Sm., in Pl. Ic. Ined., t. 33.

Cape: Hottentots' Kloof, 7795. Lower eastern slopes (left bank) of Kradouw Krantz, 5321. Below cliffs (eastern aspect) left bank of Oliphant's River at Kradouw Krantz, 5303. Upper Region: Ravines at Loeriesfontein, 4847. Khamiesberg: Among rocks at Namaroup, 6592. Namaqualand: Cornlands at Brakdam, 5597.

*E. calycina*, Sm., var.  $\beta$ , *versicolor*, Stapf, in Fl. Cap., vii., p. 675.

Khamiesberg: Dry slopes in Khoms Ravine, 6694. Tweerivieren, 400 ft. above Settlement, 6609.

6. *E. ramosa*, Thunb., in Prodr., 192.

Cape: Common on hill-sides among rocks at Leeuwfontein, 3222. Upper North-east slopes above Pickenier's Pass, 5133.

7. *E. aphylla*, Schrad., in Goett. Gel. Auz., iii. (1821), 2077, and in Schult. f., Syst., vii., 1369.

Cape: Ceres, 3533.

8. *E. barbinodis*, Nees, l. c., 20.

Khamiesberg: Dry slopes in Khoms Ravine, 6713.

9. *E. gigantea*, Thunb., l. c.

Cape: Upper southern slopes above Kradouw Krantz, 5317. Upper South-west slopes above Pickenier's Pass, 5121.

*E. gigantea*, Thunb., var.  $\gamma$ , *stenophylla*, Stapf, in Dyer, Fl. Cap., vii., p. 681.

Cape: Summit of mountain, Hottentots' Kloof, 4928. Tops and upper slopes of hills above Hottentots' Kloof, 4935. Mountain slopes above Hottentots' Kloof, 4911.

## 28. FINGERHUTHIA.

1. *F. africana*, Lehm., in Ind. Sem. Hort. Hamb., 1834, and in Linnaea, x., Litt. Ber., 112.

Khamiesberg: Common in clumps on dry slopes in Khoms Ravine. 7797. Namaqualand: Sandy hill at Stinkfontein, 6485. Great Namaqualand: Akam River-bed, 4740, 4768. Base of kopje between Dabaigabis and Gründoorn, 3148. Mountain slopes at Schakalskuppe, 4798. By side of dry stream-bed near Dabaigabis, 4387. On stream-bed between Dabaigabis and Gründoorn, 3115. Sandy river-bed 25 km. North of Warmbad, 4294.

2. *F.* sp.

Great Namaqualand: Locality uncertain, 4294.

## 29. SCHISMUS.

1. *S. fasciculatus*, Beauv., in Agrost., 74, 177.

Namaqualand: Near dam North of Bitterfontein, 6475. Locality uncertain, 3482. Khamiesberg: Dry stony hills at Varsche Rivier, 6508.

## 30. LASIOCHLOA.

1. *L. ciliaris*, Kunth, in Rév. Gram., ii., 555, t. 192.

Cape: Slopes of Oliphant's River Mts., near Warm Baths, 7146, 7340, 7336. Summit of Oliphant's River Mts., behind Warm Baths, 7144. Oliphant's River Valley, near Warm Baths, 7143.

2. *L. longifolia*, Kunth, *l. c.*, 557, t. 193.

Cape: Common among bushes on hill-sides at Leeuwfontein, 3181. Upper south-western slopes above Pickenier's Pass, 5113. Leeuwfontein, 3215.

*L. longifolia*, Kunth, var.  $\beta$ , *hispidula*, Stapf, in Dyer, Fl. Cap., vii., p. 699.

Cape: Mountain slopes above Hottentots' Kloof, 4912.

*L. longifolia*, Kunth, var.  $\gamma$ , *pallens*, Stapf, *l. c.*

Khamiesberg: Upper north-western slopes of Sneeuwkop, 5800.

## 31. BRIZOPYRUM.

1. *B. oblitterum*, Stapf, *l. c.*, 703.

Cape: River-bed between Ceres and Leeuwfontein, 3243. Stream-side at Leeuwfontein, 3242.

2. *B. capense*, Trin., in Mém. Acad. St. Petersb., Sér. 6, iv. (1838), and in Gram. Gen. Suppl., 54.

Cape: Summit of Oliphant's River Mts., behind Warm Baths, 7133, 7132. Lower eastern slopes, Kradouw Pass, 5294. Ceres, 3531.

## 32. BRIZA.

1. *B. maxima*, Linn., in Sp. Pl., 70.

Cape: Slopes of Oliphant's River Mts., near Warm Baths, 7152.

2. *B. minor*, Linn., *l. c.*

Cape: Stream-side between Ceres and Leeuwfontein, 3254. Khamiesberg: Stream-side on South side of pass between Bowesdorp and Groot Gans, 5882.

## 33. ENTOPLOCAMIA.

1. *E. aristulata*, Stapf, in Dyer, Fl. Cap., vii., 711.

Great Namaqualand: Among quartzite blocks Akam River basin, 4748.

34. POA.

1. *P. annua*, Linn., in Sp. Pl., 68.

Damp ground near stream, Groene Kloof, 6618.

35. ATROPIS.

1. *A. Borreri*, Stapf, *l. c.*, 716.

Karoo : Beukesfontein, 4968. Upper Region : Near water conduit in drying mud at Karieboemfontein, 3924.

36. FESTUCA.

1. *F. scabra*, Vahl., in Symb. Bot., ii., 21.

Khamiesberg : Upper north-western slopes of Sneeuwberg, 5804.

37. BROMUS.

1. *B. patulus*, Mert. and Koch, in Röhl. Deutschl. Fl., 1, 685, var.  $\gamma$ , *vestitus*, Stapf, *l. c.*, 730.

Cape : Roadside between Hottentots' Kloof and Karroopoort, 4826. Khamiesberg : Khamsoap Ravine, 7746. Namaqualand : Bitterfontein, 6572.

38. HORDEUM.

1. *H. secalinum*, Schreb., in Spicil. Fl. Lips., 148.

Cape : Roadside between Ceres and Leeuwfontein, 3257. Roadside between Hottentots' Kloof and Karroopoort, 4833.

**FILICES.\***

*By T. R. Sim.*

1. MOHRIA.

1. *M. caffrorum*, Desv., Kuhn, Fil. Afr., 171.

Khamiesberg : Upper western slopes, under rocks, Sneeuwkop, 5829.

2. GYMNOGRAMME.

1. *G. cordata*, Schl. Adum., 16.

Namaqualand : Crevices in granite slopes 6 miles North of Anenous on the road to Chubiessis, 6184. Locality uncertain, 2935.

\* Percy Sladen Memorial Expeditions in South-West Africa. Report No. 72.

## 3. BLECHNUM.

1. *B. australe*, Linn., Thunb. Prod., 172. Probably sporeling.

Cape: On mud banks of stream on eastern side of Pickenier's Pass, 5213.

*B. australe*, Linn., *l. c.*, 172.

Khamiesberg: Beaem Hill, 2 miles South-east of Leliefontein, 6373.

## 4. CHEILANTHES.

1. *C. hirta*, Sw., Schl. Adum., 50, t. 30.

Cape: Upper southern slopes above Kradouw Krantz, 5320.

Top of Oliphant's River Mts. behind Warm Baths, 6859.

2. *C. multifida*, Sw., *l. c.*, 49, t. 29.

Namaqualand: Rietkloof Mt., under stones on northern side near the summit, 5726. Khamiesberg: On slopes of Beaem Hill North-west of Leliefontein, 6327. Cape: Under rocks in kloof behind Warm Baths, Oliphant's River Valley, 7316.

3. *C. induta*, Kze., Linn., 10, 538.

Cape: On upper western slopes above Kradouw Krantz, 5828. Common among rocks at Leeuwfontein, 3223. Khamiesberg: Beaem Hill, 2 miles South-east of Leliefontein, 6374.

## 5. ADIANTOPSIS.

1. *A. capensis* (Thunb.), Fee.

Namaqualand: Crevices in granite slope 6 miles North of Anenous on the road to Chubiessis, 6182. Khamiesberg: Lower slopes of Zuurberg, 6251. Under rocks close to stream in upper part Khoms Ravine, 6633.

## 6. ADIANTUM.

1. *A. Capillus-veneris*, Linn., Pappe and Rawson, 32.

Namaqualand: Richtersveld; damp ledges in shade overhanging brakwater pools near Hell's Kloof, 6096. Karroo: Damp places in shady cliffs in ravine at Loeriesfontein, 4863.

## 7. ASPLENIUM.

1. *A. adiantum-nigrum*, Linn., Schl. Adum., 31, t. 17.

Khamiesberg: Middle slopes of Sneeuwkop, western aspect, 3rd kloof above Bowesdorp, 5838.



2. *A. praemorsum*, Sw., Prod., 130.

Cape : Damp fissures in rocks near river, Ceres, 3500.

#### 8. PELLAEA.

1. *P. auriculata*, Link., Hook., Sp. Fil., ii., 140.

Khamiesberg : Under rocks, Beaem Hill, 6691.

2. *P. namaquensis*, Bkr., in Journ. Bot. (1874).

Cape : Rock crevices near top of Rattelpoort Mt., 2970.

3. *P. hastata*, Link., *l. c.*, 145, t. 116B.

Namaqualand : Under rocks on kopje leading down to Gründoorn, 3124.

4. *P. deltoidea*, Bkr., Syn. Fil., 146.

Namaqualand : Crevices on kopje between Dabaigabis and Gründoorn, 3176.

#### 9. OSMUNDA.

1. *O. regalis*, Linn., Kunze, Linnaea, 10, 491.

Cape : North end of Nardouw Pass under palmet, Oliphant's River, 5327. In river-bed, in sand, Ceres, 3517.

*O. regalis*, Linn., Kunze, Linnaea, 10, 491. Sporeling.

Cape : Pools along Oliphant's River, Kradouw Pass, 5293.

#### 10. TODEA.

1. *T. barbara*, Moore, in Moore's Index, 119. Sporelings.

Khamiesberg : Middle slopes of Sneeuwkop, western aspect, 3rd kloof above Bowesdorp, 5837.

#### 11. OPHIOGLOSSUM.

1. *O. vulgatum*, Linn., Sp. Pl., 7740

Bushmanland : Red sand, Dabeep, 6224. Namaqualand : Deep sand near Kuibis Railway Station, 4738.

## LEGUMINOSAE.\*

By Louisa Bolus.

### 1. PODALYRIA.

1. *P. myrtillifolia*, Willd., Sp. Pl., ii., 505.

Cape: Slopes of Oliphant's River Mts. behind Warm Baths, 7035.

2. *P. biflora*, Lam., Illustr., ii., 471, var. *brevipedunculata*, L. Bolus.

Cape: Summit of Oliphant's River Mts. behind Warm Baths, 7026.

### 2. COELIDIUM.

1. *C. spinosum*, Benth.

Locality uncertain, 7745.

### 3. BORBONIA.

1. *B. parviflora*, Lam., Encyc., 1, 437.

Cape: Summit of Oliphant's River Mts. behind Warm Baths, 7023.

2. *B. lanceolata*, Linn., Sp. Pl., 707.

Khamiesberg: Lower southern slopes Sneeuwkop, 5873. Upper western slopes of Sneeuwkop, 5764. Middle Khamiesberg plateau North-east of Leliefontein, 6346.

3. *B. undulata*, Thunb., var.  $\beta$ , *multiflora*, Harv., in Harv. and Sond., Flor. Cap., ii., 30.

Cape: Pickenier's Pass, eastern slopes, rocky places, 5147.

### 4. RAFNIA.

1. *R. cuneifolia*, Thunb., Nov. Gen., 145.

Cape: Summit of Oliphant's River Mts., Warm Bath, 6853. Lower slopes of Oliphant's River Mts., Warm Bath, 7031.

\* Percy Sladen Memorial Expeditions in South-West Africa. Report No. 73 (*Leguminosae, Acanthaceae*). Contributed by the Bolus Herbarium of the South African College.

5. EUCHLORA.

1. *E. serpens*, E. and Z., Enum. 171.

Khamiesberg: Old cornfields, Witsand, 6565.

6. LOTONONIS.

1. *L. digitata*, Harv., in Harv. and Sond., Flor. Cap., ii., 52.

Locality uncertain, 7744.

Namaqualand: Clefts of granite, Brakdam, 5652. Upper western slopes of conical hill  $1\frac{1}{2}$  miles South of Stinkfontein, 5555.

2. *L. oxyptera*, Benth., in Hook., Lond. Journ., ii., 605.

Cape: Foot of Oliphant's River Mts., Warm Baths, 7012, 7034.

3. *L. micrantha*, Harv., *l. c.*, 58, var. *brevipedunculata*, Harv.

Cape: On sand flats between Driefontein and Heeren Logement, 6735.

4. *L. falcata*, Benth., in Hook., Lond. Journ. Bot., ii., 608.

Great Namaqualand: Lower slopes of kopje above pass leading down to Gründoorn, 3132.

5. *L. anthylloides*, Harv., *l. c.*, 59.

Cape: Foot of Oliphant's River Mts., Warm Baths, 7015.

6. *L. polycephala*, Benth., in Hook., Lond. Journ. Bot., ii., 605.

Bushmanland: Sand between Kweekfontein and Ougrabies, 3795.

7. *L. prostrata*, Benth., var.  $\gamma$ , *heterophylla*, Harv., *l. c.*, 53.

Cape: On slopes of Oliphant's River Mts., 7024, 7030, 7029.

8. *L. Leobordea*, Benth., in Hook., Lond. Journ. Bot., ii., 611.

Great Namaqualand: Lower slopes of hills above pass leading to Gründoorn, 3127. Sand near base of kopje 15 miles South-east of Gründoorn, 4563.

9. *L. exstipulata*, n. sp., *L. angustifoliae*, Steud., affinis, sed indumento appresso, foliis exstipulatis, marginibus involutis, pedunculis brevioribus 2 floris, ceterisque differt.

Herba perennis, undique, petalis exceptis, appresse pubescens quasi strigosa, ad 10 cm. alta; rami adscendentes graciles, internodiis 0·3–0·8 cm. longis; folia erecta vel patentia, petiolo 0·3–0·9 cm. longo, exstipulata, foliolis 3, spathulato-linearibus vel oblanceolatis, saepius mucronatis, marginibus involutis, supra glabra, 0·5–1·2 cm. longis; pedunculi terminales teretes, 0·7–2·3 cm. longi, 2 flori, floribus suberectis umbellatis; bracteae lineares vel lanceolatae, 0·2–0·3 cm. longae, pedicellis ad 0·4 cm. longis; calyx 1·1 cm. longus, segmento antico lanceolato acuminato, 0·6 cm. longo, lateralibus ovato-lanceolatis acuminatis, 0·3 cm. longis; vexillum 1·6 cm. longum, lamina late ovata, acuta subcordata, infra, apicem versus, nervo medio parcissime pubescente, 1·2 cm. longa; alae 1·3 cm. longae, lamina oblonga obtusa, basi postice auriculata, antice fere truncata, 0·9 cm. longa; carina obtusa saccata, vexillo aequilonga; ovarium lineare, apicem versus tenuiter pilosum, multiovulatum; legumen ignotum.

Cape: On slopes, Hottentots' Kloof, 4902.

A perennial herb, all parts, the petals excepted, pubescent with adpressed strigose-looking hairs, up to 10 cm. high; branches ascending slender, the internodes 0·3–0·8 cm. long; leaves erect or spreading, the petiole 0·3–0·9 cm. long, exstipulate, the leaflets 3, spathulate-linear or oblanceolate, usually mucronate, the margins involute, glabrous above, 0·5–1·2 cm. long; peduncles terminal terete, 0·7–2·3 cm. long, 2 flowered, flowers somewhat erect umbellate; bracts linear or lanceolate, 0·2–0·3 cm. long, the pedicels up to 0·4 cm. long; calyx 1·1 cm. long, the anticous segment lanceolate acuminate, 0·6 cm. long, the lateral ovate-lanceolate acuminate, 0·3 cm. long; vexillum 1·6 cm. long, the lamina broadly ovate, acute subcordate, below, towards the apex, on the medial nerve very sparingly pubescent, 1·2 cm. long; alae 1·3 cm. long, the lamina oblong obtuse, posticously auriculate at the base, anticously almost truncate, 0·9 cm. long; carina obtuse saccate, as long as the vexillum; ovary linear, thinly pilose towards the apex, many-ovuled, 0·9 cm. long; legume unknown.

Allied to *L. angustifolia* but differs by the adpressed indument, the exstipulate leaves with involute margins, the shorter 2-flowered peduncles and by other characters.

Plate VII., A, Fig. 1, sketch of a branch; 2, leaf, upper side, nat. size; 3, calyx; 4, ditto, laid open; 5, vexillum, lower side; 6, ala; 7, carina—all the latter  $\times 2$ ; 8, androecium,  $\times 3$ ; 9, gynaeceum,  $\times 2$ ; 10, ovary, one side removed,  $\times 3$ .

7. LEBECKIA.

1. *L. multiflora*, E. Mey., Comm. Pl. Afr. Austr., 34.

Namaqualand : Sandy roadside between Anenous and Chubiessis outspan, 5978. Sandy ravine below Doornpoort, 6017.

2. *L. linearifolia*, E. Mey., *l. c.*, 33.

Great Namaqualand : A little South of Dabaigabis, 4390. Common in sandy river-bed near Dabaigabis, 4396. Bushmanland : Sand at foot of mountains between Wolftoon and Henkriesfontein, 3105.

3. *L. sericea*, Thunb., Nov. Gen., 140.

Khamiesberg : Common from Nieuwerust to Kharkams, 6500. Bushmanland : Common on kopjes Nieuwefontein, 3468.

4. *L. Simsiana*, E. and Z., Enum. 192.

Cape : Alluvial sand in Oliphant's River Valley near Warm Baths, 7013.

5. *L. grandiflora*, Benth., in Hook., Lond. Journ. Bot., iii., 357.

Cape : Summit of Oliphant's River Mts. behind Warm Baths, 7036.

6. *L. pauciflora*, E. and Z., Enum. 192.

Cape : Roadside near Warm Baths, Oliphant's River Valley, 7019.

7. *L. Candolleana*, Walp., in Linnaea, xiii., 477.

Cape : Moist spots near Hex River, 5240.

8. *L. spinescens*, Harv., in Harv. and Sond., Flor. Cap., ii., 88. Forma.

Bushmanland : Sandy veld, Wortel, 3633. Great Namaqualand : Sand about 20 km. North of Raman's Drift, 4046. On sandy plains South of Löwen's River at Gawachab, 4098.

8. VIBORGIA.

1. *V. armata*, Harv., in Harv. and Sond., Flor. Cap., ii., p. 91.

Namaqualand : Roadside between Brakdam and Rietkloof, 5676. Karroo : Common a little North of Bitterfontein, 5536. Khamiesberg : Wilgehout Ravine, 6349.

2. *V. sp.* Material insufficient.

Khamiesberg : Tweerivieren, hill-sides, 6763.

3. *V. sp.* Material insufficient.

Locality uncertain, 7752.

#### 9. ASPALATHUS.

1. *A. acuminata*, Lam., Encyc., i., 287.

Cape : Leeufontein, 3028. Khamiesberg : Among granite rocks on kopje South-west of Leliefontein, 6301. Namaqualand : Sandy ground on South side pass leading to Rietkloof, 5682.

2. *A. ciliaris*, Linn., Mant., 262.

Cape : Top and upper slopes of mountains at Hottentots, Kloof, 4936.

3. *A. Benthamii*, Harv., in Harv. and Sond., Flor. Cap., ii., 111.

Cape : Slopes of Oliphant's River Mts., near Warm Baths, 7032, 7016, 7110.

4. *A. heterophylla*, E. Mey., Comm. Pl. Afr. Austr., 40.

Cape : Slopes of Oliphant's River Mts. near Warm Baths, 7037, 7017.

5. *A. vulnerans*, Thunb., Prod. Pl. Cap., 128.

Cape : On western slopes of Nardouw Kloof, 5426. Foothills of Cold Bokkeveld Mts. opposite Warm Baths, Oliphant's River Valley, 7020.

6. *A. triquetra*, Thunb., *l. c.*, 127.

Cape : Summit of Oliphant's River Mts. behind Warm Baths, 6864.

7. *A. pungens*, Thunb., *l. c.*, 129.

Khamiesberg : On dry veld, Lang Kloof, 5354.

8. *A. divaricata*, Thunb., *l. c.*, 128.

Cape : On rocks on hill-tops at Hottentots' Kloof, 4931. On lower slopes of Oliphant's River Mts. near Warm Baths, 7018.

9. *A. ericifolia*, Linn., Sp. Pl., 711.

Khamiesberg : Elliottsberg, 7695. Roadside between Brakdam and Rietkloof, 5670.

10. *A. thymifolia*, Linn., *l. c.*, 711.

Khamiesberg : On kopje South-west of Leliefontein Mission

Station, 6304. Among rocks in Middle Khamiesberg Plateau North-east of Leliefontein, 6343.

11. *A. mollis*, Lam., Encyc., i., 290.

Khamiesberg : On east side of Pickenier's Pass, 5219.

12. *A. divaricata*, Thunb., Prod. Pl. Cap., 128.

Khamiesberg : Hill-sides, 3187.

#### 10. MELOLOBIUM.

1. *M. cernuum*, E. and Z., Enum. 190.

Little Namaqualand : Among rocks on pass between Grauwater and Klipplaat, 3287, Draaiklip, 6790.

#### 11. ARGYROLOBIUM.

1. *A. collinum*, E. and Z., Enum. 186.

Upper Region : Loeriesfontein near outspan, 4875.

*A. collinum*, E. and Z., var.  $\gamma$ , *angustatum*, Harv., in Harv. and Sond., Flor. Cap., ii., 72.

Khamiesberg : Summit of Sneeuwkop, 5771.

2. *A. petiolare*, Steud., Nom., ed. 2, i., 130.

Khamiesberg : Elliottsberg, 7701.

3. *A. velutinum*, E. and Z., Enum. 186.

Cape : Eastern slopes Pickenier's Pass, 5143.

#### 12. MEDICAGO.

1. *M. denticulata*, Willd., Sp. Pl., iii., 1414.

Namaqualand : Sandy bank of Orange River at Bethany Drift, 6039.

2. *M. nigra*, Willd., *l. c.*, 1418.

Cape : Close to water-edge, Groene Kloof, 6621.

#### 13. TRIFOLIUM.

1. *T. procumbens*, Linn., Sp. Pl., 727.

Cape : Foothills Cold Bokkeveld Mts. opposite Warm Baths, Oliphant's River Valley, 7109.

## 14. CROTALARIA.

1. *C. Pearsonii*, Bak. f., in Journ. Linn. Soc., xlii., 342.

Namaqualand · Doornpoort ravine, 6131.

Plate VII., B, Fig. 1, sketch of a branchlet, nat. size; 2, flower; 3, calyx; 4, ditto, laid open; 5, vexillum, lower side; 6, ala; 7, carina; 8, androecium; 9, gynaeceum—both the latter taken from a bud; 10, ditto, from an older flower—all the latter  $\times 2$ ; ovary, longitudinal section,  $\times 3$ .

2. *C. effusa*, E. Mey., Comm. Pl. Afr. Austr., 25.

Cape: Oliphant's River Valley near Warm Baths, 7105.

3. *C. humilis*, E. and Z., Enum. 174.

Khamiesberg: Common on hill-side, Tweerivieren, 6768.

4. *C. virgultalis*, Burch., ex DC., Prod., ii., 128.

Great Namaqualand: Common on sand dunes at Sandverhaar, 3712. Exact locality unknown, 7753. Bushmanland: Sand dunes between Ougrabies and Aggenys, 2928.

## 15. PSORALEA.

1. *P. aphylla*, Linn., Pl. Afr. Bar., 15.

Cape: Foothills Cold Bokkeveld Mountains opposite Warm Baths, Oliphant's River Valley, 7313.

2. *P. candicans*, E. and Z., Enum. 228.

Cape: Roadside between Hottentots' Kloof and Karroopoort, 4805, 4811.

3. *P. striata*, Thunb., var.  $\beta$ , *gracilis*, Harv., in Harv. and Sond., Flor. Cap., ii., 153.

Namaqualand: Roadside between Brakdam and Rietkloof, 5668, 5667.

4. *P. hamata*, Harv., in Harv. and Sond., Flor. Cap., ii., 152.

Khamiesberg: Abundant on south-eastern slopes of Sneeuwkop, above Modderfontein, 5864.

5. *P. oligophylla*, E. and Z., Enum. 227.

Khamiesberg: Middle Khamiesberg plateau North-east of Leliefontein, 6344. Growing socially in ravines upper end of lower



plateau Vogelklip, South-east slopes, 5932. Cape: Boontjes Rivier, 5116.

6. *P. obtusifolia*, DC., Prod., ii., 221.

Namaqualand: In sand of river-bed, Grauwater, 3262. Great Namaqualand: 20 km. North of Raman's Drift, 4520. In sand of river-bed 2 miles South of Dabaigabis, 4393.

## 16. INDIGOFERA.

1. *I. heterophylla*, Thunb., Prod. Pl. Cap., 133.

Cape: Among bushes on roadside between Hottentots' Kloof and Karroopoort, 4823. Khamiesberg: Elliottsberg, 7696, 7700—extremely stunted forms. Sneeuwkop, upper western slopes, 5768—extremely stunted forms. Bushmanland: Nieuwefontein, among stones in veld, 3329—material poor, but very probably this species.

2. *I. adenocarpa*, E. Mey., Comm., 105.

Bushmanland: Pass at Wortel, 3599.

3. *I. psoraleoides*, Linn., Syst., 469.

Cape: On mud bank of stream near top of Pickenier's Pass, eastern side, 5214.

4. *I. anabaptista*, Steud., Nom., ed. 2, i., 805.

Great Namaqualand: Sandy places among rocks between Dabaigabis and Gründoorn, 3153.

5. *I. spinescens*, E. Mey., Comm. Pl. Afr. Austr., 93.

Namaqualand: Middle granite slopes facing East, a little North of Middelkraal, 5616; northern slopes Rietkloof Mt., 5725. Bush near Wortel, 3621. Khamiesberg: Near summit of Vogelklip, 5921.

6. *I. pungens*, E. Mey., *l. c.*, 93.

Locality uncertain, 7779.

7. *I. venusta*, E. and Z., Enum. 235.

Cape: Slopes of Oliphant's River Mts. below Warm Baths, 7025, 7108.

8. *I. heterotricha*, DC., Prod., ii., 227.

Great Namaqualand: Dry river-bed 20 km. North of Raman's Drift, 4545, 4520. Bushmanland: Common on sand near Wortel, 3630. Common in broken ground at Groot Rozynbosch, 3835. Sandy and rocky places at Dabainoris, 3016. Wortel, 3612.

9. *I. psammotropha*, Bolus, in Journ. Bot., 1896, 22.

Great Namaqualand: Sandy plains Schakalskuppe, 4786, 4785. Sandy plains West of Ganus, 4481. Stream-course on sandy plains between Keetmanshoep and Seeheim, 4346. Sand near base of kopje on plains 12 miles South-east of Gründoorn, 4950. Sand and sand dunes, Sandverhaar, 4679.

10. *I. amoena*, Dryand, in Ait., Hort. Kew, ed. 1, iii., 68.

Cape: Slopes of Oliphant's River Mts., Warm Baths, 7033.

11. *I. argyroides*, E. Mey., Comm. Pl. Afr. Austr., 106.

Bushmanland: Dry stream-bed West of Pella, 3561. Great Namaqualand: On stony ground 12 km. West of Sandverhaar, 4599-

12. *I. frutescens*, Linn. f., Suppl., 334.

Cape: Foot of Oliphant's River Mts., Warm Baths, 7027.

13. *I. cryptantha*, Benth., ex Harv. and Sond., Fl. Cap., ii., 195.

Great Namaqualand: Sandy slopes and dunes Sandverhaar, 4342. Sandy river-bed at Sandverhaar, 4656. Sand of river-bed at Buchholzbrunn, 3663.

14. *I. rhytidocarpa*, Benth., ex Harv. and Sond., Fl. Cap., ii., 202.

Great Namaqualand: In sandy valley North of Sabiesis, 4112.

15. *I. hololeuca*, Benth., l. c., 200.

Bushmanland: Sand at Dabainoris, 3016.

16. *I. alternans*, DC., Prod., ii., 229.

Great Namaqualand: Sand dunes at Sandverhaar, 4658. Sandstone and dunes, Sandverhaar, 4690. Schaf River-bed at Seeheim, 3733. In sandy places South of Warmbad, 4371. Hill East of Gobas Station, 3715.

17. *I. auricoma*, E. Mey., Comm. Pl. Afr. Austr., 107.

Great Namaqualand: Sandy plains 25 km. North of Warmbad, 4309, 4288. Sandy flat on stony plains 12 km. West of Sandverhaar,

4626. On sandstone hills at Seeheim, 3726. Dry steam-bed, sandy plains West of Ganus, 4485. In sand of stream-bed near Dabaigabis, 4407. Broad sandy river-bed North of Sabiesis, 4130.

18. *I. denudata*, Thunb., Prod. Fl. Cap., 132.

Khamiesberg: Tweerivieren, 6766.

19. *I. affinis*, Harv., in Harv. and Sond., Fl. Cap., ii., 184.

Great Namaqualand: Sandy river-bed at Buchholzbrunn, 3653. On sand dunes at Sandverhaar, 3709. Rocky hills near Holoog, 4138.

20. *I. limosa*, n. sp., fortasse *I. gracilem*, Spreng., proxime accedit sed annua, et foliis saepe 5 foliolatis, petiolis longioribus, stipulis lineari-setaceis, racemis laxis, calycis segmentis acuminatis distinguitur.

Herba annua tenella, ramis diffusis elongatis filiformibus, tenuiter strigosis, internodiis ad 3 cm. longis; folia adscendentia vel patentia, petiolo capillaceo, 1-2.2 cm. longo, stipulis flaccidis lineari-setaceis, 0.3-0.4 cm. longis, foliolis 3-5, rarissime ad unum reductis, digitatis obovatis, obtusissimis vel subtruncatis, muticis vel minute mucronulatis, basi subcuneatis, supra glabrescentibus, infra parce strigosis, 0.5-1.1 cm. longis; pedunculi filiformes, ad 6 cm. longi, supra medium laxe pluriflori, floribus adscendentibus; bractee mox deciduae, lineari-setaceae, 0.2 cm. longae; pedicelli 0.1 cm. longi; calyx extus strigosus, 0.4 cm. longus, segmentis lanceolatis, longe acuminatis, 0.3 cm. longis; vexillum 0.6 cm. longum, lamina suborbicularis ciliata, ungue vix 0.1 cm. longo; alae vexillo aequilongae, oblongae, supra medium ampliatae, apice obliquae, obtusae, basi postice minute gibbosae, ungue brevissimo; carina alis aequilonga, obtusa ciliata, medio saccata, ungue laminam fere aequante; ovarium anguste lineare pluri-ovulatum, 0.4 cm. longum; legumen cernuum lineari-teres, valvis immaturis subtorulosis, deinde convexis, tenuiter strigosum, 1.1 cm. longum, seminibus 7-9 glaberrimis.

Khamiesberg: Among grasses in marshy ground South-west of Leliefontein, 6325.

An annual slender herb, with diffuse elongate filiform, thinly strigose branches, the internodes up to 3 cm. long; leaves ascending or spreading, the petiole capillary, 1-2.2 cm. long, the stipules flaccid linear-setaceous, 0.3-0.4 cm. long, the leaflets 3-5, very rarely reduced to one, digitate obovate, very obtuse or somewhat truncate, muticous or minutely mucronulate, somewhat cuneate at base,

glabrescent above, sparingly strigose below, 0.5–1.1 cm. long; peduncles filiform, up to 6 cm. long, laxly several-flowered above the middle, the flowers ascending; bracts soon deciduous, linear-setaceous, 0.2 cm. long; pedicels 0.1 cm. long; calyx strigose without, 0.4 cm. long, the segments lanceolate, long acuminate, 0.3 cm. long; vexillum 0.6 cm. long, the lamina suborbicular ciliate, the claw scarcely 0.1 cm. long; alae as long as the vexillum, oblong, widened above the middle, oblique at the apex, obtuse, at the base posticously minutely gibbous, the claw very short; carina as long as the wings, obtuse ciliate, saccate in the middle, the claw almost equalling the lamina; ovary narrow-linear several-ovuled, 0.4 cm. long; legume cernuous linear-terete, the immature valves somewhat torulose, finally convex, thinly strigose, 1.1 cm. long, the seeds 7–9, quite glabrous.

Probably nearest *I. gracilis*, but is distinguished by being an annual with the leaves often 5-foliolate, with longer petioles, linear-setaceous stipules, lax racemes, and acuminate calyx segments.

Plate VII., C., Fig. 1, sketch of plant, nat. size; 2, flower; 3, calyx; 4, ditto, laid open, inner view; 5, vexillum; 6, ala; 7, carina—all the latter  $\times 3$ ; 8, androecium; 9, gynaeceum  $\times 4$ ; 10, ovary, one side removed,  $\times 6$ .

#### 17. SYLITRA.

1. *S. biflora*, E. Mey., Comm. Pl. Afr. Austr., 114.

Great Namaqualand: Sandy river-bed near Dabaigabis, 4404. Dry river-bed 20 km. North of Raman's Drift, 4542. Among rocks at Dabaigabis, 4318. Common in shallow stream-bed on stony plains 12 km. West of Sandverhaar, 4611.

#### 18. TEPHROSIA.

1. *T. sphaerosperma*, Baker, in Oliver, Fl. Trop. Afr., ii., 125.

Great Namaqualand: Sand dunes at Sandverhaar, 3,100 ft., 4653, 4951.

2. *T. Dregeana*, E. Mey., in Linnaea, vii., 169.

Great Namaqualand: Sandstone at Sandverhaar, 4668. Near base of kopje 15 miles South-east of Gründoorn, 4576. Common in sandy valley North of Sabiesis, 4113. Sand South of Warmbad, 5031. Sandy valley 20 km. North of Raman's Drift, 4521. Damara-land: Barren granite slopes, Welwitsch, 4417.

19. SUTHERLANDIA.

1. *S. frutescens*, R. Br., in Ait., Hort. Kew, ed. 2, iv., 327.

Cape: Foothills Cold Bokkeveld Mts. opposite Warm Baths. Oliphant's River Valley, 7022. Little Namaqualand: Brakrivier, sand of river-bed, 3903.

20. LESSERTIA.

1. *L. excisa*, DC., Prod., ii., 272.

Cape: Kloof below Warm Baths, Oliphant's River Valley, 7106.

2. *L. capitata*, E. Mey., Comm. Pl. Afr. Austr., 116.

Namaqualand: Draai Klip, 6791.

3. *L. linearis*, DC., Prod., ii., 272.

Cape: Sandy flats eastern aspect above Pickenier's Pass, 5204.

4. *L. macrostachya*, DC., in Ann. Sc. Nat., Sér. i., iv., 100.

Great Namaqualand: Sand dunes Sandverhaar, 4277, 4340.

*L. macrostachya*, DC., var.  $\beta$ , *atomaria*.

Namaqualand: Dry sandy stream-beds opposite Sendling's Drift, 6111.

5. *L. spinescens*, E. Mey., Comm. Pl. Afr. Austr., 115.

Khamiesberg: Bailey's Vlake, 6613.

21. HALLIA.

1. *H. imbricata*, Thunb., in Schrad., Journ., i., 319.

Cape: Amongst Palmiet in Oliphant's River-bed, Kradouw Krantz, 5292. Damp ground along the Oliphant's River, 5252.

22. VICIA.

1. *V. sativa*, Linn., Sp. Pl., 736.

Cape: Kloof below Warm Baths, Oliphant's River Valley, 7107.

Khamiesberg: Khoms Ravine near stream, 6662.

23. VIGNA.

1. *V. Burchellii*, Harv., in Harv. and Sond., Fl. Cap., ii., 239.

Great Namaqualand: Sand of Schaf River-bed at Seeheim, 3738, Sandy river-bed at Sandverhaar, 4644.

## 24. RHYNCHOSIA.

1. *R. Totta*, DC., Prod., ii., 388, var. *grandiflora*, L. Bolus, in Ann. Bolus Herb., i., 15.

Great Namaqualand : Sandstone slopes at Seeheim, 3741. Kopje near crossing of the Kalkfontein Railway track, 4571.

2. *R. viscidula*, Steud., Nom. Bot., ed. 2, ii., 454. -  
Khamiesberg : Near water in Khoms Ravine, 6669.

## 25. HOFFMANSEGGIA.

1. *H. Pearsonii*, Phillips, in Kew. Bull. (1911), 262.

Great Namaqualand : Aub River-bed at Gobas, 3747. Sand dunes at Sandverhaar, 4658. Sand of river-bed at Sandverhaar, 4652. River-bed at Holoog, 4122.

## 26. PARKINSONIA.

1. *P. africana*, Sond., in Linnaea, xxiii., 38.

Bushmanland : Common on sandy plains between Kweekfontein and Ougrabies, 3797. Sand at foot of Wolftoon, near Henkriesfontein, 3104.

## 27. BAUHINIA.

1. *B. gariepensis*, E. Mey., Comm. Pl. Afr. Austr., i., 162.

Bushmanland : Wortel, 3597. Common on sand near Dabainoris, 3022.

Great Namaqualand : Sandy bed a little North of Raman's Drift, 4044.

## 28. SCHOTIA.

1. *S. speciosa*, Jacq., Coll., i., 93, var. *tamarindifolia*, Harv., in Harv. and Sond., Fl. Cap., ii., 274.

Bushmanland : River-bed at Groot Rozynbosch, 3824.

Great Namaqualand : Dry river-bed, 20 km. North of Raman's Drift, 4540.

## 29. ACACIA.

1. *A. hebeclada*, DC., Cat. Hort. Monsp., 73.

Great Namaqualand : Sandy river-bed 25 km. North of Warmbad, 4306.

2. *A. detinens*, Burch., Trav., i., 310.

Great Namaqualand: Sandy plains 25 km. North of Warmbad, 4299.

3. *A. glandulifera*, Schinz, in Mem. Herb. Boiss., i., 114.

Great Namaqualand: Sandy flat South of Löwen's River, Gawachab, 4081.

4. *A. giraffae*, Willd., Enum. Hort. Berol., 1054.

Bushmanland: Pella, 3584, 2951.

5. *A. horrida*, Willd., Sp. Pl., iv., 1082.

Namaqualand: Two miles South of Tweefontein, 3456.

## ACANTHACEAE.

*By Louisa Bolus.*

### 1. RUELLIA.

1. *R. Marlothii*, Engl., Bot. Jahrb., x., 257.

Damaraland: Welwitsch, 4420. Deep ravines near Welwitsch, 4148.

### 2. PETALIDIUM.

1. *P. linifolium*, Harv., in Thes. Cap., ii., 27, t. 143.

Great Namaqualand: Near stream-bed on stony plains, 12 km. West of Sandverhaar, 4624.

2. *P. ovatum*, C. B. Cl., in Dyer, Fl. Trop. Afr., v., 90.

Damaraland: Dry stream-courses at Welwitsch, 4151.

3. *P. Gossweileri*, S. Moore, in Journ. Bot., 1902, 307.

Bushmanland: Pella, 3548.

### 3. BLEPHARIS.

1. *B. furcata*, Pers., in Syn., ii., 180.

Namaqualand: Dry river-bed at foot of Jackal's Berg, 6162. On quartzite slopes above Brakwater pool, 6074. Quartzite on plateau above Modderfontein Pass, 5998. Dry sandy places in South side of pass between Daunabis and Bethany Drift, 6032.

Great Namaqualand: Common on slopes of granite hills South of Tschauhab Station, 4262. Along shallow stream-courses, 12 km. West of Sandverhaar, 4606.

2. *B. villosa*, C. B. Cl., Dyer, in Fl. Cap., v., 29.

Bushmanland: Fissures in gneissic river-bed at Pella, 5043.

Great Namaqualand: Among quartzite blocks near Akam River, 4760.

3. *B. extenuata*, S. Moore, in Journ. Bot., 1901, 301.

Bushmanland: Aggenys, 2942. Namaqualand: Common among rocks between Grauwater and Klipplaat, 3288. Near Klipplaat, 3392. Lower slopes Rattelpoort Mt., 2976. Common on steep krantz 1 mile South of Buffels River between Arkoep and Mesklip, 5902. Great Namaqualand: Common on lower slopes East of Aus, 4716.

#### 4. ACANTHOPSIS.

1. *A. carduiifolia*, Schinz., in Verh. Bot. Ver. Brandenb., xxxi., 200.

Bushmanland: In sand at foot of kopje, Alewyn's Fontein, 3346. Khamiesberg: Sandy ground at foot of Beaem Hill 2 miles South-east of Leliefontein Mission Station, 6378. Namaqualand: In valley 2 miles West of Garies, 5640. Stony hills South of Brakrivier, 3895. Sandy ravine below Doornpoort. Also common as far as Daunabis, 6009.

*A. carduiifolia*, Schinz, var.  $\beta$ , *glabra*, C. B. Cl., in Dyer, Fl. Cap., v., 34.

Namaqualand: About 10 miles North-east of Klipplaat, 3308.

2. *A. hoffmannseggiana*, C. B. Cl., in Fl. Cap., v., 35.

Bushmanland: Common at Rozynbosch, 4019.

3. *A. trispina*, C. B. Cl., *l. c.*, 35.

Namaqualand: Quartzite slopes North of Modderfontein, 6159. Quartzite hills North-east of Stinkfontein, 6153.

4. *A. spathularis*, Schinz, in Verh. Bot. Ver. Brandenb., xxxi., 201.

Namaqualand: Near the summit of Rattelpoort Mt., 2961. Common on dry mountain slopes South of Tweefontein, 3783. Bushmanland: Common on kopje at Rietfontein, 3772. Gneissic ridges West of outspan Alewyn's Fontein, 3490.



5. BARLERIA.

1. *B. irritans*, Nees, in *Linnaea*, xv., 359.

Great Namaqualand: Among quartzite blocks, Akam River basin, 4744. Common on lower slopes of mountain South of Tschauchab Station, 4266. Lower slopes of kopje leading down to Gründoorn, 3123. Sandy valley 20 km. North of Raman's Drift, 4525.

- B. irritans*, Nees, var.  $\beta$ , *rigida*, C. B. Cl., in *Fl. Cap.*, v., 48.

Bushmanland: Side of stream-bed at Pella, 3545. Great Namaqualand: Kopje 12 km. West of Sandverhaar, 4629.

2. *B. lancifolia*, T. Anders., *Journ. Linn. Soc.*, vii., 28 (1864).  
Var. *foliis ovatis vel lanceolato-ovatis*; bracteis interdum foliis subconformibus, ad 1.4 cm. longis.

Great Namaqualand: South of Warmbad, 4001, 4022.

6. MONECHMA.

1. *M. incanum*, C. B. Cl., in *Dyer, Fl. Cap.*, v., 69.

Namaqualand: First day's outspan between Plaatklip and Bitterfontein, 3294. Great Namaqualand: Broad sandy valley North of Sabiesis, 4127. Sandy river-bed near Dabaigabis, 4386. Sandy plains between Dabaigabis and Gabis, 4312. Dry stream-bed in sandy plains West of Ganus, 4486.

2. *M. molle*, C. B. Cl., *l. c.*

Bushmanland: Dry river-beds near Dabainoris, 3020. Namaqualand: Lower north-western slopes of hill South-west of Chubiessis outspan, 6189. Dry sandy river-bed South of Daunabis, 6060. Great Namaqualand: Common on kopje South of Warmbad, 4004. Ravines on mountains South of Tschauchab Station, 4460. South of Warmbad, 4034. Kopje 12 km. West of Sandverhaar, 4631, 4636, 4664. Locality uncertain, 3697.

3. *M. leucoderme*, C. B. Cl., *l. c.*, 70.

Great Namaqualand: Middle slopes of kopje above pass leading down to Gründoorn, 3125.

4. *M. arenicolum*, C. B. Cl., in *Dyer, Fl. Trop. Afr.*, v., 218.

Damaraland: Ravines of Khan River near Welwitsch, 4144, 4419.

5. *M. spartioides*, C. B. Cl., in *Dyer, Fl. Cap.*, v., 72.

Bushmanland: Common in sands at Pella, 3543. Great Namaqualand: Common on lower slopes East of Aus, 4717. Broad

sandy river-bed North of Sabiesis, 4123. Buchholzbrunn, 3643. Sandy ground and on kopjes 20 km. North of Raman's Drift, 4043. Sand at Sandverhaar, 3701. Karroo: River-bed between Pappekuil and Stompiesfontein, 4966.

These are all forms of *M. spartioides*, C. B. Cl., and connect this species with *M. Atherstonci* and *M. pseudopatulum*—all three of which are, in our opinion, forms of one species.

6. *M. divaricatum*, C. B. Cl., *l. c.*, 72.

Great Namaqualand: River-bed below Railway Station at Buchholzbrunn, 3678.

7. *M. genistaefolium*, C. B. Cl., in Dyer, *Fl. Trop. Afr.*, v., 217.

Great Namaqualand: Sandstone at Sandverhaar, 4662. Sandy valley North of Sabiesis, 4107. Rocky hills around Holog, 4140. Among quartzite blocks in Akam River Valley, 4770. Kopje 12 km. West of Sandverhaar, 4635.

## SCROPHULARIACEAE.\*

*By N. E. Brown, Louisa Bolus, and E. P. Phillips.*

### 1. APTOSIMUM.

1. *A. albomarginatum*, Marl. and Engl., in *Engl. Jahrb.*, x., p. 249.

Great Namaqualand: Gawachab, sandy flat South of Löwen's River, 4082. Broad sandy valley North of Sabiesis, 4101.

2. *A. Steingroeveri*, Engl., *Jahrb.*, xix., p. 149.

Namaqualand: Prostrate in dry sandy river-bed, outspan beyond Plaatklip, 3289. Common on sandy slopes, Kamabies, 3,000 ft., 5041. Right bank of Buffels River between Arkoep and Mesklip, 5960.

3. *A. abietinum*, Burch., *Trav. S. Afr.*, i., p. 308.

Great Namaqualand: Sand at Gabis, 4329.

Var.  $\beta$ , *elongata*, Benth., in *Lindl. Bot. Reg.*, sub t. 1882.

Bushmanland: Very common at Groot Rozynebosch, 3827. Common along water-courses between Aggenys and Pella, 3586. Dry rivulet, Wortel, 3681. Great Namaqualand: Rocky ground near Dabaigabis, 4400. Slopes and plateau West of Gobas Station, 3743.

\* Percy Sladen Memorial Expeditions in South-West Africa. Report No. 74.

4. *A. scaberrimum*, Schinz, in Verhandl. Bot. Ver. Brandenb., xxxi., p. 185.

Great Namaqualand: Sandstone at Sandverhaar, 3,100 ft., 4670.

5. *A. lineare*, Engl. and Marl., in Engl. Jahrb., x., p. 250.

Sandy valley 20 km. North of Raman's Drift, 4517.

6. *A. indivisum*, Burch., Trav. S. Afr., i., p. 219, 225.

On granite kopje, Nieuwfontein, 3472.

7. *A. depressum*, Burch., Trav. S. Afr., i., p. 260.

Namaqualand: Common in sand of river-bed at Brakrivier, 3904.

Great Namaqualand: Plains North of Ganus, 3,000-3,200 ft., 4507.

## 2. PELIOSTOMUM.

1. *P. virgatum*, E. Mey., ex Benth., in Bot. Reg., sub t. 1882.

Namaqualand: Klipfontein, 3,360 ft., 5983. In sand at foot of a kopje about 10 miles North-east of Klipplaat, 3307.

2. *P. leucorrhizum*, E. Mey., ex Benth., in Bot. Reg., sub t. 1882.

Great Namaqualand: About 30 km. North of Raman's Drift, 4052.

Var.  $\gamma$ , *grandiflorum*, Hiern, in Dyer, Flor. Cap., iv., § 2, p. 135.

Great Namaqualand: Sand dunes at Sandverhaar, 3,100 ft., 4692.

## 3. ANTICCHARIS.

1. *A. scoparia*, Hiern, ex Schinz, in Verhandl. Bot. Ver. Brandenb., xxxi., p. 189.

Great Namaqualand: Top of ridge, Gobas, 3742.

2. *A. linearis*, Hochst., ex Aschers, in Monatsb. Acad. Berl. (1866), 880.

Great Namaqualand: Schaf River-bed at Seeheim, 2,300 ft., 3734.

3. *A. juncea*, L. Bolus, *A. longifoliam*, Marl. et Engl., proxime accedit, sed suffruticosa glabra, foliis paucioribus minoribusque, et pedicellis brevioribus.

Fruticulus glaberrimus, ad 30 cm. altus; rami ramulique stricti teretes striati subspinescentes, distanter foliati, interdum fere nudi; folia erecta linearia, obtusa vel acuta, basin versus gradatim

attenuata, 0.5–0.7 cm. longa, 0.1 cm. lata; pedicelli supra medium bibracteolati, 0.2–0.4 cm. longi; calycis segmenta oblonga vel linearia, acuta, 0.2–0.4 cm. longa, 0.1 cm. lata; corolla 1.9–2.1 cm. longa, lobis 0.3–0.4 cm. longis; stamina fertilia parum dimidium corollae excedentia, filamentis hispidulis, apice contortis, antheris adhaerentibus, lateribus tangentibus crispulato-pilosis, apice basique longe barbatis, aliter parce hispidulis, 0.4 cm. longis, staminodiis 0.2 cm. longis; ovarium ovatum glabrum, 0.2 cm. longum; capsula oblongo-ovata subacuta, supra medium compressa, 0.7–0.8 cm. long.

Bushmanland: Near Wortel, 2,700 ft., 3609. Common in pass near base of kopje, Wortel, 3600.

Great Namaqualand: Kopje South of Warmbad, 4002.

An entirely glabrous shrublet, up to 30 cm. high; branches and branchlets straight terete striate becoming somewhat spiny, distantly leaved, sometimes almost nude; leaves erect linear, obtuse or acute, gradually narrowed towards the base, 0.5–0.7 cm. long, 0.1 cm. wide; pedicels bibracteolate above the middle, 0.2–0.4 cm. long; calyx segments oblong or linear, acute, 0.2–0.4 cm. long, 0.1 cm. wide; corolla 1.9–2.1 cm. long, the lobes 0.3–0.4 cm. long; fertile stamens reaching a little beyond the middle of the corolla, the filaments hispidulous, twisted at the apex, the anthers adhering, the adjacent sides pilose with crisped hairs, bearded with long hairs at the base and apex, otherwise sparingly hispidulous, 0.4 cm. long, the staminodes 0.2 cm. long; ovary ovate glabrous, 0.2 cm. long; capsule oblong-ovate subacute, compressed above the middle, 0.7–0.8 cm. long.

Nearest *A. longifolia*, but suffruticose glabrous with fewer and smaller leaves and shorter pedicels.

Plate VI., B, Fig. 1, sketch of a branchlet; 2, corolla, laid open,  $\times 2$ ; 3, anthers with portion of filament, front view; 4, ditto, back view,  $\times 4$ ; 5, capsule,  $\times 2$ ; 6, gynaeceum,  $\times 2$ .

#### 4. DIASCIA.

1. *D. pachyceras*, E. Mey., ex Benth., in Hook., Comp. Bot. Mag., ii., p. 16.

Cape: Sandy flat between Driefontein and Heeren Logement, common, 5840.

2. *D. thunbergiana*, Spreng., Syst. Veg., ii., p. 800.

Khamiesberg: Under bushes at Kharkams, 6664.

5. HEMIMERIS.

1. *H. montana*, L. f., Suppl., p. 280.

Khamiesberg: Namaroup, 6600.

6. COLPIAS.

1. *C. mollis*, E. Mey., ex Benth., in Hook., Comp. Bot. Mag., ii., p. 53.

Namaqualand and Bushmanland: In small crevices in face of gneissic rocks, Rietfontein, 2,300 ft., 3438. Namaqualand: Rock fissures, middle slopes of Rattelpoort Mt., 2969.

7. NEMESIA.

1. *N. versicolor*, E. Mey., ex Benth., in Hook., Comp. Bot. Mag., ii., p. 20.

Khamiesberg: Tweerivieren, 6767.

2. *N. anisocarpa*, E. Mey., ex Benth., in Hook., Comp. Bot. Mag., ii., p. 19.

Khamiesberg: Between Bitterfontein and Stinkfontein, 6501.

3. *N. liquilata*, E. Mey., ex Benth., in Hook., Comp. Bot. Mag., ii., p. 20.

Khamiesberg: Wet places, Naras Ravine, 6705. Witsand, 6697.

3. *N. diffusa*, Benth., in Hook., Comp. Bot. Mag., ii., p. 22, var.  $\beta$ , *rigida*, Benth., *l. c.*

Cape: Common in moist soil, in hollows, in rocks not far from water, Ceres, 3498. South sides of cliffs above Pickenier's Pass, 5187.

5. *N. lanceolata*, Hiern, in Dyer, Flor. Cap., iv., § 2, p. 198.

Khamiesberg: Southern slopes of Sneeuwkop, 5878. Beaem Hill, 2 miles South-east of Leliefontein Mission Station, 6365.

8. TEEDIA.

1. *T. lucida*, Rudolphi, in Schrad., Journ., ii., p. 288.

Cape: Among rocks on upper slopes and tops of hills, Hottentots' Kloof, 4899.

Namaqualand: Crevice near top of Rattelpoort Mt., 2985.

## 9. FREYLLINIA.

1. *F. oppositifolia*, Spin., Jard. S. Sébast., ed. 2, p. 13, 29, nota 12.

Khamiesberg: Marshy ground, Wilgehout Ravine, 6383. Among rocks near stream, Khoms Ravine, 6639.

## 10. MANULEA.

1. *M. altissima*, L. f., Suppl., p. 286.

Cape: Foothills of Cold Bokkeveld Mts., opposite Warm Baths, Oliphant's River Valley, 7267. Sand veld on right bank of Oliphant's River between Builshoek and Doorn River, 5399.

Var.  $\beta$ , *longifolia*, Hiern, in Dyer, Flor. Cap., iv., § 2, p. 229.

Cape: Sand flats between Driefontein and Heeren Logement, 6799. Khamiesberg: Eenkoker, 6759.

Var.  $\gamma$ , *glabricaulis*, Hiern, *l. c.*

Namaqualand: Sandy ground on South side of plain leading to Rietkloof, 5681.

2. *M. densiflora*, Benth., in Hook., Comp. Bot. Mag., i., p. 382.

Khamiesberg: Kopje South-west of Leliefontein Mission Station, 6305.

3. *M. rigida*, Benth., *l. c.*

Cape: Among bushes on veld between Ceres and Leeuwfontein, 3247. Namaqualand: Bed of Doorn Rivier South of Brakrivier, 3884.

## 11. SUTERA.

1. *S. annua*, Hiern, in Flor. Cap., iv., § 2, p. 264.

Cape: Mt. slopes, Oliphant's River Valley, near Warm Baths, 6989.

2. *S. ramosissima*, Hiern, *l. c.*, p. 265.

Bushmanland: In crevices of quartzite cliff, Ougrabies, 3568.

3. *S. revoluta*, O. Kuntze, Rev. Gen. Pl., ii., p. 467.

Khamiesberg: In shade of rocks on kopje South-west of Leliefontein Mission Station, 6303. Southern slopes, Sneeuwkop, 5880. Beaem Hill, 2 miles South-east of Leliefontein, 6370, 6372. Common on upper slopes of Vogelklip, 5922.

4. *S. tomentosa*, Hiern, *l. c.*, p. 283.

Great Namaqualand: Kopje between Dabaigabis and Gründoorn, 3172.

5. *S. amplexicaulis*, Hiern, *l. c.*, p. 287.

Upper: Ravine at Loeriesfontein, 4841. Namaqualand: With Arundo overhanging brakwater pools, Kuboos, 6086. At foot of kopje, Kamabies, 3466. Dry river-bed, Stinkfontein, 5518.

6. *S. Maxii*, Hiern, *l. c.*, p. 288.

Bushmanland: River-bed, Aggenys, 2930. In river-bed at Aus, 4701. Great Namaqualand: Sandstone at Sandverhaar, 4666. River-courses on mountain slopes at Schakalskuppe, 4245. Damaraland: Shallow water-courses on Namib at Welwitsch, 4153.

7. *S. fruticosa*, Hiern, *l. c.*

Namaqualand: Near Middelkraal, 5614. Sandy ravine below Doornpoort, 6012. Sandy river-bed near Doornpoort water-hole, 6137.

8. *S. tristis*, Hiern, *l. c.*, p. 289.

Khamiesberg: Tweerivieren, 6776. Namaqualand: In sand on low kopje opposite Bowesdorp, 5846.

9. *S. altoplana*, Hiern, ? *l. c.*, p. 302.

Bushmanland: Groot Rozynbosch, 3629.

10. *S. canescens*, Hiern, *l. c.*, p. 303.

Great Namaqualand: Sandy plains North of Ganus, 4505.

11. *S. rigida*, L. Bolus, n. sp., omnibus partibus glaberrimis, ramis spinescentibus, foliis polymorphis, floribus in racemulis densis numerosissimis dispositis.

Frutex rigidus ramosus, omnino glaberrimus, ad 2 metralis; rami ramulique divaricati vel juniores adscendentes, teretes spinescentes, foliorum delapsorum pulvinis notati, ad 0·4 cm. diam.; folia fasciculata, fasciculis 3-10foliatis alternis, erecta vel erecto-patentia, sessilia vel novellis petiolata, linearia, spathulato-linearia, anguste elliptica vel obovata, obtusa vel rarius acuta, integerrima, 0·2-0·9 cm. longa, ad 0·1 cm. lata; flores in racemulos subsessiles densos, ex fasciculis orientes, ad 2·5 cm. longos, dispositi, adscendentes, deinde patentes, 0·6-0·8 cm. longi, bracteis linearibus, vix 0·2 cm. longis;

pedicelli graciles, 0·2–0·3 cm. longi, bibracteolatii, bracteolis vix 0·1 cm. longis; calyx 5partitus, segmentis linearibus subacutis, 0·2 cm. longus; corolla infundibuliformis, 0·6–0·7 cm. longa, segmentis oblongo-rotundatis, marginibus undulatis, 0·2–0·3 cm. longis; stamina posteriora inclusa, staminodium paullo excedentia, anteriora manifesta, antheris similibus ovalibus; discus obscure crenulatus; stylus inclusus, apice minute bilobus, 0·2 cm. longus; ovarium ovatum; capsula ignota.

Bushmanland: Rocky places at foot of kopje near Groot Rozynbosch, 3619. Great Namaqualand: Kopje about 25 km. South of Warmbad, 4377. Between Dabaigabis and Gründoorn, 3149. Great Karasberg: Narudas Süd, 8133. Krai Kluft Ravine, 8284.

A rigid much-branched shrub, altogether glabrous, attaining 2 met. in height; branches and branchlets divaricate or the younger ascending, terete spinescent, marked with the remains of the fallen leaf-tufts, up to 0·4 cm. in diam.; leaves fasciculate, the fascicles of 3–10 leaves, alternate, erect or erect-spreading, sessile or petiole on the youngest shoots, linear spathulate-linear narrow-elliptic or obovate, obtuse or more rarely acute, entire, 0·2–0·9 cm. long, up to 0·6 cm. wide; flowers in subsessile dense racemules, springing from the fascicles, up to 2·5 cm. long, ascending, finally spreading, 0·6–0·8 cm. long, the bracts linear, scarcely 0·2 cm. long; pedicels slender, 0·2–0·3 cm. long, bibracteolate, the bracteoles under 0·1 cm. long; calyx 5 partite, 0·2 cm. long, the segments linear subacute; corolla infundibuliform, 0·6–0·7 cm. long, the segments oblong-rotundate with undulate margins, 0·2–0·3 cm. long; posterior stamens included, a little longer than the staminode, the anterior manifest, the anthers all alike oval; disk obscurely crenulate; style included, minutely bilobed at the apex, 0·2 cm. long; ovary ovate; capsule unknown.

A very distinct species, the whole plant being glabrous, the branches spinescent, the leaves polymorphic and the numerous dense racemules terminating the abbreviated leafy shoots.

Plate VI., C, Fig. 1, sketch of a branch; 2, leaf-tuft, enlarged; 3, 4, 5, leaves,  $\times 3$ ; 6, flower,  $\times 3$ ; 7, corolla, laid open,  $\times 4$ ; 8, stamen; 9, gynaeceum; 10, transverse section of ovary—all the latter variously enlarged.

## 12. PHYLLOPODIUM.

1. *P. capitatum*, Benth., *l. c.*, p. 373.

Cape: Along roadside from Warm Baths to Modderfontein,



Oliphant's River Valley, 7277. Sandy slopes above Pickenier's Pass, 5196.

13. POLYCARENA.

1. *P. pubescens*, Benth., *l. c.*, p. 372.

Khamiesberg: At foot of Beaem Hill, 6696.

14. ZALUZIANSKYA.

1. *Z. villosa*, F. W. Schmidt, *Neue u. Selt. Pfl.*, 11.

Namaqualand: Last outspan before Garies, 6522.

2. *Z. peduncularis*, Walp., *Repert.*, iii., 308, var. *glabriuscula*, Benth.

Khamiesberg: In old cornfields, Witsand, 6563.

3. *Z. gilioides*, Schltr., in *Engl. Jahrb.*, xxvii., p. 182.

Khamiesberg: Wet places, Naras Ravine, 6702. Damp places Khamsoap Ravine, 6546.

15. LIMOSELLA.

1. *L. capensis*, Thunb., *Prodr.*, p. 104.

Upper: In water conduit at Kariboomfontein, 3921.

16. VERONICA.

1. *V. Anagallis*, L., *Sp. Pl.*, ed. 1, p. 12.

Upper: In water furrow, Kariboomfontein, 4991.

17. HARVEYA.

1. *H. purpurea*, Harv., *Gen. S. Afr. Pl.*, ed. 1, p. 249.

Cape: Southern aspect at summit of mountains behind Kradouw Krantz, 5307.

2. *H. squamosa*, Steud., *Nomencl. Bot.*, ed. 2, i., p. 723.

Khamiesberg: West slopes 30 ft. below the summit of Sneeuw-kop, 5760.

18. BELLARDIA.

1. *B. Trivago*, All., *Fl. Pedem.*, i., p. 61.

Khamiesberg: Elliottsberg, 7693. River-bed on Khamiesberg

Plateau, 6235. By stream-bed on South side of pass between Bowesdorp and Groot Gans, 5872.

## SOLANACEAE.

*By Louisa Bolus.*

### 1. SOLANUM.

1. *S. giftbergense*, Dunal, DC., Prod., xiii., 1, 288.

Cape: Roadside in Nardouw Kloof, 5330. Karroo and Namaqualand: Between Grauwater and Klipplaat, 3397. Namaqualand: between Stinkfontein and Garies, 5646. Foot of granite kopje by roadside between Brakdam and Rietkloof, 5665.

2. *S. tomentosum*, Linn., Sp. Pl., ed. 1, 188.

Cape: Mountain slopes, Oliphant's River Valley, 6868. Roadside in Nardouw Kloof, 5338.

3. *S. capense*, Linn., Syst., ed. 10, 935. Forma luxurians.

Great Namaqualand: Sandy valley 20 km. North of Raman's Drift, 4546. Schakalskuppe, 4238.

4. *S. Rangei*, U. Damm., Engl. Bot. Jahrb., 48, 244 (1913). Karroo—Upper: Blaukrantz Pass, 4957. Namaqualand: Banks of river-bed, Brakrivier, 3896. Bushmanland: Rock crevices at Groot Rozynbosch, 3836. About 8 miles South or South-west of Bitterfontein, 3422. Upper Namaqualand and Karroo: Alewyn's Fontein, 3439. Great Namaqualand: Kopjes near last outspan before Gründoorn, 4361. Akam River-bed, 4732. Near Dabaigabis, 4410. Gawachab, in low bush near high-water mark on bank of Löwen's River, 4085, 4090. Locality uncertain, 7781.

### 2. DATURA.

1. *D. Metel*, Linn., Sp. Pl., ed. 1, 179.

Upper and Namaqualand: Cornfield weed, near Brakrivier, 4882.

2. *D. Stramonium*, Linn., Sp. Pl., ed. 1, 179.

Khamiesberg: River-bed 6 miles North of Garies, 6388.

3. LYCIUM.

1. *L. austrinum*, Miers, Ann. and Mag. Nat. Hist., xiv., 13 (1854).  
Upper and Namaqualand: In Tamarisk thicket in bed of Hantam's River, near Brakrivier Farm, 4881.

2. *L. tetrandrum*, Thunb., Prodr., 37.  
Upper: Probably near Loeriesfontein, 5027.

3. *L. namaquense*, U. Damm., *l. c.*, 234.  
Great Namaqualand: Sandy places South of Warmbad, 4042. In loose bush, near high-water mark, Löwen's River, Gawachab, 4079.

4. *L. sp.*, probably *L. Rangei*, U. Damm., *l. c.*, 230.  
Namaqualand: Common in dry river-bed North of Alewyn's Fontein, 3938.

5. *L. Afrum*, Linn., Sp. Pl., ed. 1, 191.  
Khamiesberg: Sand flats between Driefontein and Heeren Logement, 6756.

6. *L. sp.*  
Khamiesberg: Varsche Rivier, on dry stony hills, 6497.

7. *L. sp.*  
Namaqualand: Between Holle Rivier and the Doorn River-bed, 3962. Great Namaqualand: Schakalskuppe, 4267, 4258. Near water-holes at Dabaigabis, 4316. Sand near river-bed North of Ganus, 4511.

8. *L. sp.*  
Karoo: Dry steam-bed at "The Bosch," near Schurkraal, 3081.

9. *L. roseum*, n. sp., *L. tenui*, Willd., affine, sed habitu robustiore, foliis latioribus glandulosis, calyce longiore, segmentis acutis, staminibus minus exsertis differt.

Suffrutex multo ramosus, ad 1·2 met. altus; rami ramulique spinescentes, ultimi 0·5–3 cm, longi, ad 0·15 cm. diam., cortice pruinoso griseo, demum laevi nitenteque, more pruni colorato; fasciculi 5–7foliati, foliis spathulatis vel spathulato-obovatis, in petiolum ad 0·15 cm. longum gradatim attenuatis, obtusis vel rarius subacutis, utrinque glandulis pellucidis conspersis, 0·7–1 cm. longis, 0·15–0·3 cm. latis; flores solitarii pedicellati, pedicellis

glanduloso-puberulis, 0·2–0·4 cm. longis; calyx campanulatus, extus glandulis pellucidis conspersus, 0·5–0·6 cm. longus, segmentis patentibus, demum recurvis, subinaequalibus, lanceolato-linearibus acutis, minutissime glanduloso-ciliatis, 0·4–0·5 cm. longis; corolla rosea, tubo infundibuliformi glabro, 0·6 cm. longo, basi 0·2 cm. diam., lobis patentibus suboblongis, apice rotundatis, 0·4 cm. longis, 0·3 cm. latis; filamenta inaequalia, corollae apicem attingentia vel breviora, tubi medio adnata, basin versus pilosa; bacca immatura ovata subacuta.

Upper: Ravine at Loeriesfontein, 4836.

Much-branched suffrutex, up to 1·2 met. high; branches and branchlets spinescent, the ultimate ones 0·5–3 cm. long, the bark at first pruinose grey, finally smooth and shining, prune-coloured; leaves 5–7 in the fascicle, spatulate or spatulate-obovate, gradually narrowed into the 0·15 petiole, obtuse or more rarely subacute, sprinkled on each side with pellucid glands, 0·7–1 cm. long, 0·15–0·3 cm. wide; flowers solitary pedicellate, the pedicels glandular-puberulous, 0·2–0·4 cm. long; calyx campanulate, sprinkled on the outer surface with pellucid glands, 0·5–0·6 cm. long, the segments spreading, finally recurved, somewhat unequal, lanceolate-linear acute, very minutely glandular-ciliate, 0·4–0·5 cm. long; corolla pink, the tube infundibuliform glabrous, 0·6 cm. long, 0·2 cm. diam. at the base, the segments spreading suboblong, rounded at the apex, 0·4 cm. long, 0·3 cm. wide; filaments unequal, the longest one reaching to the tip of the corolla, the rest shorter, adnate to about the middle of the corolla-tube, pilose towards the base; immature berry ovate subacute.

Allied to *L. tenue*, but differs by being more robust in habit, with broader glandular leaves, longer calyx with acute segments, and less exerted stamens.

Plate VIII., C, Fig. 1, sketch of a branchlet, nat. size; 2, calyx, the segments straightened; 3, ditto, laid open; 4, corolla, laid open,  $\times 2$ ; 5, gynaeceum,  $\times 3$ .

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#### Erratum.

Vol. IX., p. 40, line 26. *Instead of* "2. *M. rigida*," *read* "MURALTIA. *M. rigida*."

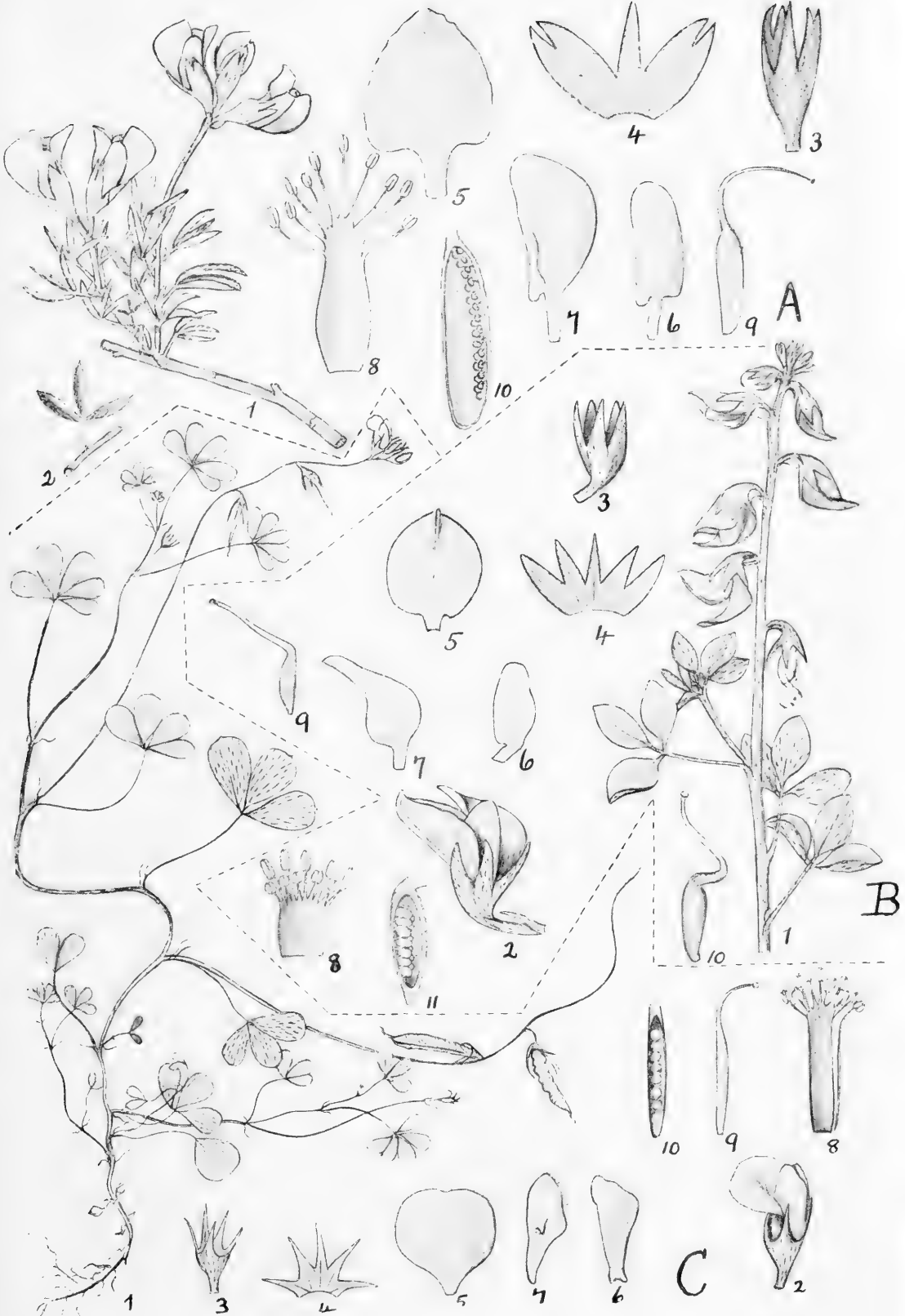


M. W. Glover del e sicc.

West, Newman proc.

A. NENAX DREGELI, L. Bolus. B. ANTICHARIS JUNCEA, L. Bolus. C. SUTERA RIGIDA, L. Bolus.





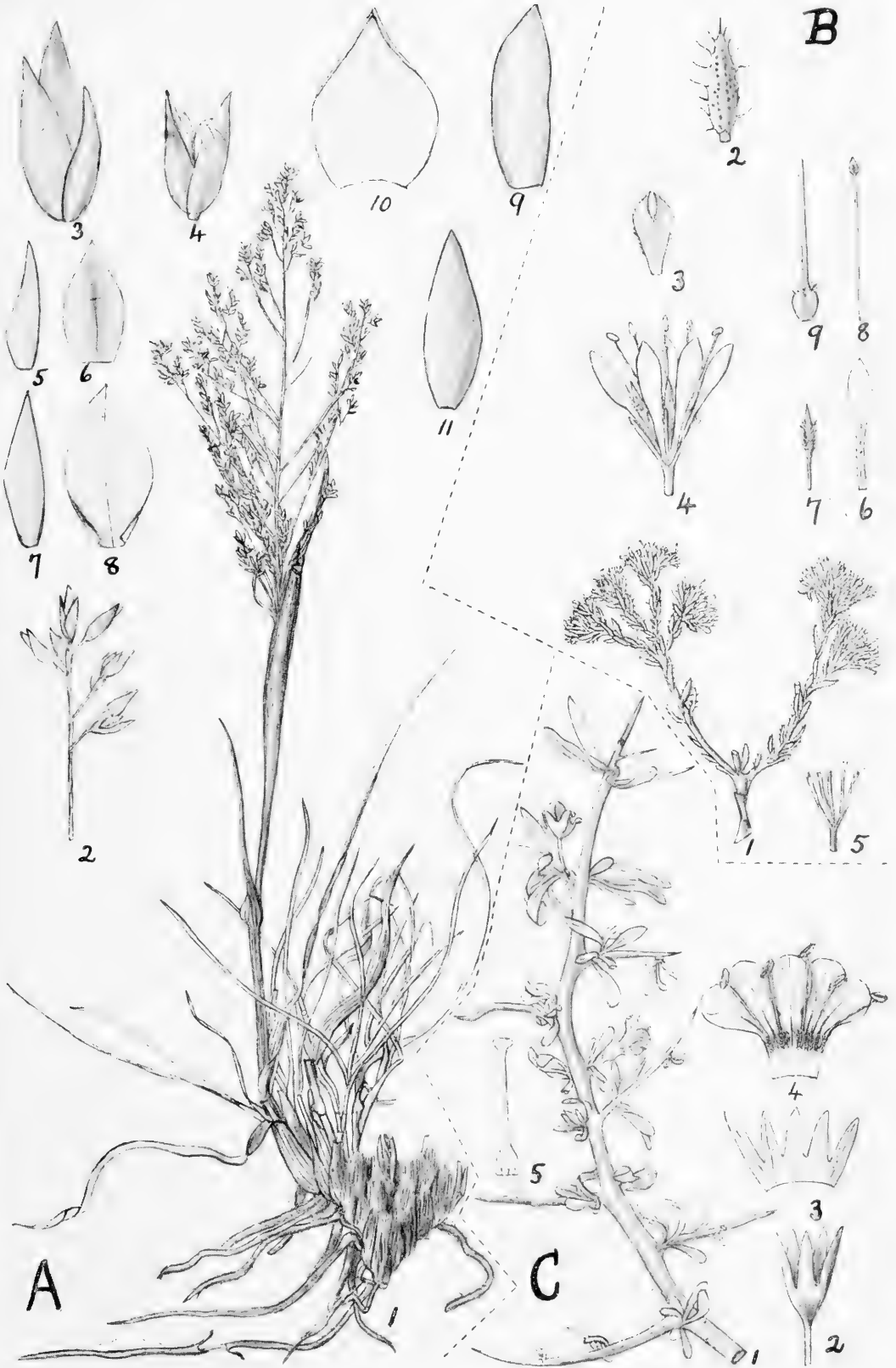
A. C. Dawson del e sicco.

West, Newman proc.

A. LOTONONIS EXSTIPULATA, L. Bolus. B. CROTALARIA PEARSONII, Baker f. C. INDIGOFERA LIMOSA, L. Bolus.







M. W. Glover del e sicco.

West, Newman proc.

A. SPOROBOLUS SLADENIANUS, *F. Bolus*. B. AGATHOSMA SLADENIANA, *R. Glover*. C. LYCIUM ROSEUM, *L. Bolus*.



12.—*A Contribution to the Knowledge of the South African Proteaceae.*  
 No. II.—By E. P. PHILLIPS, M.A., F.L.S.

*Leucadendron Muirii*, Phillips (Proteaceae-Proteeae).

*Frutex*, 3–1·3 m. altus. *Ramuli* pubescentes vel glabri. *Folia* crassa, carnosae, 1–3 cm. longa, ·6–1·2 cm. lata, spathulata, apice aliquando obtusa aliquando retusa, basi angustata, glabra. *Inflorescentia* ♂ solitaria vel 4-nata, terminalia, pedunculata, 2–3·5 cm. longa, circa 1 cm. lata, ellipsoidea. *Pedunculus* 1·3–1·7 cm. longus, pubescens, bracteis ovatis acuminatis ciliatis circa 3 mm. longis tectus. *Bracteae* 1·6 mm. longae, 1·5 mm. latae, ovatae, acuminatae, apice obtusae, sparse villosae, ciliatae. *Tubus perianthii* 1 mm. longus, villosus; lobi 1·5 mm. longi, lineares, villosi; limbus 1·5 mm. longus, ellipticus, apice obtusus, pubescens. *Antherae* 1 mm. longae, oblongae. *Stylus* 3 mm. longus, glaber; stigma clavatum. *Squamae hypogynae* 1·5 mm. longae, lineares. *Inflorescentia* ♀ solitaria, terminalia, pedunculata, 3·5 cm. longa, 1·2–1·5 cm. lata, ellipsoidea, obtusa. *Pedunculus* 1·3–1·5 cm. longus, bracteatus. *Bracteae* floris crassae, 4 mm. longae, 6 mm. latae, acuminatae, apice obtusae. *Segmenta perianthii* 4 mm. longa, linearia, apice obtusa, basi paullo angustata, villosa. *Ovarium* 2·5 mm. longum, 2·5 mm. latum, compressum, semiorbiculatum, alatum, glabrum; stylus 3 mm. longus, glaber; stigma obliquum. *Fructus* 5 mm. longus, 5 mm. latus, planus, alatus.

CAPE PROVINCE: Riversdale Division, Melkhoutfontein, on the Kafir Kuils River, near Still Bay and surrounding farms. January 7th, 1914. Dr. J. Muir, 1234, 1235, and in Herb. Musei Austro-Afric. 5111, 6724.

A bush ·3–1·3 m. high. *Young branchlets* glabrous or pubescent; older branches glabrous, smooth or peeling in membranous scales. *Leaves* similar in both sexes, thick, somewhat fleshy, 1–3 cm. long, ·6–1·2 cm. broad above, spathulate, obtuse or sometimes faintly retuse at the apex, narrowed at the base, glabrous. *Male inflorescence* solitary or 4-nate, terminal, peduncled, 2–3·5 cm. long, about 1 cm. in diameter, ellipsoid. *Peduncle* 1·3–1·7 cm. long, pubescent, bearing scattered ovate acuminate

ciliated bracts about 3 mm. long. *Floral-bracts* 1.6 mm. long, 1.5 mm. broad, ovate, acuminate, obtuse, sparsely villous, ciliate. *Perianth-tube* 1 mm. long, villous; lobes 1.5 mm. long, linear, villous; limb 1.5 mm. long, elliptic, obtuse, pubescent. *Anthers* 1 mm. long, oblong. *Style* 3 mm. long, glabrous; stigma clavate. *Hypogynous scales* 1.5 mm. long, linear. *Female inflorescence* solitary, terminal, peduncled, 3.5 cm. long, 1.2–1.5 cm. in diameter, ellipsoid, obtuse. *Peduncle* 1.3–1.5 cm. long, bearing numerous obovate or transversely-oblong glabrous ciliated bracts produced into a linear or lanceolate-linear ciliated appendage 4 mm. long. *Floral bracts* thick, 4 mm. long, 6 mm. broad, transversely oblong, produced into a very short obtuse ciliated acumen, otherwise glabrous. *Perianth-segments* adhering in the middle third of their length, 4 mm. long, linear, obtuse, slightly narrowed at the base, villous. *Ovary* 2.5 mm. long, 2.5 mm. broad, flattened, semiorbicular, slightly emarginate at the apex, with a membranous wing above, glabrous; style 3 mm. long, linear, glabrous; stigma oblique. *Mature cones* 3–4.5 cm. long, 3 cm. in diameter, ellipsoid; cone scales woody, 1.1 cm. long, 1.3 cm. broad, obovate, grey on the upturned portion. *Fruits* 5 mm. long, 5 mm. broad, flattened, orbicular, grey with black markings, with a marginal wing, broadest above. Dr. Muir reports: "The leaves are almost fleshy and are shining something like those of *Zygophyllum Morgsana* with which it grows."

This species in appearance resembles *L. coriaceum*, Phill. & Hutch., from which it is at once distinguished by the different female bracts and the stalked male inflorescences. It is a totally different plant from the other three species of *Leucadendron* which have peduncled male heads.

The species is named in honour of Dr. J. Muir of Albertinia, Riversdale Div., who has been untiring in his efforts at working the Riversdale flora.

*Spatallopsis Begleyi*, Phillips, sp. nov. (Proteaceae-Proteeae), a omnibus speciebus in genere capitulis uni-floribus differt.

*Suffrutex*. *Rami* paullo pilosi. *Folia* acicularia, 1.5–3.5 cm. longa, apice acuta, mucronata, pilosa demum glabra. *Capitula* in spicas 2.5 cm. longas circa 2 cm. latas disposita. *Bractee* 9–1 cm. longae, lineares, acuminatae, apice acutae, concavae, paullo pilosae, ciliatae. *Capitulum* subsessile, uniflorum; pedunculus circa 1 mm. longus, pilosus; bractee involucri 4, bilabiatae, 5–8 mm. longae, acuminatae, apice acutae, ciliatae. *Tabus perianthii* 3.5 mm. longus,

infra glaber; segmenta 2·25 mm. longa, linearia, villosa; limbus 1·75 mm. longus, ellipticus, apice obtusus, villosus. *Antherae* ·75 mm. longae, ellipticae. *Squamae hypogynae* 1 mm. longae, lineares. *Fructus* 4 mm. longus, 3 mm. latus, subglobosus, villosus; stylus 7·5 mm. longus, teres, supra angustatus; stigma ·5 mm. longum, conicum.

CAPE PROVINCE: Stellenbosch Division. Hottentots Holland Mountains, south of Sneeuw Kop, 4,500 ft., January, 1915. H. W. Begley in Herb. Musei Austro-Afric. 7649.

A small bush about 6 m. high? *Branches* arising in whorls of 5-7, scantily pilose; bark light reddish-brown. *Leaves* acicular, 1·5-3·5 cm. long, terete, acutely mucronate, finely pilose, the older leaves almost glabrous. *Inflorescence* a one-flowered capitulum; the capitula massed into a terminal solitary sessile spike 2·5 cm. long and about 2 cm. broad, surrounded by the upper leaves. *Bracts* subtending the capitulum ·9-1 cm. long, linear, acuminate, acute, concave above, convex beneath, scantily pilose, ciliated. *Capitulum* subsessile, one-flowered; peduncle about 1 mm. long, pilose; involucre of 4 bracts, bilabiate; the upper lip entire, 8 mm. long, otherwise similar to the bract; lower lip tri-partite to about the middle, curved, deeply concave in the lower half; lobes 5 mm. long, otherwise similar to the bract. *Perianth-tube* 3·5 mm. long, glabrous below; segments 5 mm. long, with a linear villous claw and an elliptic obtuse villous limb, the latter 1·75 mm. long. *Anthers* ·75 mm. long, elliptic. *Hypogynous scales* 1 mm. long, linear. *Fruit* 4 mm. long, 3 mm. broad, subglobose, shortly villous; style 7·5 mm. long, terete, slender, gradually narrowing upwards, breaking away near the base and leaving a short beak on the fruit; stigma ·5 mm. long, conical.

This handsome shrub has very much the general appearance of a *Serruria*. It is totally distinct from any other species in the genus by having one-flowered capitula, which are massed into a contracted spike and surrounded by the upper leaves.

I have named the plant in honour of Mr. H. W. Begley of Somerset West, a Member of the Mountain Club of South Africa and a keen naturalist, who discovered the species.

*Nivenia Marlothii*, Phillips, sp. nov. (Proteaceae-Proteeae), a *N. Dregeo*, Buek., foliis latioribus differt.

*Rami* minute pubescentes. *Folia* 2-3 cm. longa, 3·5-9 mm. lata, lanceolato-elliptica, apice obtusa, basi angustata, glabra vel junioria

pubescentia. *Spicae* 3-natae, terminales, breve pedunculatae. *Pedunculus* pubescens, bracteatus. *Capitula* 4-flora. *Bracteae* 6 mm. longae, ovatae, acuminatae, apice obtusae, tomentosae, ciliatae. *Bracteae involucri* aequales, 6 mm. longae, oblongae, apice obtusae, concavae, pubescentes, ciliatae. *Segmenta perianthii*, 1.3 cm. longa, villosa; limbus 2.5 mm. longus, ellipticus, apice obtusus barbatusque. *Stamina* 2.5 mm. longa, lineari-oblonga. *Squamae hypogynae* 1.5 mm. longae, lineares. *Ovarium* 2 mm. longum, pilis longis vestitum; stylus 1.1 cm. longus, cylindricus, glaber; stigma 2 mm. longum, ellipsoideum vel subclavatum.

CAPE PROVINCE: Prince Albert Division, 4,000 ft., Marloth, 2478.

*Branches* minutely pubescent. *Leaves* 2-3 cm. long, 3.5-9 mm. broad, lanceolate-elliptic, obtuse, narrowed at the base into a short petiole, glabrous or the young leaves pubescent with crisped hairs. *Spikes* 3-nate at the end of the branches, shortly peduncled, bearing about 9-12 capitula. *Peduncle* pubescent, bearing more or less linear bracts 8 mm. long. *Capitulum* 4-flowered. *Bracts* subtending the capitulum 6 mm. long, ovate, acuminate, obtuse, tomentose, ciliate. *Involucral-bracts* equal, 6 mm. long, 3 mm. broad, oblong, obtuse, concave, pubescent, ciliate, becoming rigidly coriaceous in the fruiting stage. *Perianth* 1.3 cm. long, villous; limb 2.5 mm. long, elliptic, obtuse and bearded. *Stamens* 2.5 mm. long, linear-oblong. *Hypogynous scales* 1.5 mm. long, cylindric, glabrous; stigma 2 mm. long, narrowly ellipsoid or sub-clavate. *Fruit* not seen.

This species is allied to *N. Dreyei*, Buek., but differs in the structure of the "spike" and in having broader leaves.

The type specimen is in the Herbarium of Dr. Marloth, in whose honour the species is named.

13.—*A revision of the genus Pteronia (Compositae).* By J. HUTCHINSON, Assistant, Kew Herbarium, and E. P. PHILLIPS, Assistant, S. Afric. Mus.

FIFTY years have now elapsed since the publication of the third volume of the 'Flora Capensis,' which was devoted mainly to Harvey's account of the South African *Compositae*. The material upon which the work was based was mainly the collections of the earlier travellers, such as Thunberg, Masson, Niven, Ecklou, Zeyher, Drège, and a few others. The huge collection made by Burchell was, however, not at that time available for general study, but a few of his specimens, mostly in the De Candolle herbarium, are quoted. It was only in the families elaborated in the later volumes of the work (vol. 4 onwards) that his plants were fully worked out. Since the appearance of the third volume our knowledge of the Cape *Compositae*, as of the rest of the flora, has greatly increased, not so much perhaps in the discovery of large numbers of novelties, as in the case of Tropical Africa,\* but rather in the distribution and habitat of the described species. For these acquisitions to our knowledge we are indebted to those ardent collectors of South African plants among whom may be mentioned especially MacOwan, Bolus, Wood, Galpin, Schlechter, with many others, and more recently the collectors on the Percy Sladen Memorial Expeditions under the direction of Prof. H. H. W. Pearson.

According to the late Dr. Bolus,† the *Compositae* of South Africa constitute on an average something like 17 per cent. of the entire phanerogamic flora, and in one region, his Upper Region, as much as 28·4 per cent. The importance to South African botany of bringing our knowledge of this family as much up to date as possible will, therefore, be obvious.

Failing a complete revision of the first three volumes, in itself a huge task, it appears advisable where necessary to revise periodically the larger and more cumbersome genera, giving keys for the determination of the species, with full descriptions and a detailed account of their distribution. With this object in view a commencement has been

\* Stapf in Kew Bull. 1906, pp. 239, 240.

† Bolus, 'Sketch of the Floral Regions of South Africa' (1905).

made with the endemic genus *Pteronia*, a member of the tribe *Asteroideae*.

Mr. Phillips has examined and described the specimens of this genus in the various South African herbaria ; but, as was natural, he found it impossible to complete the work without reference to types in the older collections preserved in Europe, especially the Thunbergian herbarium in Upsala, and the rich material at Kew, Dublin, and the Natural History Museum, South Kensington. Fully appreciating this difficulty, I gladly undertook the completion of the revision of this interesting genus. The specimens worked out by Mr. Phillips were, therefore, forwarded to Kew with the kind permission of Dr. L. Péringuey, Director of the South African Museum, to whom we tender our best thanks. To Dr. Juel, of Upsala, we are very greatly indebted for the loan of Thunberg's type specimens, as also to Prof. Dixon for kindly forwarding the Dublin material ; to Sir David Prain and Dr. Rendle for facilities in the study of the Kew and Natural History Museum specimens respectively, and to Dr. Stapf for friendly criticism and suggestions.

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The genus *Pteronia* was founded by Linnaeus\* in 1760 on a figure published by Plukenet† in 1700. Plukenet's drawing is an excellent representation of *P. camphorata*, L., which species stands as the type of the genus, and which was first described in Linnaeus' second edition of the *Species Plantarum* of 1763.

In 1781 Linnaeus fil ‡ published a list of 15 species accompanied by very brief descriptions, mostly of plants collected by Thunberg.

In 1800 Thunberg § gave a list of 24 species collected by him on his Cape journeys, and in the same year Willdenow || published descriptions of 27 species ; three of the latter are now referred to other genera.

The Schultz edition of Thunberg's *Flora Capensis*, which appeared in 1823, contains full descriptions of 25 species.

Little if any attempt at classification of the species is evident in any of the above works, so they may be passed over without further comment.

In 1836 De Candolle ¶ arranged the 63 species recognised by him into three sections as follows :

\* *Amoen. Acad.* v. No. 48.

† *Plukenet, Mant.* 56, t. 345, fig. 56:2.

‡ *Suppl. Plant.* pp. 355-358.

§ *Prodr. Fl. Cap.* ii. pp. 143-4.

|| *Species Plant.* iii. pp. 1176-1182.

¶ *DC. Prodr.* v. 356-365.



- I. SCEPINIA.—*Heads* many- or few-flowered. *Receptacle* alveolate, shortly fimbriiferous. *Achenes* terete or subcompressed, villous, narrowed slightly into a neck. *Leaves* alternate or opposite.—27 species.
- II. PACHYDERIS.—*Heads* many-flowered. *Receptacle* alveolate. *Achenes* compressed (outer sometimes trigonous), shortly beaked at the apex, conspicuously attenuated into a thick glabrous neck below the pappus. *Leaves* opposite, rarely alternate.—25 species.
- III. PTEROPHORUS.—*Heads* many-flowered. *Receptacle* fimbriiferous. *Achenes* erostrate, flat or compressed. *Pappus* sub-1-seriate, setae joined at the base into a ring. *Leaves* sparse, linear, entire. *Heads* solitary, terminal; branches leafy almost to the apex.—3 species.

Eight species are unclassified as being imperfectly known, although nearly all were collected and described by Thunberg.

De Candolle's arrangement was closely followed by Harvey in Harvey & Sonder, Fl. Capensis vol. iii, published in 1864, so the work of these two authors may be considered jointly. Harvey reduced the number of species to 52, placed the "imperfectly known" ones into the above sections according to their characters, and added an "artificial key to the species."

It will be observed that there is scarcely any clear dividing line between De Candolle's first two sections, the presence or absence of a distinct neck to the achene furnishing the most definite character. Section *Pterophorus*, containing only three species (reduced by Harvey to one), is distinguished by the absence of the beak and in a supposed difference in the pappus, a character which appears to us to be of trifling value. We therefore propose an entirely different classification, based principally on the nature of the indumentum of the leaves or its absence, as affording an easily ascertainable and highly constant character. On this feature alone they may be grouped into four sections as follows:

- I. INCANAE.—Nine species, in which the leaves are clothed by a woolly whitish indumentum.
- II. PAPILLATAE.—Eight species with the leaves densely papillous or scabrid all over the surfaces.
- III. CILIATAE.—Sixteen species with conspicuously ciliate but mostly otherwise glabrous leaves.
- IV. GLABRATAE.—Twenty-eight species, in which the leaves are entirely glabrous and fleshy.

The *Incanae* are further characterised by the constantly opposite

leaves, solitary flower-heads and villous achenes. They are distributed, with a few exceptions, in the Western and Karroo Regions. The most widely-spread species of this group is *P. incana*, L., which occurs from Little Namaqualand through the Karroo eastward to Albany. The remainder of the species appear to be extremely local in distribution.

The *Papillatae* have also constantly opposite leaves, with the exception of *P. scabra*, Harv., mostly solitary heads, and villous or pubescent and glandular achenes, which in a few species are contracted into a beak at the apex. Two species, *P. lucilioides* and *P. undulata*, grow only in the Western Region and in the extreme south-west of the Kalahari Region. The remainder are mostly confined to the South-Western Coast Region, from Worcester and Somerset eastward to Uitenhage.

The *Ciliatae*, with the exception of two species, have opposite leaves connate at the base. The heads are solitary, except in *P. tricephala*, in which they are sometimes ternate, and the achenes are either villous or glandular or glabrous except for a tuft of hairs from the base. They are distributed mainly in the Karroo and the Upper Region, with one species, *P. onobromoides*, in the extreme north-west of the South-Western Coast Region and the south of the Western Coast Region, one, *P. tricephala*, extending into the Kalahari Region, and one, *P. elongata*, Thunb., confined to the South-Western Region. The distribution of this group is therefore in the Karroo and Upper Regions, but principally Karroo.

In the *Glabratae*, the largest group, the leaves are alternate in eight species, the heads are corymbose or solitary, the achenes are without exception villous or pilose, and the hairs are frequently accompanied by sessile glands. The species are most abundant in the Western Coast and the South-Western Coast Regions, but very rare in the Karroo and almost absent from the Upper Region.

To sum up the distribution of each section, therefore, the *Incanae* are Western and Karroo, the *Papillatae* are chiefly South-Western, the majority of the *Ciliatae* favour the Karroo and the Upper Region, and the *Glabratae* are almost confined to the Western and South-Western Regions. The genus is not represented in the South-Eastern Region.

The majority of the species are very distinct and little liable to confusion. Very many are quite local in their distribution. A few possess some striking characteristic which distinguishes them at once from the rest of the genus. Species deserving special mention are *P. heterocarpa*, DC., which is remarkable in being procumbent and rooting at the nodes, and much resembles a marsh plant, but as a matter of fact it favours dry, stony hills; in *P. fasciculata*, L.f., the

heads are crowded together into a compound head, each unit being 1-flowered; and *P. erythrochaeta*, DC., and *P. Eenii*, S. Moore, are remarkable in having a purplish pappus.

Few of the species appear to be of any economic importance. *P. onobromoides*, DC., which inhabits the sandy coast flats from Port Nolloth to St. Helena Bay, has succulent and very aromatic leaves, which mixed with fat are used by the Namaquas and Bastards as a perfume under the name of "Buchu." The cultivation of this plant may be worthy of the attention of the authorities of the New Botanic Garden at Kirstenbosch. According to Pillans the shoots of *P. utilis*, Hutchinson (a new species), are eaten by stock. *P. incana*, DC., is cultivated as an ornamental plant at La Mortola, Italy (*cf.* Bot. Mag. t. 8380), where it was first grown in 1872 from seeds communicated by Prof. MacOwan.—J. H.

#### PTERONIA, Linn. Gen. n. 937.

Flower-heads homogamous, discoid, 1-many-flowered; flowers hermaphrodite, equal. Involucre campanulate, ovoid or cylindric, with numerous bracts in several series, often chaffy with membranous glabrous or ciliate margins, sometimes spine-tipped gradually increasing in length upwards. Receptacle convex, flat or concave, often deeply honeycombed, the pits with marginal setae or lacerate. Corolla tubular, regular, with a turbinate or subcampanulate 5-lobed limb. Anthers obtuse or rarely acute at the base. Style branches flattened, with short or rather long appendages. Achenes turbinate or more or less compressed and then often glabrous, frequently villous, often contracted into a neck at the apex. Setae of the pappus numerous or rarely somewhat 1-seriate, often connate at the base into a ring, very unequal, more or less barbellate or subpilose, mostly straw-coloured, rarely purple.

Shrubs, much branched, sometimes only a few inches high, rarely with decumbent branches rooting at the nodes, often viscid. Leaves alternate or mostly opposite, entire or ciliate-serrulate, coriaceous or fleshy, woolly-tomentose, papillous or glabrous, rarely warted, sometimes very small and clustered. Flower-heads large or medium-sized, solitary or corymbose at the end of the shoots. Corolla yellow, rarely purplish or greenish.

Species 63, all endemic to South Africa.

## Key to the Sections.

- Leaves woolly-pubescent or tomentose with whitish hairs, always opposite . . . . . Sect. I. *Incanae*.  
 Leaves papillous, scabrid, ciliate or glabrous, opposite or alternate.  
 Leaves densely papillous or scabrid with extremely short and thick hairs . . . . . Sect. II. *Papillatae*.  
 Leaves ciliate or serrate on the margins only, rarely setose-pilose with longish hairs on both surfaces . . . . . Sect. III. *Ciliatae*.  
 Leaves glabrous and fleshy, sometimes warted, rarely pubescent within the sheathing base . . . . . Sect. IV. *Glabratae*.

## KEY TO THE SPECIES.

Sect. I. *INCANAÆ*.—*Leaves woolly-pubescent or tomentose with white or silvery hairs, always opposite. Flower-heads solitary at the ends of the shoots. Achenes villous.*

Involucral bracts acutely cuspidate-acuminate with somewhat spiny tips.

- Bracts and pappus yellow . . . . . 1. *acuta*.  
 Bracts and pappus purple . . . . . 2. *Eenii*.

Involucral bracts obtuse or acute, not cuspidate-acuminate.

Involucral bracts glabrous outside, with very narrowly membranous hyaline glabrous margins . . . . . 3. *incana*.

Involucral bracts pubescent or canous puberulous outside.

Pappus yellowish or straw-coloured.

Leaves linear or linear-lanceolate, 2–3 mm. broad.

- Branches recurved and pendulous . . . . . 4. *Bolusii*.  
 Branches divaricate.

Heads 4–5-flowered . . . . . 5. *glauca*.

Heads many-flowered . . . . . 6. *cinerea*.

Leaves ovate or oblong-ovate, 8–10 mm. broad . . . . . 7. *ovalifolia*.

Pappus purplish or reddish-brown.

Pappus purplish . . . . . 8. *erythrochaeta*.

Pappus reddish-brown . . . . . 9. *quinqueflora*.

Sect. II. *PAPILLATAÆ*.—*Leaves densely papillous or scabrid all over the surface with very short hairs, opposite or very rarely alternate. Flower-heads solitary or rarely corymbose. Achenes villous or pubescent and glandular.*

Heads solitary at the ends of the shoots.

Involucral bracts with usually very wide and almost transparent margins.

Leaves oblong-lanceolate or slightly oblanceolate,

8–11 mm. long . . . . . 10. *membranacea*.

Leaves linear, 2–4 mm. long . . . . . 11. *beckioides*.

Involucral bracts not or only slightly narrowly membranous on the margin.

- Leaves ovate or ovate-lanceolate, broad at the base . 12. *oppositifolia*.  
 Leaves linear or linear-oblongate, narrowed to the base.  
 Heads very acute just before expansion; leaves 5-8 mm. long . . . . . 13. *lucilioides*.  
 Heads obtuse before expansion; leaves 1.5-2.5 cm. long.  
 Involucral bracts lanceolate, gradually acuminate 14. *scabra*.  
 Involucral bracts broadly ovate, not acuminate . 15. *centauroides*.  
 Heads corymbose at the ends of the shoots.  
 Leaves with strongly undulate and crinkled margins, glandular-papillous . . . . . 16. *undulata*.  
 Leaves with straight margins, scabridulous . . . . . 17. *divaricata*.

Sect. III. CILIATAE.—Leaves with usually conspicuously ciliate or pectinate margins, otherwise glabrous and often viscid, rarely setose pilose on the surfaces, mostly opposite. Heads solitary except in two or three species. Achenes villous or glabrous.

- Leaves acicular, subterete, narrow, tufted or alternate, rarely opposite.  
 Involucral bracts shorter than the flowers, acute; flowers yellow . . . . . 18. *camphorata*.  
 Involucral bracts longer than the flowers, tailed-acuminate; flowers apparently green . . . . . 19. *stricta*.  
 Leaves never acicular and rarely tufted or alternate.  
 Leaves alternate.  
 Leaves 2-4 cm. long; heads 3.5 cm. long; branches glabrous . . . . . 20. *onobromoides*.  
 Leaves about 1 cm. long; heads 1.5 cm. long; branches woolly . . . . . 21. *villosa*.  
 Leaves opposite.  
 Heads 1-flowered, densely glomerate at the ends of the shoots . . . . . 35. *fasciculata*.  
 Heads several-flowered, solitary or up to 3 together.  
 Leaves flat, 3-10 mm. broad.  
 Involucral bracts broadly and transversely saccate just below the apex.  
 Leaves setose-pilose on both surfaces . . . . . 22. *inflexa*.  
 Leaves setose only on the margins . . . . . 23. *punctata*.  
 Involucral bracts not saccate.  
 Leaves setose-pilose on both surfaces; involucral bracts acute . . . . . 24. *utilis*.  
 Leaves setose only on the margins; involucral bracts rounded at the apex.  
 Branches glabrous; leaves 1-nerved, roughly ciliate . . . . . 25. *adenocarpa*.  
 Branches finely and densely puberulous; leaves minutely scabrid-ciliolate . . . . . 26. *Mooreiana*.

- Leaves keeled or strongly convex on the lower surface, fairly narrow.
- Heads always solitary, broadly obconic, campanulate or cylindric.
- Involucral bracts not mucronate or only slightly so.
- Leaves usually fair-sized, not tufted, mostly strongly ciliate or setose on the surfaces.
- Achenes densely villous all over; leaves often hirsute all over . . . . . 27. *hirsuta*.
- Achenes glabrous except for a tuft of hairs at the base; leaves hairy only on the margin.
- Branchlets shortly pubescent.
- Involucral bracts with jagged erinkled margins . . . . . 28. *elongata*.
- Involucral bracts with entire margins 29. *stachelinoides*.
- Branchlets quite glabrous . . . . . 30. *viscosa*.
- Leaves very small and tufted, glabrous or very minutely ciliolate on the margins . 31. *glomerata*.
- Involucral bracts conspicuously mucronate . 32. *mucronata*.
- Heads usually 3 together at the ends of the shoots, narrowly obconic, about 5 mm. in diameter. . . . . 33. *tricephala*.

Sect. IV. GLABRATAE.—*Leaves fleshy, glabrous or rarely pubescent within the base, never ciliate, smooth or warted, alternate or opposite. Heads corymbose or solitary. Achenes villous.*

- Stems procumbent and rooting at the nodes; leaves conspicuously villous within the sheathing base . . . 34. *heterocarpa*.
- Stems neither procumbent nor rooting at the nodes; leaves very rarely pubescent within the base.
- \*Heads densely glomerate into a compound head, 1-flowered . . . . . 35. *fasciculata*.
- \*\*Heads corymbose, 3-several arranged laxly at the end of each shoot, 3-several-flowered.
- Leaves 2 cm. long or less; basal sheaths 5 mm. long or usually much less.
- Leaves prominently uncinatè . . . . . 36. *uncinatà*.
- Leaves straight or nearly so.
- Heads 1 cm. long or less.
- Leaves alternate, free at the base . . . . . 37. *baccharoides*.
- Leaves opposite and connate into a sheath at the base.
- Leaves 1.5-2.5 cm. long; heads numerous in each corymb . . . . . 38. *paniculata*.
- Leaves 3-5 mm. long; heads 1-3 in each corymb . . . . . 39. *fastigiata*.

- Heads 2-2.5 cm. long, cylindrical . . . . . 40. *cylindracea*.  
 Leaves 3-7 cm. long, sheathing at the base for about  
 1 cm. . . . . 41. *flexicaulis*.  
 \*\*\*Heads solitary at the end of each shoot.  
 †Leaves alternate.  
 Leaves smooth, not warted.  
 Involucral bracts with long spiny tips.  
 Branches white; leaves club-shaped, small;  
 heads 1-1.5 cm. long . . . . . 42. *leucoclada*.  
 Branches mostly not white; leaves oblanceo-  
 late or obovate; heads 2-2.5 cm. long.  
 Bracts not membranous-winged; leaves  
 1-2 cm. long . . . . . 43. *acuminata*.  
 Bracts with very broad membranous wings;  
 leaves about 5 mm. long . . . . . 44. *scariosa*.  
 Involucral bracts rounded at the apex or at most  
 acute, not spine-tipped.  
 Leaves flat.  
 Involucral bracts acuminate, hardly ciliate . 45. *aspalatha*.  
 Involucral bracts acute or subobtuse, ciliate 46. *glaucescens*.  
 Leaves terete, trigonous or keeled.  
 Bracts ciliate; leaves 2-7 mm. long; heads  
 well exerted from the leaves . . . . . 47. *ciliata*.  
 Bracts glabrous; leaves 7-13 mm. long; heads  
 more or less enveloped by the leaves . . . 48. *trigona*.  
 Leaves very densely and coarsely warted . . . 49. *Rangei*.  
 ††Leaves opposite.  
 Leaves very densely and coarsely warted.  
 Leaves 2-3.5 cm. long; branchlets not spinulose;  
 bracts with jagged margins . . . . . 50. *tenuifolia*.  
 Leaves 0.6-1 cm. long; branchlets densely spinu-  
 lose with the persistent leaf-connections . . 51. *spinulosa*.  
 Leaves 0.5-1.5 cm. long; branchlets hardly  
 spinulose; bracts entire . . . . . 52. *succulenta*.  
 Leaves smooth.  
 Leaves 3-7 cm. long, sheathing at the base for  
 about 1 cm. . . . . 41. *flexicaulis*.  
 Leaves usually short; sheaths nothing or very  
 short.  
 Leaves acicular . . . . . 18. *camphorata*,  
 Leaves not acicular. [var. *laevigata*.  
 Heads widely campanulate, about 1 cm. broad  
 at the base; leaves flat, 1-2.5 cm. long,  
 2.5-6 mm. broad . . . . . 53. *glabrata*.  
 Heads turbinate at the base or constricted  
 in the middle; leaves usually much  
 shorter than in the preceding, if long  
 then narrower.

- Heads acutely acuminate or subacute in bud, narrowly cylindrical and widest across the middle when open, 4-5 mm. in diameter.
- Leaves pubescent within at the base . . . . . 54. *leptospermoides*.
- Leaves glabrous within the base . . . . . 55. *gymnocline*.
- Heads obtuse in bud, constricted in the middle, about 3 cm. long; leaves 2-3 cm. long. . . . . 56. *Pillansii*.
- Heads obtuse in the bud, obconic and widest across the top when open, about 1 cm. broad or slightly more or less.
- Leaves flat and oblanceolate, 2-3.5 mm. broad . . . . . 57. *oblanceolata*.
- Leaves more or less terete, 1-1.5 mm. broad.
- Leaves 1 cm. long or more; bracts coriaceous, brownish . . . . . 58. *pallens*.
- Leaves 8 mm. long or much less; bracts greenish or yellow with membranous margins.
- Bracts not truncate and mucronate.
- Bracts green all along the middle, glabrous . . . . . 59. *sordida*.
- Bracts keeled in the upper half only, minutely ciliolate . . . . . 60. *ambrariifolia*.
- Bracts truncate and mucronate . . . . . 61. *unquiculata*.

## SECTION I. INCANAE.

1. *P. acuta*, Muschler in Engl. Bot. Jahrb. xlv. 99.

A shrub; branchlets appressed-woolly-pubescent with white or silvery hairs. *Leaves* opposite, connate at the base, linear, acute or subobtuse, trigonous in section, 4-10 mm. long, about 1-1.75 mm. across the flat upper surface, thick, woolly-pubescent with silvery hairs. *Heads* terminal, solitary, campanulate-obconic, 1 cm. long and about the same in diameter, several-flowered. *Involucral bracts* about 6-seriate, bright greenish yellow, the outermost linear-lanceolate, about 4 mm. long, the innermost linear-oblong, 8 mm. long, all with narrowly membranous margins, woolly-villous outside, and acutely cuspidate-acuminate. *Receptacle* small. *Corolla* yellow, 6 mm. long; tube strongly ribbed for 1.5 mm. at the base, upper part cylindrical and slightly contracted to the base of the lobes, glabrous; lobes linear, subacute, 2 mm. long, finely pubescent outside. *Achenes* obconic, 3 mm. long, densely appressed-villous. *Pappus* 7 mm. long, straw-coloured.



DISTRIB.—South West Africa: Chamis, *Schultze*, 433! Kuibis, December, *Pearson*, 8020!

2. *P. Eenii*, S. Moore in Journ. Linn. Soc. xxxv. 325.

*Branches* woolly pubescent. *Leaves* opposite, linear, obtuse, 1–1.5 cm. long, about 1.25 mm. thick, densely woolly pubescent with soft white hairs. *Heads* solitary, sessile, obconic, 1.3–1.5 cm. long, about 8 mm. in diameter. *Involucral bracts* about 4-seriate, lanceolate or linear-lanceolate, acutely spine-tipped, woolly-pubescent outside, tinged with purple. *Corolla* 7 mm. long, constricted and ribbed at the base for 2 mm., glabrous; lobes linear-lanceolate, subacute, 1.5 mm. long. *Achenes* 3.5 mm. long, densely appressed-villous with white hairs. *Pappus* 8 mm. long, purple.

DISTRIB.—Damaraland; without precise locality, *Een*!

3. *P. incana*, DC. Prodr. v. 358.

A much-branched shrub; branches divaricate, pubescent when young, at length glabrous, with dark-coloured bark. *Leaves* opposite, linear or spatulate-linear, obtuse, narrowed to and connate at the base, 0.5–1.5 cm. long, 1–2 mm. broad, coriaceous, canous-tomentose. *Heads* solitary, sessile, about 10-flowered, turbinate, about 1.5 cm. long and nearly 1 cm. in diameter across the top. *Involucral bracts* 5–6-seriate, the outermost ovate, about 2 mm. long, the innermost oblong-linear, about 8 mm. long, all obtuse, glabrous, with narrowly membranous hyaline margins. *Receptacle* fimbriate. *Corolla* 1.3–1.5 cm. long; tube cylindric in the lower part, slightly expanded in the upper, glabrous; lobes linear-lanceolate, acute, 3.5–4 mm. long, glabrous. *Anthers* 4 mm. long, subacute. *Achenes* compressed, obovate, 5 mm. long, appressed-villous in the lower part, glandular. *Pappus* nearly white or yellowish white, about 1 cm. long.—Harv. in Harv. & Sond. Fl. Cap. iii. 358; Hutchinson in Bot. Mag. t. 8380. *P. rigida*, Berg. Pl. Cap. 231?. *P. xantholepis*, DC. Prodr. v. 358.

DISTR.—From Little Namaqualand through the Karroo to Albany: Little Namaqualand; near Ookiep, October, *Morris in Herb. Bolus*, 5670! Kaus Mountain near Goedemanskraal, Rustbank and Kookfontein, *Drège* a! near Klippfontein, August, *Bolus*, 421! Khamiesberg, hills at Namaroup, September, *Pearson*, 6630! without precise locality, *Scully*, 131! Calvinia; Oorlogs Kloof, Onder Bokkeveld, August, *Schlechter*, 10938! without precise locality, *Johannsen*! Ceres; between Little Doorn River and Great Doorn River, *Burchell*, 1212! Tulbagh; Tulbagh Road, September, *Schlechter*, 8999! Steendal,

*Pappe!* without precise locality, *Zeyher*, 144! Sutherland; Klein Roggeveld, *Burchell*, 1296! Laingsburg: Seven Weeks Poort on Great Zwartbergen, *Phillips*, 1389! Worcester; Hex River Valley, October, *Tyson*, 689! *Bolus*, 8014! Caledon, *Mund*, 33! Swellendam; *Ecklon & Zeyher*, 89, 9! *Zeyher!* Breede River, *Pappe!* Riversdale; near Heidelberg, October, *Galpin*, 4114! Mossel Bay; Attaquas Kloof, *Gill!* near Oudtshoorn, *Bolus*, 11952! Port Elizabeth, *Mrs. Paterson*, 161! Uitenhage; Zwartkops River, September, *Zeyher*, 256! 2505! 2507! 2771! Despatch, near Uitenhage, *I. L. Drège*, 274! 6 miles west of Uitenhage, *Bolus*, 1628! Albany; Hounslow Farm, near Grahamstown, August, September, *Galpin*, 159! near Grahamstown, October, *Daly & Sloe*, 302! *MacOwan*, 3250! in the Karroo near Bothasberg, *MacOwan*, 814! near Albany, *Bowker!* *Williamson!* Jansenville; near Loot's Kloof, *Leonard*, 814! Murraysburg, September, *Tyson*, 204! *Peddie!* Lime Drift, *Sim*, 2559! South Africa; without precise locality, *Thunberg!* *Niven!* *Mund & Maire!* *Grey!* *Verreaux!*

4. *P. Bolusii*. Phillips, n. sp.

*Frutex*. Rami cano-pubescentes. *Folia* opposita, basi contigua non connata, lineari-lanceolata, apice subobtusata, subtus carinata, 0·5–1 cm. longa, 2–3 mm. lata, crassa coriacea, utrinque molliter cano-tomentella. *Capitula* 5-flora, solitaria, terminalia, cylindrica, 1·5 cm. longa, circa 5 mm. lata. *Bractea*e involucri 4–5-seriatae, imbricatae; extimae late ovato-triangularae, apice subacutae, 3–4 mm. longae; intimae ovato-lanceolatae, circa 8 mm. longae, 5 mm. latae, paullo canescentes, breviter ciliatae. *Receptaculum* parvum, fimbriatum. *Corolla* 1 cm. longa, apicem versus sensim ampliata, costata, glabra; lobi lanceolati, 3 mm. longi. *Achenia* 5 mm. longa, infra sericeo-villosa. *Pappus* circiter 9 mm. longus, brunneo-fuscus.

A straggly shrub; branches sparingly canous-pubescent, with longitudinally splitting bark. *Leaves* opposite, contiguous but not connate at the base, linear-lanceolate, subobtusate, keeled, 0·5–1 cm. long, 2–3 mm. broad, thick and coriaceous, softly and shortly canous-tomentellous on both surfaces. *Heads* 5-flowered, solitary, terminating short leafy branchlets, cylindric, 1·5 cm. long, about 5 mm. in diameter across the middle. *Involucral bracts* 4–5-seriate, closely imbricate, the outermost broadly ovate-triangular, subacute, 3–4 mm. long, the innermost ovate-lanceolate, about 8 mm. long and 5 mm. broad, all with a distinct midrib and a broad band of short canous indumentum up the middle, the outer and intermediate ones shortly ciliate. *Receptacle* small, fimbriate. *Corolla* 1 cm. long, gradually

widened upwards, slightly ribbed, glabrous; lobes lanceolate, 3 mm. long. *Anthers* not exerted beyond the tips of the lobes. *Achenes* 5 mm. long, appressed silky-villous in the lower part. *Pappus* about 9 mm. long, brownish yellow.

DISTRIB.—Graaff Reinet; near Graaff Reinet, October, *Bolus*, 745!

5. *P. glauca*, Thunb. Prodr. 144.

A small bush 1–2 ft. high, usually trichotomously branched above; branches canous-pubescent; bark at first smooth, at length splitting. *Leaves* opposite, lanceolate or linear-lanceolate, obtuse or subacute, 4–10 mm. long, 2–2.5 mm. broad, canous-tomentose. *Heads* 4-flowered, terminal, solitary, turbinate, 1.2–1.5 cm. long, about 8 mm. in diameter across the top. *Involucral bracts* 5–6-seriate, the outermost ovate-lanceolate or oblong-lanceolate, 3 mm. long, the innermost oblong-lanceolate, all subacute, with membranous margins, a distinct midrib and a band of canous hairs up the middle. *Receptacle* fimbriate. *Corolla* 1 cm. long; tube ribbed below, widened above; lobes 1.5 mm. long, triangular-ovate, obtuse. *Achenes* 3 mm. long, obovate, much contracted at the top, villous from the lower half. *Pappus* straw-coloured, 1 cm. long.—Thunb. Fl. Cap. ed. Schult. 632; DC. Prodr. v. 36. Harv. in Harv. & Sond. Fl. Cap. iii. 107. *P. glabrata*, DC. Prodr. v. 362, not of Linn. f. *P. Candollei*, Harv. in Harv. & Sond. Fl. Cap. iii. 105. *P. latisquama*, DC. Prodr. v. 363; Drège, Zwei Pflanzengeogr. Docum. 65, 69. *P. thymifolia*, Muschler in Engl. Bot. Jahrb. xvi. 100.

DISTRIB.—Great Namaqualand to Vanrhynsdorp and through the Upper Region to Middleburg:

Great Namaqualand; Farm Hoffnung, 5000 ft., August, *Dinter*, 967! Vanrhynsdorp; Bushman's Karroo, 3000–4000 ft., November, *Drège* a! Calvinia; between Calvinia and Holle River, December, *Pearson*, 3967! Kopjes between Klipplaat and Bitterfontein, *Pearson*, 3070! Fraserburg; between Karree River and Klein Quaggas Fontein, *Burchell*, 1410! Willowmore; Aasvogel Berg, 2000 ft., August, *Drège* b! Carnarvon; Karel Kriegers grave, *Burchell*, 1589! Hanover; near Naauwpoort, *Deenon*, 17! Sutherland; near Wilgenboschfontein, Roggeveldt, *Worsdell*! Murraysburg; near the town, September, *Tyson*, 204! *Banks in Herb. Bolus*! Middleburg; Conway Farm, 3600 ft., August, *Gilfillan in Herb. Galpin*, 5528!

6. *P. cinerea*, Linn. f. Suppl. 356.

A small shrub often growing amongst rocks; branches softly canous-pubescent when young, at length glabrous. *Leaves* opposite,

slightly connate at the base, spatulate-linear, obtuse, 4–10 mm. long 2–2.5 mm. broad, coriaceous, canous-pubescent or tomentose. *Heads* terminal, solitary, turbinate-campanulate, 2–2.3 cm. long, about 1 cm. across the top. *Involucral bracts* about 8-seriate, the outermost triangular-ovate, about 5 mm. long, the innermost oblong-lanceolate, about 1.3 cm. long, all chaffy-membranous, with a distinct midrib and woolly-pubescent more or less all over the upper half outside, margins membranous and jagged. *Receptacle* pitted. *Corolla* 1.1 cm. long; tube ribbed in the lower part, glabrous; lobes lanceolate, 1.5 mm. long. *Achenes* 4–5 mm. long, densely appressed-silky-villous. *Pappus* straw-coloured, 1 cm. long.—Thunb. Fl. Cap., ed. Schult. 632; DC. Prodr. v, 358; Harv. in Harv. & Sond. Fl. Cap. iii. 100. *P. canescens*, DC. Prodr. v. 358; Drège, Zwei Pflanzengeogr. Docum. 70.

DISTRIB.—Little Namaqualand; Riet Kloof, near Bowesdorp, September, *Schlechter*, 11194! Clanwilliam; near Wupperthal, 1900 ft., October, *Bolus*, 9014! near Pakhuis, October, *Leipoldt*! Krakadouw, *Leipoldt*, 502! Calvinia; Uien Vallei, Bokkvelde Mts., 2000–2500 ft., December, *Drège* b! South Africa; without precise locality, *Thunberg*!

7. *P. ovalifolia*, DC. Prodr. v, 361.

A slender shrub; *branchlets* opposite, scantily woolly-pubescent, becoming glabrous with age. *Leaves* opposite, often with buds in their axils, free from each other and broad at the base, ovate or oblong-ovate, obtuse, white woolly-tomentose. *Heads* 13–18-flowered, sessile, solitary, narrowly campanulate, 2–3 cm. long, 1.8–2 cm. in diameter. *Receptacle* flat, honeycombed, not fimbriated. *Involucral bracts* 5–6-seriate, closely imbricate, ovate, obtuse, woolly-tomentose in the upper part outside, with narrowly membranous and slightly fimbriated margins. *Corolla* 1.8 cm. long, tubular, gradually widened above; lobes 4 mm. long, lanceolate-linear, subobtuse. *Stamens* inserted about half way down the tube; filaments 3.5 mm. long, filiform; anthers 5.5 mm. long, linear, lanceolate and acute at the apex. *Style* 1.7 cm. long, terete; style-branches 4.5 mm. long, papillose above. *Achenes* 3.5 mm. long, oblong, villous. *Pappus* about 1.5 cm. long, straw-coloured.—Drège, Zwei Pflanzengeogr. Docum. 107, 214; Harv. in Harv. & Sond. Fl. Cap. iii. 104.

DISTRIB.—Little Namaqualand, Vanrhynsdorp and Calvinia:

Little Namaqualand, *Scully*, 205! 229! Vanrhynsdorp; Ebenezer, November, *Drège*! Oliphant's River, November–December, *Pappe*! Calvinia; Kamos, February, *Ecklon*! Piquetberg, foot of mountains

on west slopes of Piquetberg Mtns., October, *Bolus*! Malmesbury; Saldhana Bay, 50 ft., September, *Bolus*, 12704! Darling? *Bachmann*, 384! Worcester, near the Hex River, *Bolus*, 5197! South Africa, without precise locality, *Masson*!

8. *P. erythrochaeta*, DC. Prodr. v. 358.

A scrubby shrub about 2 ft. high; branchlets minutely pubescent when young, at length glabrous, with greyish bark. *Leaves* ovate or ovate-lanceolate, subacute, 3–6 mm. long, 1.5–2 mm. broad, usually distinctly 1-nerved beneath, finely canous-pubescent. *Heads* 4–5-flowered, solitary, sessile, turbinate, 1–1.5 cm. long, about 8 mm. in diameter. *Involucral bracts* 5–6-seriate, lanceolate, acute or subacute, 1-nerved, finely puberulous with membranous margins tinged with red, minutely ciliate. *Corolla* 1 cm. long; lobes lanceolate, subacute, 2 mm. long. *Achenes* 3 mm. long, oblong-linear, coarsely and densely villous. *Pappus* 1 cm. long, bright purple.—Drège, Zwei Pflanzengeogr. Docum. 61; Harv. in Harv. & Sond. Fl. Cap. iii. 100.

DISTRIB.—Upper Region to George:

Fraserburg; between Karree River and Klein Quaggas Fontein, August, *Burchell*, 1403! Carnarvon; Sihiet Fontein, September, *Burchell*, 1546! Jansenville; Zwart Ruggens, Karroo Plats, 2000–3000 ft., August, Drège! Murraysburg, *Tyson*! Middleburg; Culmstock, October, *Galpin*, 5589! George, *Pappe*!

The bright purple pappus is a striking feature of this species.

9. *P. quinqueflora*, DC. Prodr. v. 363.

A small shrub 8–12 in. high; branches elongated, terete, canous pubescent, becoming glabrous with age; twigs opposite; bark brown, smooth. *Leaves* opposite, slightly connate at the base, linear or lanceolate-linear, subobtusate or subacute, 1-nerved beneath, canous-tomentellous. *Heads* 3–4-flowered, terminal, sessile, solitary, 0.9–1 cm. long, about 5 mm. in diameter, oblong. *Involucral bracts* about 4-seriate, more or less ovate, subacute, with a distinct midrib, greenish, with a band of short canous indumentum up the middle. *Receptacle* flat, honeycombed, fimbriated. *Corolla* 0.9–1.1 cm. long, tubular, 5-angled below; lobes 2.75–3 mm. long, lanceolate, subacute. *Stamens* inserted  $\frac{3}{4}$  down the corolla-tube; filaments 3–5 mm. long, filiform; anthers 4 mm. long, linear, lanceolate and acute at the apex. *Style* 9 mm. long, terete; style-branches 3–3.5 mm. long, linear, becoming lanceolate-ovate near the apex, papillous on the broadened

portion. *Achenes* 3 mm. long, obovate-oblong, villous from the base. *Pappus* reddish-brown, 1 cm. long.—Harv. in Harv. & Sond. Fl. Cap. iii. 107.

DISTRIB.—Without locality, *Ecklon and Zeyher*, 2481; Stormberg, December, *Sim!*

## SECTION II. PAPILLATAE.

### 10. *P. membranacea*, Linn. f. Suppl. 357.

*Branches* more or less quadrangular, glabrescent; branchlets terete, densely mealy-puberulous. *Leaves* opposite, oblong-lanceolate or slightly oblanceolate, acute, slightly narrowed to a broad base, 8–11 mm. long, about 3 mm. broad, rigidly chartaceous, distinctly keeled below, not visibly nerved above, densely puberulous on both surfaces. *Heads* solitary, terminal, sessile, turbinate, 2.5 cm. long, 1.5 cm. in diameter, about 13-flowered. *Involucral bracts* 6-seriate, the outermost two opposite, ovate, cuspidate, 5 mm. long, 3 mm. broad, strongly keeled, with broad membranous hyaline margins, the latter not extending to the apex, minutely puberulous on the outside; remainder of bracts with the hyaline margins continued to the apex, the innermost series oblong-lanceolate, rounded at the apex, about 1.8 cm. long and 5 mm. broad, with a broad pointed green middle portion and membranous slightly jagged hyaline margins which are broadest near the apex. *Receptacle* flat, shortly and rigidly setose. *Corolla-tube* 1 cm. long, cylindric, broader in the middle, with a sub-campanulate limb, glabrous; lobes lanceolate, subobtusate, 2 mm. long. *Anthers* 4.5 mm. long, linear, with an acute lanceolate apex. *Achenes* 3.5 mm. long, densely long-villous, contracted at the apex into a distinct glabrous neck. *Pappus* yellowish-brown when dry, slightly shorter than the corolla-tube, inserted on a distinct annulus.—Thunb. Fl. Cap. ed. Schult. 633; DC. Prodr. v. 361; Harv. in Harv. & Sond. Fl. Cap. iii. 104.

DISTRIB.—Somerset and Caledon eastward to Uitenhage:

Somerset; Boschberg, *MacOwan*, 1961! between the Zuurberg Range and Klein, Briuntjes Hoogte, 2000–5000 ft., October, *Drège* a! Caledon; Zondereinde River, November, *Zeyher*, 2773! George; Karrooeger, *Zeyher* in Herb. Kew! Zuurbergen, *Bolus*, 2324! Robertson; Kochman's Kloof, November, 800–1200 ft., *Mund*, 140! Oudtshoorn, near Cango, 2000 ft., December, *Bolus*, 11949! Uitenhage; on the hills by Port Elizabeth, February, *Ecklon & Zeyher*, 407! Redhouse, *Paterson* in Herb. Albany Mus., 2157!

11. *P. beckeoides*, DC. Prodr. v. 359.

A slender, twiggy shrub; older twigs quite glabrous; young twigs and leaves minutely pulverulent, slender. *Leaves* opposite, linear, subacute, 2-4 mm. long, 1 mm. wide, thickish, somewhat keeled, entire, powdery. *Heads* terminal, solitary, sessile, oblong-turbinate, conical at the base. 1.4-2 cm. long, glabrous. *Involucral bracts* in many rows, ovate-lanceolate, acute or acuminate, with membranous torn edges, the outer short. *Achenes* densely hairy. *Pappus* foxy.

DISTRIB.—Swellendam, *Drège*.

Known to us only from description.

12. *P. oppositifolia*, Linn. Syst. 538.

A small shrub. *Branches* densely puberulous. *Leaves* opposite, ovate or ovate-lanceolate, subacute, broad at the base, 0.5-1 cm. long, 2.5-5 mm. broad, rigidly chartaceous, flat, with a prominent midrib below, densely puberulous on both surfaces. *Heads* terminal, solitary, about 20-flowered, campanulate, 2 cm. long, about 1.25 cm. in diameter. *Involucral bracts* 5-7-seriate, closely imbricate, gradually increasing in size from below, the outer ovate-oblong, the inner oblong or linear-oblong, rounded at the base, scarious with a darker patch on the outside towards the apex, glabrous, shortly ciliate towards the apex. *Receptacle* flat, with long setose, subulate bristles. *Corolla* 9-10 mm. long, glabrous; lobes linear-lanceolate, subobtuse, 2.5 mm. long. *Achenes* 3 mm. long, villous with slender ascending white hairs, abruptly contracted and glabrescent at the apex. *Pappus* reddish, as long as the corolla-tube.—Thunb. Fl. Cap. ed. Schult. 632; DC. Prodr. v. 358; Harv. in Harv. & Sond. Fl. Cap. iii. 99.

DISTRIB.—Worcester to Mossel Bay: Worcester; on hills at Touw's River Railway Station, 2500 ft., December, *Bolus*, 7438! Swellendam, December, without collector's name in *South African Museum Herbarium*! Riversdale; between Zoetemelks River and Little Vet River, November, *Burchell*, 6837! near Riversdale, November, *Schlechter*, 1816! Mossel Bay; Attaquas Kloof, November, *Thunberg*!

13. *P. lucilioides*, DC. Prodr. v. 358.

A slender, much-branched, glaucous shrub; young branches scabrid-puberulous, at length glabrous. *Leaves* opposite, free from each other at the base, linear or subspathulate-linear, obtuse, 5-8 mm. long, about 1.25 mm. broad, very convex below, concave above, coriaceous, densely white scabrid-papillous on both surfaces. *Heads* terminal, solitary, sessile, acutely acuminate in the bud state, at length oblong-

cylindric, 2 cm. long, nearly 1 cm. in diameter, about 12-flowered. *Involucral bracts* gradually differentiated from the upper leaves, about 6-seriate, yellow when dry, the outermost oblong-ob lanceolate, about 6 mm. long and 3 mm. broad, finely puberulous down the middle outside, the intermediate ones oblong, 1.2 cm. long, 5 mm. broad, the innermost linear-oblong, 1.8 cm. long, 4 mm. broad, all scaly membranous and glabrous. *Receptacle* 3.5 mm. in diameter, deeply honeycombed. *Corolla-tube* 8 mm. long, gradually widened upwards, glabrous; lobes lanceolate, subacute, 2 mm. long. *Anthers* 4.5 mm. long. *Achenes* 6 mm. long, densely glandular and shortly setose with scattered hairs. *Pappus* straw-coloured, 1 cm. long.—Harv. in Harv. & Sond. Fl. Cap. iii. 100. *P. gymnocline*, E. Mey. in Drège, Zwei Pflanzengeogr. Docum. 94, 214, not of DC. *P. lucilioides*, var. *sparsifolia*, Harv. l.c. *P. bromoides*, S. Moore in Bull. Herb. Boiss. Ser. II. iv. 1011.

DISTRIB.—Great Namaqualand to Great Bushmanland: Great Namaqualand; without precise locality, Wyley! Chamis, September, von Trotha, 147b! Jakalskopje, Dinter, 1197! Great Karasberg, Pearson, 7917! near Aus, Marloth, 5060! Little Namaqualand; near the mouth of the Orange River, hills below 600 ft., October, Drège! TeAlee Mountains, common on lower middle slopes, January, Pearson, 6150! between Steinkopf and the Orange River, October, Phillips, 1598! Great Bushmanland; Wortel, June, Max Schlechter, 110

14. *P. scabra*, Harv. in Harv. & Sond. Fl. Cap. iii. 109.

*Branches* slender, roughly scabrid. *Leaves* alternate or subopposite, linear, obtuse, 1.5–2.5 cm. long, 2–3 mm. broad, coriaceous, with a thick prominent midrib on the lower surface, coarsely scabrid-papillous all over. *Heads* terminal, solitary, sessile, narrowly campanulate or subobconical, 2.5–3 cm. long, about 1.5 cm. in diameter, many-flowered. *Involucral bracts* 5–6-seriate, lanceolate, obtuse, the outer ones reaching nearly up to the middle of the head, 1-nerved, very finely scabrid-puberulous outside. *Receptacle* small and convex. *Corolla-tube* 1.2 mm. long, gradually widened upwards, glabrous; lobes narrowly lanceolate, obtuse, 4 mm. long, glabrous. *Achenes* 5 mm. long, villous with long silky subappressed white hairs. *Pappus* light yellow when dry, 1.5 cm. long.

DISTRIB.—Caledon; Houwhoek, Zeyher; 1000 ft., December, Bolus, 6942! Bredasdorp; near Elim, 300 ft., December, Schlechter in Herb. Bolus, 8547!



15. *P. centauroides*, DC. Prodr. v. 362.

*Branches* fairly slender, subterete, scabrid-papillous. *Leaves* opposite or subopposite, free from each other at the base, linear or linear-lanceolate, subacutely mucronate, 1–2 cm. long, 1·5–4 mm. broad, coriaceous, with a slightly prominent midrib on the lower surface, scabrid-papillous on both surfaces. *Heads* terminal, solitary, pedunculate, cylindric, 2·5–3 cm. long, about 1·3 cm. in diameter, about 25-flowered. *Involucral bracts* 6–7-seriate; the outer ovate, about 0·5 cm. long; the intermediate oblong, 1·5 cm. long, about 0·5 cm. broad; the innermost linear, 2 cm. long, about 4 mm. broad; all rounded at the apex and with extremely narrowly membranous margins, scaly, glabrous. *Receptacle* quite flat, honeycombed, fimbriolate, about 6 mm. in diameter. *Corolla-tube* 1·2 cm. long, gradually widened upwards, glabrous; lobes linear-lanceolate, obtuse, 2·5 mm. long, glabrous. *Achenes* 7 mm. long, compressed, obovate-oblancheolate, villous with long silky appressed hairs. *Pappus* brownish-yellow when dry, 1·3 cm. long.—Harv. in Harv. & Sond. Fl. Cap. iii. 105.

**DISTRIB.**—Worcester; Dutoit's Kloof, 1900–2000 ft., October–January, Drège!

16. *P. undulata*, DC. Prodr. v. 361.

A shrub; main branches light coloured, with longitudinally splitting bark; flowering branchlets slender, minutely viscid-puberulous. *Leaves* opposite, free from each other at the base, obovate, narrowed into a short petiole, 0·5–1·5 cm. long, about 0·8 cm. broad, with strongly twisted and crinkled margins, more or less viscid, coriaceous, scabrid on the margins and midrib. *Heads* 3–6 at the ends of the branchlets, 3–4-flowered, pedunculate, somewhat turbinate, 1·5–2 cm. long; peduncles 0·5–1·5 cm. long, slender, scabrid-puberulous, with a pair of small oblong opposite bracts at the base of the involucre. *Involucral bracts* about 3-seriate, gradually longer upwards; the outermost oblong-lanceolate, subacute, about 2 mm. long; the innermost linear-oblancheolate, obtuse, about 8 mm. long and 2 mm. broad; all membranous and glabrous. *Receptacle* very small. *Corolla* gradually widened upwards, 1 cm. long, glabrous; lobes linear-lanceolate, subacute, 2·5 mm. long. *Anthers* scarcely exerted from the tips of the corolla lobes. *Achenes* somewhat compressed, abruptly contracted at the apex, 5 mm. long, slightly pubescent and glandular. *Pappus* 1 cm. long, nearly white.—Drège, Zwei Pflanzengeogr. Docum. 90, 95, 214; Harv. in Harv. & Sond. Fl. Cap. iii. 104.

**DISTRIB.**—Little Namaqualand: Modderfontein, 1500–2000 ft.,

August, *Drège a!* Silver Fontein, near Ookiep, 2000–3000 ft., September, October, *Drège b!*

17. *P. divaricata*, Less. Syn. Comp. 196.

A scrubby bush 4–8 ft. high; branchlets opposite, finely puberulous. *Leaves* opposite, shortly petiolate, obovate-elliptic or sometimes nearly orbicular, narrowed at the base, 2–3 cm. long, 1–2 cm. broad, trinerved from the base, subcoriaceous, flat, finely scabrid-puberulous on both surfaces and on the margin. *Heads* corymbose, several at the end of each branchlet, pedunculate, about 5-flowered, turbinate, about 1·5 cm. long; peduncles up to 1·5 cm. long, slender, densely puberulous. *Involucral bracts* 4–5-seriate; the outermost broadly ovate, about 2·5 mm. long; the innermost linear-oblong, obtuse or subacute, 8 mm. long; all membranous and often bright green when dry, glabrous. *Receptacle* small. *Corolla* 1–1·2 cm. long, gradually widened upwards, ribbed and pubescent below the middle; lobes linear-lanceolate, acute, 3 mm. long. *Anthers* exerted. *Achenes* 5 mm. long, sparingly pubescent, glandular. *Pappus* 0·8–1 cm. long, nearly white or reddish-white.—DC. Prodr. v. 357; Harv. in Harv. & Sond. Fl. Cap. iii. 99.

DISTRIB.—Great Namaqualand to the Cape Div.:

Great Namaqualand: Kubub, March, *Schinz*, 697! Khamiesberg; above Twee Rivieren, September, *Pearson*, 6764! Little Namaqualand; Spektakel, 1200 ft., September, *Bolus*, in Herb. Norm. Austro-Afric., 398! near Ookiep, November, *Morris in Herb. Bolus*, 5669! Rietfontein, 2500 ft., *Pearson*, 3770! Calvinia; Blaukrantz Pass, December, *Pearson*, 4958! Bushmanland; Kopjes, Nieuwfontein, *Pearson*, 3469! Clanwilliam; Clanwilliam, *Mader*, 2178! Ram's Kop, *Leipoldt*, 88! Lambert's Bay, August, *Schlechter*, 8542! Blauwberg, *Zeyher*, 818! near Oliphant's River, *Pappe!* Koeberg, *Pappe!* Piquetberg; near Goedverwacht, *Bolus*, 13565! Malmesbury; Riebeck's Castle, below 1000 ft., November, *Drège a!* Saldhana Bay, *Bolus*, 12703! Cape; plains near Cape Town, *Niven*, 22! South Africa; without precise locality, *Zeyher*, 139! 244! *Masson!* *Pearson*, 3404! 5020!

SECTION III. CILIATAE.

18. *P. camphorata*, Linn. Sp. Pl. ed. II. 1176.

A shrub 1–3 ft. high; branches pale, scabrid with small hook-like short setae. *Leaves* tufted, or if scattered then alternate, acicular, acute, glabrous except for a row of short white teeth on each infolded margin, 1–1·3 cm. long, about 1 mm. thick, much shorter than

the flower-heads. *Heads* terminal, solitary or often up to 5 in a corymb, well exerted from the leaves, pedunculate, the peduncles bearing smaller leaves, subcampanulate, about 1.5 cm. long and the same in diameter. *Involucral bracts* about 5-seriate, shorter than the flowers; the outermost linear or linear-lanceolate, acute, about 3 mm. long; the intermediate lanceolate, acute, with a distinct keel in the upper half; the innermost linear-lanceolate, about 1 cm. long, acute; all straw-coloured or brownish straw-coloured and shortly and closely ciliate, otherwise glabrous. *Receptacle* setose and deeply pitted. *Corolla* yellow, 1 cm. long, gradually widened upwards, very sparingly pubescent; lobes linear-lanceolate, acute, 2 mm. long. *Achenes* 3–4 mm. long, flattened, glabrous and shining. *Pappus* sub-uniseriate, connate into a ring at the base, about 1 cm. long, whitish straw-coloured.—Thunb. Fl. Cap. ed. Schult. 629, partly; Harv. in Harv. & Sond. Fl. Cap. iii. 110, partly; Lamark Ill. t. 667; *P. aspera*, Thunb. Fl. Cap. ed. Schult. 631; *P. camphorata*, var. *aspera*, Harv. l.c.; *P. crassifolia*, Poir. Encycl. v. 731 ?; *P. camphorata*, var. *armata* Harv. l.c. partly; *P. laricina*, Hoult ex DC. Prodr. v. 364.

DISTRIB.—Bushmanland to Piquetberg and around the Cape Districts generally, to Bredasdorp:

Bushmanland; Beacon Hill, Khamiesberg, 2 miles south-east of Leliefontein, near summit, 5400 ft., January, *Pearson*, 6354! Clanwilliam; Oliphant's River Mtns. 600 ft., September, *Schlechter*, 5112! Piquetberg; stony and rocky mountain places, 1000–2000 ft., June, *Drège* a! Tulbagh; *Pappe*! Malmesbury; near Groene Kloof, 300 ft., November, *Bolus*, 4286! Hoetjes Bay, 150 ft., September, *Bolus*, 12705! Cape Peninsula; Kirstenbosch, *Zeyher*, 4796; Simon's Bay, *Wright*! roadsides towards Chapman's Bay, September, *Wolley Dod*, 1552! Bredasdorp; Zeekoe Vlei, August, *Schlechter*, 8483! South Africa; without precise locality, *Pappe*! *Zeyher*! *Wallich*, 809! *Lindley*! *Villette*!

Var. *armata*, Harv. l.c., partly.

*Leaves* rigidly setose all over the surface. *P. camphorata*, *Drège* Zwei Pflanzengeogr. Docum. 75.

DISTRIB.—Oliphants River Mountains; lower slopes of mountains behind Farmer's Baths, September, *Stephens*, 6961! Clanwilliam; near Honig Vallei and on the Koude Berg, 3000–4000 ft., December, *Drège* b! Piquetberg; near Goedverwacht, October, *Bolus*, 13564! South Africa; without locality, *Niven*, 90! *Auge*!

Var. *laevigata*, Harv. l.c.

*Stems* and *leaves* quite glabrous, the latter often more scattered than in the type and opposite or subopposite.

DISTRIB.—Vanrhynsdorp; Gift Berg, 1500–2500 ft., *Drège* d! Piquetberg; near 24-Rivers, *Zeyher*, 810! Ceres; near Elandsfontein, 5200 ft., January, *Schlechter*, 10017!

Var. *longifolia*, Harv. l.c.

*Stems* and *branches* finely setulose. *Leaves* 3–5 cm. long, often overtopping the flower-heads, very sparingly ciliate towards the base or glabrous.

DISTRIB.—Paarl; Paarl Mt., 1000–2000 ft., November and December, *Drège* a! 1000 ft., October, *Bolus*, 3175! Drakenstein, near Wellington, 2000 ft., November, *MacOwan*, in Herb. Norm. Austro-Afric., 143! French Hoek, *Phillips*, 1161! Robertson; Kochmans Kloof, November, *Mund*, 142! Caledon; Zondereinde River Valley, near Villiersdorp, 1200 ft., November, *Bolus*, 4286! Worcester; mts. above Worcester, *Rehmann*, 2654! South Africa; without precise locality, *Zeyher*, 2776!

*P. camphorata* seems to be a polymorphic species as regards the arrangement and the surface-covering of the leaves, varying from opposite to alternate in var. *laevigata*, alternate in the other forms, and from entirely glabrous in var. *laevigata* to densely setose all over the surface in var. *armata*. These differences, however, are not associated with any others, the flower-heads being identical in all.

19. *P. stricta*, Ait. Hort. Kew, ed. I. iii. 162.

A shrub; branches strigose-pubescent. *Leaves* dense, clustered or alternate, acicular, acute, subterete, 1–2 cm. long, fleshy, with a few cilia on the lower part or sometimes nearly glabrous. *Heads* corymbose at the ends of the principal branches, each terminating a short lateral branch, campanulate, about 2 cm. long and about 1.5 cm. in diameter. *Involucral bracts* 5–6-seriate, exceeding the flowers, greenish when dry, all linear or linear-lanceolate, conspicuously tailed-acuminate, and very prominently ribbed, very slightly ciliolate, otherwise glabrous. *Receptacle* honeycombed. *Corolla* green? about 1 cm. long, ribbed and sparsely puberulous in the lower part, gradually widened from the middle upwards; lobes lanceolate, subacute, 1.5 mm. long. *Achenes* glabrous, somewhat flattened and elliptic when ripe, 5 mm. long, smooth and shining, with thickened lighter

coloured margins. *Pappus* about 8 mm. long, 1-seriate, straw-coloured, the setae shortly pilose and connate into a ring at the base.—DC. Prodr. v. 364; Drège, *Zwei Pflanzengeogr. Docum.* 64. *P. chryso-comifolia*, Poir. Encycl. v. 732. *P. camphorata*, var. *stricta*, Harv. in Harv. & Sond. Fl. Cap. iii. 110.

DISTRIB.—Robertson to George and Prince Albert: Robertson; Outeniqua Mts., Robertson Pass, *Hops*, 67! Swellendam, *Mund*! George; Oliphant's River, *Gill*! Lange Kloof, *Zeyher*, 257! Prince Albert; Great Zwartbergen Range, 3000–4000 ft., August, *Drège* a! c. 4050 ft., November, *Marloth*, 2475! c. 5000 ft., December, *Bolus* 11522! South Africa; without precise locality, *Thunberg*!

Var. *longifolia*, Phillips, var. nov.

Leaves up to 4.5 cm. long.

DISTRIB.—Prince Albert; stony places at summit of the Zwartberg Pass, c. 5000 ft., December, *Bolus*, 11523!

In appearance this is very similar to *P. camphorata*, var. *longifolia*, but can at once be distinguished from it by the tailed-acuminate inner involucre bracts, which are not ciliated.

20. *P. onobromoides*, DC. Prodr. v. 364.

A bush 1–3 ft. high; branches glabrous, with smooth light-coloured bark. *Leaves* alternate, linear or broadly linear, obtuse or subacute, truncate at the base, 2–4 cm. long, 3–5 mm. broad, flat or concave above, distinctly 1-nerved beneath, glabrous and wrinkled when dry, closely pectinate-setose on the margins with acute ivory-white teeth. *Heads* solitary, terminal, sessile, numerous-flowered, campanulate, 3.5 cm. long, about 1.5–2.5 cm. in diameter. *Receptacle* about 8 mm. broad, slightly concave, honeycombed and fimbriate. *Involucre bracts* about 7-seriate; the outermost ovate, about 8 mm. long; the others gradually becoming narrower; the innermost linear-oblong, obtuse or truncate at the apex, glabrous, chaffy-coriaceous. *Corolla* 2 cm. long, with a slender ribbed tube, glabrous; lobes linear-lanceolate, acute, 3.5 mm. long. *Achenes* compressed, oblanceolate, 7 mm. long, covered with golden glands, not hairy. *Pappus* 1.5 cm. long, brownish-yellow.—Harv. in Harv. & Sond. Fl. Cap. iii. 109.

DISTRIB.—Little Namaqualand to St. Helena Bay, Piquetberg: Little Namaqualand; Port Nolloth, sandy flats near the coast, *Atherstone*, 6! Among bushes near Oograbies Poort, September, *Bolus*, 8349! Port Nolloth, January, *Galpin and Pearson*, 7651! without precise locality, *Ecklon and Zeyher* (ex Harv.) *Scully*, 220! Van-

rhynsdorp; Ebenezer, on dry stony hills below 500 ft., November, Drège! Clanwilliam; Vogelfontein, Zeyher, 816! Piquetberg; Elandsberg and towards Verloren Valley, and near St. Helena Bay, Wallich!

According to Dr. Atherstone, who collected in Little Namaqualand in 1856, this species grows in the sandy flats near the coast at Port Nolloth. The leaves are succulent and very aromatic, and, mixed with fat, used by the Namaquas and Bastards as a perfume under the name of "Buchu." It is called "Sab" in the Namaqua language, and is dried and collected for sale.

21. *P. villosa*, Linn. f. Suppl. 356.

A shrub, branches woolly villous, with whitish hairs which at length fall off. *Leaves* alternate, spathulate-linear, obtuse, 0·8–1 cm. long, 1·5–2 mm. broad, concave above, convex below, setose on the margin and often also on the lower surface. *Heads* solitary, terminal, broadly campanulate, about 1·5 cm. long and 1–1·3 cm. in diameter. *Involucral bracts* 5–7-seriate; the outermost oblong-elliptic, rounded at the apex, about 4 mm. long, glabrous, with finely membranous hyaline margins which at length become jagged; the innermost oblong, about 1 cm. long with rounded slightly broader apices and more membranous than the outer ones. *Receptacle* not examined. *Corolla-tube* gradually widened upwards, nearly 1 cm. long, glabrous, lobes linear-lanceolate, subacute, 2 mm. long. *Achenes* about 5 mm. long, very densely appressed silky-villous. *Pappus* brownish straw-coloured, 8–10 mm. long.—Thunb. Fl. Cap. ed. Schult. 631; Harv. in Harv. & Sond. Fl. Cap. iii. 105.

**DISTRIB.**—Calvinia; "Hantam and in the Karroo below Bockland," October, Thunberg!

22. *P. inflexa*, Thunb. ex Linn. f. Suppl. 356.

A small, sparingly branched undershrub with an elongated spirally twisted stout stem and longitudinally splitting bark; branches sparingly pubescent. *Leaves* opposite, oblong or oblong-elliptic, rounded at the apex, 0·5–1·5 cm. long, 3–5 mm. broad, coriaceous, setulose-pubescent and glandular on both surfaces. *Heads* solitary at the ends of short branchlets, cylindric-campanulate, 1·5–2 cm. long, about 1 cm. in diameter, many-flowered. *Involucral bracts* about 6-seriate, all suborbicular with a sharply defined membranous margin 1 mm. wide, sparingly glandular outside, otherwise glabrous. *Receptacle* nearly flat, nearly 5 mm. in diameter. *Corolla* 1 cm. long, gradually widened from near the base upwards, glabrous; lobes

lanceolate, subacute, 1·5 mm. long. *Achenes* 4 mm. long, thinly villous. *Pappus* as long as the corolla, straw-coloured.—Linn. Syst. Veg. 1202; Linn. f. Suppl. 356; Harv. in Harv. & Sond. Fl. Cap. iii. 99. *P. lupulina*, DC. Prodr. v. 357.

DISTRIB.—Calvinia; Bitterfontein, *Zeyher*, 3097! Fraserburg; between Zak River and Kopjes Fontein, September, *Burchell*, 1495! South Africa, without precise locality, *Masson*!

23. *P. punctata*, Phillips, n. sp.

*Frutex* parvus. *Ramuli* minute albo-pubescentes, demum glabri. *Folia* opposita, superiora aliquando alternata, obovato-oblonga vel lineari-oblonga, apice obtusa, basi angustata, 0·5–1·9 cm. longa, 3–6·5 mm. lata, plana, punctata, glabra, ciliata. *Capitula* multiflora, terminalia, solitaria, sessilia, 1·5–1·7 cm. longa, cylindrico-campanulata. *Bracteae* involucri 5–7-seriatae, imbricatae, oblongo-orbiculatae, supra saccatae, marginibus membranaceis. *Corolla* 1 cm. longa; lobi 1·5 mm. longi, ovati vel lanceolati, apice subacuti. *Filamenta* 2·5 mm. longa, filiformia; antherae 4 mm. longae, lineares, apice subacutae. *Achaenia* 3 mm. longa, oblonga, dense appresso-villosa. *Pappus* pallidus.

A small shrub with the habit of *P. inflexa*; branchlets minutely whitish pubescent, becoming glabrous with age. *Leaves* opposite or sometimes the upper ones alternate, obovate-oblong to linear-oblong, obtuse, narrowed at the base, 0·5–1·9 cm. long, 3–6·5 mm. broad, flat, punctate with black dots, glabrous, setulosely ciliate. *Heads* many-flowered, terminal, solitary, sessile, 1·5–1·7 cm. long, cylindric-campanulate. *Involucral bracts* 5–7-seriate, closely imbricate, oblong-orbicular, prominently saccate below the apex, with membranous margins, glabrous. *Corolla* 1 cm. long; lobes 1·5 mm. long, ovate or lanceolate, subacute. *Stamens* inserted about  $\frac{2}{3}$  down the tube; filaments 2·5 mm. long, filiform; anthers 4 mm. long, linear, subacute. *Achenes* 3 mm. long, oblong in outline, densely appressed-villous. *Pappus* light straw-coloured, as long as the corolla.

DISTRIB.—Worcester through the Karroo to Jansenville and Cradock:

Worcester; between Worcester and Beaufort West, *Rogers*, 2466! Murraysburg, around Murraysburg, *Tyson*! Jansenville; near Loots Kloof, November, *MacOwan*, 1803! Graaff Reinet; in plains near Graaff Reinet, November, *Bolus*, 630! Middleburg; Conway Farm, 3600 ft., August, *Gillfillan* in *Herb. Galpin*, 5529! Cradock; near Cradock, *Rogers* in *Herb. Bolus*!

This species is very closely allied to *P. inflexa*, Thunb., with which

it has been associated in Herbaria. The glabrous leaf-surfaces, the more strikingly saccate involucreal bracts, and its more easterly distribution seem sufficient to distinguish it.

24. *P. utilis*, Hutchinson, n. sp.

*Frutex* circiter 30 cm. altus. *Rami* prostrati; ramuli setuloso-pilosi. *Folia* opposita, basi libera, lanceolata vel elliptico-lanceolata, apice acuta, mucronata, basi angustata, 1.5-2.5 cm. longa, 0.4-1 cm. lata, coriacea, unicostata, utrinque marginibusque pilis albis setosa. *Capitula* terminalia, solitaria, subsessilia, campanulata, 2-2.5 cm. longa, circa 1.5 cm. lata. *Bracteae* involucri circiter 5-seriatae, lanceolatae, apice acutae; extimae circiter 4 mm. longae; intimae circa 1.3 cm. longae; omnes paullo carinatae, glabrae, marginibus minute ciliatis. *Receptaculum* concavum, alveolatum, circiter 0.8 cm. latum. *Corolla* lutea, subcylindrica, superne sensim dilatata, 1.3 cm. longa, medio tenuiter puberula, costata; lobi lineari-lanceolati, apice acuti, 2 mm. longi. *Achaenia* 4-5 mm. longa, dense albo-villosa. *Pappus* pallidus, 1 cm. longus.

A bush about 30 cm. high, with prostrate branches; branchlets setulose-pilose. *Leaves* opposite, free from each other at the base, lanceolate or elliptic-lanceolate, acutely mucronate, narrowed to the base, 1.5-2.5 cm. long, 0.4-1 cm. broad, coriaceous, 1-nerved, setose-pilose with white hairs on the margins of both surfaces. *Heads* terminal, solitary, subsessile, campanulate, 2-2.5 cm. long, about 1.5 cm. in diameter. *Involucreal bracts* about 5-seriate, lanceolate, acute, the outermost about 4 mm. long, the innermost about 1.3 cm. long, all slightly keeled, chaffy and darker-coloured in the middle with minutely ciliolate margins, otherwise glabrous. *Receptacle* concave, honeycombed, about 0.8 cm. in diameter. *Corolla* yellow, subcylindric, gradually widened upwards, 1.3 cm. long, finely puberulous about the middle, ribbed; lobes linear-lanceolate, acute, 2 mm. long. *Achenes* 4-5 mm. long, densely villous with whitish hairs. *Pappus* straw-coloured, 1 cm. long.

DISTRIB.—Piquetberg; Upper south-west slopes above Pickenier's Pass, November, *Pillans*, 5114! South side of summit above Kradouw Krantz, November, *Pillans*, 5316!

*Pillans* states that the shoots are eaten by stock.

25. *P. adenocarpa*, Harv. in Harv. & Sond. Fl. Cap. iii. 109.

A rigid shrub 1-2 ft. high. *Branches* glabrous; bark smooth when young, becoming rougher with age. *Leaves* opposite, oblong-oblanco-



late or obovate-elliptic, acute or subacute, narrowed to and slightly connate at the base, 1-1.3 cm. long, 0.5-1 cm. broad, punctate on both surfaces with shortly setulose-ciliate margins. *Heads* terminal, solitary, obconic, about 3 cm. long and 1.5 cm. in diameter. *Involucral bracts* 5-6-seriate; the outer ones broadly ovate; the innermost oblanceolate, rounded or truncate at the apex, glabrous, with membranous and sometimes slightly jagged margins. *Receptacle* small. *Corolla-tube* 1.3 cm. long, cylindrical, glabrous; lobes lanceolate, subacute, 3.5 mm. long. *Anthems* 6 mm. long, acute. *Achenes* 7 mm. long, rather densely covered with subsessile golden glands and rarely with a few long hairs. *Pappus* bent near the base, 1.5 cm. long, brownish when dry.—*P. viscosa* DC. Prodr. v. 364, not of Thunb.

DISTRIB.—From Worcester north to Victoria West, and east to Albany:

Worcester; near Worcester, November, *Pappe*! Tulbagh; Winterhoek, *Ecklon and Zeyher*! Sutherland; Great Riet River, August, *Burchell*, 1382! near Sutherland, August, *Burchell*, 1383; Fraserburg; between Karree River and Klein Quaggas Fontein, August, *Burchell*, 1409! Beaufort West; Courland's Kloof, Nelspoort, July, *Pearson*, 1471! 1485! Victoria West; on the hills near Victoria West, *Shaw*, 1241! Graaff Reinet; near Graaff Reinet, June, *Bolus*, 513! 3500 ft., December, *F. Bolus in Herb. Bolus*, 11950! Murraysburg; near the way to the "Cave," June, *Tyson*, 215! Willowmore; between Great Zwartbergen and Aasvogel Berg, 2000 ft., August, *Drège* a! Somerset; Zwarttruggens, *MacOwan*, 1960! Albany, *Bowker*!

26. *P. Mooreiana*, Hutchinson, n. sp.

*Rami* crassi; ramuli tenuiter puberuli. *Folia* plana, opposita, oblongo-elliptica vel oblongo-oblanceolata, apice obtusa, basi paullo cuneata, 1-1.5 cm. longa, 3-7 mm. lata, coriacea, marginibus scabrido-serrulatis, aliter glabra, frequenter a basi 3-nervis distinctis aequidistantibus. *Capitula* solitaria, cylindrica vel cylindrico-obconica, 3 cm. longa, circa supra 1.5 cm. lata. *Bractee* involucri circa 7-seriatae, ovatae ad oblongo-lanceolatae, marginibus membranaceis, glabrae. *Corolla* 1.5 cm. longa, inferne costata, superne paullo dilatata pubescentia; lobi lineari-lanceolati, apice obtusi, 1.5 mm. longi. *Achaenia* villosa. *Pappus* pallidus, basi connatus, 1.5 cm. longus.

*Branches* stout, blackish when dry; young branchlets finely and closely puberulous. *Leaves* flat, opposite, oblong-elliptic or oblong-oblanceolate, obtuse, very slightly connate at the base, 1-1.5 cm.

long, 3-7 mm. broad, coriaceous, with finely scabrid-serrulate margins resembling the edge of a very fine saw, otherwise glabrous, frequently with 3 distinct parallel nerves from the base. *Heads* solitary, cylindrical or cylindrical-obconic, 3 cm. long, about 1.5 cm. across the top. *Involucral bracts* about 7-seriate, ovate to oblong-lanceolate, chaffy with broad membranous margins, glabrous. *Corolla* 1.5 cm. long, ribbed in the lower, a little expanded and slightly pubescent in the upper half; lobes linear-lanceolate, obtuse, 1.5 mm. long. *Achenes* villous. *Pappus* straw-coloured, connate at the base into a ring, 1.5 cm. long.

DISTRIB.—South Africa; without locality, *Masson in Herb. Mus. Brit.!*

A very fine species closely allied to *P. adenocarpa*, Harv., but distinguished by its conspicuously puberulous branchlets, frequently trinerved leaves with very finely and densely scabrid-ciliolate margins. Unfortunately there is no record of the locality in which Masson collected the specimen. Named in compliment to Mr. Spencer Moore, of the Natural History Museum, South Kensington.

27. *P. hirsuta*, Linn. f. Suppl. 356.

A small much-branched shrub 1-1½ ft. high; branchlets terete, rather densely setose-pilose. *Leaves* opposite, almost free from each other at the base, lanceolate or linear-lanceolate, obtuse, 0.7-1.4 cm. long, up to 5 mm. broad, coriaceous, flat, distinctly 1-nerved, prominently setose-ciliate or pilose on the margin and often on the back of the midrib. *Heads* 15-25-flowered, solitary, sessile, terminal, cylindrical or campanulate, 2-3 cm. long, 1-1.5 cm. in diameter. *Involucral bracts* gradually changed from the foliage, 4-5-seriate, the outermost strongly ciliate like the leaves, the innermost oblong or linear-oblong, about 2 cm. long and 7 mm. broad, chaffy, glabrous, with very narrowly membranous finely jagged margins. *Receptacle* long-setose. *Corolla* 1.7 cm. long, narrowly cylindrical and ribbed towards the base, gradually widened upwards, glabrous; lobes linear, subacute, 3.5 mm. long. *Anthers* slightly exerted beyond the tips of the corolla. *Achenes* flattened, 8 mm. long, appressed-villous. *Pappus* brownish-yellow, 1.4 mm. long.—Thunb. Fl. Cap. ed. Schult. 631; Harv. in Harv. & Sond. Fl. Cap. iii. 103, incl. var. *vera*, Harv.; *P. retorta*, Linn. f. Suppl. 356. *P. uniflora*, Poir. Encycl. v. 733.

DISTRIB.—Malmesbury through the Coast Region to Mossel Bay; Malmesbury; between Eikenboom and Riebeeck Kasteel, below 1000 ft., October, *Drège* b! Tulbagh; Winterhoek, November, *Pappe*! near Saron, October, *Schlechter*, 10617! Worcester; Breede River, November, *Ecklon and Zeyher*, 48! Paarl; Paarl Mountain, 1000-2000 ft.,

November–December, *Drège* a ! Cape ; between Cape Town and Table Mountain, on the plain, December, *Burchell*, 61 ! towards Camp's Bay, October, *Dümmmer*, 1995 ! Cape Town, *MacOwan* ! *Pappe* ! Swellendam, *Kennedy*. Mossel Bay ; between Duyker River and Gauritz River, November, *Burchell*, 6380 ! between Little Brak River and Hartenbosch, October, *Burchell*, 6208 ! South Africa ; without precise locality, *Bowie* ! *Masson* ! *Nelson* ! *Niven* !

Var. *Cephalotes*, Harv. in Harv. & Sond. l.c.

*Branches* and margins of leaves shortly setose but not pilose.—*P. cephalotes*, Linn. f. Suppl. 358 ; Thunb. Fl. Cap. ed. Schult. 631 ; DC. Prodr. v. 361.

DISTRIB.—Riversdale ; hills near Zoetsmelks River, November, *Burchell*, 6792 ! “South Africa,” *Thunberg* !

Var. *glabra*, DC. Prodr. v. 361.

*Leaves* glabrous or nearly so.—Harv. in Harv. & Sond. Fl. Cap. iii. 103.

DISTRIB.—In the Karroo, without precise locality, *Ecklon and Zeyher* !

28. *P. elongata*, Thunb. Fl. Cap. ed. Schult. p. 631.

*Branches* shortly pubescent ; bark greyish, smooth, becoming rougher with age ; young branchlets short and twiggy. *Leaves* opposite, not connate at the base, linear, obtuse or subacute, 0·6–1·2 cm. long, concave above, strongly keeled beneath, glabrous on both surfaces, with sharp rough cartilaginous teeth on the margin, those subtending the heads scarcely toothed. *Heads* about 40-flowered, terminal, solitary, sessile, obconic, about 3 cm. long, 1·5–2·5 cm. in diameter. *Involucral bracts* 5–6-seriate, ovate-elliptic, oblong or oblong-linear, obtuse to acute, glabrous, with membranous and somewhat jagged margins, especially in the upper half. *Receptacle* concave, rather narrow. *Corolla-tube* widened above, slightly bent about the middle, 1·5 cm. long ; lobes lanceolate, obtuse or subobtuse, 2·5 mm. long. *Stamens* inserted about the middle of the tube ; filaments 4·5 mm. long ; anthers linear, acute, 5·5 mm. long. *Style* terete, gradually thickened above, 1·5 cm. long ; branches subacute, 5 mm. long, papillose on the upper third. *Achenes* oblong-obovoid, 6 mm. long, with a tufted ring of hairs at the base about 4 mm. long, otherwise glabrous or nearly so. *Pappus* 1·6 cm. long, yellowish-brown.—DC. Prodr. v. 362 ; Harv. in Harv. & Sond. Fl. Cap. iii. 108.

DISTRIB.—From Swellendam along the Coast districts to Port Elizabeth :

Swellendam; between Swellendam and Breede River, January, *Burchell*, 7442b! Riversdale; Albertina, *Muir*, 884! Humansdorp, *Kennedy*! Uitenhage; between Coega River and Sunday River, on chalk flats below 1000 ft., December, *Drège*! Sunday River, *Zeyher*, 242! Port Elizabeth, November, *Kennedy*, 215! *Kemsley in Herb. Albany Mus.*, 1087! South Africa: without precise locality, *Thunberg*! *Verreaux*! *Mund*

Compared with the type specimen in Thunberg's Herbarium.

29. *P. staehelinoïdes*, DC. Prodr. v. 364.

A rigid, scrubby bush; branches pubescent with very short rigid reflexed white hairs, becoming glabrous with age. *Leaves* opposite, linear or linear-lanceolate, acute, 1.3–2 cm. long, free at the base, flat or concave above, keeled beneath, rigidly ciliate, otherwise glabrous. *Heads* about 28-flowered, sessile, terminal, solitary, cylindric-campanulate, 2.5–3 cm. long, about .2 cm. in diameter. *Involucral bracts* 7-seriate, from ovate to ovate-lanceolate, subacute or subobtusate, very minutely puberulous outside, with membranous margins. *Corolla* 1.5 cm. long, ribbed, gradually widened upwards, glabrous; lobes lanceolate, subacute,  $\frac{3}{4}$ –1 in. long. *Anthers* slightly exerted. *Achenes* 4 mm. long, glabrous except for a tuft of hairs at the base and a few very small glands. *Pappus* 1.5 cm. long, dull white.—Harv. in Harv. & Sond. Fl. Cap. iii. 109

DISTRIB.—George, Prince Albert, and Fraserburg, eastward to Albany and Graaf Reinet:

George; Gauritz River, *Ecklon and Zeyher*, 250! Uitenhage; Cradock, *Pappe*! Koegakamma Kloof, *Ecklon and Zeyher*, 2775! Port Elizabeth; Red House, *West*, 105! Albany; Niemand's Kraal, June, *MacOwan*. 1159! Prince Albert; Great Zwarte Berg Range, on stony hills 3000–4000 ft., July, *Drège a*! Near Prince Albert, 2600 ft., December, *Bolus*, 11948! Mountain slopes, June–July, *Glover*, 2687! Fraserburg; between Karree River and Klein Quaggas Fontein, August, *Burchell*, 1428! Graaff Reinet; *Ecklon and Zeyher*, 147! In stony and rocky mountain places, 3000–4000 ft., August, *Drège b*; May, *Burchell*, 2921! Stony hillsides, Bruintjes, Hoogte, near the Hotel, c. 3200 ft., September, *MacOwan*, 1953! South Africa, without precise locality, *Mund and Maire*! *Harvey*!

30. *P. viscosa*, Thunb. Prod. Fl. Cap. 144.

A shrublet 1–2 ft. high; branchlets covered with greyish-white glabrous bark. *Leaves* opposite, contiguous but only slightly connate

at the base, lanceolate or oblong-lanceolate, slightly mucronate, 0·8–1 cm. long, about 4 mm. broad, keeled, shortly setulose-ciliate on the margin and often on the lower surface, especially the keel, thick and fleshy. *Heads* about 15-flowered, terminal, solitary, obconic, 2–2·5 cm. long, about 1·5 cm. in diameter. *Involucral bracts* about 5-seriate; the outermost broadly ovate, subacute, about 8 mm. long, scaly; the innermost linear-lanceolate, acute, about 1·5 cm. long, membranous, scaly, all rugulose in the upper part outside. *Receptacle* small and honeycombed. *Corolla* slender, 1·2 cm. long, slightly angular at the base, glabrous; lobes ovate-lanceolate, subacute, 1·25 mm. long. *Anther* tips produced very slightly beyond the tips of the corolla lobes. *Achenes* closely packed, compressed, obovate, 7 mm. long, 4 mm. broad, with strongly ribbed margins, quite glabrous over the surface, but sometimes with 2 or 3 long hairs on the ribs. *Pappus* straw-coloured, as long as the corolla.—Thunb. Fl. Cap. ed. Schult. 632; DC. Prodr. v. 364; Drège, Zwei Pflanzengeogr. Docum. 61; Harv. in Harv. & Sond. Fl. Cap. iii. 108.

DISTRIB.—Great Namaqualand through Calvinia to Prince Albert: Great Namaqualand; 18 km. west of Aus, February, *Pearson*, 3677! Calvinia; Hautum, October, *Thunberg*! Graaff Reinet; near Stoepjes, 2500 ft., November, *Bolus*, 2323! Jansenville: Zwart Ruggens, on dry stony hills, 2500–3000 ft., August, *Drège* b! Faserburg: between Karree River and Klein Quaggas Fontein, near Fraserburg, August, *Burchell*, 1323! Prince Albert; on stony hills, near Prince Albert, about 2300 ft., December, *Bolus*, 11524!

31. *P. glomerata*, Linn. f. Suppl. 356.

A small scrubby bush up to about 1 ft. high; branches glabrous, sometimes viscid towards the apex, with short internodes. *Leaves* opposite, usually very crowded and tufted, oblong or oblong-lanceolate, obtuse, very slightly connate at the base, about 2 mm. long or less, fleshy, very minutely puberulous or almost glabrous on the margins. *Heads* terminal, solitary, subcampanulate, 2 cm. long, about 1 cm. in diameter. *Involucral bracts* dull green, 6–7-seriate, the outermost very broadly ovate, about 4 mm. long, the innermost oblong, about 1 cm. long, all rounded at the apex, viscid outside, very minutely ciliolate. *Receptacle* small. *Corolla* 1·2 cm. long, glabrous; lobes lanceolate, subacute, 3·5 mm. long. *Anthers* exerted beyond the tips of the corolla lobes. *Achenes* compressed, obovate, 5 mm. long, villous with long stiff hairs from near the base. *Pappus* straw-coloured, 1 cm. long.—Thunb. Fl. Cap. ed. Schult. 633; DC. Prodr.

v. 359; Harv. in Harv. & Sond. Fl. Cap. iii. 101. *P. microphylla*, DC. Prodr. v. 359.

DISTRIB.—Little Namaqualand to Worcester and through the Karroo to Colesberg:

Little Namaqualand; Karoemas, [September, *Schlechter*, 11394; Vanrhynsdorp; Bushmanns Karoo, 3000–4000 ft., *Drège* d; Calvinia; Blauwkrantz Pass, December, *Pearson*, 4976! Upper Roggeveld above Blauwkrantz Pass, December, *Pearson*, 4973! Ceres; between Hottentot's Kloof and Karroo Poort, November, *Pearson*, 4808! Sutherland; in the Roggeveld near Jackhal's Fontein, South of Sunderland, August, *Burchell*, 1328! between Kuilenberg and Great Riet River, August, *Burchell*, 1359! Laingsburg; Matjesfontein, October, *MacOwan*, 1883! Prince Albert; *Glover*, 2639! Fraserburg; between Karree River and Klein Quaggas Fontein, near Fraserberg, August, *Burchell*, 1410–2! 1425! Willowmore; between the Zwart Berg and Aasvogel Berg, 2000 ft., August, *Drège* a! Graaff Reinet; near Graaff Reinet, August, *Bolus*, 614! 669! Somerset; Vogel River, *MacOwan*, 1604! Murraysburg; *Tyson*, 221; Worcester: Hex River near De Doorns, *Bolus*, 13124!; near Louw's Railway Station, *Bolus*, 5970; Beaufort West: Nieuwveldt above Beaufort West, *Marloth*, 4752! Richmond: On the flats at Vlakplaats, *Bolus*, 13781! Colesberg; *Shaw*! South Africa, without locality, *Masson*!

32. *P. mucronata*, DC. Prodr. v. 362.

A low, much-branched shrub 1–2 ft. high; branchlets twiggy, short, glabrous. *Leaves* opposite, shortly connate at the base, linear, ericoid, flat or concave above, rounded below, obtuse, 2–8 mm. long, nearly 1 mm. thick, with serrulate-ciliolate margins. *Heads* solitary, terminal, cylindric, acute at the base, 1.5–2 cm. long, about 7 mm. in diameter, *Involucral bracts* 6–7-seriate; the outermost broadly ovate, about 3 mm. long; the innermost oblong-linear, about 1 cm. long; all membranous and straw-coloured, with mucronate recurved tips, glabrous except the jagged ciliate margins. *Receptacle* flat, honey-combed. *Corolla* 1 cm. long, sparingly glandular; lobes lanceolate, subobtuse, 1.75 mm. long. *Anthers* 4 mm. long, acute. *Achenes* 4 mm. long, densely villous. *Pappus* 1 cm. long, bright yellow.—Harv. in Harv. & Sond. Fl. Cap. iii. 106. *P. Dinteri*, S. Moore in Bull. Herb. Boiss. Ser. II. iv. 1012.

DISTRIB.—Hereroland; South border of the Etosa depression, *Dinter*, 739! Bushmanland; Bitterfontein, April, *Zeyher*, 817! about 8 miles from Bitterfontein, *Pearson*, 3419! Graaff Reinet; in the plains near

Graaff Reinet; 2700 ft., June, *Bolus*, 600! Jansenville; Zwart Ruggens Range, 2000–3000 ft., August, *Drège*! South Africa; without precise locality, *Arnott*!

*P. callosa*, DC., which is unknown to us, may be the same as this species. It was collected on the Zwart Ruggens by *Drège*.

33. *P. tricephala*, DC. Prodr. v. 359.

A small branched shrub. *Branches* glabrous or very minutely scaberulous, viscid. *Leaves* opposite, almost free from each other at the base, linear-trigonous, acute and hooked pointed at the apex, 0·5–1·2 cm. long, glabrous or slightly scabrous on the margin, viscid. *Heads* 5-flowered, usually ternate, rarely solitary, narrowly obconic, 1·3–1·5 cm. long, about 5 mm. in diameter. *Involucral bracts* 6–7-seriate, lanceolate, acute or subacute, distinctly keeled near the apex, glabrous, with membranous margins, very finely ciliate. *Receptacle* flat, honeycombed, hardly fimbriate. *Corolla* 8·5 mm. long, glabrous; lobes linear-oblong, subacute, 2 mm. long. *Filaments* inserted at the base of the corolla tube, 7 mm. long, filiform; anthers 3·5 mm. long, linear, lanceolate and subacute at the apex. *Style* 9·5 mm. long, terete; branches 4 mm. long, linear, acute. *Achenes* obovate-oblong, 2·5 mm. long, densely hairy. *Pappus* pale straw-coloured, a little longer than the corolla.—Harv. in Harv. & Sond. Fl. Cap. iii. 101.

DISTRIB.—Graaff Reinet; Sneeuwbergen, 4500 ft., November, *Bolus*, 2038! Fraserburg; Nieuweveld, *Drège*! Wodehouse; Stormberg, December, *Sim*! Middelburg; Middelburg Road Railway Station, November, 4000 ft., *Flanagan*, 1387! Orange River Colony; near Boshof, October, *McLea* in *Herb. Bolus*, 5672!

SECTION IV. GLABRATAE.

34. *P. heterocarpa*, DC. Prodr. v. 364.

*Stems* decumbent, rooting at the nodes, glabrous or very minutely puberulous; branches erect, up to 8 cm. long, terete, with smooth reddish-brown bark. *Leaves* opposite, shortly connate at the base, linear, obtuse, 3–3·5 cm. long, 2–3 mm. broad, fleshy, glabrous, densely woolly-villous within the basal sheath. *Heads* 25–30-flowered, solitary, terminal, broadly campanulate, 1·5–2 cm. long, nearly 2 cm. in diameter. *Involucral bracts* 3–4-seriate; the outermost resembling the leaves and scaly outside, oblong-lanceolate, rounded at the apex, about 7 mm. long, with very broad membranous margins, gradually increasing in length upwards; the innermost about 1·5 cm. long and more or less of the same shape as the outer; all glabrous. *Receptacle* small and convex.

*Corolla-tube* gradually widened upwards, 8 mm. long, glabrous; lobes lanceolate, subacute, 2.5–3 mm. long. *Anthers* slightly exerted. *Achenes* obovate, 3.5 mm. long, long-pilose with rather stiff hairs from near the base. *Pappus* 1 cm. long, reddish-brown when dry.—Harv. in Harv. & Sond. Fl. Cap. iii. 108.

DISTRIB.—Vanrhynsdorp; on dry stone hills near Ebenezer, below 500 ft., November, *Drège!* Zout River, 600 m., July, *Schlechter*, 8148! Clanwilliam; Kareebergen, 800 ft., August, *Schlechter*, 8167, partly! (This specimen was mixed with *Senecio* in Herb. Bolus.)

35. *P. fasciculata*, Linn. f. Suppl. 357.

A bush 1–2 ft. high; branches ascending, opposite or whorled, stout, subspinulose with the closely-arranged old persistent leaf-bases, glabrous. *Leaves* crowded, closely imbricate, opposite, lanceolate-linear, acutely acuminate, 2–4 cm. long, 3–5 mm. broad, narrowly keeled below, flat and with a slightly impressed midrib above, rigidly coriaceous, glabrous, sometimes minutely scabrid on the margins, often viscid. *Heads* 1-flowered, crowded into a dense capitate cluster 2–4 cm. in diameter at the ends of the branches, narrow, compressed, about 1.8 cm. long and 3 mm. in diameter. *Involucral bracts* about 6-seriate, the outermost lanceolate, about 5 mm. long, keeled, the innermost linear, 1.5 cm. long, all acute, scaly-membranous, glabrous. *Receptacle* very small. *Corolla* 1 cm. long, ribbed near the base, glabrous; lobes lanceolate, subacute, 2 mm. long. *Anthers* 4 mm. long, acute. *Achenes* 4 mm. long, shortly and densely villous with soft white hairs, glandular. *Pappus* about 9 mm. long, whitish.—DC. Prodr. v. 360; *Drège*, *Zwei Pflanzengeogr.* Docum. 75; Harv. in Harv. & Sond. Fl. Cap. iii. 103.

DISTRIB.—Clanwilliam to Robertson and Prince Albert:

Clanwilliam; near Ezels Bank, Ceder Bergen, 4000–5000 ft., December, *Drège!* Worcester; Hex River Valley, *Rehmann*, 2752! January, 2500 ft., *Bolus*, 5199! Brand Vlei, 1000 ft., January, *Schlechter*, 9928! Robertson; Karroo, near Kogmans Kloof, November, 1000–1400 ft., *Mund*, 138! Prince Albert; Zwart Bergen, December, *Bolus*, 11520! South Africa; without precise locality, *Thom*, 458! *Ecklon and Zeyher*, 141! 243! *Masson*

36. *P. uncinata*, DC. Prodr. v. 357.

A shrub. *Branches* glabrous, sulcate, with brown bark. *Leaves* opposite or 3 in a whorl, acicular, acute, about 1 cm. long, furrowed above, convex beneath, with hooked recurved apices, free from each



other at the base, glabrous, often viscid. *Heads* stalked, densely corymbose, 4-5-flowered, obconic, a little over 1 cm. long. *Involucral bracts* 4-5-seriate; the outer ovate-lanceolate or oblong-lanceolate, obtuse; the innermost linear-lanceolate, subacute, glabrous, often greenish when dry, scaly-membranous. *Receptacle* small, very deeply honeycombed. *Corolla* cylindric below, expanded above, 8 mm. long; lobes lanceolate, subobtuse, glabrous. *Anthers* 2.75 mm. long. *Achenes* oblong-obconic, 2.5 mm. long, finely villous. *Pappus* white, 8-9 mm. long, equalling the corolla.—Drège, *Zwei Pflanzengeogr. Docum.* 109; Harv. in Harv. & Sond. Fl. Cap. iii. 99. *P. verticillata*, DC. Prodr. v. 357.

**DISTRIB.**—Mostly near the sea-shore from Clanwilliam to Malmesbury and in the Riversdale Division:

Clanwilliam; Lange Valley, below 1000 ft., July, *Drège!* Verloren Valley, near the sea-shore, *Wallich!* Piquetberg; St. Helena Bay, *Torner in Herb. Rudge!* Without collector in *Herb. Foster!* Malmesbury; Coenradenberg, near Hopefield, March, *Bachmann*, 490! and in *Herb. Bolus*, 6242! Saldanha Bay, *Grey!* Riversdale; Stille Bay, June, *Muir*, 441! *Muir in Herb. Galpin*, 5220! *Centlivers in Herb. Bolus!*

37. *P. baccharoides*, Less. Syn. Comp. 196.

A much-branched erect bush 1-2 ft. high; branches glabrous. *Leaves* alternate linear-trigonous, acute or subacute, 0.7-1 cm. long, flat or slightly concave above, keeled below, glabrous. *Heads* crowded at the ends of the branchlets, 3-flowered, shortly pedunculate, obconic, about 1 cm. long; peduncle 6-7 mm. long, glabrous, bearing small linear bracts, rarely nearly naked. *Involucral bracts* 6-seriate; the outermost small and lanceolate; the innermost narrowly lanceolate, subacute, all scaly-membranous and glabrous, with a little thicker brownish midrib, straw-coloured. *Receptacle* very small, very deeply honeycombed. *Corolla* 9 mm. long, slightly swollen in the middle, glabrous; lobes linear, 4 mm. long. *Anthers* a little exerted beyond the tips of the lobes. *Achenes* turbinate, scarcely 2 mm. long, appressed villous. *Pappus* 8 mm. long, straw-coloured.—DC. Prodr. v. 357; Harv. in Harv. & Sond. Fl. Cap. iii. 98. *P. acerosa*, DC. Prodr. v. 357.

**DISTRIB.**—Kynsna eastwards to Albany:

Kynsna; near Plettenberg Bay, *Mund*, 80! Uniondale; Longe Kloof, between Haarlem and Avontuur, March, *Burchell*, 5009! Humansdorp; between Kromme River and Gamtoos River, below 1000 ft., April, *Drège!* Kromme River, *Harvey*, 914! *Bowie!* *Bun-*

*bury*, 231! Uitenhage; on Vanstadensberg, near to Galgebosch, February, *Burchell*, 4721! Plains of Uitenhage, *Bowie*! Without precise locality, *Cooper*, 1509! Port Elizabeth; Algoa Bay, *Forbes*! *Cooper*, 2615! *Kennedy*, 321! *Galpin*, 6356! Near Port Elizabeth, *West*, 255! Albany, *Alexander* Near Grahamstown, *Bolton*! *Bolus*, 1630! *MacOwan*, 148! *Schlechter*, 2650! *Miss Bowker*! Assagabosch, *Zeyher*, 914! Soutars Post, near Tea Fontein, *Burchell*, 3494! South Africa; without precise locality, *Zeyher*, 2770! *Mund and Maire*! *Hooker*! *Ecklon and Zeyher*, 254! 255! *Masson*.

38. *P. paniculata*, Thunb. Prodr. Fl. Cap. 143.

A scrubby bush; branches glabrous; internodes 1.5 mm. long. *Leaves* opposite, connate and encircling the branchlet for about 5 mm. at the base, linear, with recurved subobtuse apices, very slightly concave and distinctly 1-nerved on the upper surface, very convex on the lower surface, 1.5–2 cm. long, 1.5–2 mm. broad, fleshy, glabrous and usually more or less viscid. *Heads* crowded and several at the apex of each branchlet, very narrowly turbinate, obtuse in the bud stage, 1 cm. long, 3 mm. in diameter in the middle, 1–4-flowered. *Involucral bracts* 4-seriate; the outermost ovate-oblong, obtuse, 2.5 mm. long, about 1.25 mm. broad, rigidly paleaceous, with a very narrow minutely jagged hyaline margin; the innermost series oblanceolate, obtuse, 8 mm. long, 2 mm. broad, with rather narrow hyaline margins. *Receptacle* about 1.25 mm. in diameter. *Corolla* ribbed, 5 mm. long, glabrous; lobes lanceolate, subacute, 1.5 mm. long. *Anthers* not exerted beyond the tips of the corolla-lobes. *Achenes* 2.5 mm. long, contracted at the top, long-villous. *Pappus* white, a little shorter than the corolla.—Thunb. Fl. Cap. ed. Schult. 629; Harv. in Harv. & Sond. Fl. Cap. iii. 102. *P. flexicaulis*, DC. Prodr. v. 360, not of Linn. f.; Drège, *Zwei Pflanzengeogr. Docum.* 71, 109, 214.

DISTRIB.—Little Namaqualand to Worcester, eastward to Albany: Little Namaqualand; *Wyley*! Spektakel, *Morris*! Ookiep, *Scully*, in Herb. Norm. Austro.-Afric., 256! 1166! Modderfontein, *Whitehead*! Vanrhynsdorp; Ebenezer, on dry stony heights, below 500 ft., November, *Drège*! Calvinia; Moedverloven, on stony dry heights, 1500–2000 ft., December, *Drège*! Ceres; between Karroo Poort and Zoutpansdrift, November, *Pearson*, 5017! Worcester; Touw's River Railway Station, December, *Bolus*, 5198! 1046! Worcester, *Rehmann*, 2625! Matjesfontein, *Marloth*, 703! Brand Vlei, January, *Schlechter*, 9937 partly! Swellendam; December, *Pappe*! *MacOwan*, 3263; Oudtshoorn; Robinson Pass, January, *Bolus*, 1629! Somerset; Brintjeshoojte, *MacOwan*, 449! Uitenhage; Zwartkops River,

November, *Zeyher*, 2772! *Ecklon and Zeyher*, 404! 814! Uitenhage, *Alexander*! foot of Elandsberg, *Wallich*! Port Elizabeth; Redhouse, November, *Mrs. Paterson*, 925! *West*, 208! Alexandria; near Coerney Station, January, *Bolus*! along the Bushman's River by Rautenbach's Drift, November, *Burchell*, 4209! Albany; Hounslow Farm, near Grahamstown, August, *Galpin*, 159a! Slaag Kraal, *Burke*! South Africa; without precise locality, *Zeyher*, 814! *Mund*! *Thom*, 252!

39. *P. fastigiata*, Thunb. Fl. Cap. ed. Schult. 629.

*Branches* finely spinulose with the appressed persistent bases of the connective between the leaf-bases, glabrous. *Leaves* opposite, connate and sheathing at the base for about 3 mm., ericoid, rounded at the apex, convex below, concave above, 3–5 mm. long, slightly curved, fleshy, glabrous. *Heads* 4-flowered, solitary or rarely in pairs or threes, narrowly cylindrical, 1.2–1.5 cm. long, 4–5 mm. in diameter across the middle. *Involucral bracts* 6–7-seriate; the outermost ovate-triangular, about 1.5 mm. long; the innermost linear-lanceolate, about 1 cm. long, all subacute and greenish when dry, shortly and rather densely ciliate. *Receptacle* very small. *Corolla* 1 cm. long, gradually widened upwards, glabrous; lobes linear-lanceolate, 4 mm. long. *Anthers* not exerted beyond the tips of the corolla lobes. *Achenes* 3 mm. long, densely appressed-villous. *Pappus* straw-coloured, 8 mm. long.—*P. paniculata* var. *fastigiata*, Harv. in Harv. & Sond. Fl. Cap. iii, 103; *P. decumbens*, Banks. ex S. Moore in Journ. Bot. 1900, 156.

DISTRIB.—Little Namaqualand; 15 miles north of Alewyns Fontein, 3200 ft., December, *Pearson*, 3925! near Nieuwefontein, December, *Pearson*, 3349! near Daunabis, December, *Pearson*, 6119! Worcester; in plain near Touw's River Railway Station, December, *Bolus*, 7439; South Africa; without locality, *Thunberg*!

40. *P. cylindracea*, DC. Prodr. v. 363.

*Branches* covered with grey glabrous bark; young branchlets rather densely leafy, slender, glabrous. *Leaves* clustered or the upper ones scattered; opposite, free from each other at the base, ericoid, flat or grooved above, semiterete below, with recurved hooked tips, 5–6 mm. long, 1 mm. thick, fleshy, glabrous, sometimes viscid. *Heads* about 5-flowered, elongated, cylindrical, 2–2.5 cm. long, about 6 mm. in diameter. *Involucral bracts* slightly increasing in length upwards, about 7-seriate; the outermost oblong orbicular, closely imbricate, about 5 mm. long; the innermost linear-oblong, 1.5 cm. long, 4 mm. broad, all chaffy-membranous, straw-coloured, glabrous, with very th in jagged margins. *Receptacle* very small. *Corolla* 1.3 cm. long,

narrowly cylindrical in the lower half of the tube, suddenly widened in the upper half; lobes linear-lanceolate, subacute, 4 mm. long. *Anthers* exserted, 5 mm. long. *Achenes* narrow, 5 mm. long, thinly pilose. *Pappus* 1 cm. long, straw-coloured.—Harv. in Harv. & Sond. Fl. Cap. iii. 106.

DISTRIB.—Carnarvon; Buffel's Bout, September, *Burchell*, 1603!

41. *P. flexicaulis*, Linn. f. Suppl. 355.

*Branches* terete, glabrous, internodes 0·5–1 cm. long. *Leaves* opposite, connate and sheathing at the base for about 1 cm. long, acicular, obtuse, often viscid, with recurved tips, 3–7 cm. long, about 1·5 mm. broad, subterete, with a groove on both sides, glabrous. *Heads* usually 3 together at the apex of the shoot, shortly pedunculate, oblong-obovoid, 2–2·5 cm. long. *Involucral bracts* 5–6-seriate, gradually increasing in length upwards; the outermost oblong- or ovate-elliptic, about 4 mm. long, rounded at the apex; the innermost linear, subacute, up to 1·8 cm. long, all chaffy and straw-coloured, glabrous. *Receptacle* flat, 4–5 mm. in diameter, honeycombed and setose. *Corolla* ribbed, 1·5 cm. long; lobes linear-lanceolate, obtusely acuminate, 2 mm. long. *Anthers* 5 mm. long. *Achenes* narrowly obovoid, 4–5 mm. long, thinly villous and finely glandular. *Pappus* up to about 7 mm. long, brownish straw-coloured.—Thumb. Fl. Cap. ed. Schult. 629; DC. Prodr. v. 360 Harv. in Harv. & Sond. Fl. Cap. iii. 102. *P. connata*, DC. Prodr. v. 360.

DISTRIB.—Worcester; Witteberg Range, near Matjesfontein, *Rehmann*, 2922! Matjesfontein Railway Station, December, *Galpin*, 4117! Beyond the Hex River, *Rehmann in Herb. Bolus*, 5673! Hex River Valley, Groote Tafelberg, *Rehmann*, 2751! Gauritz River, December, *Ecklon and Zeyher*, 245! Oudtshoorn, Robinson Pass, *Taylor in Herb. Bolus*, 10712! South Africa, without precise locality, *Thom*, 230! 383! *Masson*! *Burt Davy*, 12662!

Var. *minor*, S. Moore in Journ. Linn. Soc. xxxv. 325.

*Leaves* less than 1 cm. long. *Heads* about 1·3 cm. long.

DISTRIB.—Ceres; in the Karroo at Verkerde Vlei, *Rehmann*, 2843!

42. *P. leucoclada*, Turc. in Bull. Soc. Nat. Mosc. xxiv. 1851, ii. 65.

A rigid shrub, 1–2 ft. high. *Branches* divaricate, covered with white and smooth bark. *Leaves* scattered, alternate, sometimes tufted, club-shaped, obtuse, narrowed to the base, 1–7 mm. long, fleshy, glabrous. *Heads* about 20-flowered, terminal, solitary at the end of almost naked twigs, obconic, 1–1·5 cm. long, nearly 1 cm. in diameter.

*Receptacle* flat, honeycombed, the walls of the cells fimbriated. *Involucral bracts* 6–8-seriate, linear-lanceolate to lanceolate, long-acuminate, very acute, glabrous, keeled, with membranous margins. *Corolla* 5.5 mm. long, tubular; lobes unequal, triangular-lanceolate, subacute, about 1 mm. long. *Stamens* inserted at the base of the corolla; filaments 2.5 mm. long, linear. *Anthers* 2.5 mm. long, linear, lanceolate and acute at the apex. *Style* 5 mm. long, terete, narrowed at the base; style-branches 1 mm. long, linear, acute, papillose. *Achenes* 2 mm. long, densely villous. *Pappus* .6 mm. long.—Harv. in Harv. & Sond. Fl. Cap. iii. 105.

DISTRIB.—Bushmanland; Bitterfontein, Zeyher, 811.

43. *P. acuminata*, DC. Prodr. v. 361.

A small shrub, branches grey, terete, glabrous. *Leaves* alternate or very rarely nearly opposite, oblanceolate, slightly mucronate, 1–2 cm. long, 5–8 cm. broad, flat, entire, coriaceous-fleshy, glabrous, 1-nerved. *Heads* solitary, terminal, pedunculate, turbinate when young and rather acute, tubular when open, 2.5 cm. long. *Involucral bracts* gradually increasing in length upwards; the outermost lanceolate, about 4 mm. long and 2 mm. broad; the innermost linear or linear-lanceolate, 2 cm. long; all very acutely acuminate, 1-nerved, thin, with membranous margins, and very shortly puberulous outside. *Receptacle* slightly convex, 4 mm. in diameter, honeycombed. *Corolla* 1.3 mm. long; lobes lanceolate, subacute, 2 mm. long. *Achenes* 4 mm. long, villous with long appressed hairs. *Pappus* 1.5 cm. long, straw-coloured.—Harv. in Harv. & Sond. Fl. Cap. iii. 105. *P. carnosa*, Muschler in Engl. Bot. Jahrb. xlv. 95, 97. *P. Feddeana*, Muschler in Fedde, Repert. ix. 384.

DISTRIB.—Great Namaqualand; Luderitz Bay, January, Dinter, 1026! Damaraland; Berseba, August, von Trotha, 129! Schultze, 406! Carnarvon; Karel Kriegers Grave, between the Karmee Bergen and Buffels Bout, September, Burchell, 1587.

44. *P. scariosa*, Linn. f. Suppl. 356.

A shrub 2–3 ft. high; branches flexuous, glabrous. *Leaves* alternate, obovate or oblong-obovate, rounded at the apex, about 5 mm. long and 2 mm. broad, thick and coriaceous, glabrous. *Heads* solitary, terminal, subcampanulate, nearly 2 cm. long, about 1.8 cm. in diameter, 14 flowered. *Involucral bracts* about 6-seriate; the outermost much smaller than the others, broadly ovate, subacutely mucronate, 3.5 mm. long, 2 mm. broad, broadly keeled, with membranous

hyaline margins, glabrous, remaining bracts gradually larger; the innermost series narrowly elongate-oblong, strongly keeled, with the keel produced at the apex beyond the broadly membranous slightly jagged margins, about 1.5 cm. long and 4 mm. broad, glabrous. *Receptacle* flat, slightly jagged, about 3 mm. in diameter. *Corolla* tube 8 mm. long, glabrous, strongly 5-ribbed for 2.5 mm. long at the base, the remaining upper portion cylindric; lobes linear-lanceolate, subacute, 2 mm. long, with reddish-brown margins when dry. *Anthers* 4.5 mm. long, acute. *Achenes* 4 mm. long, long-villous with ascending hairs, contracted at the top into a short glabrous neck. *Pappus* reddish-brown when dry, 1.3 cm. long, inserted on a distinct annulus.—Thunb. Fl. Cap. ed. Schult. 633; DC. Prodr. v. 361; Harv. in Harv. & Sond. Fl. Cap. iii. 104.

DISTRIB.—Bushmanland; near Nieuwfontein, December, *Pearson*, 3409! Little Namaqualand; Silver Fontein, near Ookiep, 2000 ft., September–October, *Drège*! South Africa, without precise locality, *Paterson* in *Herb. Forsyth*!

45. *P. aspalatha*, DC. Prodr. v. 356.

A weak shrub; branches divaricate, leafy, slender, sulcate, reddish-brown, slightly puberulous towards the apex, glabrous below. *Leaves* alternate, linear-ob lanceolate, obtuse, 0.5–1.5 cm. long, 1.5–2 mm. long, thick and coriaceous, glabrous, entire or rarely with a single lateral tooth on each margin. *Heads* solitary at the end of the shoots, subcampanulate, about 1.5 cm. long and as much in diameter. *Involucral bracts* 3–4-seriate; the outermost oblong-linear, subacute, 3 mm. long; the innermost oblong-lanceolate, acutely acuminate, 7 mm. long, membranous, slightly puberulous outside. *Receptacle* convex, about 4.5 mm. in diameter, honeycombed. *Corolla* 7 mm. long, cylindric and puberulous below, slightly widened in the upper third; lobes 0.8 mm. long, triangular, obtuse. *Anthers* 2 mm. long, much exserted, subobtuse. *Achenes* slightly obliquely oblong, appressed-villous, 3.5 mm. long. *Pappus* about 8 mm. long, slightly exceeding the corolla, yellowish-white.—Harv. in Harv. & Sond. Fl. Cap. iii. 98.

DISTRIB.—Fraserburg; between the Karree River and Klein Quaggas Fontein, near Fraserburg, August, *Burchell*, 1427

46. *P. glaucescens*, DC. Prodr. v. 357.

A small shrub with rather straggly elongated branchlets; branchlets with light-coloured bark, slightly pubescent when young. *Leaves*

tufted, or when scattered alternate, linear or subspathulate-linear, obtuse at the apex, narrowed to the base, 0·5–1·5 cm long, 1–2 mm. broad, fleshy, glabrous, nerveless. *Heads* few, solitary, terminal, subcampanulate, about 1·4 cm. long, 1 cm. in diam. *Involucral bracts* 4-seriate; the outermost linear-lanceolate, acute or subobtuse, about 2 mm. long; the innermost linear, subobtuse, about 8 mm. long and 1·75 mm. broad, scaly membranous, shortly ciliate, otherwise glabrous. *Receptacle* convex, 2·5 mm. in diameter, reticulate. *Corolla* 6 mm. long; tube gradually widened upwards, slightly angular, glabrous; lobes triangular, scarcely 1 mm. long. *Achenes* narrow, 4 mm. long, shortly villous. *Pappus* 5 mm. long, yellowish white.—Harv. in Harv. & Sond. Fl. Cap. iii. 98.

**DISTRIB.**—Victoria West; Nieuwveld, between Brak River and Uitvlugh, 3000–4000 ft., December, *Drège*, a! and b! Near Fraserburg, *Bolus*, 1031! Middelburg: near Middelburg Road Railway Station, *Flanagan*, 1388! Graaff Reinet; near Graaff Reinet, March, *Bolus*, 1822!

47. *P. ciliata*, Thunb. Prodr. 144.

A scrubby bush up to 4 ft. high, branchlets short, terete, slightly puberulous. *Leaves* alternate, linear, obtuse, 2–7 mm. long, concave and with a prominent midrib above, keeled below, thick and fleshy, glabrous. *Heads* terminal, solitary, more or less narrowly oblong-ellipsoid, contracted at the top, 1·5–2 cm. long, 6–7 mm. in diameter. *Involucral bracts* closely pressed together, 7–10-seriate, densely ciliate; the outer ovate and gradually passing into the leaves; the innermost linear, about 1·2 cm. long; all obtuse and rigidly scaly, with a faint but distinct midrib on the back, yellow or yellowish green. *Receptacle* deeply concave, 5 mm. in diameter, fimbriate-honeycombed. *Corolla* about 1 cm. long, glabrous; lobes linear-lanceolate, acute, 3 mm. long, green? *Achenes* 3 mm. long, densely silky-villous. *Pappus* 5 mm. long, brownish-yellow.—Thunb. Fl. Cap. ed. Schult. 632; DC. Prodr. v. 359; Harv. in Harv. & Sond. Fl. Cap. iii. 102. *P. turbinata*, DC. l.c. 362; Harv. l.c. 106. *P. ciliata*, vars. *Thunbergii* and *Ecklonis*, Harv. l.c. 102.

**DISTRIB.**—Bushmanland and Little Namaqualand to Clanwilliam:

Little Namaqualand; Steinkopf, *Schlechter*, 43! Specktakel, *Morris* in *Herb. Bolus*, 5674!; between Steinkopf and the Orange River, October, *Phillips*, 1596! between Kook Fontein and Holgat River, 1000–2000 ft., September–October, *Drège*! O'okiep, *Scully* in *Herb. Norm. Austro-Afric.*, 1167! near Nieuwfontein, December, *Pearson*, 3350!

3353! north of Alewyn's Fontein, December, *Pearson*, 3313! 3926!  
3929! Kopjeskraal, December, *Pearson*, 3890! Grauwater, December,  
*Pearson*, 3268! near Ougrabies, *Pearson*, 3572! Upper slopes above  
Daunabis, December, *Pearson*, 6119! Bushmanland; Kweekfontein,  
January, *Pearson*, 3820! 3821! Eenriet, January, *Pearson*, 3094!  
Sandy plains near Groot Roggebosch, *Pearson*, 3842! Valley below  
Nieuwe Rust, December, *Pillans*, 5490! Vanrhynsdorp; Ebenezer,  
on dry stony hills below 500 ft., November, *Drège*! Clanwilliam;  
Ramskop, *Leipoldt*, 503! South Africa; without precise locality,  
*Masson*!

De Candolle's type of *P. turbinata* is an exact match of Thunberg's specimen of *P. ciliata*; both have the long leaves which were given as the difference between the two species; the shorter-leaved form represented by Harvey's var. *Ecklonis* does not seem worthy of varietal distinction.

48. *P. trigona*, Phillips, n. sp.

*Ramuli* glabri, dense foliati. *Folia* alternata, trigona vel lineari-subteretia, apice subacuta, 0·7–1·3 cm. longa, carnosae, glabrae. *Capitula* circiter 12-flora, solitaria, sessilia, 1–1·3 cm. longa, circiter 1 cm. lata, oblonga vel obovoidea. *Bracteae* involucri 5–6-seriatae; extimae ovato-oblongae; intimae lanceolato-lineares, apice obtusae, glabrae, marginibus angustis membranaceis. *Corolla* 1 cm. longa, inferne dilatata; lobi 6, lineari-lanceolati, apice subobtusiusculi, 3 mm. longi. *Filamenta* 3·75 mm. longa, filiformia; antherae 3·5 mm. longae, lineares, apice acutae. *Stylus* 1·2 cm. longus, teres, basi angustatus; lobi 3·5 mm. longi, lineares, acuminati, apice acuti, papilloso. *Achaenia* oblonga, 1·2 mm. longa, villosa. *Pappus* ad 8 mm. longus, fulvus.

*Branches* glabrous, densely leafy. *Leaves* alternate, trigonous or linear-subterete, subacute, 0·7–1·3 cm. long, fleshy, glabrous. *Heads* about 12-flowered, solitary, sessile, 1–1·3 cm. long, about 1 cm. in diameter, oblong or obovoid. *Involucral bracts* 5–6-seriate; the outer ovate-oblong; the inner lanceolate-linear, obtuse, glabrous, with narrow membranous margins. *Corolla* 1 cm. long, dilated below the middle; lobes 6, linear-lanceolate, subobtusiusculi, 3 mm. long. *Stamens* inserted in the dilated portion; filaments 3·75 mm. long, filiform; anthers 3·5 mm., long, linear, acute. *Style* 1·2 cm. long, terete, narrowed below; branches 3·5 mm. long, linear, acuminate, acute, papillose on the margin and back. *Achenes* oblong, 1·2 mm. long, villous. *Pappus* up to 8 mm. long, brownish-yellow.

DISTRIB.—Uitenhage; at the top of Vanstadensberg, 1000 ft.,



January, *MacOwan*, 1072! Port Elizabeth; between Krakamma and the upper part of Leadmine River, February, *Burchell*, 4577! Albany; tops of mountains at Howison's Poort, 2300 ft., *MacOwan*!

49. *P. Rangei*, Muschler in Engler. Jahrb. xlv. 96.

A shrub 2 ft. high; branchlets whitish, glabrous. *Leaves* crowded, probably alternate, subterete, obtuse, about 1 cm. long and 1.25 mm. thick, strongly warty when dry, otherwise glabrous. *Heads* solitary, terminal subcampanulate, 1.4 cm. long, nearly 1 cm. across the top, *Involucral bracts* 5-seriate; the outer mostly oblong-lanceolate; the innermost linear-lanceolate, 1 cm. long; all with recurved apices, and with a thick glandular midrib, glabrous. *Corolla* yellow, 8 mm. long; tube pubescent, strongly ribbed in the lower two-thirds, contracted at the apex; lobes linear-lanceolate, subacute, 1.5 mm. long. *Achenes* oblong, appressed-villous, 3 mm. long. *Pappus* white, 8 mm. long.

DISTRIB.—Great Namaqualand; Tafelberg, October, 4800 ft., *Range*, A 26!

50. *P. tenuifolia*, DC. Prodr. v. 363

*Stem* simple or subsimple, arising from a rhizome, up to 1 ft. high, slender, angular, glabrous, straw-coloured when dry. *Leaves* opposite, free and articulating at the base, acicular, acute or subacute, 2–3.5 cm. long, about 1 mm. thick, warty, otherwise glabrous, the warts giving a crenulate appearance to the surface. *Heads* solitary, terminal, pedunculate, or subsessile, oblong-ellipsoid, 2–2.5 cm. long, scarcely 2 cm. in diameter across the top of the flowers. *Involucral bracts* about 6-seriate, gradually increasing upwards; the outermost ovate-oblong, about 4 mm. long and 2.5 mm. broad; the innermost broadly linear, 1.5 cm. long and about 5 mm. broad; all rounded at the apex, coriaceous, with a broad fleshy keel on the back towards the apex, very narrowly membranous and finely serrulate on the margin, glabrous. *Receptacle* flat, honeycombed, not fimbriate. *Corolla* 1.3 cm. long, glabrous; lobes linear, acute, 5 mm. long. *Anthers* 5 mm. long. *Achenes* 5 mm. long, silky-villous with appressed hairs. *Pappus* 1 cm. long.—Harv. in Harv. & Sond. Fl. Cap. iii. 107. *P. elegans*, Sch. Bip. ex Walp. Rep. ii. 970.

DISTRIB.—Caledon; near Caledon, *Ecklon and Zeyher*, 142! 244! between Genadendal and Donker Hoek, March, *Burchell*, 7932! Vogelgat, November, *Schlechter*, 9525! near Hemel en Aarde, without collector (ex *Schultz Bip. l.c.*), near Hermanus, December, *Kensit in Herb. Bolus*, 13467! Bredasdorp; near Elim, December, *Bolus*, 8546!

51. *P. spinulosa*, Phillips, n. sp.

*Frutex*. *Rami* teretes; ramuli infra spinulosi, glabri. *Folia* opposita, basi connata, subtus carinata, supra concava, apice obtusa, 0·6–1 cm. longa, circiter 4 mm. lata, verrucosa, aliter glabra. *Capitula* plerumque solitaria, sessilia, angusto-ellipsoidea, 1·5 cm. longa, apice circiter 7 mm. lata. *Bracteeae* involucri 7-seriatae, imbricatae; extimae oblongae, 2–3 mm. longae; intimae circa 1 cm. longae; omnes apice obtusae, coriaceae, marginibus paullo crystallinis, ad apicem carinatae, glabrae. *Receptaculum* planum, alveolatum, fimbriatum. *Corolla* 6·5 mm. longa. glabra; lobi 1·5 mm. longi, angusto-triangulares, apice subobtusii. *Atherae* 3 mm. longae. *Achaenia* 3–4 mm. longa, albo-sericeo-villosa. *Pappus* 5 mm. longus, pallidus.

A much-branched woody shrub; main branches terete, glaucous-grey; leafy branchlets short, with numerous spinules in the lower part, glabrous. *Leaves* opposite, connate at the base but not sheathing, boat-shaped, keeled below, deeply concave above, obtuse, 10·6– cm. long, up to about 4 mm. broad, densely covered with warts when dry, otherwise glabrous. *Heads* usually solitary, sessile, narrowly ellipsoid, 1·5 cm. long, about 7 mm. in diameter at the top. *Involucral bracts* 7-seriate, closely imbricate, gradually increasing in length upwards; the outermost oblong, 2–3 mm. long; the innermost nearly 1 cm. long; all obtuse and coriaceous with slightly hyaline margins, with a broad fleshy darker-coloured keel towards the apex, glabrous. *Receptacle* flat, deeply honeycombed, fimbriate. *Corolla* 6·5 mm. long, glabrous; lobes 1·5 mm. long, narrowly triangular, subobtusae. *Anthers* 3 mm. long. *Achenes* 3–4 mm. long, appressed silky-villous with whitish hairs. *Pappus* 5 mm. long, straw-coloured.

DISTRIB.—Great Namaqualand; Angra Pequena, January, Galpin & Pearson, 7645! November, Marloth, 4621!

52. *P. succulenta*, Thunb. Prodr. 143.

*Branchlets* slender, leafy only at the tips, angular, glabrous, brown when dry. *Leaves* few, crowded at the apex of the shoots, opposite, free from each other at the base, linear-trigonus, obtuse, 0·5–1·5 cm. long, densely covered with prominent warts, fleshy, glabrous. *Heads* terminal, solitary or three together, pedunculate, campanulate or ovoid, 1·5 cm. long, about 1 cm. in diameter. *Involucral bracts* 4–5-seriate; the outermost broadly ovate, about 5 mm. long; the innermost linear-oblong, 1·3 cm. long; all rounded at the apex, scaly-membranous, with narrowly membranous margins, glabrous. *Receptacle* flat, long-etose. *Corolla* nearly 1 cm. long; lobes linear-lanceolate, subacute,

*A revision of the genus Pteronia (Compositae).*

2 mm. long. *Anthers* shortly exerted. *Achenes* 3 mm. long, silky-villous. *Pappus* 1 cm. long, brownish yellow.—Thunb. Fl. Cap. ed. Schult. 630; DC. Prodr. v. 360; Harv. in Harv. & Sond. Fl. Cap. iii. 102.

DISTRIB.—Bushmanland; between Klipplaat and Bitterfontein, December, *Pearson*, 3878! Vanrhynsdorp; Ebenezer, on stony hills below 500 ft., November, *Drège*! Calvinia; below Bockland and in Hantum, *Thunberg*! Oudtshoorn; “The Brook,” near Oudtshoorn, about 1100 ft., December, *Bolus*, 11946! South Africa, without precise locality, *Masson*!

53. *P. glabrata*, Linn. f. Suppl. 358.

A bush up to ft. high; branches opposite, brown when dry, glabrous. *Leaves* opposite, quite free from each other at the base, linear, often somewhat falcate, rounded at the apex, 1–2.5 cm. long, 2.5–6 mm. broad, flat, 1-nerved, fleshy, glabrous, finely longitudinally wrinkled when dry. *Heads* terminal, solitary, campanulate, 1.5–2 cm. long, nearly 2 cm. in diameter. *Involucral bracts* about 5-seriate, gradually increasing in size upwards; the outermost broadly ovate, about 3 mm. long; the innermost linear-oblong, 1.5 cm. long, all rounded at the apex, with narrowly membranous margins, glabrous. *Receptacle* flat or slightly concave, honeycombed, and fimbriate, about 8 mm. in diameter. *Corolla* 1 cm. long, slightly and gradually widened upwards, glabrous; lobes linear-lanceolate, subacute, 2 mm. long. *Anthers* exerted 1.5 mm. from the tips of the lobes. *Achenes* 3.5 mm. long, densely appressed silky-villous. *Pappus* brownish-yellow, 1 cm. long.—Thunb. Fl. Cap. ed. Schult. 630; DC. Prodr. v. 630; Harv. in Harv. & Sond. Fl. Cap. iii. 102. *P. sesuvifolia*, DC. Prodr. v. 360; *Drège*, *Zwei Pflanzengeogr. Docum.* 108, 214.

DISTRIB.—Namaqualand; Plaat Klip, December, *Pearson*, 3284! without locality, *Pearson*, 3440! Angra Pequena, January, *Galpin and Pearson*, 7652! Little Namaqualand: Rietfontein, December, *Pearson*, 3763! Stinkfontein, September, *Schlechter*, 11097! between Steinkopf and the Orange River, October, *Phillips*, 1597! Vanrhynsdorp; Ebenezer, on stony, dry hills below 500 ft., November, *Drège* a! between Holgat River and the Orange River, 1000–5000 ft., September, *Drège* d! South Africa, without locality, *Ecklon*, 76! 258!

54. *P. leptospermoides*, DC. Prodr. v. 363.

A shrub 2–3 ft. high. *Branches* glabrous, the young ones often somewhat glaucous; branchlets opposite. *Leaves* opposite, 0.9–1.5 cm.

long, 1·3 mm. broad, linear or oblanceolate-linear, acute or subacute, narrowed and free at the base, flat or when very narrow almost terete and club-shaped, whitish woolly pubescent within the base for about 3 mm., otherwise glabrous. *Heads* about 5–7-flowered, subcylindric, subacute when young, 2 cm. long. *Involucral bracts* few, about 3-seriate, closely imbricate, lanceolate, obtuse or subacute, concave within, glabrous. *Receptacle* flat, honeycombed. *Corolla* white, pubescent; lobes lanceolate, subobtuse, 2·5 mm. long, glabrous. *Style-branches* 2 mm. long, linear, subacute, papillous on the uppermost third. *Achenes* long-pilose from the lower part and pubescent on the remaining portion. *Pappus* setae unequal, up to 7 mm. long, reddish.—Drège, *Zwei Pflanzengeogr. Docum.* 68, 90, 95, 214; Harv. in Harv. & Sond. Fl. Cap. iii. 107.

DISTRIB.—Little Bushmanland to Little Namaqualand:

Bushmanland; Kweekfontein, January, *Pearson*, 3815! Little Namaqualand; between Pedros Kloof and Lelie Fontein, 3,000–4,000 ft., November, *Drège* a! Dry hills near Spektakel, September, *Bolus*, 420! 6542! Springbokfontein, 3000 ft., September, *Schlechter*, 11312! Poort Mountain, December, *Pearson*, 2974! Spektakel, *Morris*! without locality, *American Rubber Co.*, 2686!

55. *P. gymnocline*, DC. Prodr. v. 359.

*Branchlets* slender, pale, slightly ribbed, glabrous. *Leaves* sometimes in clusters or the lower ones opposite and the upper alternate, free from each other at the base, linear or subspathulate-linear, obtuse, keeled 0·5–1 cm. long, up to 2 mm. broad, thick and fleshy, minutely punctate. *Heads* solitary, terminal, sessile, acutely acuminate in bud, at length cylindric, 1·5–2 cm. long, about 6 mm. in diameter. *Involucral bracts* straw-coloured, about 6-seriate; the outermost passing gradually into the leaves, oblong-lanceolate, about 2 mm. long; the innermost linear or oblong-linear, about 1·4 cm. long; all chaffy and rounded at the apex or obtuse, with a very small mucro slightly below the actual apex, quite glabrous. *Receptacle* flat, about 2·5 mm. in diameter, deeply honeycombed. *Corolla-tube* cylindric, ribbed towards the base, 7 mm. long, glabrous; lobes ovate-lanceolate, subacute, 1·5 mm. long. *Achenes* 4·5 mm. long, densely villous with appressed yellow hairs. *Pappus* as long as the corolla, straw-coloured.—Harv. in Harv. & Sond. Fl. Cap. iii. 101. *P. calvescens*, Drège, *Zwei Pflanzengeogr. Docum.* 93, name only.

DISTRIB.—Little Namaqualand; on stony and rocky hills near Verleptpram, below 1000 ft., September, *Drège*!

56. *P. Pillansii*, Hutchinson, n. sp.

*Frutex* 30–45 cm. altus; ramuli plus minusve viscosi, costati, glabri. *Folia* opposita, basi vix connata, linearia vel subspatulato-linearia, apice obtusa, 1–4 cm. longa, 1.5–3 mm. lata, crassa carnosaque, glabra, subtus convexa, supra concava, distincte unicostata; juniora maculata. *Capitula* pluriflora, terminalia, solitaria, sessilia, plus minusve cylindrica, 2.5–3 cm. longa, supra paullo angusta, in medio circiter 1 cm. lata. *Bracteae* involucri circiter 6-seriatae: extimae oblongo-ellipticae, apice rotundatae, circiter 4 mm. longae; intimae lato-lineares; omnes paleaceae, marginibus submembranaceis dentato-ciliatis, glabrae. *Receptaculum* convexum, alveolatum, 5 mm. latum. *Tubus* corollae cylindricus, costatus, circa 1 cm. longus, glaber; lobi lineari-lanceolati, apice subacuti, 4 mm. longi. *Achaenia* 6–7 mm. longa, pilis albis sericeis appresse villosa. *Pappus* 1 cm. longus, stramineus.

A bush 30–45 cm. high, branchlets more or less viscid, not hairy, ribbed, brown when dry. *Leaves* opposite, contiguous but scarcely connate at the base, linear, or subspathulate-linear, obtuse, 1–4 cm. long, 1.5–3 mm. broad, thick and fleshy, finely spotted when young, soon quite glabrous, convex below, concave and with a distinct midrib above. *Heads* several-flowered, terminal, solitary, sessile, more or less cylindrical, 2.5–3 cm. long, slightly contracted in the upper half, about 1 cm. in diameter across the middle. *Involucral bracts* about 6-seriate: the outermost oblong-elliptic, rounded, about 4 mm. long; the innermost broadly linear, all chaffy with submembranous jagged-ciliate margins, otherwise glabrous. *Receptacle* convex and deeply honey-combed, 5 mm. in diameter. *Corolla-tube* cylindric, ribbed, nearly 1 cm. long, glabrous; lobes linear-lanceolate, subacute, 4 mm. long. *Achenes* 6–7 mm. long, appressed-villous with silky white hairs. *Pappus* 1 cm. long, very pale yellow.

DISTRIB.—Little Namaqualand; common from top of pass North of Garies to Brakdam, December, *Pearson & Pillans*, 5609! Vaurhynsdorp; slope north of and facing Nieuwe Rust, December, *Pillans*, 5553!

57. *P. oblanceolata*, Phillips, n. sp.

*Rami* glabri. *Folia* opposita, basi paullo connata, oblanceolata, apice subacuta, basi attenuata, 1–1.6 cm. longa, 2–3.5 mm. lata, plana, carnosae, glabrae. *Capitula* 15–20-flora, sessilia, terminalia, 1.5–2 cm. longa, circa 1.5 cm. lata, obconica. *Bracteae* involucri 4-seriatae, ovatae ad lanceolatae, apice obtusae vel subobtusae, glabrae, marginibus

latis membranaceis. *Corolla* 1·2 cm. longa, tubulosa, supra paullo dilatata, glabra; lobi 2 mm. longi, lanceolato-triangulares, apice obtusi. *Filamenta* 5 mm. longa, filiformia; antherae 4 mm. longae, lineares, apice lanceolatae acutaeque. *Stylus* 1·4 cm. longus, teres; lobi 3·5 mm. longi, lineares, supra paullo dilatati, subacuminati, apice acuti, papilloso. *Achaenia* 3·5 mm. longa, oblonga, pilis longis molliter villosa. *Pappus* pallidus, circiter 1 cm. longus.

*Branches* glabrous. *Leaves* opposite, slightly connate, oblanceolate, subacute, attenuate at the base, 1–1·6 cm. long, 2–3·5 mm. broad, flat, fleshy, glabrous. *Heads* 15–20-flowered, sessile, terminal, 1·5–2 cm. long, about 1·5 cm. in diameter, obconic. *Involucral bracts* 4-seriate, ovate to lanceolate, obtuse or subobtuse, glabrous, with broad membranous margins. *Corolla* 1·2 cm. long, tubular, somewhat dilated above, glabrous; lobes 2 mm. long, lanceolate-triangular, obtuse. *Stamens* inserted about  $\frac{2}{3}$  down the corolla-tube; filaments 5 mm. long, filiform; anthers 4 mm. long, linear, lanceolate and acute at the apex. *Style* 1·4 cm. long, terete; branches 3·5 mm. long, linear, slightly dilated above, subacuminate, subacute, papillous on the dilated and acuminate portion. *Achenes* 3·5 mm. long, oblong, softly villous, with long hairs. *Pappus* light straw-coloured, nearly 1 cm. long.

DISTRIB.—Vanrhynsdorp; Klein Kobbis, August, *Schlechter*, 10980!

58. *P. pallens*, Linn. f. Suppl. 357.

A small bush up to 0·6 m. high. *Branches* glabrous, with greyish-white bark. *Leaves* opposite, slightly connate at the base, linear-acicular, obtuse, with a narrow groove on the upper side, 1–3 cm. long, about 1 mm. thick, glabrous. *Heads* 11–12-flowered, solitary, shortly pedunculate, turbinate-campanulate, about 1·3 cm. long. *Involucral bracts* about 6-seriate, increasing upwards; the outermost ovate-elliptic, about 1·5 mm. long; the innermost linear, 7 mm. long, about 1·25 mm. broad; all rounded at the apex and shortly ciliate, slightly keeled, not membranous. *Receptacle* flat, 3 mm. in diameter, deeply honeycombed and rather long-setose. *Corolla* 8 mm. long, gradually widened upwards, glabrous; lobes narrowly triangular, obtuse, scarcely 1 mm. long. *Anthers* 3 mm. long. *Achene* 3 mm. long, densely villous. *Pappus* light straw-coloured, 6 mm. long.—Thunb. Fl. Cap. ed. Schult. 630; DC. Prodr. v. 359; Harv. in Harv. & Sond. Fl. Cap. iii. 101.

DISTRIB.—Calvinia through the Karroo to Prince Albert and Mossel Bay:

Calvinia; Blauwkrantz Pass, December, *Pearson*, 4963! near Schurkraal, December, *Pearson*, 3075! Ceres; Gansfontein, December,

*Pearson*, 3990! between Gausfontein and Papekuil, December, *Pearson*, 3981! north of Zoutpansdrift, November, *Pearson*, 5001! Griqualand West; near Kimberley, *Bolus*, 6820! Laingsburg; Witteberg Range, near Matjesfontein, 2800 ft., February, *Rehmann*, 2920! and in *Herb. Bolus*, 5671! Prince Albert; near Prince Albert, December, *Bolus*, 11521! Middelburg; Grootfontein, *Tyson*, 2669! Oudtshoorn; Oudtshoorn and Morrass River Drift, December, *Bolus*, 11949! Oudtshoorn, October, *Miss Britten*, 72! 111! Mossel Bay; Gauritz River, December, *Pappe*! *Eklon and Zeyher*, 99, 12! George; near George, *Zeyher*! South Africa; without locality, *Niven*! *Masson*! *Herb. Pallas in Herb. Mus. Brit.*!

59. *P. sordida*, N.E. Br. in Kew Bull. 1906, 103.

A small shrub about 0·35 m. high. *Branches* glabrous, rarely minutely whitish pubescent, at length becoming glabrous; bark rough and splitting. *Leaves* opposite, ericoid, linear or lanceolate-linear, obtuse, subconnate at the base, 2–6 mm. long, flat above, rounded beneath, glabrous or very minutely puberulous when young. *Heads* about 8-flowered 1·2–1·4 cm. long, obconic. *Involucral bracts* 7-seriate, closely imbricate, oblong-linear, obtuse, narrowed at the base, glabrous, with membranous margins. *Receptacle* small, fimbriate. *Corolla* 1·1 cm. long; lobes 2 mm. long, lanceolate, subacute. *Stamens* inserted about  $\frac{2}{3}$  down the tube; filaments 4·5 mm. long, filiform; anthers, 3·5 mm. long, linear, with a lanceolate acute apical appendage. *Achenes* 3·5 mm. long, oblong, densely villous. *Pappus* 8–9 mm. long, as long as the corolla, light straw-coloured.

DISTRIB:—Graaff Reinet, near Graaff Reinet, August, *Bolus*, 614! Murraysburg, Conway Farm, 3600 ft., August. *Gilfillan in Herb. Galpin*, 5527! Murraysburg, June, *Tyson*, 221!

60. *P. ambrariifolia*, Engl. in Engl. Bot. Jahrb. xxvii. 198.

*Branches* angular, dark purple when dry, glabrous, branchlets sulcate, slender. *Leaves* opposite, free from each other at the base, linear, trigonous, with obtuse recurved tips, fleshy, glabrous. *Heads* terminal, solitary, sessile, about 12-flowered, 1·5 cm. long, 1 cm. in diameter, narrowly obconic when open. *Involucral bracts* 5–6-seriate; the outermost ovate, about 4 mm. long, gradually increasing upwards; the innermost lanceolate, subobtuse, glabrous except the submembranous minutely ciliate margins. *Corolla-tube* 9 mm. long, ribbed in the lower part, gradually widened upwards, glabrous; lobes linear-lanceolate, subacute, 2·5 mm. long. *Anthers* linear, with a lanceolate

acute apex, 4 mm. long. *Achenes* 3 mm. long, oblong-obovoid densely villous. *Pappus* setae unequal, the longest 8 mm. long, tawny.

DISTRIB.—Clanwilliam; Wupperthal, 2500 ft., August, *Schlechter*, 8786!

61. *P. unguiculata*, S. Moore in Bull. Herb. Boiss. Ser. II, ix. 1012.

A small divaricately branched shrub; branches pale, shortly jointed, glabrous. *Leaves* opposite, small and ericoid, somewhat club-shaped, obtuse, about 4 mm. long, fleshy, glabrous. *Heads* solitary, obtuse in bud, subcylindric, nearly 1 cm. long. *Involucral bracts* yellow, about 6-seriate, broadly truncate and acutely mucronate, entire, somewhat membranous, glabrous. *Corolla* glabrous. *Achenes* villous. *Pappus* pale yellow.

DISTRIB.—Great Namaqualand; Gubub, *Dinter*, 1233! Little Namaqualand; Wolveton on the hills, September, *Schlechter*, 11440!

*Imperfectly known Species.*

62. *P. callosa*, DC. Prodr. v. 362.

*Suffrutex* about 6 in. high, much branched. *Leaves* linear, thickish, subobtuse, 10–14 mm. long, scarcely 1 mm. thick, entire, not ciliate, indistinctly nerved. *Heads* terminal, solitary, sessile, about 15-flowered, 1.5 cm. long. *Involucre* oval-oblong, pale greenish, more intensely coloured at the tips of the scales; bracts appressed, delicately and softly ciliate, obtuse and callous at the apex. *Corolla* yellow. *Achenes* very villous, compressed, shortly beaked.

DISTRIB.—Jansenville; Zwartruggens, on the Karroo, *Drège*.

Unknown to us except from the above description; perhaps identical with *P. mucronata*, DC.

63. *P. empetrifolia*, DC. Prodr. v. 363.

A very dwarf viscidulous plant about 10 cm. high; internodes scarcely 2 mm. long. *Leaves* opposite, densely crowded on the short twigs, spreading, linear, keeled, obtuse, 2–3.5 mm. long, flattish above or channelled, thick, entire. *Heads* terminal, solitary, sessile, oblong-turbinate, many-flowered, 1.4 cm. long. *Involucral bracts* yellowish, oblong, appressed, obtuse, opaque, horny, with a very narrow ciliate-lacerate margin. *Flowers* purplish. *Achenes* villous.—Harv. in Harv. & Sond. Fl. Cap. iii. 108.

DISTRIB.—South Africa; without locality, *Drège*.



Known to us only from description. The type is in Herb. Sonder.  
It is evidently one of the section *Glabratae*.

*Excluded Species.*

<i>P. aizoides</i> , Muschler	=	<i>Pterothamnus</i> Marlothianus, O. Hoffm.
<i>P. caroliniana</i> , Walt	=	<i>Liatris squarrosa</i> .
<i>P. chamaepeuce</i> , Spreng.	=	<i>Cnicus chamaepeuce</i> .
<i>P.</i> „ Tenore	=	„ gnaphalodes.
<i>P. dentata</i> , Spreng.	=	<i>Pegolettia baccharidifolia</i> , Less.
<i>P. echinata</i> , Thunb.	=	<i>Aster echinatus</i> , Less.
<i>P. Engleriana</i> , Muschler	=	<i>Pterothrix Engleriana</i> , Phillips & Hutchinson, comb. nov.
<i>P. fasciculata</i> , Willd.	=	<i>Athanasia fasciculata</i> , Harv.
<i>P. marginata</i> , Herb.	=	<i>Inula Cappa</i> .
<i>P. minuta</i> , L.f.	=	<i>Nestlera humilis</i> , Less.
<i>P. pauciflora</i> , Sims,	=	<i>Helipterum virgatum</i> , DC.
<i>P. Porophyllum</i> , Cav.	=	<i>Adenophyllum Porophyllum</i> .
<i>P. spinosa</i> , L.f.	=	<i>Hoplophyllum spinosum</i> , DC.

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A revision of the genus *Pteronia* (Compositae).

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- 14.—*A Contribution to the Knowledge of the South African Proteaceae.*  
 No. 3.—By E. P. PHILLIPS, M.A., D.Sc., F.L.S., Assistant.

LEUCADENDRON, R. Bt.

1. *L. Deasii*, Phillips, sp. nov. (Proteaceae-Proteeae). *Rami* glabri. *Folia* inferioria 5 cm. longa, 1·5 mm. lata, acicularia, subtus convexa, supra sulcata, apice acuta, glabra; folia superioria ad 1 cm. lata, lanceolato-lineararia, lanceolata, vel oblanceolata, apice acuta, interdum tri-dentata, glabra. *Inflorescentia* ♀ 10 cm. longa, 4·5 cm. lata, ovoidea, apice obtusa. *Bractee* 1·5 cm. longae, 2 cm. latae, obovatae, apice rotundae, glabrae. *Segmenta perianthii* 4·5 mm. longa, ·5 mm. lata, linearia, hirsuta. *Stylus* 4·5 mm. longus, linearis, glaber; stigma obliquum. *Fructus junior* niger, 8 mm. longus, 8–9 mm. latus, orbiculatus, alatus, apice emarginatus, glaber

KARROO REGION: Prince Albert Div., Mountain sides, Zwartberg Pass, May 24th, *Deas in Herb. Musei Austro-Afric.* 9031, 9049.

*Branches* glabrous; bark light reddish-brown, the epidermis peeling off in membranous flakes. *Leaves* of two kinds on the shoots; the lower 5 cm. long, 1·5 mm. broad, acicular, convex beneath, channelled above, acute, glabrous; the upper gradually widening to 1 cm. broad above, lanceolate-linear, lanceolate, or oblanceolate, acute, sometimes 3-toothed, glabrous, the uppermost forming a cup at the base of the female inflorescence. *Young female* cone 10 cm. long, 4·5 cm. in diameter, ovoid, obtuse at the apex. *Bracts* 1·5 cm. long, 2 cm. broad above, obovate, rounded at the apex, glabrous; the lowermost barren and green; the fertile bracts brown. *Perianth-segments* 4·5 mm. long, ·5 mm. broad, linear, hirsute. *Style* 4·5 mm. long, linear, glabrous, broadened above; stigma oblique. *Young fruit* black, 8 mm. long, 8–9 mm. broad, orbicular, with a membranous wing, broadest and emarginate round the apex, glabrous.

This species belongs to a group of three species, viz. *L. platyspermum*, *L. xenulus*, and *L. Dregei*, which has two kinds of leaves on

the same shoot. It is, however, easily distinguished from them all by the very large cones. The cone has more the appearance of that of a *Pinus* than any other *Leucadendron* that I know of; unfortunately I have not seen male specimens.

Named in compliment to Mr. Wm. Deas, J.P., of Cango East, Oudtshoorn, who collected the species and who is greatly interested in the flora of his district.

2. *L. Dregei*, E. Mey. *Male inflorescence* sessile, solitary, terminal, globose, 1 cm. in diameter. *Involucral bracts* 1-2-seriate, ovate, acuminate, acute, pubescent, ciliate. *Floral bracts* 2 mm. long, linear, villous. *Perianth-tube* 1.5 mm. long, surrounded at the base with long hairs; segments 5 mm. long, spathulate-linear, villous; limb 1 mm. long, oblong, obtuse, villous. *Anthers* .5 mm. long, oblong. *Style* 5 mm. long, filiform, villous at the base; stigma .75 mm. long, clavate.

SOUTH-WESTERN REGION: Oudtshoorn Div. Zwartbergen, Cango East, Wm. Deas in *Herb. Musei Austro-Afric.* 5135.

KARROO REGION: Prince Albert Div. Zwartberg Pass, Pearson, 7717.

Pearson's specimen differs from the type in that the leaves are not acicular but flattened towards the apex.

The above description supplements that given in the 'Flora Capensis,' where the male inflorescence is not described.

3. *L. glutinosum*, Hutchinson. *Branchlets* scantily pilose, at length becoming glabrous. *Leaves* similar in both sexes, 2.2-4.6 cm. long, 5.5-8 mm. broad, lanceolate, bluntly mucronate at the apex, narrowed at the base, glabrous. *Male heads* globose, sessile, 1 cm. long, about 1 cm. in diameter, solitary, terminating the branchlets, surrounded by the upper leaves. *Involucral bracts* 2-3-seriate, 4.5-5.5 mm. long, 4-5 mm. broad, ovate, obtuse, glabrous, viscid. *Floral bracts* 5-6 mm. long, 1 mm. broad, linear or linear-oblong, obtuse, concave, densely villous on the lower half. *Perianth-tube* 5 mm. long, 1 mm. broad, terete, glabrous; segments 4 mm. long, linear, glabrous; limb 2 mm. long, oblong, obtuse. *Anthers* 1.1 mm. long, linear. *Style* about 5 mm. long, cylindrical, with a few long hairs on the lower portion; stigma 2 mm. long, .5 mm. broad, cylindrical, obtuse. *Hypogynous scales* 1.5 mm. long, linear. *Female inflorescence* globose, sessile, solitary at the ends of the branchlets, 2.5 cm. long, 2.5 cm. in diameter. *Bracts* 1.2 cm. long, 2.2 cm. broad, transversely oblong, densely villous on the

lower half, viscid on the upper half. *Perianth segments* 1.1 cm. long, .75 mm. broad, linear, villous; limb 1.5 mm. long, oblong, obtuse. *Style* 8.5 mm. long, linear, glabrous; stigma oblique, retuse at the apex. *Fruit* 7 mm. long, 1.1 cm. broad, transversely ellipsoid, dark brown in colour, glabrous.

SOUTH-WESTERN REGION: Clanwilliam Div.] Northern slopes of Oliphant's River Valley, opposite Modderfontein, September, *Pillans*, 1511.

Hitherto this species was only known from the description of Knight (see 'Flora Capensis,' vi, 551) which agrees well with Pillans' specimen, and which I have no hesitation in regarding as a rediscovery of a species, the type of which has been lost to science.

4. *L. Pillansii*, Phillips, sp. nov. *Ramuli* *badii*, pubescentes. *Folia* ♂ .9–2.7 cm. longa, 3–7 mm. lata; ♀ 2.7–4 cm. longa, 1–1.4 cm. lata; omnia oblanceolata, apice rotunda vel obtusa, basi angustata, glabra vel raro junioria paulo pilosa. *Inflorescentia* ♂ 1.2 cm. longa, circa 1 cm. lata, solitaria, terminalia. *Receptaculum* 4 mm. longum, 2 mm. latum. *Bracteeae involucri* 3-seriatae, 7.5–8 mm. longae, 3.5 mm. latae, ovatae, concavae, acuminatae, apice obtusae, ciliatae, pubescentes. *Bracteeae floreae* 6.5 mm. longae, .5 mm. latae, supra lanceolatae villosaeque, infra unguiculae. *Tubus perianthii* 6 mm. longus, cylindricus, villosus; segmenta 4 mm. longa, linearia, glabra; limbus 2 mm. longus, linearis. *Antherae* 1.75 mm. longae, lineares. *Stylus* 9 mm. longus, in medio villosus; stigma 1.5 mm. longum, cylindricum. *Squamae hypogynae* 3.5 mm. longae, lineares. *Inflorescentia* ♀ 2 cm. longa, circa 2 cm. lata, globosa, solitaria, terminalia. *Receptaculum* 1 cm. longum, 7 mm. latum. *Bracteeae involucri* 2-seriatae, 1.6–1.7 cm. longae, 5–6 mm. latae, oblongae, acuminatae, apice acutae, ciliatae, supra albo-pubescentes. *Bracteeae floreae* 9 mm. longae, 2 mm. latae, concavae, apice obtusae, dense sericeo-pubescentes. *Segmenta perianthii* 1.1 cm. longa, linearia, in medio villosa; limbus 1.5 mm. longus, linearis. *Squamae hypogynae* 2.5 mm. longae, lineares, apice obtusae. *Ovarium* 1.5 mm. longum, globosum, villosum; stylus 9 mm. longus, linearis, glaber; stigma obliquum. *Conus* circa 3 cm. longus, globosus. *Bracteeae* concavae, dense tomentosus, infra villosus. *Fructus* 8 mm. longus, supra 9 mm. latus, subglobosus, niger, glaber vel paucis dispersis pilis.

SOUTH WESTERN REGION: Picquetberg Div., August, *Miss Edwards in Herb. Bolus*; northern slopes of the Oliphant's River Valley, near Modderfontein, September, *Pillans*, 1512.

*Branchlets* pale yellow when fresh, pubescent, those of the female densely leafy. *Leaves* of male and female differing in size; those of the male 0.9–2.7 cm. long, 3–7 mm. broad; those of the female 2.7–4 cm. long (very rarely less), 1–1.4 cm. broad; all oblanceolate, rounded or obtuse above, narrowed to the base, glabrous, or sometimes the young leaves of the female pilose beneath and of the male minutely pubescent on the narrowed portion. *Male inflorescence* 1.2 cm. long, about 1 cm. in diameter, solitary, terminal, surrounded by the upper leaves which are longer than the inflorescence and which gradually merge into three series of involucre bracts. *Receptacle* 4 mm. long, 2 mm. broad, *Involucre bracts* 7.5–8 mm. long, 3.5 mm. broad, ovate, concave, acuminate, obtuse, ciliate, pubescent without. *Floral bracts* 6.5 mm. long, .5 mm. broad, lanceolate above, narrowed into a long linear claw below, villous on the lanceolate portion. *Perianth-tube* 6 mm. long, cylindrical, villous; segments 4 mm. long, linear, glabrous; limb 2 mm. long, linear. *Anthers* 1.75 mm. long, linear. *Style* 9 mm. long, filiform-terete, villous on the middle third; stigma 1.5 mm. long, cylindrical. *Hypogynous scales* 3.5 mm. long, linear. *Female inflorescence* 2 cm. long, about 2 cm. in diameter, globose, solitary, terminal, surrounded by the upper leaves which gradually merge into two series of involucre bracts. *Receptacle* 1 cm. long, 7 mm. broad. *Involucre bracts* 1.6–1.7 cm. long, 5–6 mm. broad, oblong, acuminate, obtuse, greenish and glabrous below, brown and finely albo-pubescent above, ciliate. *Floral bracts* 9 mm. long, 9 mm. broad, broadly ovate, concave, very shortly and bluntly acuminate, obtuse, densely silky-pubescent without. *Perianth segments* 1.1 cm. long, linear. *Hypogynous scales* yellowish, 2.5 mm. long, linear, obtuse. *Ovary* 1.5 mm. long, globose, villous; style 9 mm. long, linear, gradually broadened above, glabrous; stigma oblique and somewhat bi-lobed. *Fruiting head* about 3 cm. long, globose. *Bracts* woody, deeply concave, densely tomentose, villous below. *Fruit* 8 mm. long, 9 mm. broad above, subglobose, black, glabrous or with a few scattered hairs.

Near *L. decurrens*, R. Br., from which it may be distinguished by the branchlets and involucre bracts being pubescent and not glabrous, and the perianth tube being villous.

Named in compliment to Mr. N. S. Pillans, who first collected the species.

5. *L. proteoides*, E. Mey. *Male inflorescence* 6 mm. long, 1 cm. in diameter, globose, sessile, solitary, terminal, surrounded by the upper leaves. *Involucre bracts* 3–4-seriate, 3–3.5 mm. long, .5–1 mm. broad,



ovate and acuminate or linear, acute, tomentose, ciliate. *Floral bracts* 2·5 mm. long, 1 mm. broad, lanceolate, subobtusate, villous and long-ciliate on the upper half, glabrous below. *Perianth tube* 1 mm. long, campanulate; lobes 3 mm. long, linear, densely villous; limb 1·5 mm. long, linear. *Style* 3 mm. long, filiform; stigma ellipsoid.

SOUTH-WESTERN REGION: Oudtshoorn Div. Cango East, *W. Deasii* in *Herb. Musei Austro-Afric.* 6173.

The above description supplements that given in the 'Flora Capensis,' where the male inflorescence is not described.

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15.—*Contributions to the Flora of South Africa.* No. 2.—By E. P. PHILLIPS, M.A., D.Sc., F.L.S. Assistant.

## STERCULIACEAE.

HERMANNIA, Linn.

*H. decipiens*, E. Mey. Frutex. *Rami* dense stellato-hispidi. *Folia* sessilia, 6–1·4 cm. longa, 2–6 mm. lata, maxime oblonga vel elliptico-oblonga, aliquando junioria linearia vel lanceolata, apice acuta vel truncata et 2–3-dentata, utrinque dense stellato-hispida. *Stipulae* 2, maxime deciduae, 4 mm. longae, angustae, pilosae. *Flores* maxime 2–3-floris, terminalibus corymbis dispositi, raro solitaires. *Pedicellus* 3 mm. longus, teres, stellato-pilosus. *Bracteae* 2, 4 mm. longae, angustae, pilosae. *Tubus calyci* 4–5 mm. longus, campanulatus, 10-costatus, stellato-pilosus; lobi 2 mm. longi, ovati, apice sub-obtusi, stellato-pilosi. *Segmenta* corollae 1·1 cm. longa, supra 4 mm. lata, quadrangula, glabra, infra angustiora, marginibus inflexis, pubescentia, basi glabra. *Filamenta* 4 mm. longa, 1 mm. lata, lineari-oblonga, 1-nervigera, glabra, membranacea; antherae 3 mm. longae, oblongae, acuminatae, apice 2-cornutae, basi rotundae. *Ovarium* 2·5 mm. longum, 2 mm. latum, obovatum, stellato-pubescente; stylus 3·25 mm. longus, teres, supra angustior, infra pilosus; stigma capitatum.

KARROO REGION: Zwartbergen. *Drège*; Seven Week's Poort, between Laingsburg and Ladismith, 4–5000 ft., September. A bush with long simple branches. Flowers yellow. Growing near a stream on Table Mountain Sandstone. *Phillips*, 1400! Seven Week's Poort, July, *Marloth*, 2978! Summit of Swanpoelspoortberg, September, *Marloth*, 4127!

*Bush.* *Branches* terete, densely stellate hispid, with dark-coloured bark. *Leaves* sessile, 6–1·4 cm. long, 2–6 mm. broad, mostly oblong or elliptic-oblong, some of the younger leaves linear or lanceolate, apex acute or truncate and 2–3-toothed, densely stellate-pilose above

and beneath. *Stipules* 2, usually deciduous, 4 mm. long, setaceous, pilose. *Flowers* usually arranged in 2-3-flowered corymbs at the ends of the branchlets, rarely solitary. *Pedicels* 3 mm. long, terete, stellate-pilose. *Bracts* 2, 4 mm. long, setaceous, pilose. *Calyx-tube* 4.5 mm. long, campanulate, 10-ribbed, stellate-pilose; lobes 2 mm. long, ovate, subobtuse, stellate-pilose. *Corolla-segments* 1.1 cm. long, divided into a quadrangular glabrous lobe above, 4 mm. broad; a middle elliptic hairy portion with inflexed margins; and an oblong glabrous channelled claw 2 mm. long. *Filaments* 4 mm. long, 1 mm. broad, linear-oblong, 1-nerved, glabrous, membranous; anthers 3 mm. long, oblong in outline, acuminate and diverging into 2 horns at the apex, rounded at the base. *Ovary* 2.5 mm. long, 2 mm. broad, obovate in outline, stellate-pubescent; style 3.25 mm. long, terete, narrowing above, pilose on the lower half; stigma capitate.

The Director of Kew kindly reported on this rare species as follows: "Appears to be conspecific with *H. decipiens*, E. Mey. The only difference observed is that the indumentum is much closer."

## GERANIACEAE.

### OXALIS, Linn.

*O. Tysonii*, Phillips, sp. nov. *Herba* erecta, 10-22 cm. alta. *Rami* pubescentes. *Folia* petiolata, 1-3.5 cm. longa; petiolus .6-2.5 cm. longus, glandulosus; foliola .5-1 cm. longa, 4-9 mm. lata, obovata, apice profunde 2-lobata, basi angustata, superne glabra, inferne pilosa; margo glandulosum pilis capitatis. *Pedunculus* uniflora, 3.3 cm. longus, glandulosus capitatis pilis. *Bractee* 2, 1.5 mm. longae, lineares, glandulosae. *Calyx* 4-4.5 mm. longus, pubescens, glandulosus; lobi ovati, apice obtusi. *Corolla* circa 1 cm. longa, glaber. *Stamina* 10; filamenta 1-2 cm. longa; antherae .75 mm. longae, oblongae. *Ovarium* 2 mm. longum, ovatum, glabrum; stylus 5, liber, .5 mm. longus, glaber; stigma capitatum.

EASTERN REGION: In clivis lapidosis circa Kokstad, Griqualand East, 5100 ft., December, *Tyson*, 1334.

An erect simple caulescent herb, 10-22 cm. high. *Stem* pubescent. *Leaves* petioled, 1-3.5 cm. long; petiole .6-2.5 cm. long, glandular with capitate glands; lamina digitately 3-foliolate; leaflets .5-1 cm. long, 4-9 mm. broad, obovate, deeply 2-lobed, narrowed at the base, glabrous above, hairy beneath, with capitate glands on the margins.

*Peduncles* 1-flowered, 3·3 cm. long, glandular with capitate glands. *Bracts* 2, 1·5 mm. long, linear, glandular; the lower inserted 5 mm. below the upper. *Calyx* 4–4·5 mm. long, pubescent, glandular; segments ovate, obtuse. *Corolla* about 1 cm. long, glabrous. *Stamens* 10; filaments of shorter stamens 1 mm. long; those of longer stamens 2 mm. long; anthers ·75 long, oblong. *Ovary* 2 mm. long, ovate in outline, glabrous; style 5 free, ·5 mm. long, glabrous; stigmas capitate.

This species resembles in habit *O. viscosa*, E. Mey., and its allies, but may be distinguished from all by the presence of capitate hairs on the stem and leaves. The stem is not densely glandular pubescent as in *O. viscosa*, E. Mey.

## RUTACEAE.

### ADENANDRA, Willd.

*A. Villiersii*, Phillips, sp. nov. *Suffrutex* 20–25 cm. altus. *Folia* subsessilia, ·4–1·4 cm. longa, 2–4 mm. lata, lanceolata vel ovato-lanceolata, apice obtusa, glabra, subtus glandulosa; petiolus 1 mm. longus. *Inflorescentia* terminalia, umbellata, 2–3-flora. *Pedunculus* 7 mm. longus, teres, glabra. *Bracteae* 2, 3·5 mm. longae, 1 mm. latae, lineares, obtusae. *Lobi calyci* 6 mm. longi, 2·5 mm. lati, ovati, apice obtusi, glabri, ciliati. *Petala* 1·2 cm. longa, 7 mm. lata, oblonga vel suborbiculata, apice rotunda, glabra. *Stamina* 5; filamenta 2·5 mm. longa, pubescentia; antherae 3 mm. longae, oblongae, glandula globosa stipitata terminatae. *Staminodia* 6 mm. longa, pilosa, apice globosa. *Ovarium* 1·5 mm. longum, 2 mm. latum; stylus 1 mm. longus, arcuatus, glaber; stigma capitatum.

SOUTH-WESTERN REGION: Mountain Range behind the village of French Hoek, 2500 ft., October. Flowers pale pinkish-white above, dark red beneath, Phillips, 1075, *Phillips in Herb. Musei Austro-Afric.* 8275.

A small bush 20–25 cm. high. *Branches* terete, minutely pubescent, with dark red or black bark. *Leaves* subsessile, ·4–1·4 cm. long, 2–4 mm. broad, lanceolate or ovate-lanceolate, obtuse, glabrous, glandular beneath; petiole 1 mm. long. *Inflorescence* terminal, umbellate, 2–3-flowered. *Peduncle* 7 mm. long, terete, glabrous, longer than the upper leaves. *Bracts* 2, 3·5 mm. long, 1 mm. broad, linear obtuse. *Calyx* divided almost to the base; lobes 6 mm. long, 2·5 mm.

broad, ovate, obtuse, ciliate, shorter than the stamens. *Petals* 1·2 cm. long, 7 mm. broad, oblong or suborbicular, rounded above, glabrous. *Fertile stamens* 5; filaments 2·5 mm. long, pubescent; anthers 3 mm. long; oblong, the connective produced at the apex into a stalked globose gland. *Staminodes* 6 mm. long, terete, pilose, globose at the apex. *Ovary* 1·5 mm. long, 2 mm. broad, ovate in outline; style 1 mm. long, curved, glabrous; stigma capitate, flattened above.

Near *A. umbellata*, Willd., from which it is easily distinguished by the peduncles being longer than the upper leaves. The floral structure also differs.

Named in compliment to Dr. de Villiers, of French Hoek, who takes a keen interest in the flora of his district.

#### AGATHOSMA, Willd.

1. *A. alta*, Phillips, sp. nov. *Frutex* 1·6 m. altus. *Rami* minute pubescentes. *Folia* ·5–1·2 cm. longa, 1–1·5 mm. lata, plana, subtus convexa punctataque, glabra. *Inflorescentia* terminalia, umbellata, c. 15-flora. *Pedicellus* 5 mm. longus, teres, glaber. *Calyx* 1·5 mm. longus, campanulatus; lobi ovati, apice obtusi, glabri. *Petala* 4 mm. longa, glabra; ungula 1·5 mm. longa, filiformis, glabra; limbus 2·5 mm. longus, obovatus, apice rotundus, glaber. *Filamenta* 3·5 mm. longa, teretia, glabra; antherae ·6 mm. longae, oblongae; staminodia 2 mm. longa, linearia, apice obtusa, pilosa. *Ovarium* 3-loculare, ·5 mm. longum, globosum, glabrum, supra tricornutum; stylus 2 mm. longus, teres; stigma simplex. *Cocci* 5 mm. longi, nervosi, glabri.

SOUTH-WESTERN REGION: French Hoek, side of ravine leading down to the Berg River Valley, 1500 ft., October. Flowers white. *Phillips*, 1083, *Phillips in Herb. Musei Austro-Afric.* 8283.

A tall bush about 8 ft. high. *Branches* minutely pubescent. *Leaves* ·5–1·2 cm. long, 1–1·5 mm. broad, obtuse, flat and smooth above, convex and punctate beneath, glabrous. *Inflorescence* terminating the branchlets, umbellate, about 15-flowered. *Pedicels* 5 mm. long, terete, glabrous. *Calyx* 1·5 mm. long, campanulate; lobes ovate, obtuse, glabrous. *Petals* 4 mm. long, glabrous; claw 1·5 mm. long, filiform, glabrous; limb 2·5 mm. long, obovate, rounded above, glabrous. *Filaments* of the fertile stamens 3·5 mm. long, terete, glabrous; anthers ·6 mm. long, oblong; staminodes 2 mm. long, linear, obtuse, pilose. *Ovary* 3-locular, ·5 mm. long, globose, glabrous, 3-horned above; style 2 mm. long, terete; stigma simple. *Cocci* 5 mm. long, veined, glabrous.

Near *A. communata*, Sond., from which it differs in being a much taller plant, in having pubescent branchlets, obtuse leaves, and glabrous claws to the petals. I know of no other species of *Agathosma* which attains the height this species does.

2. *A. Dummeri*, Phillips, sp. nov. *Frutex* 3–6 m. altus. *Rami* pubescentes. *Folia* 5–1.1 cm. longa, 1–1.5 mm. lata, linearia vel lanceolato-linearia, apice obtusa, supra concava, subtus glandulosa carinataque, ciliata. *Inflorescentia* terminalia, globosa, umbellata, c. 30-flora. *Pedicellus* 4 mm. longus, teres, glandulosus. *Sepala* 2 mm. longa, ovata, apice obtusa, glabra. *Petala* 4 mm. longa, glabra; ungula 1.5 mm. longa, linearis; limbus 2.5 mm. longus, obovatus, apice rotundus, basi cuneatus. *Filamenta* 2 mm. longa, raro 5 mm. longa, teretia, glabra; antherae .75 mm. longae, oblongae; staminodia 3 mm. longa, linearia, apice obtusa, basi angustata, pilosa. *Ovarium* 1.2 mm. longum, 3-loculare, ovatum, glabrum vel supra paullo pilosum; stylus 1.5 mm. longus, teres, glaber; stigma simplex.

SOUTH-WESTERN REGION: French Hoek, mountain ridges above Kriel's Farm, 3250 ft., October. Flowers pale blue, *Phillips*, 1084, *Phillips in Herb. Musei Austro-Afric.* 8284.

A bush 1–2 ft. high. *Branches* pubescent. *Leaves* 5–1.1 cm. long, 1–1.5 mm. broad, linear or lanceolate-linear, obtuse, smooth and concave above, glandular and keeled beneath, ciliate. *Inflorescence* terminal, globose, umbellate, about 30-flowered. *Pedicels* 4 mm. long, terete, glandular. *Sepals* 2 mm. long, ovate, obtuse, glabrous. *Petals* 4 mm. long, glabrous; claw 1.5 mm. long, linear; limb 2.5 mm. long, obovate, rounded above, cuneate at the base. *Filaments* of the fertile stamens usually 2 mm. long, rarely 5 mm. long, terete, glabrous; anthers .75 mm. long, oblong; staminodes 3 mm. long, linear, obtuse, narrowing at the base, pilose. *Ovary* 1.2 mm. long, 3-locular, ovate in outline, glabrous except for a few long hairs above; style 1.5 mm. long, terete, glabrous; stigma simple.

In appearance this closely resembles *A. hirta*, B. & W., but differs in being perfectly glabrous.

Named in compliment to Mr. R. Dümmer, who monographed the genus *Agathosma*.

## COMPOSITAE.

## MAIRIA, Neis.

*M. pustulata*, Phillips, sp. nov. *Planta* acaulescens. *Folia* radicalia, 3-6.5 cm. long, .9-2.2 cm. lata, elliptica, apice rotunda, basi attenuata, integra, utrinque setosa. *Pedunculi* 3, 12-23.5 cm. longi, pilosi, foliosi paucis linearibus foliis 1.2-2.5 cm. longis. *Capitula* 1.2 cm. longa, 2.5 cm. lata. *Bracteae involucri* 2-seriatae, 1 cm. longae, 1.5-2 cm. latae, lineares, apice acutae, pilosae pilis basi bulbosis, *Flores radii* femineae; tubus corollae 4 mm. longus, teres, sparse pilosus; limbus 1.2 cm. longus, 4 mm. latus, elliptico-oblongus, apice acutus apiculatusque, 4-nervigerus, glaber. *Pappus* 5 mm. longus, plumosus. *Ovarium* 3 mm. longum, .75 mm. latum, oblongo-lineare, compressum, tenue pilosum; stylus 2.75 mm. longus, teres, glaber; lobi 1.5 mm. longi, lineares, apice obtusi. *Flores disci* hermaphroditi; tubus corollae 5 mm. longus, infra teres et glanduloso-pilosus, supra infundibuliformis; lobi 1 mm. longi, .5 mm. lati, ovati, apice obtusi, glabri. *Filamenta* 1.5 mm. longa, filiformia; antherae, 2.5 mm. longae, lineares, apice ovatae, basi rotundae. *Pappus* 5.5 mm. longus, plumosus. *Ovarium* 3.5 mm. longum, .75 mm. latum, lineare, pubescente; stylus 4.5 mm. longus, teres, glaber; lobi 1.5 mm. longi, lineares, apice acuti, supra breviter pilosi.

EASTERN MOUNTAIN REGION: Basutoland. Thaba-Bosin Distr., slopes of Machache Mtn., November, *Jacottet in Herb. Dieterlen*, 1059.

An acaulescent plant. *Leaves* radicle, 3-6.5 cm. long, .9-2.2 cm. broad, elliptic, rounded at the apex, attenuate at the base, entire, setose above and beneath with bulbous based hairs. *Peduncles* 3 to a root-stock, 12-23.5 cm. long, terete, pilose, bearing a few linear leaves 1.2-2.5 cm. long. *Head* 1.2 cm. long, 2.5 cm. in diameter. *Involucral bracts* 2-seriate, 1 cm. long, 1.5-2 cm. broad, linear, acute, pilose with bulbous based hairs. *Ray florets* female, purplish mauve in colour; corolla-tube 4 mm. long, terete, scantily pilose; limb 1.2 cm. long, 4 mm. broad, elliptic-oblong, obtuse and shortly articulate at the apex, 4-nerved, glabrous. *Pappus* 5 mm. long, plumose. *Ovary* 3 mm. long, .75 mm. broad, oblong-linear, flattened, finely pilose; style 2.75 mm. long, terete, glabrous; style-lobes 1.5 mm. long, linear, obtuse. *Disc florets* hermaphrodite; corolla-tube 5 mm. long, terete and glandular pilose below, funnel-shaped in the upper half;



lobes 1 mm. long, 5 mm. broad, ovate, obtuse, glabrous. *Filaments* 1·5 mm. long, filiform; anthers 2·5 mm. long, linear, with an ovate gland at the apex, rounded at the base. *Pappus* 5·5 mm. long, plumose. *Ovary* 3·5 mm. long, 75 mm. broad, linear, pubescent; style 4·5 mm. long, terete, glabrous; style-lobes 1·5 mm. long, linear, acute, shortly pilose on the upper half.

Similar in appearance to *M. crenata*, Ness, from which it is easily distinguished by the bulbous-based setae on the leaves.

#### HELICHRYSUM, Gaertn.

1. *H. Hutchinsonii*, Phillips, sp. nov. *Frutex* 18–22 cm. altus. *Rami* teres, sparse pilosi. *Folia* 5–1·5 cm. longa, 1–3 mm. lata, oblanceolata, apice obtusa, lanata, interdum seneroria glabra. *Capitula* solitaria, sessilia, terminalia vel axillaria, 5 mm. longa, circa 4 mm. lata. *Bractee involucri* circa 2–3-seriatae, 3–3·5 mm. longae, 75–1·25 mm. latae, lineares vel lanceolatae, apice acutae, mucronatae, glabrae vel eximae lanatae. *Flores marginis* femineae. *Tubus corollae* 2·5 mm. longus. *Flores disci* hermaphroditi. *Tubus corollae* 2·5 mm. longus, cylindratus, glaber; lobi 25 mm. longi, triangulato-ovati, apice acuti. *Antherae* 1·5 mm. longae, lineares. *Ovarium* 5 mm. longum, ellipsoideum; stylus 2 mm. longus, filiformis; lobi 5 mm. longi. *Pappus* 3·5 mm. longus, deciduus.

WESTERN REGION: Namaqualand, between Steinkopf and the Orange River, near Henkries, October. *Phillips*, 1612, *Phillips in Herb. Musei Austro-Afric.* 8989.

A small shrub 18–22 cm. high, with numerous stiff slender branches arising from an underground woody root-stock. *Branches* terete, scantily pilose, with dark-reddish bark. *Leaves* 5–1·5 cm. long, 1–3 mm. broad, oblanceolate, obtuse, woolly, the older leaves sometimes glabrous. *Heads* solitary, sessile, either terminating short lateral shoots or arising from the axils of the uppermost leaves, 5 mm. long, about 4 mm. broad. *Involucral bracts* 2–3-seriate, 3–3·5 mm. long, 75–1·25 mm. broad, linear to lanceolate, acutely mucronate, the outermost matted with hairs, otherwise glabrous. *Marginal flowers* female. *Corolla-tube* 2·5 mm. long. *Disc flowers* hermaphrodite. *Corolla-tube* 2·5 mm. long, cylindric, glabrous; lobes 25 mm. long, triangular-ovate, acute. *Anthers* 1·5 mm. long, linear. *Ovary* 5 mm. long, ellipsoid; style 2 mm. long, filiform; lobes 5 mm. long. *Pappus* exceeding the corolla, 3·5 cm. long, deciduus.

Named in compliment to Mr. J. Hutchinson, of the Kew Herbarium.

2. *H. splendidum*, Less., var. *basuticum*, Phillips, var. nov. *Rami* lanati. *Folia* 1-2.5 cm. longa, 2-5 mm. lata, linearia, raro oblonga, apice obtusa, aliquando mucronata, superne lanata vel subglabra, inferne lanata, distincte nervigera. "*Capitula*" 2-3 cm. lata.

EASTERN MOUNTAIN REGION.—Slope of Machache Mtn., Thaba-Bosin Distr., *Miss Jacottet in Herb. Dieterlen*, 1068.

*Stem* woody, terete, prominently covered with the glabrous distinctly veined leaf-bases, woolly. *Leaves* 1-2.5 cm. long, 2.5 mm. broad, linear, more rarely oblong, obtuse, sometimes mucronate, woolly or subglabrous above, woolly beneath, distinctly veined. *Capitula* arranged in globose "heads" 2-3 cm. in diameter.

This plant has all the characters of *H. splendidum*, Less., but is of a totally different habit to the typical form, and I think it is better to regard it as a local variety rather than a distinct species.

#### NESTLERA, Spreng.

*N. Dieterlenii*, Phillips, sp. nov. *Frutex* 1-1.6 m. altus. *Rami* juniores lanato-tomentosi, demum glabri. *Folia* congesta, 1-1.6 cm. longa, .6 mm. lata, linearia, apice acuta, subtus sulcata; junioria super lanata, subtus dense lanata; senioria demum araneosa. *Capitula* terminalia, solitaria, circa 1.2 cm. longa 3.5 mm. lata, linearia vel lineari-oblonga. *Bracteaevolvocri* circa 6-seriatae; eximae 4-5 mm. longae; 2-2.5 mm. latae, ovatae, apice obtusae, membranaceaeque, glabrae; intimae 9 mm. longae, 1.5 mm. latae, lineares, apice obtusae, membranaceaeque, glabrae. *Receptaculum* alveolatum. *Flores radii* feminei; tubus corollae 4 mm. longus, teres, glaber; limbus 6 mm. longus, 2.5 mm. latus, ellipticus, apice 3-dentatus, 6-nervigerus, glaber. *Squamulae pappi* 1 mm. longae, lineares. *Ovarium* 4.5 mm. longum, .5 mm. latum, lineare, glabrum; stylus 5 mm. longus, teres, glaber; lobi 1.5 mm. longi, lineares, apice obtusi. *Flores disci* hermaphroditi; tubus corollae 6.5 mm. longus, infra cylindratus, supra campanulatus, glaber; lobi .75 mm. longi, .6 mm. lati, ovati, apice obtusi. *Filamenta* 2.5 mm. longa; antherae 2.5 mm. longae, lineares, apice ovatae obtusaeque, basi sagittatae. *Squamulae pappi* 1 mm. longae, lineares. *Ovarium* 5.5 mm. longum, .5 mm. latum, lineare, glabrum; stylus 6 mm. longus, teres, glaber; lobi 1 mm. longi, lineares, apice obtusi.

EASTERN MOUNTAIN REGION: Thaba-Bosin Distr., stony and sunny spot on slopes of Roma Kloof, *Miss Jacottet in Herb. Dieterlen*, 1065.

*Bush* 1-1.6 m. high. *Young branchlets* white woolly-tomentose, becoming glabrous with age. *Leaves* crowded, 1-1.6 cm. long, 6 mm.

broad, linear, acute, channelled beneath; the youngest woolly above, densely woolly beneath; the older becoming cobwebby. *Heads* terminal, solitary at the ends of short shoots, about 1·2 cm. long, 3·5 mm. in diameter, linear or oblong-linear in outline. *Involucral bracts* about 6-seriate; the outer 4–5 mm. long, 2–2·5 mm. broad, ovate, obtuse, with a membranous appendage at the apex, glabrous; inner 9 mm. long, 1·5 mm. broad, linear, obtuse, with a rounded membranous appendage at the apex, glabrous. *Receptacle* honey-combed. *Ray-florets* female; corolla-tube 4 mm. long, terete, glabrous; limb 6 mm. long, 2·5 mm. broad, elliptic, 3-toothed at the apex, 6-nerved, glabrous. *Pappus* 1 mm. long, composed of a number of linear scales. *Ovary* 4·5 mm. long, ·5 mm. broad, linear in outline, glabrous; style 5 mm. long, terete, glabrous; style-lobes 1·5 mm. long, linear, cylindric in the lower half, campanulate above, glabrous; lobes ·75 mm. long, 6 mm. broad, ovate, obtuse. *Filaments* 2·5 mm. long; anthers 2·5 mm. long, linear, with a small ovate obtuse appendage at the apex, tailed at the base. *Pappus* 1 mm. long, composed of linear scales. *Ovary* 5·5 mm. long, ·5 mm. broad, linear in outline, glabrous; style 6 mm. long, terete, glabrous; lobes 1 mm. long, linear, flat within, convex without, obtuse.

## ATHANASIA, Linn.

*A. Hameri*, Phillips, sp. nov. *Frutex* 1·3 m. altus. *Rami* dense foliosi, supra dense pubescentes vel subtomentosi, demum glabri. *Folia* ·9–2·5 cm. longa, profunde 3–5-secta; junioria molle pilosa, demum glabra; infra 5–8 mm. longa, 1·5–2 mm. lata, linearia; segmenta ·3–1·5 cm. longa, ·75 mm. lata, linearia, acute mucronata. *Pedunculus* ad 1·5 cm. longus, teres, subtomentosus. *Capitula* 4·5–6 mm. longa, 4–5 mm. lata, urceolata vel subglobosa. *Receptaculum* paleaceum; paleae 2 mm. longae, ·75 mm. latae, oblongae. *Bracteae involucri* 3-seriatae, 3·5–4 mm. longae, ovato-lanceolatae, apice obtusae, membranaceaeque, sparse pilosae, ciliatae. *Tubus corollae* 2 mm. longus, teres, glaber; lobi 1 mm. longi, ovati, apice subobtusius, glabri. *Filamenta* 1·5 mm. longa, linearia, glabra; antherae 1·25 mm. longae, lineares, apice ovatae. *Squamae pappi* 1 mm. longae, lineares. *Ovarium* 1·25 mm. longum, ·75 mm. latum, oblongum, costatum, glabrum; stylus 2 mm. longus, teres, glaber; lobi ·75 mm. longi, lineares, apice truncati.

SOUTH-WESTERN REGION: French Hoek, near the Waterfall above the village, 1500 ft., October, *Phillips*, 1169, and *Phillips in Herb. Musei Austro-Afric.* 8369.

A bush 1·3 m. high. *Branches* densely leafy, densely pubescent or subtomentose above, soon becoming almost glabrous. *Leaves* ·9–2·5 cm. long, deeply 3–5-sect; the younger leaves softly pilose, becoming glabrous with age; the lower undivided portion of the leaf 5–8 mm. long, 1·5–2 mm. broad, linear; segments ·3–1·5 cm. long, ·75 mm. broad, linear, acutely mucronate. *Heads* peduncled, massed in a dense globose corymb at the ends of the branches, 4·5–6 mm. long, 4·5 mm. in diameter, urceolate or subglobose, between 50–60-flowered. *Peduncles* up to 1·5 cm. long, terete, subtomentose. *Receptacle* paleaceous; paleae 2 mm. long, ·75 mm. broad, oblong, shortly jagged towards the apex. *Involucral bracts* 3-seriate, 3·5–4 mm. long, ovate-lanceolate, obtuse, membranous round the apex, with a brown spot near the tip, scantily pilose, almost glabrous, ciliate. *Corolla-tube* 2 mm. long, terete, glabrous; lobes 1 mm. long, ovate, subobtusate, glabrous. *Filaments* 1·5 mm. long, linear, glabrous; anthers 1·25 mm. long, linear, with a small ovate gland at the apex. *Pappus* a series of very narrow linear scales 1 mm. long. *Ovary* 1·25 mm. long, ·75 mm. broad, oblong in outline, ribbed, glabrous; style 2 mm. long, terete, glabrous; lobes ·75 mm. long, linear, truncate.

I at first determined this plant as *A. palmatifida*, DC., from the description in the 'Flora Capensis,' but as we had no specimen, material was forwarded to Kew. The Director of Kew very kindly sent one of the specimens to Dr. C. Lindman, of Stockholm, who compared it with Sonder's plant. Dr. Lindman reported fully on the specimen, and there seems to be considerable doubt as to the plant being *A. palmatifida*, DC., and as the type of the species is so imperfect it was considered advisable to describe my plant as a new species. It differs from the type of *A. palmatifida*, DC., in the following respects: the young leaves are pilose, not "densely tomentose with a fine short tomentum"; the involucral bracts are scantily pilose, sometimes almost glabrous, not "so densely tomentose that their shape and form can hardly be seen."

I take the opportunity of naming this plant in compliment to Mr. A. Handel Hamer, who has done so much to arouse public interest in the protection of the Cape flora.

#### EURYOPS, Cass.

*E. Pearsonii*, Phillips, sp. nov. *Rami* supra foliosi, infra nudi, glabri. *Folia* ·7–1·6 cm. longa, 3–6 mm. lata, elliptica vel elliptico-oblonga, apice obtusa, basi angustata, rugosa, glabra. *Capitula*

3-4-nata, pedunculata, terminalia, 7 mm. longa, c. 8 mm. lata. *Pedunculus* 6-8 mm. longus, teres, glaber. *Bractæae involucri* 6, connatae, campanulatae, glabrae; lobi 4.5 mm. longi, 3-3.5 mm. lati, elliptici, apice obtusi, supra marginibus paucis glandulosis pilis, *Receptaculum* 1.5 mm. latum, convexum, alveolatum. *Flores radii* 6.5 mm. longi; corolla supra 2 mm. lata, apice obtusa, 3-fida, glabra, basi cylindrata. *Pappus* 1.5 mm. longus, tenuis plumosus. *Ovarium* 1.5 mm. longum, oblongum, dense pubescente; stylus 3 mm. longus, linearis, basi bulbosus, glaber; lobi 1 mm. longi, lineares, apice obtusi. *Flores disci* 6.5 mm. longi; infra tubulosi 2 mm. longi, .5 mm. lati, glabri; supra campanulati, 2.5 mm. longi, 5-dentati, glabri; dentes .75 mm. longi, ovati, apice subobtusi. *Filamenta* 1 mm. longa, filiformia, glabra; antherae 2 mm. longae, lineares, apice ovatae obtusaeque. *Ovarium* 1.75 mm. longum, lineari-oblongum, pubescente; stylus 4.5 mm. longus, teres, basi bulbosus, glaber; lobi .75 mm. longi, lineares, truncati.

KARROO REGION: Matjesfontein, June, Pearson, 1572, Pearson in *Herb. Musei Austro-Afric.* 1530.

The upper branches usually arising trichotomously, closely leafy, becoming naked below and rough with the remains of the petioles, glabrous. *Leaves* .7-1.6 cm. long, 3-6 mm. broad, elliptic or elliptic-oblong, obtuse, narrowed at the base into a very short petiole, rugose when dry, glabrous. *Capitula* peduncled, 3-4 at the end of the branchlets, 7 mm. long, about 8 mm. in diameter. *Peduncles* 6-8 mm. long, terete, glabrous. *Involucre* 6-lobed, broadly campanulate, glabrous; lobes 4.5 mm. long, 3-3.5 mm. broad, elliptic, obtuse, with a few glandular hairs on the margin near the apex. *Receptacle* 1.5 mm. in diameter, convex, honeycombed. *Ray florets* 6.5 mm. long; corolla ligulate, 2 mm. broad above, obtuse, 3-fid, cylindric below, glabrous. *Pappus* 1.5 mm. long, finely feathered. *Ovary* 1.5 mm. long, oblong in outline, densely pubescent; style 3 mm. long, linear, bulbous at the base, glabrous; style branches 1 mm. long, linear, obtuse. *Disc florets* numerous, 6.5 mm. long, tubular below, then suddenly campanulate above; the tubular portion 2 mm. long, .5 mm. in diameter, glabrous; the campanulate portion 2.5 mm. long, 5-toothed, glabrous; teeth .75 mm. long, ovate, subobtuse. *Stamens* situated in the throat of the corolla; filaments 1 mm. long, filiform, glabrous; anthers 2 mm. long, linear, with an ovate obtuse gland at the apex, blunt at the base. *Ovary* 1.75 mm. long, linear-oblong in outline, pubescent; style 4.5 mm. long, terete, bulbous at the base, glabrous; style branches .75 mm. long, linear, truncate.

Kew reports on this specimen as follows: "This is undescribed, but

is identical with specimens collected by Drège at Matjesfontein and distributed as *E. latifolius* var. ?”

#### URSINIA, Gaertn.

1. *U. longiscapa*, Phillips, sp. nov. *Rami* pubescentes mox glabri *Folia* 4·5–6·5 cm. longa, pinnatisecta vel bipinnatisecta; lobi 1·5–2·2 cm. longi, 75 mm. lati, lineares apice acuti mucronatique, pilosi, aliquando glabri. *Pedunculus* 7–26·5 cm. longus, teres, sulcatus, paullo pilosi. *Capitulum* 2·5 cm. latum. *Bracteae* involucri 4–5-seriate, supra paullo pilosae. *Corolla* radii 1·1–2·05 cm. longa; limbus 7–1·65 cm. longus, 2–5 mm. latus, linearis vel lineari-oblanco-latus, apice rotundus. *Corolla* disci 3·5 mm. longa; tubus 3 mm. longus, teres, glaber; lobi 1·5 mm. longi; oblongi, apice obtusi. *Filamenta* 1·5 mm. longa; antherae 2 mm. longae, lineares. *Ovarium* 1 mm. longum, glabrum; stylus 1·75 mm. longus, glaber; lobi 1 mm. longi.

SOUTH-WESTERN REGION: Mountain slopes round French Hoek, 1500 ft., October. A handsome bush, 1–3 ft. high; rays dark reddish-brown beneath, orange above and light yellow at the base. Phillips, 1387, *Phillips in Herb. Musei Austro-Afric.* 5108.

*Branches* pubescent, becoming glabrescent. *Leaves* 4·5–6·5 cm. long, pinnatisect or bipinnatisect; lobes 1·5–2·2 cm. long, 75 mm. broad, linear, acutely mucronate, pilose, sometimes becoming glabrous. *Peduncle* 7–26·5 cm. long, terete, furrowed, bearing 3–4 scattered linear leaves, scantily pilose, sometimes almost glabrous. *Capitulum* 2–5 cm. in diameter. *Involucral bracts* 4–5 seriate, scantily pilose on the upper half; the outermost 5 mm. long, 1·5 mm. broad, linear or ovate-acuminate, with a membranous tip; the inner 1·5 mm. long, 3 mm. broad, oblong, with a large elliptic-ovate membranous tip 7 mm. long, 5·5 mm. broad; the innermost similar with a slightly membranous tip. *Receptacle* bearing paleae; paleae 3·4 mm. long, 1–1·5 mm. broad, oblong or linear-oblong, transparent, retuse and mucronate at the apex. *Ray florets* neuter. *Corolla-tube* 4 mm. long, cylindric; lobes 1·7–1·65 cm. long, 2–5 mm. broad, linear or linear-oblanco-late, rounded above, entire or minutely retuse, 7-nerved, glabrous, glandular when viewed by transmitted light. *Disc florets* hermaphrodite. *Corolla-tube* 3 mm. long, terete, glabrous; lobes 1·5 mm. long, oblong, obtuse. *Stamens* inserted near the base of the corolla-tube: filaments 1·5 mm. long, filiform; anthers 2 mm. long, linear, with a quadrate membranous appendage at the apex. *Ovary* 1 mm. long, cylindric, glabrous; style 1·75 mm. long, terete, glabrous; lobes 1 mm. long. *Pappus* coroniform.

Kew reported on this plant as follows: "*Ursinia* sp., closely allied to *U. anethifolia*, N.E.Br. and identical with Zeyher 2804, which was wrongly included in *Sphenogyne anethifolia* by Harvey.

2. *U. tysoniana*, Phillips, sp. nov. *Herba* simplex vel basi ramis diffusa. *Rami* pubescentes. *Folia* 1·6–3 cm. longa, pinnatifida vel bipinnatifida, basi paullo amplexata; segmenta 3–9 mm. longa, ·5 mm. lata, linearia, acute mucronata, glabra. *Pedunculus* 6·7–10 cm. longus, striatus, glaber vel tenue pilosus. *Bracteae involucri* 4-seriatae, glabrae; eximae 4 mm. longae, 2 mm. latae, ovatae, apice obtusae; marginibus latis fuscis membranaceis; intimae 6 mm. longae, 2·5 mm. latae, oblongae, apice obtusae, marginibus membranaceis apice maximis latis. *Receptaculum* paleaceum; palae 5 mm. longae, 1–1·25 mm. latae, oblongae vel lineari-oblongae, apice semiorbiculatae, membranaceae. *Flores radii* neutrii; tubus corollae 4 mm. longus, cylindratus; lobi 1·1 cm. longi, lineares, apice obtusi 3-fidique, 4-nervigeri. *Flores disci* hermaphroditi; tubus corollae 2·75 mm. longus, infra cylindratus, supra latus; lobi ·75–1 mm. longi, ovati, apice obtusi. *Filamenta* 1 mm. longa, filiformia; antherae 2 mm. longae, lineares, apice ovatae. *Ovarium* 1 mm. longum, oblongum; stylus 3 mm. longus, filiformis; lobi 1 mm. longi. *Squamulae pappi* 3 mm. longae, membranaceae.

SOUTH-EASTERN REGION: Griqualand East. In montis Ingeli et Zuurburg, October, *Tyson*, 1873.

A subherbaceous plant with a woody rootstock, 13–15 cm. high, simple or branched from the base. *Branches* pubescent. *Leaves* 1·6–3 cm. long, pinnatifid or bipinnatifid, slightly sheathing at the base; leaf segments 3–9 mm. long, ·5 mm. broad, linear, acutely mucronate, glabrous. *Peduncles* 6·7–10 cm. long, striate, glabrous or finely pilose with short scattered hairs. *Involucral bracts* 4-seriate, glabrous; the outer 4 mm. long, 2 mm. broad, ovate, obtuse, with a wide brown membranous margin; inner 6 mm. long, 2·5 mm. broad, oblong, obtuse, with a membranous margin much widened round the apex. *Receptacle* paleaceous; paleae 5 mm. long, 1–1·25 mm. broad, oblong or linear-oblong, with a semiorbicular crest at the apex, membranous. *Ray-florets* neuter; corolla-tube 4 mm. long, cylindric; lobes 1·1 cm. long, linear, obtuse, 3-fid at the apex, 4-nerved. *Disc florets* hermaphrodite; corolla-tube 2·75 mm. long, cylindric in the lowermost third, widening above; lobes ·75–1 mm. long, ovate, obtuse. *Stamens* inserted in the widened portion of the tube; filaments 1 mm. long, filiform; anthers 2 mm. long, linear, with an ovate gland at the apex. *Ovary* 1 mm. long, oblong; style 3 mm. long, filiform; lobes 1 mm. long. *Pappus* scales 3 mm. long, membranous.

Near *U. brevicaulis*, W. & E., but differs in having glabrous leaves and the leaf-segments being sharply mucronate.

## SELAGINEAE.

WALAFRIDA, E. Mey.

*W. basutica*, Phillips, sp. nov. *Suffrutex* circa 20 cm. altus. *Rami* teres, minute pubescentes. *Folia* 2-4 mm. longa, linearia, apice obtusa, inferne concava, glabra vel raro paucis pilis tecta. *Inflorescentia* cylindrata, terminalia, aliquando paniculata. *Bracteae* 2 mm. longae, .75 mm. latae, ovato-lanceolatae, apice obtusae, ciliatae, glabrae. *Calyx* 2-partitus, 2.5 mm. longus; lobi ovati, apice obtusi, membranacei, ciliati. *Tubus corollae* 2.5 mm. longus, teres, glaber; lobi 1 mm. longi, .5 mm. lati, oblongi, apice obtusi. *Stamina* .5 mm. longa. *Ovarium* .75 mm. longum, ellipsoideum, glabrum; stylus 2 mm. longus, teres, glaber; stigma simpliciter.

EASTERN MOUNTAIN REGION: Small plateau between Laikopile and Thaba-Chicha Mtns., Likhoele, Mafeteng Distr., February, A. Dieterlen, 1105.

A small shrub about 20 cm. high with numerous rod-like branches arising from a woody stem. *Branches* terete, minutely pubescent. *Leaves* fascicled, 2-4 mm. long, linear, obtuse, concave beneath, glabrous, or rarely with a few hairs. *Inflorescence* terminating the rod-like branches, sometimes arranged in a paniculate manner. *Bracts* 2 mm. long, .75 mm. broad, boat-shaped (ovate-lanceolate), obtuse, ciliated, glabrous. *Calyx* 2-partite, 2.5 mm. long; lobes ovate, obtuse, membranous, ciliated, with a greenish keel. *Flowers* white. *Corolla-tube* 2.5 mm. long, terete, glabrous; lobes 1 mm. long, .5 mm. broad, oblong, obtuse. *Stamens* .5 mm. long, shorter than the corolla-lobes. *Ovary* .75 mm. long, ellipsoid, glabrous; style 2 mm. long, terete, glabrous; stigma simple.

Very similar in appearance to *W. wilbergensis*, Rolfe, from which it may be distinguished by the cylindric inflorescences, the 2-partite calyx, and the smaller flowers.

Sesuto: Mophethu.



## IRIDEAE.

## WATSONIA, Mill.

*W. Muirii*, Phillips, sp. nov. *Cormus* globosus, 1·5–2 cm. longus. *Folia* 4, 7–18 cm. longa, 6–1 cm. lata, linearia, apice acuta, basi angustata, pluri-nervigera, unicostata, glabra. *Pedunculus* 14–25 cm. longus, teres, glaber. *Bracteae* 1·7–2 cm. longae. *Tubus* perianthii 1·7 cm. longus, 5–6 mm. latus, supra paullo angustatus, infra cylindricus; lobi 1·5 cm. longi; interiores 9 mm. lati, apice obtusi; exteriores angustiores, apice acuti. *Filamenta* 1·3 cm. longa, glabra; antherae 7 mm. longae, lineares, basi sagittatae. *Ovarium* 3 mm. longum, cylindricum, glabrum; stylus 2·1 cm. longus, glaber; lobi 2 mm. longi, bifidi.

SOUTH-WESTERN REGION: French Hoek. Sandy ground in field near Kriel's Farm, c. 850 ft., October. Flowers pink. *Phillips*, 1324, *Phillips in Herb. Musei Austro-Afric.* 8524. Riversdale Div. near Albertina, *Muir*.

*Corn* globose, 1·5–2 cm. long, covered with coarse matted fibres. *Produced leaves* usually 4, 7–18 cm. long, 6–1 cm. broad, linear, acute, narrowed at the base, many nerved, with a prominent midrib, glabrous. Exposed portion of the peduncle 14–25 cm. long, terete, glabrous, bearing one or two short clasping leaves. *Spathe-valves* 1·7–2 cm. long, half as long as the exposed portion of the perianth. *Perianth tube* 1·7 cm. long, 5–6 mm. in diameter at the throat, gradually narrowing downwards in the upper half, becoming cylindric in the lower half; lobes 1·5 cm. long; the inner 9 mm. broad, obtuse; the outer slightly narrowed and acute. *Stamens* inserted at the widened portion of the perianth tube; filaments 1·3 cm. long, semiterete, glabrous; anthers 7 mm. long, linear, sagittate at the base, basi-fixed. *Ovary* 3 mm. long, cylindric, glabrous; style 2·1 cm. long, filiform-terete, glabrous; style-branches 2 mm. long, 2-lobed.

The flowers are of a light brick-red colour; the filaments have a slightly reddish tinge; anthers yellow; style branches reddish. Near *W. brevifolia*, Ker., from which it differs in having a smaller corm and the exposed portion of the flower being at least twice as long as the spathe-valves.

Named in compliment to Dr. J. Muir, of Albertina, Riversdale.

## LILIACEAE.

## BULBINE, Linn.

*B. Foleyi*, Phillips, sp. nov. *Herba* acaulescens. *Tuberi* fusiformes. *Folia* radicalia, 9–19 cm. longa, teretia, carnosa, apice acuta, glabra. *Pedunculus* 10–28 cm. longus, teres, sulcatus, glaber. *Inflorescentia* racemosa, 2–6-flora, ad 3·5 cm. longa. *Bracteae* 2·75 mm. longae, 2 mm. latae, ovatae, acuminatae, apice acutae, membranaceae, glabrae. *Pedicellus* 5·5–6·5 mm. longus, teres, glaber. *Segmenta perianthii* 7 mm. longa, 1·5 mm. lata, lineari-oblonga, apice obtusa. *Filamenta* 3 mm. longa, lineari-clavatis pilis tecta; antherae 1 mm. longae, subglobosae. *Ovarium* 1·5 mm. longum, 1 mm. latum, oblongum, sparse glandulosum; stylus 4·5 mm. longus, linearis, glaber; stigma capitatum.

SOUTH-WESTERN REGION: Worcester Div. Hex River, near De Doorns, September, *Bolus* ex parte. Paarl Div. Mountains round French Hoek, c. 1200 ft., October, *Kensit in Herb. Bolus*, 10612; mountain slopes above Kriel's Farm, 2000 ft., October, *Phillips*, 1351, *Phillips in Herb. Musei Austro-Afric.* 8551.

An acaulescent herb. *Rootstock* of many fusiform tubers. *Leaves* radicle, usually shorter than, rarely as long as the pedicels, 9–19 cm. long, terete (linear in dried specimens and then 1–2·5 mm. broad), acute, fleshy, glabrous. *Peduncle* 10–28 cm. long, terete, furrowed, glabrous. *Inflorescence* racemose, 2–6-flowered, up to 3·5 cm. long. *Bracts* 2·75 mm. long, 2 mm. broad, ovate, acuminate, acute, membranous, glabrous. *Pedicels* 5·5–6·5 mm. long, terete, glabrous, articulated with the flower at the apex; anthers 1 mm. long, subglobose. *Ovary* 1·5 mm. long, 1 mm. broad, oblong in outline, sparsely glandular; style 4·5 mm. long, glabrous; stigma capitate.

Perianth yellow within; the three outer segments brown beneath with a darker midrib; the three inner with a brown midrib.

Named in compliment to Mr. J. Foley, who accompanied me to French Hoek.

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16. LIST OF PLANTS COLLECTED IN THE PERCY SLADEN MEMORIAL EXPEDITIONS, 1908-1911, CONTINUED (COMPOSITAE).

(With Text-figs. 1-16.)

*Introduction to Mr. J. Hutchinson's account of the Family Compositae.*

—By H. H. W. PEARSON.\*

THE *Compositae* are predominant in all the South African regions.† In the western coast region, within which the bulk of these collections was obtained, this family is said to include about 23 per cent. of the whole phanerogamic flora,‡ a figure which the following list will doubtless help to modify. The fact that the family plays so important a part in the composition of the flora of the region gives an added interest to the distribution of its species, and to their occurrence in other South African floral regions.

On the collection as a whole, Mr. Hutchinson makes the following observations:—

“Altogether there were gathered about 630 specimens of this family, and some idea of the immense value of the collection as a contribution to our knowledge of the *Compositae* of these regions may be gathered from the following.

“Some 269 species are represented, out of which 30 are new. These, with two exceptions, are described in the following pages, the majority accompanied by black and white figures in the text. Certain genera are represented by a surprisingly large number of species: such are *Pteronia*, 19 species, 2 of which are new; *Helichrysum*, 21 species; *Athanasia*, 9 species, 1 new, and a new variety; *Pentzia*, 8 species, of which no less than 3 are new; *Senecio*, 28 species, 4 new; *Euryops*, 7 species, 1 new; *Othonna*, 14 species, 4 new, one of which, *Othonna euphorbioides* (Fig. 15), is of a very remarkable habit closely resembling a spiny *Euphorbia*,

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 76.

† Bolus, H., Sketch of the Floral Regions of South Africa—Science in South Africa, 1905, p. 199.

‡ Bolus, *loc. cit.*, p. 206.

the spines being the indurated persistent peduncles; *Dimorphotheca*, 8 species, 1 new; *Tripteris*, 11 species, 3 new; and *Ursinia*, 9 species.

“The arrangement of the genera follows that of Bentham and Hooker’s ‘Genera Plantarum,’ the species being more or less after Harvey’s account in the ‘Flora Capensis,’ vol. iii. The *Pteronias* are grouped after a revision by Dr. Phillips and the writer.\* The descriptions of the new *Pteronias* in the following list are included in this revision.”†

The *Compositae* now described, together with the other families which have been or are yet to be published in this Journal, were obtained by expeditions which passed through several of the recognised South African floral regions. Many of the earlier records are of little value for phytogeographical purposes on account of their lack of precision. Since it is certain that the boundaries of some of these regions will require revision, it is desirable that the localities recorded below should be as clearly indicated as possible. It may, therefore, be useful to give a summary of the more important places visited by the four expeditions concerned, and an indication of the floral regions in which they are situated. These indications are liable to revision, since, in most cases, the floral region has been identified in the field, not by a study of the statistics of the vegetation—the *data* for which are generally incomplete. Nevertheless, the collections among which these *Compositae* are included will undoubtedly throw some light upon the phytogeographical problems of South-West Africa, and certain conclusions, briefly referred to in the following notes, are already foreshadowed.

In the summary of localities given below, as in Mr. Hutchinson’s list, the “Cape” region is synonymous with that which Bolus called “The South-Western Coast region.”‡ The change is made merely for the sake of convenience and, in particular, to obviate any possible confusion with the “Western Coast region” to which a large proportion of these plants belong. The latter region, as defined by Bolus,§ includes that part of the Khamiesberg range, of which little was known of the flora when Bolus wrote. The following account of the distribution of the Khamiesberg *Compositae* confirms the impression derived from a study of the rest of the known vegetation of this range, viz., that botanically its outstanding relationships are

\* Ann. S. A. Mus., vol. ix, 1916, pp. 277-329.

† *Loc. cit.*, p. .

‡ Bolus, *loc. cit.*, 207.

§ *Loc. cit.*, 204.



neither with Namaqualand nor with Bushmanland, but with the Cape. At the same time, it contains many forms whose affinities are with the two former regions. Until this extensive range has been more exhaustively explored, there appears good reason for raising it provisionally to regional rank. This is done in the following pages under the title of the "Khamiesberg region."

The term Bushmanland, as used below, connotes merely that part of the Western Kalahari region which lies south of the Orange River. In the present state of our knowledge there seems to be no valid objection to this course, since the Kalahari region, as this term is usually understood by botanists,

"is yet so imperfectly explored as to its physical divisions, its aspect, its climate, and the systematic constituents of its vegetation, that it . . . will hereafter almost certainly require to be divided into several regions, or at least to be subdivided into provinces."\*

Some comment on the separation of Great Namaqualand from Little Namaqualand is also desirable. Such knowledge as we possess of the vegetation of Great Namaqualand has very largely been acquired within recent years, and its effect upon the determination of the botanical relationship with Little Namaqualand to the south, and with other regions to the east and north of it, is not yet fully apparent. Great and Little Namaqualand are separated by the lower course of the Orange River, which is certainly not a phytogeographical dividing line. Similarly, the northern boundary of Great Namaqualand, the Swakop River, does not indicate a line of separation between two floras. The line which separates it from the Kalahari to the east will probably be found to coincide more or less closely with the western edge of the Grass and Acacia associations which are so characteristic of the Western Kalahari. Botanically, the southern part of Great Namaqualand is the northern continuation of Little Namaqualand. It is quite probable that the northern frontier of this great region is laid down by the succulents—particularly the genera *Mesembryanthemum*, *Euphorbia*, and *Crassula*—which are relatively abundant throughout Little Namaqualand and the southern part of Great Namaqualand, as far north as a longitudinal line situated between Angra Pequena and Walfisch Bay; northwards of this line succulents cease to be a dominating element in the vegetation.

Of the Great Namaqualand localities † named in the following list,

\* Bolus, *loc. cit.*, 229, 230.

† See map in Pearson, *Journ. R. Geogr. Soc.*, 1910; reprinted in *S. A. Mus.*, vol. ix., part 1.

those which lie between Raman's Drift and Gründoorn appear to belong more or less distinctly to the Kalahari region. Gründoorn, Sabiesis, Holoog, Gawachab, Seeheim, and Gobas are within or on the flanks of the Karasberg.\* Keetmanshoep lies on the Kalahari Plateau. From Sandverhaar westwards to Angra Pequena (Lüderitzbucht) the vegetation has affinity with that of Little Namaqualand, but from Goraf to the sea this relationship is modified by the intense desert conditions of the Namib. Where there is a great development of sand, as at Sandverhaar itself, incursions of Kalahari elements are met with. Elevation appears to determine the local prevalence of Composites, as at Schakalskuppe, and of shrubby Mesembryanthema, as at Aus. All these localities (except, perhaps, Keetmanshoep) lie to the south of the northern limit of the area characterised by the abundance of succulents, and should probably be included with Little Namaqualand in one botanical region. The formal establishment of such a region is, however, not desirable until we know more of the very difficult country which lies between the Orange River, the southern course of the Great Fish River, and the Angra Pequena-Seeheim railway line. Consequently the distinction between Great Namaqualand and Little Namaqualand is still retained, although it is admitted to be immaterial.

In the following summary that part of Little Namaqualand known as the Richtersveld is separated from the rest of that region. This area includes the country lying to the south of the Orange River and near its mouth. Its southern and eastern boundaries are indefinite, but for practical purposes it may be regarded as including all the mountainous country shown on Sheets 127 E, 127 F of the Reconnaissance Maps of the British War Office (scale  $\frac{1}{250000}$ , July, 1907). The greater part of the Richtersveld is an arid, trackless mountain-complex. Its botany is very imperfectly known, but it includes a number of apparently endemic species. The Richtersveld, together with an area to the North of the river, when more thoroughly explored, will probably rank at least as a distinct province of Little Namaqualand.

Another area, here included in Little Namaqualand, deserves mention. This is the arid plain, known locally as the Knechtvlakte, which extends northwards from Van Ryn's Dorp to Nieuwerust. Geologically, its structure is remarkable and somewhat obscure.† Its

\* See Ann. Bolus Herbarium, vol. i.

† Rogers, A. W., An Introduction to the Geology of Cape Colony, 1909, pp. 52-54.

flora is peculiar, and in many respects unlike that met with elsewhere in Little Namaqualand. It is distinguished by the abundance of succulents, particularly Mesembryanthea, many of which appear to be endemic and extremely local in their occurrence. Its crossing in the summer is necessarily rapid owing to the lack of water, and away from the main road it is little known. When a geographical classification of the vegetation of Namaqualand is seriously attempted, the Knechtsvlakte will probably be separated, though to what extent it is at present impossible to say. The localities, Vaarsche Rivier, Klipkalk, and Bakhuis are situated within this area.

Welwitsch, situated to the North of the Swakop River, is a typical desert station whose vegetation, however, differs markedly from that of the southern parts of the Namib. These differences include not only the comparative rarity of succulents, but also the presence of so remarkable a type as *Welwitschia*. The latter character it shares with many other stations near the sea between the mouth of the Swakop River and San Nicolau, which lies near the northern limit of the littoral desert.

The principal localities visited by the expeditions, whose collections yielded the *Compositae* described in Mr. Hutchinson's paper, are given in chronological order:—

#### EXPEDITION I.\*

NOVEMBER, 1908—MARCH, 1909.

*Collector*: H. H. W. Pearson.

*Localities*: Ceres,† Calvinia,‡ Loeriesfontein,‡ Kamabies,§ Tweefontein,§ O'okiep,§ Kweekfontein,¶ Pella,¶ Groot Rozynbosch¶, Wortel,¶ Abbasis,¶ Raman's Drift,¶ Henkriesfontein,¶ O'okiep,§ Sabies,¶ Raman's Drift,¶ Warmbad,|| Gründoorn,|| Holoog,|| Seeheim,|| Angra Pequena || (Lüderitzbucht), Swakopmund,\*\* Welwitsch.\*\*

\* Journ. R. Geog. Soc., 1910, p. 481; Ann. S. A. Mus. vol. ix. 1911, p. 4.

† Cape Region.

‡ Upper Region.

§ Little Namaqualand.

|| Great Namaqualand.

¶ Bushmanland.

\*\* Damaraland.

## EXPEDITION II.\*

SECTION 1.—NOVEMBER—DECEMBER, 1910.

*Collectors*: H. H. W. Pearson and N. S. Pillans.*Localities*: Eendekuil,† Henkwir,† Clanwilliam,† Windhoek,† Van Rhyn's Dorp,† Nieuwerust,‡ Bitterfontein,‡¶ Garies,‡¶ Middlekraal,¶ Brakdam,¶ Reitkloof,¶ Koets,¶ Bowesdorp,¶ Sneeuwkop,¶ Vogelklip,¶ O'okiep.‡

SECTION 2.—DECEMBER, 1910—JANUARY, 1911.

*Collector*: H. H. W. Pearson.*Localities*: O'okiep,‡ Klipfontein,‡ Annenous,‡ Chubiessis,§ Stinkfontein,§ Modderfontein,§ Doornpoort,§ Daunabis,§ Bethany Drift,§ Hellskloof,§ Kuboos,§ Te Alee Mountains,§ Modderfontein,§ Stinkfontein,§ O'okiep,‡ Rattelkraal,|| Steinkop,‡ Koeberg,|| Dobabeep,|| Rietfontein,‡|| Anegas,¶ Lelifontein,¶ Ezelsfontein,¶ Garies,‡¶ Nieuwerust,‡ Van Rhyn's Dorp.‡\* *Ann. S. A. Mus.*, vol. ix, 1912, p. 21.

† Cape Region.

‡ Little Namaqualand.

§ Little Namaqualand (Richtersveld).

|| Bushmanland.

¶ Khamiesberg.

## EXPEDITION III.\*

SEPTEMBER, 1911.

*Collector*: H. H. W. Pearson.*Localities*: Van Rhyn's Dorp,‡ Vaarsche River,‡ Klipkalk,‡ Nieuwerust,‡ Bitterfontein,‡§ Stinkfontein,‡§ Garies,‡§ Brakdam,§ Namaroep § (Kharkams), Twee Rivieren,§ Draiklip,§ Lelifontein,§ Beacon Hill,§ Naras Ravine,§ Khamsoap Ravine,§ Schaf Ravine,§ Wilgehout Ravine,§ Witsand,§ Khoms Ravine,§ Groenkloof,§ Garies,‡§ Van Rhyn's Dorp,‡ Heerenlogement,† Graaffwater.†

## EXPEDITION IV.\*

SEPTEMBER, 1911.

*Collectors*: Miss E. L. Stephens and Miss R. Glover.*Localities*: Oliphant's River Mountains† (Modderfontein and vicinity of Warm Baths Springs).\* *Ann. S. A. Mus. loc. cit.*

† Cape Region.

‡ Little Namaqualand.

§ Khamiesberg.

It may be noted that localities at about 3000 ft. in the vicinity of the Khamiesberg Range—*e.g.*, Bitterfontein, Stinkfontein, Garies—show a typically Namaqualand vegetation on the plains, while higher slopes bear forms of Khamiesberg affinity. The same locality, therefore, may be within two regions. In some cases two or more localities, sometimes widely separated, bear the same name. Examples occurring in the following list are:—

*Stinkfontein.*—(1) South of Garies and the Khamiesberg; (2) in the Richtersveld, 13 miles from the Orange River.

*Modderfontein.*—(1) In the Oliphant's River Mountains (Cape Region); (2) in the Richtersveld, 13 miles from the Orange River; (3) in the Khamiesberg, near Sneeuwkop Mountain (see *Othonna euphorbioides*).

*Bitterfontein.*—(1) In the south-western corner of Little Bushmanland; (2) in Little Namaqualand, between Nieuwerust and Garies.

It should also be noted that the Windhoek referred to below lies beneath the western edge of the Gifberg, some 600 miles South of the capital of the South-West African Protectorate which bears the same name; and that the Hex River, along which plants were collected in November, 1911, is a small tributary of the Oliphant's River, not the better known stream of that name which enters the Breede River at Worcester. The latter is the locality for Tyson's numbers 772, 759, on which Mr. Hutchinson finds his new species, *Berkeya Tysoni* (*q.v.*).

PLANTS COLLECTED IN THE PERCY SLADEN MEMORIAL  
EXPEDITIONS, 1908-1911.

COMPOSITAE.\*

*By J. Hutchinson (Kew).*

HOPLOPHYLLUM, DC.

1. *H. spinosum*, DC. Prodr. v. 73.

Little Namaqualand: Shrub 1-3 ft., fls. yellow, plentiful in dry sand between Klipplaat and Bitterfontein, 3290, 3875; sandy karroid plain south of Bakhuis, 5444. Bushmanland: Base of gneissic kopje a few miles east of Nieuwefontein, 3493.

DISTRIBUTION.—Vanrhynsdorp and Clanwilliam.

This is evidently an extremely local species and probably peculiar to the sandy coast region between the mouths of the Oliphant and

\* Report of the Percy Sladen Memorial Expeditions in South-West Africa, No. 77.

Orange Rivers. The only other species of the genus, *H. ferox*, Sond., evidently very rare, occurs in the Prince Albert and Beaufort Divisions.



FIG. 1.—*Fresenia nana*, Hutchinson, n. sp. A, part of whole plant, showing habit, natural size; B, involucral bracts,  $\times 2$ ; C, flower bud,  $\times 5$ ; D, outer pappus; and E, inner pappus-bristles,  $\times 5$ .

FRESENIÆ, DC.

1. *F. nana*, Hutchinson, sp. nov. (fig. 1); species habitu nana, foliis

lineari-oblongeolatis basi amplexicaulibus subtiliter longe pilosis distincta.

*Rhizoma* elongatum, polycephalum, dense fibrosum; caules brevissimi, dense foliati, 2-3 cm. longi, inferne foliorum basibus persistentibus dense induti. *Folia* lineari-oblongeolata, subacuta, basi amplexicaulia, 1-1.5 cm. longa, 1.5-2 mm. lata, carnosa, subtiliter longe pilosa, ima basi longe ciliata. *Capitula* homogama, terminalia, solitaria, hemisphaerica, circiter 1.3 cm. diametro. *Involucri bractee* subtriseriatae, subacute acuminatae, usque ad 9 mm. longae, extra pubescentes, interiores margine membranaceae. *Flores* numerosi; corollae tubus 4 mm. longus, glaber; achenia compressa, villosa, 2 mm. longa; pappi setae exteriores lineari-subulatae, fere laeves, 1.25 mm. longae, interiores 6 mm. longae, barbellato-plumosae.

Khamiesberg: Klipkalk, dry slope, *Pearson*, 6758.

#### PTERONIA, L.

##### 1. *P. incana*, DC. Prodr. v. 358.

Khamiesberg: Common on hills at Namaroup, bush 4 ft., fls. yellow, 6630.

Little Namaqualand: Near top of Rattel Poort Mt., shrub 3 ft., 2956.

DISTRIBUTION.—Little Namaqualand through the Karoo to Albany.

##### 2. *P. glauca*, Thunb. Fl. Cap. ed. Schult. 631.

Little Bushmanland: Lower slopes of kopjes between Klipplaat and Bitterfontein, mucilaginous, aromatic bush, 4 ft., 3070.

Upper Region: Between Calvinia and Holle River, 2500 ft., common bush 1-2 ft., 3967.

DISTRIBUTION.—Great Namaqualand to Vanrhynsdorp and through the Upper Region to Middleburg.

##### 3. *P. cinerea*, Linn. f. Suppl. 356.

Khamiesberg: Summit of Vogelklip, bush 1-2 ft., 5915.

DISTRIBUTION.—Little Namaqualand to Clanwilliam and Calvinia.

##### 4. *P. lucilioides*, DC. Prodr. v. 358.

Little Namaqualand (Richtersveld): To Allee Mts., lower middle slopes, common; erect bush,  $3\frac{1}{2}$  to 4 ft., 6150.

Great Namaqualand: Granite slopes, 18 km. west of Aus, bush  $1\frac{1}{2}$  ft., 4214.

DISTRIBUTION.—Great Namaqualand to Great Bushmanland.

5. *P. divaricata*, Less. Syn. Comp. 196.

Khamiesberg: Kharkams, bush 3-4 ft., 6629; above Twee Rivieren, bush 3 ft., fls. white, called by the Hottentots "Buchu," 6764; Eenkobus, bush 3 ft., aromatic, fls. white, 6779.

Little Namaqualand: Common on kopjes at Rietfontein, 2500 ft., 3770.

Upper Region: Blaukrantz Pass, bush 4 ft., 4958; Nieuwefontein, shrub 3-4 ft., 3469; without locality, 3304, 5020.

DISTRIBUTION.—Great Namaqualand to Malmesbury.

6. *P. camphorata*, Linn. Sp. Pl. 1176.

Cape: Windhoek Mountains, fls. yellow, 7445.

Khamiesberg: Beacon Hill (2), 2 miles south-east of Leliefontein, near summit about 5400 ft., bush 2½ ft., 6354; Upper south slopes of Sneeuwkop, bush 2-4 ft., 5792.

DISTRIBUTION.—Cape Districts generally.

*P. camphorata*, Linn., var. *armata*, Harv. in Harv. et Sond. Fl. Cap. iii. 110.

Cape: Lower slopes of Oliphant's River Mountains, behind Farmers' Baths, 1½-2 ft., fls. yellow, 6961.

DISTRIBUTION.—Clanwilliam.

7. *P. utilis*, Hutchinson in Ann. South African Mus., ined.

Cape: Piquetberg Div., upper south-west slopes above Pickenier's Pass, Nov., *Pillans*, 5114; south side of summit above Kradouw Krantz, *Pillans*, 5316.

"Shoots eaten by stock" (*Pillans*).

8. *P. viscosa*, Thunb. Prod. Fl. Cap. 144.

Great Namaqualand: Granite slopes 18 km. west of Aus, bush 1½ ft., 3677.

DISTRIBUTION.—Great Namaqualand through Calvinia to Prince Albert Division.

9. *P. glomerata*, Linn. f. Suppl. 356.

Cape: Roadside between Hottentot's Kloof and Karoopoort, small bush, fls. yellow, 4808.

Upper Region: Roggeveld above Blaukrantz Pass, 3000 ft., bush 1-2 ft., 4973, 4978.

DISTRIBUTION.—Little Namaqualand to Ceres and through the Karoo to Colesberg.



10. *P. mucronata*, DC. Prodr. v. 362.

Bushmanland: About 8 miles from Bitterfontein, 3419.

DISTRIBUTION.—Occurs also in Hereroland and Graaff Reinet.

11. *P. paniculata*, Thunb. Prodr. Fl. Cap. 143.

Cape: Slopes between Clanwilliam and Lang Kloof, bush 2 ft., 5339.

Little Namaqualand: Slope south of Nieuwerust, bush 1–1½ ft., 5551.

Karoo: Common on plains between Karoopoort and Zoutpansdrift, 2000 ft., bush 1–1½ ft., 5017.

Bushmanland: Common on Veld between Brak Puts and Bitterfontein, bush 2 ft., 6389.

DISTRIBUTION.—Little Namaqualand to Worcester and eastwards to Albany.

12. *P. fastigiata*, Thunb. Fl. Cap. ed. Schult. 629.

Little Namaqualand: Without precise locality, bush 1 ft., fls. lemon yellow, 3349; common in broken country about 15 miles north of Alewyn's Fontein, 3200 ft., bush ½ to 1 ft., fls. greenish yellow, 3925.

Upper Region; Roggeveld above Blaukrantz Pass, 3000 ft., bush 1–2 ft., 4976.

DISTRIBUTION.—Occurs also in Worcester Division.

13. *P. ciliata*, Thunb. Prodr. 144.

Bushmanland: Common on slopes at Eenriet, 1–2 ft., 3094; middle mountain slopes at Kweekfontein, 3300 ft., 3820; foot of mountain slopes, 3821; sandy plains near Groot Rozybosch, 2800 ft., 3842; Ougrabies, 3572.

Little Namaqualand: Valley below Nieuwe Rust, bush 2½ ft., 5490; Grauwater, bush 1–2 ft., mostly dead, 3268; Alewyn's Fontein, Kopje, 3313; near Nieuwefontein, 3350, 3353; Kopjes Kraal, 2300 ft., shrub 1 ft., 3890; common in broken country 15 miles north of Alewyn's Fontein, 3700 ft., 3926, 3929; common on upper slopes above Daunabis (Richtersveld), bush 2 ft., 6119.

DISTRIBUTION.—Bushmanland and Little Namaqualand to Vanrhynsdorp.

14. *P. scariosa*, Linn. f. Suppl. 356.

Bushmanland: Shrub 2–3 ft., common, 3409.

DISTRIBUTION.—Little Namaqualand.

15. *P. succulenta*, Thunb. Prodr. 143.

Bushmanland: Sandy plains about half-way between Klipplaat and Bitterfontein, bush 1-2 ft., 3878.

DISTRIBUTION.—Bushmanland to Calvinia and Oudtshoorn Divisions.

16. *P. glabrata*, Linn. f. Suppl. 358.

Little Namaqualand: Plains near Klipplaat, shrub 4 ft., 3284; plentiful on dry sand, first day's outspan between Klipplaat and Bitterfontein, bush 2 ft., leaves fleshy, 3291; no loc. 3540, 3763.

DISTRIBUTION.—Great Namaqualand to Vanrhynsdorp.

17. *P. leptospermoides*, DC. Prodr. v. 363.

Bushmanland: Upper mountain slopes at Kweekfontein, 3700 ft., bush 3 ft., 3815.

Khamiesberg: Twee Rivieren, hills east of Settlement, bush 3 ft., fls. white, 6599.

Little Namaqualand: Lower slopes, Rattelpoort Mountain, shrub, 2-3 ft., 2974.

DISTRIBUTION.—Only known from these regions.

18. *P. Pillansii*, Hutchinson in Ann. South African Mus., ined.

Cape: Vanrhynsdorp, slope north of and facing Nieuwe Rust, Dec., *Pillans*, 5553.

Little Namaqualand: Common from top of pass north of Garies to Brakdam, Dec., *Pearson & Pillans*, 5609.

DISTRIBUTION.—As above.

19. *P. pallens*, Linn. f. Suppl. 357.

Karoo: Common bush near Skuurkraal, 3075; chiefly near hill-tops between Gansfontein and Pappekuil, 1200 ft., small bushes 1-2 ft., 3981; Blaukrantz Pass, very common, 4963; north of Zoutpansdrift, common bush, 5001; Gansfontein, 1200 ft., 3990.

DISTRIBUTION.—Calvinia through the Karoo to Prince Albert and Mossel Bay.

## GARULEUM, CASS.

1. *G. Schinzii*, O. Hoffm. ex Schinz in Bull. Herb. Boiss. i. 74.

Great Namaqualand: Dry river-bed, sandy plains north of Ganus, ray-fls. blue, 4501; sandy bed of Akam river, bush 2-3 ft., with glandular leaves, 4758.

DISTRIBUTION.—Great Namaqualand.

AMELLUS, Cass.

1. *A. microglossus*, DC. Prodr. v. 215.

Little Namaqualand: Vaarsche River, 6509.

Khamiesberg: Twee Rivieren, 6831.

DISTRIBUTION.—Little Namaqualand to Piquetberg Division.

CHARIEIS, Cass.

1. *C. heterophylla*, Cass. in Bull. Soc. Philom. 1817, 68.

Cape: Oliphant's River Mountains, road to Modderfontein, 6974.

Khamiesberg: Twee Rivieren, ray fls. blue, common, 6770.

DISTRIBUTION.—Cape and western districts generally.

MAIREA, DC.

1. *M. pereziioides*, Nees, Aster, 249.

Cape: Oliphant's River Mountains; tops of the mountains behind the Baths, ray-fls. yellow, 6893.

DISTRIBUTION.—Clanwilliam, Piquetberg and Malmesbury Divisions.

2. *M. Ecklonis*, Sond. in Harv. and Sond. Fl. Cap. iii. 66.

Cape: Giftberg, 1–2000 ft., on stony ground, local, ray fls. white, 7442.

I have matched this specimen with *Schlechter* 8831 from Ezelbank and *Schlechter* 8575 from Zeekoe Vlei, both named by *Schlechter M. Ecklonis*, Sond. An authentic specimen of the latter has not been seen, but as the ray flowers are described as *yellow*, I am somewhat doubtful of the determination.

ASTER, L.

1. *A. fruticosus*, Linn. Sp. Pl. 872.

Cape: Giftberg, 1–2000 ft., 7433. Great Namaqualand: Stream course at foot of mountains north of Schakalskuppe Station, 4900 ft., bush 3 ft., 4783.

DISTRIBUTION.—Western districts generally.

FELICIA, Cass.

1. *Felicia lasiopoda*, Hutchinson, sp. nov.; affinis *F. muricatae*, DC., sed foliis multo longioribus glabris vel minutissime ciliolatis, involucri bracteis dorso glabris differt.

*Suffrutex* 0·5 m. altus; caules purpurascens, satis graciles, adpresse pubescentes, demum glabri. *Folia* crassa, subacicularia, plerumque circiter 2 cm. longa, interdum vix 1 cm. longa, ad 1·5 mm. lata, glabra vel minutissime ciliolata. *Capitula* terminalia, solitaria, longe pedunculata, circiter 1·8 cm. expansa; pedunculi 3·5–8 cm. longi, 0·75 mm. crassi, pubescentes, purpurascens. *Involucri bracteae* 4-seriatae, sensim longiores, usque ad 4 mm. longae, planae, dorso glabrae, marginibus lacerato-ciliolatis. *Flores radii* circiter 1 cm. longae, numerosae; corollae tubus 2 mm. longus, glaber. *Flores disci* numerosi; corollae tubus 3 mm. longus, glaber. *Achaenia* breviter pubescentia. *Pappi setae* fragiles, albae, 3·5 mm. longae.

Cape: Sand at base of Giffberg, western aspect, *Pearson*, 5435. Khamiesberg: Middle slopes of Beacon Hill (1), north-west of Leliefontein, 5300 ft., 1½ ft., rays blue, *Pearson*, 6328.

[Also collected at Lange Kloof by *Schlechter* (no. 8397) and distributed under the name *Felicia Bowiei*.]

2. *F. pusilla*, N. E. Br. in Kew Bull. 1908, 435.

Cape: Oliphant's River Mountains; Kloof below Baths, fls. cream, 6982; 6983; lower mountain slopes behind Farmers' Baths, on burnt places, ray-fls. variable, white, yellow or blue, 6984.

DISTRIBUTION.—Worcester.

3. *F. deserti*, *Schlechter*.

Great Namaqualand: Between Dabaigabis and Gründoorn, 4200 ft., 3169.

DISTRIBUTION.—Great Namaqualand.

4. *F. tenella*, DC. Prodr. v. 219.

Cape: Prostrate annual on eastern [sandy slopes above Pickenier's Pass, 5135; 5203. Oliphant's River Mountains; road to Modderfontein, fls. mauve-blue, 6979. Khamiesberg: Namaroup, very abundant, rays blue, 6525; at foot of Beacon Hill 2, 6640.

DISTRIBUTION.—Throughout the western districts.

According to *Harvey* this is a very variable species and is divided by him into several varieties, which would be worthy of study in the field.

5. *F. fragilis*, Cass. in Dict. Sci. Nat. xvi. 315.

Cape: Gift Berg, 1–2000 ft., 7396.

DISTRIBUTION.—Western districts.

6. *F. hyssopifolia*, Nees, var. *hirta* (*Harv.*).

Little Namaqualand: Common on sand north of Anenous, 6183.

Great Namaqualand: Buchholzbrunn, sandy river bed, bush 1 ft., rays bluish white, 3656; in sand at Sandverhaar, 3100 ft., 3703 without locality, 3607; 3649.

DISTRIBUTION.—Western districts.

Many of Harvey's varieties described in the "Flora Capensis" are probably distinct species.

7. *F. Pappi*—*Aster Pappi*, Harv. in Harv. et Sond. Fl. Cap. iii. 79.

Khamiesberg: Leliefontein, common, 6555.

DISTRIBUTION.—Western districts generally.

#### NIDORELLA, Cass.

1. *N. gariiepina*, DC. Prodr. v. 324.

*Felicia gariiepina*, L. Bolus in Ann. Bol. Herb. i. 72.

Great Namaqualand: Kopje between Dabaigabis and Gründoorn, 4200 ft., bush  $\frac{1}{2}$  to 1 ft., fls. yellow, 3175; crevices in granite near top of mountain behind Rotkuppe Station, bush 1 ft., 4186; sandy dry river bed north of Ganus, 3000–3200 ft., 4508.

DISTRIBUTION.—Also in Little Namaqualand.

#### CONYZA, Less.

1. *C. incisa*, Ait. Hort. Kew. iii. 184.

Cape: Damp spots among grass in Biesjes Rivier, 3 ft. high, 5163.

DISTRIBUTION.—Occurs in Clanwilliam, Uitenhage, and in the Transvaal and Natal.

2. *C. ivaefolia*, Less. in Linnaea, 1831, 138.

Cape: Attis River bed, shrub 4 ft. high, 5383. Upper Region: Very common in rock crevices in bed of Holle River, 3979; damp places in ravine at Loeriesfontein, 2500 ft., 4851.

Khamiesberg: Near Leliefontein, 6299.

DISTRIBUTION.—Throughout the Colony into Natal and the Transvaal.

#### PSIADIA, Jacq.

1. *P. arabica*, Jaub. et Spach, Illustr. iv. 85, tt. 352–3.

*Nidorella punctulata*, DC. Prodr. v. 323; Harv. in Harv. et Sond. Fl. Cap. iii. 90.

Great Namaqualand: Schakalskuppe, upper slopes, 5400 ft., bush

3-4 ft., leaves "varnished," fls. yellow, 4231; on Kopje near crossing of railway track to Kalkfontein, 3300-3600 ft., bush 3 ft., 4574.

DISTRIBUTION.—Throughout Tropical Africa to Arabia.

#### NOLLETIA, Cass.

1. *N. arenosa*, O. Hoffm. ex Schinz in Bull. Herb. Boiss. i. 76 (1893).

Great Namaqualand: Railway embankment about 10 km. west of Aus, 4219; in sand a little north of Ganus, 3000-3200 ft., fls. yellow, 4497; dry stream bed between Gründoorn and Sabiesis, 3000-3400 ft., 4582; Sandverhaar, 3100 ft., fls. yellow, 4655.

DISTRIBUTION.—Occurs also in Carnarvon.

#### CHRYSOCOMA, Cass.

1. *C. Coma-aurea*, Linn. Sp. Pl. 1178.

Cape: Along the Leeuwfontein Road, 9 miles from Ceres, 3511; between the top of Leeuwfontein Pass and Hottentots Kloof, 3202.

DISTRIBUTION.—Common in the western districts.

2. *Chrysocoma sparsifolia*, Hutchinson, sp. nov.; affinis *C. coma-aureae*, Linn., sed foliis sparsissimis crassis brevibus, involucri bracteis interioribus obtusis differt.

*Frutex* 0.75-1.3 m. altus; rami elongati, sulcati, glabri. *Folia* sparsa, patula vel demum recurvata, oblongo-lanceolata, subericoidea, obtusa, 3-8 mm. longa, 1.5-2.5 mm. lata, plerumque subturgida, demum supra plana, crassa, glabra. *Capitula* laxa corymbosa, solitaria, brevissime pedunculata, circiter 8 mm. diametro. *Involucri bracteae* circiter 5-seriata, exteriores lanceolatae, 1.5 mm. longae, interiores oblongo-lineares, obtusae, 5 mm. longae, glabrae, 1-nerviae. *Flores* numerosi, tubulosi; corollae tubus 4 mm. longus, glaber; lobi lanceolati; subacuti. *Achaenia* complanata; 2.5 mm. longa, parce pubescentia, *Pappus* albus, 3 mm. longus.

Khamiesberg: Common among granite blocks on small kopje between summit of Pass and Middelkraal, bush 3-4 ft., *Pearson*, 5626; southern slopes of Sneeuwkop, *Pearson & Pillans*, 5888; upper and middle slopes of Zuurberg (Anegas), *Pearson*, 6253; kopje south-west of Leliefontein, *Pearson*, 6307.

3. *C. ciliata*, Linn. Sp. Pl. 1177.

Great Namaqualand: Sandy plain north of railway at Schakalskuppe, rootstock woody, stem 9-12 in., rays pale blue, 4222.

DISTRIBUTION.—Western districts.

4. *C. tenuifolia*, Berg. Cap. 285.

Cape: Giffberg, not common, 1–2000 ft., small bush 9–12 in. high, fls. yellow, 7403; Pickenier's Pass, eastern slopes, stems 1 ft., 5119.

Bushmanland: Aggenys, river-beds, middle and upper slopes, bush 1 ft., 2940; sandy flat 8 miles south or south-west of Bitterfontein, 3417.

Khamiesberg: Western middle slopes of Sneeuwkop, third kloof above Bowesdorp, under shade of rocks, 5839.

Upper Region: Roggeveld after Blaukrantz Pass, 3000 ft., bush 1 ft., 4977; Blaukrantz Pass, 4964.

DISTRIBUTION.—Throughout the Colony.

5. *C. peduncularis*, DC. Prodr. v. 353.

Khamiesberg: Khamiesberg Plateau, 3000 ft., among rocks, 6242; Sneeuwkop, western slopes about 30 ft. below the summit, 5763.

Upper Region: Alewyn's Fontein, on kopje, 2900 ft., 1–2 ft., fls. yellow, 3314.

DISTRIBUTION.—Upper western region.

6. *C. longifolia*, DC. Prodr. v. 354.

Cape: Oliphant's River valley between Modderfontein and Biesjes River, 3 ft. high, fls. yellow, 5160; south aspect of hills between Hex River and outspan of November 26th, 5267.

Little Namaqualand: Sandy places between Nieuwe Rust and Bitterfontein, 5547.

DISTRIBUTION.—Clanwilliam and Vanrhynsdorp Divisions.

7. *C. puberula*, Schlechter.

Bushmanland: In sand between Aggenys and Pella, 3592.

DISTRIBUTION.—Also in Little Namaqualand.

BLUMEA, DC.

1. *B. natalensis*, Sch. Bip. in Walp. Rep. ii. 971.

*Conyza caffra*, DC.; Harv. in Harv. et Sond. Fl. Cap. iii. 112.

Cape: Sand banks in river-bed below Kradouw Krantz, 3 ft. high, 5365.

Bushmanland: Orange River at Abbasis, partly submerged, 3002; banks of water conduit, Pella, 1500 ft., fls. blue-purple, 3836.

Damaraland: In association with *Salicornia*, mouth of Swakop River, 3382.

DISTRIBUTION.—Natal to Kingwilliamstown Division; apparently

no specimens have so far been gathered between the above and these widely separated areas.

2. *B. gariiepina*, DC. Prodr. v. 448.

Little Namaqualand: Sandy bank of the Orange River at Bethany Drift, 2-3 ft. high, 6034.

Great Namaqualand: Buchholzbrunn, in conglomerate of river bank, bush 5 ft., 3667; river-bed at Dabaigabis, 4315; river-bed below Railway Station, 3669.

[Collected also at Haikamechab, near Swakopmund, by Galpin & Pearson, 7657.]

DISTRIBUTION.—Griqualand West and in Angola and the Zambesi basin.

PLUCHEA, CASS.

1. *P. Leubnitziae*, N. E. Br. in Kew Bull. 1909, 117.

Great Namaqualand: Sandy bed of the Schaf River at Seeheim, 2300 ft., bush 4-5 ft., 3735.

DISTRIBUTION.—Angola and Tropical Bechuanaland.

IFLOGA, CASS.

1. *Ifloga setulosa*, Hutchinson, sp. nov., species foliis acicularibus prominenter setosis capitula circumdantibus et longioribus distincta.

*Suffrutex* ramosus usque ad 20 cm. altus; rami ascendentes, foliati, cano-pubescentes. *Folia* acicularia vel subclavata, acuta, basi angustata, leviter recurvata, 0.5-1 cm. longa, circiter 1.5 mm. crassa, marginibus valde recurvatis, supra setuloso-pilosa, infra albotomentella. *Capitula* sessilia, ad apices ramorum dense aggregata, circiter 6-8-nata, foliis superioribus involucreta, circiter 1 cm. longa, 3 mm. diametro. *Involucri bracteae* lanceolatae, membranaceae, acutissimae, extra albo-pubescentes, leviter purpurascens. *Flores* pauci, tubulosi; corollae tubus cylindricus, glaber; achaenia glabrescentia, basi callosa; pappi setae dense plumosae, corollis aequilongae.

Cape: Giftberg, 1-2000 ft., fls. white, *E. P. Phillips*, 7438.

GNAPHALIUM, LINN.

1. *G. undulatum*, Linn. Sp. Pl. 1197.

Khamiesberg: Among *Phragmites* in damp places on middle western slopes of Sneeuwkop, third kloof above Bowesdorp, 5842; marshy ground of Khamiesberg plateau, about 5000 ft., 6322.

DISTRIBUTION.—Throughout South Africa and in Angola.



2. *G. candidissimum*, Lamk. Encycl. ii. 754.

Cape: Upper southern slopes above Pickenier's Pass, 5201; sand of river-bed between Lang Kloof and Nardouw Pass, 5348.

Khamiesberg: Marshy ground  $1\frac{1}{2}$  miles south-west of Leliefontein, 5000 ft., 6336.

DISTRIBUTION.—South-western districts to Uitenhage.

#### HELIPTERUM, DC.

1. *H. variegatum*, DC. Prodr. vi. 212.

Cape: Top of Oliphant's River Mountains, behind Baths, flower-heads brown and white, 6892.

DISTRIBUTION.—Southward to the Cape Peninsula and Caledon.

2. *H. canescens*, DC. Prodr. vi. 212.

Cape: Giffberg, 1–2000 ft., bush 9–12 in. high, bracts white, 7436; top of Oliphant's River Mountains, behind Baths, 6887.

DISTRIBUTION.—Western districts generally, southwards to Caledon.

3. *H. virgatum*, DC. Prodr. vi. 213.

Khamiesberg: Near summit of Beacon Hill, north-west of Leliefontein, 5400 ft., bush  $1\frac{1}{3}$  ft., fls. yellow, bracts with rosy margins, 6333.

DISTRIBUTION.—Little Namaqualand, Clanwilliam and the districts of Worcester and Paarl.

#### HELICHRYSUM, VAHL.

1. *H. alsinoides*, DC. Prodr. vi. 169.

Cape: Oliphant's River Mountains, 7713.

DISTRIBUTION.—Great Bushmanland to the Karee Bergen.

I have not seen an authentic specimen of this species, but have compared the above plant with specimens so named by Schlechter and collected by him in the Karee Bergen (No. 8170) and at Pella in Great Bushmanland (without number). The type was collected by Drège, but no locality was given by either De Candolle or Harvey, and it is not mentioned in Drège's Catalogue.

2. *H. capillaceum*, Less. Syn. vi. 275.

Cape: Rocks near stream at head of Mitchell's Pass, Ceres, 1000 ft., 3532.

Khamiesberg: In shade of rocks near bottom of Khoms Ravine, damp places, fls. white, 6663; low kopje opposite Bowesdorp, 5848.

DISTRIBUTION.—Mountains throughout the Colony, extending into Natal; the species seems to be remarkably consistent in its preference for shady rocky places.

3. *H. herniarioides*, DC. Prodr. vi. 170.

Bushmanland: Prostrate on sand about 8 miles south-west or west of Bitterfontein, fls. whitish yellow, 3411.

DISTRIBUTION.—Western Region.

4. *H. expansum*, Less. Syn. 276.

Cape: Roadside between Ceres and Leeuwfontein, 3256; sandflats between Dreifontein and Heeren Logement, 6731.

DISTRIBUTION.—South-western districts.

5. *H. ericaefolium*, Less. Syn. 314.

Cape: Western aspects of Nardouw Kloof, bush 1 ft. high, densely matted growth, 5411.

Khamiesberg: Summit of pass between Garies and Middelkraal, 5611.

DISTRIBUTION.—Mountains throughout the Colony, evidently common and widely spread.

6. *H. pulchellum*, E. Mey. in Drège, Zwei Pflanzengeogr. Docum. 114.

Khamiesberg: Bitterfontein, 6566.

DISTRIBUTION.—Previously gathered only by Drège in the Ceres Division; evidently a rare plant.

The type specimen at Kew is a mere fragment, but I have little doubt as to the accuracy of the above determination.

7. *H. cylindricum*, Less. Syn. Comp. 281.

Cape: Summit of Oliphant's Mountain, above Pickenier's Pass, fls. yellow, 5115; foot of Cold Bokkeveld, opposite Baths, 6946.

DISTRIBUTION.—Western and Cape districts.

*H. cylindricum*, Less., var. *rubellum*, Moeser in Engl. Jahrb. xliv. 293.

Cape: Giffberg, 1–2000 ft., small plant 6 in. high, involucre white, 7400.

DISTRIBUTION.—Worcester.

8. *H. paniculatum*, Thunb. Fl. Cap. ed. Schult. 661.

Cape: Oliphant's River Mountains, behind Baths, 1 ft. high, flower-heads white, 6696.

DISTRIBUTION.—South-western Region from Clanwilliam to Algoa Bay.

9. *H. Lambertianum*, DC. Prodr. vi. 190.

Cape: Upper southern slopes of mountain above Kradouw Krantz, only bush seen, 5309.

DISTRIBUTION.—Tulbagh and Worcester.

10. *H. rutilans*, Less. Syn. 275.

Cape: Southern slopes above Pickenier's Pass, 5260.

DISTRIBUTION.—Cape Districts north to Vanrhysdorp Division.

11. *H. hebelepis*, DC. Prodr. vi. 186.

Cape: Giffberg, 1–2000 ft., growing on rocks, bush 1–1½ ft. high, fls. yellow, 7409.

DISTRIBUTION.—Little Namaqualand and Worcester and in the Karee Bergen.

12. *H. lucilioides*, Less. Syn. 290.

Little Namaqualand: Chubiessis outspan (Richtersfeld), common in sand, 6190.

Upper Region: Prostrate in ravine at Loeriesfontein, 2500 ft., fls. yellow, 4848.

DISTRIBUTION.—Upper and Karoo Regions.

13. *H. odoratissimum*, Less. Syn. 301.

Cape: Damp places among grass, Biesje's Rivier, 5161.

DISTRIBUTION.—Throughout the Colony and in the Transvaal and Natal.

14. *H. parviflorum*, DC. Prodr. vi. 203.

Cape: Common between Leeuwfontein and Hottentot's Kloof, 3206; dry veld between Ceres and Leeuwfontein, 3245; Leeuwfontein Road, also occurring continuously on road to Karroo Poort, 3507; upper slopes of Hottentot's Kloof, 4908.

DISTRIBUTION.—Western districts generally.

15. *H. maritimum*, Less. Syn. 304.

Cape: Among grass in damp places at Biesje's River, scrambling

bush 3 ft., 5162; Oliphant's River Mountains, foot of mountain behind Farmers' Baths, 1½ ft., fls. yellow, 6956; 7342.

DISTRIBUTION.—Western and Cape districts.

16. *H. hamulosum*, DC. Prodr. vi. 192.

Khamiesberg: Upper slopes of Zuurberg (Anegas), common on Khamiesberg Plateau, bush 2–4½ ft., 6255.

DISTRIBUTION.—Western and Cape districts.

17. *H. Kraussii*, Sch. Bip. in Flora, 1844, 679.

Khamiesberg: Low kopje opposite Bowesdorp, bush 3 ft., 5845.

DISTRIBUTION.—Angola and Eastern subtropical Africa.

18. *H. scabrum*, Less. Syn. 315.

Cape: Oliphant's River Mountains, behind Baths, foliage sticky, 6867, 6962; foot of mountains behind Farmer's Baths, 7344.

Var. *microphyllum*, DC.

Khamiesberg: Brakdam, granite knoll amongst low bush, 5657; summit of Sneeuwkop, 5789; lower southern slopes of Sneeuwkop, bush 2½ ft., 5875; upper end of Vogelklip, 5939.

DISTRIBUTION.—Little Namaqualand to Clanwilliam and Griqualand West. The variety was previously known only from the Giftberg (*Drège*).

19. *H. Zeyheri*, Less. Syn. 309.

Cape: South slopes between Hex River and outspan of November 26th, 5265.

Little Namaqualand: Shrub 3 ft., common near top of Rattelpoort Mountain, 2963.

Great Namaqualand: Hill-tops at Schakalskuppe, 5600 ft., 4235.

DISTRIBUTION.—Generally distributed in the Colony.

20. *H. obtusum*, Moeser in Engl. Bot. Jahrb. xliv. 297.

(*H. Dinteri*, var. *obtusum*, S. Moore in Bull. Herb. Boiss. ser. ii. iv. 1016).

Without locality, 3339.

DISTRIBUTION.—Great Namaqualand.

21. *H. stellatum*, Less. Syn. 279.

Cape: Cleft in rock on eastern side of Pickenier's Pass, near top, 5215; Oliphant's River Mountains, sandy soil behind Burger's Vlei Farm, flower-heads white to pink, 7008.

DISTRIBUTION.—Few of the specimens in the Kew Herbarium are localised, but such as are show a distribution from Worcester, Tullagh, and Colesberg.

LEONTONYX, CASS.

1. *L. squarrosus*, DC. Prodr. vi. 167.

Cape: Oliphant's River Mountains; mountain side behind Baths, common on burnt patches, shrub  $\frac{1}{2}$  ft., fls. cream, 6994; without locality, 4913 partly.

Khamiesberg: Sandy ground at base of pass leading to Rietkloof, spreading prostrate, 5620.

DISTRIBUTION.—Throughout the Colony.

2. *L. glomeratus*, DC. Prodr. vi. 168.

Upper Region: Alewyn's Fontein, sandy flat, 3345.

Khamiesberg: Beacon Hill, 2 miles south-east of Leliefontein, under rocks, middle south-west slopes, 5200 ft., 6375.

DISTRIBUTION.—Western districts generally.

3. *L. spathulatus*, Less. Syn. 327.

Little Namaqualand: Small dry stream-bed 8 miles north of Vanrhynsdorp, 5454; between Stinkfontein and Garies, 5644; Grauwater, 3267; sandy bed of Brakrivier, 1600 ft., 3905; common on sand north of Anenous, 6183.

Bushmanland: River-bed near outspan 10 miles north-east of Klipplaat, 3401; on veld between Klipplaat and a point 10 miles to north-east, 3303.

DISTRIBUTION.—Western and South-western districts.

4. *L. neglectus*, Schlechter, MSS.

Little Namaqualand: Very common on both sides of Stinkfontein, 5632.

DISTRIBUTION.—Also in Calvinia.

PETALACTE, DON.

1. *P. coronata*, D. Don in Mem. Wern. Soc. v. 553.

Cape: Giffberg, 1–2000 ft.; small shrub, 9–12 in. high, fls. white locally frequent, 7426.

DISTRIBUTION.—Western districts.

## ERIOSPHAERA, LESS.

1. *E. Oculus-Cati*, Less. Syn. 270.

Upper Region : Common on flat ground near Holle River, 2900 ft.; without locality, 3970.

DISTRIBUTION.—Also in Calvinia.

## STOEBE, LINN.

1. *S. leucocephala*, DC. Prodr. vi. 259.

Cape : Small bush 1–2 ft., on plateau at summit of Nardouw Mountains, 5423.

Khamiesberg : Roadside at Middelkraal, 5606.

DISTRIBUTION.—Calvinia Division, and (according to *Drège*) in Clanwilliam.

2. *S. cinerea*, Thunb. Prod. Fl. Cap. 169.

Cape : Gifberg, 1–2000 ft.; dense bush, 3–4 ft., very common, 7398.

DISTRIBUTION.—Common throughout the Colony.

## ELYTROPAPPUS, CASS.

1. *E. Rhinocerotis*, Less. Syn. 341.

Cape Region : Between top of Leeuwfontein Pass and Hottentot's Kloof, 3204; hillsides near Leeuwfontein, bush, 3210; along the Leeuwfontein road, 3510; roadside between Hottentot's Kloof and Karoo Poort, 4806; slopes and tops of mountains above Hottentot's Kloof, bush 1–3 ft., 4934.

Khamiesberg : Upper slopes of Zuurberg (Anegas), also extremely abundant on Khamiesberg plateau, 6272; near summit of mountain, 3 miles North-east of Stinkfontein, 5631.

Little Namaqualand : Summit of ridge opposite Klipfontein, common, 5950.

Great Namaqualand : Sandy river-bed 25 km. north of Warmbad, 4304.

Karoo : Rather common on plain and in sandy river-bed between Karooport and Zoutpans drift, 2000 ft., 5019.

Upper Region : Roggeveld after Blaukrantz Pass, 3000 ft., 4980.

DISTRIBUTION : Common throughout most of the Colony; well known as the *Rhenoster-bosch*.

PTEROTHRIX, DC.

1. *P. spinescens*, DC. Prodr. vi. 280.

Upper Region: Kopje behind Loeriesfontein. 3200 ft., bush 6 in. high, 4837.

DISTRIBUTION.—Griqualand West and Graaff Reinet.

2. *P. flaccida*, Schlechter, MSS.

Upper Region: Broken country to west of outspan 15 miles north of Alewyn's Fontein, 3200 ft., 3929.

DISTRIBUTION.—Occurs also in Worcester Division.

AMPHIGLOSSA, DC.

1. *A. tomentosa*, Harv. in Harv. & Sond. Fl. Cap. iii. 276.

Khamiesberg: Top of pass between Garies and Middelkraal, scrambler 2 ft. high, 5610.

DISTRIBUTION.—Calvinia and Oudtshoorn Divisions.

METALASIA, R. Br.

1. *M. divergens*, Don in Mem. Wern. Soc. v. 557.

Khamiesberg: Upper western slopes of Sneeuwkop, 5794.

DISTRIBUTION.—Cape and Western districts.

2. *M. muricata*, Less. var. *pungens*, Harv. in Harv. et Sond. Fl. Cap. iii. 271.

Khamiesberg: Northern aspect, upper slopes of Reitkloof Mountain, 5693.

DISTRIBUTION.—Western districts.

3. *M. stricta*, Less. Syn. 336.

Cape: Oliphant's River Mountains; slopes behind Farmers' Baths, 1-1½ ft., fls. cream, 6959.

DISTRIBUTION.—Worcester, Paarl, and Caledon Divisions.

4. *M. fasciculata*, Don in Mem. Wern. Trans. v. 558.

Cape: Giftberg, 1-2000 ft., simple plant 1-2 ft. high, involucre pink or white, 7401, 7443. Oliphant's River Mountains; road to Modderfontein, fls. white, 6975.

DISTRIBUTION.—Western and Cape districts.

5. *Metalasia speciosa*, Hutchinson, sp. nov. (fig. 2); affinis *M. nitidulae*, Harv., sed robustior, foliis fasciculatis, pedunculis multo longioribus differt.

*Frutex* circiter 0.75 m. altus; rami ascendentes, dense foliati, minute adpresse pubescentes. *Folia* imbricata, patula, acicularia, spiraliter torta, acutissima, 1 cm. longa, 1.5 mm. lata, supra glabra et subnitida, infra cano-tomentosa, marginibus valde recurvatis, in

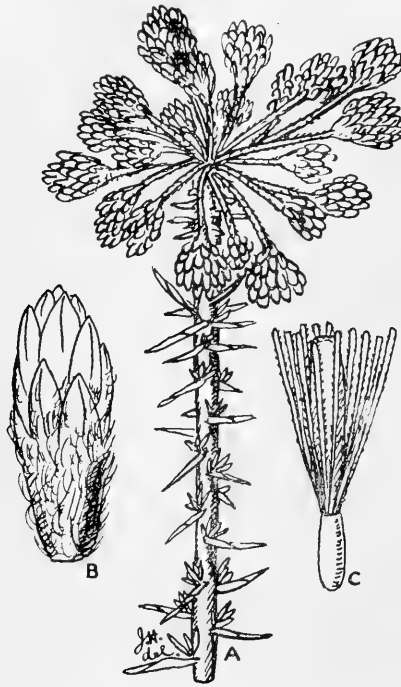


FIG. 2.—*Metalasia speciosa*, Hutchinson, n. sp. A, upper portion of flowering shoot, nat. size; B, single flower head,  $\times 7$ ; C, flower,  $\times 11$ .

axillis foliis minoribus fasciculatis instructa. *Capitula* circiter 5-flora, terminalia, dense corymbose-glomerata, glomerulis breviter pedunculatis confertis; pedunculi primarii 0.5–1 cm. longi, albo-tomentosi, ultimi vix 1 mm. longi. *Involutra* anguste cylindrica, 5 mm. longa; bracteae inferiores cano-pubescentes, superiores glabrescentes, roseae. *Corollae tubus* cylindricus, 2 mm. longus, glaber, vix lobatus, apice truncatus. *Achaenia* glabra. *Pappi setae* albae, 2 mm. longae, obtusae, planae, minute barbellatae.

Cape: Southern side of slopes of mountain above Kradoww Krantz,



bush 2 ft., *Pillans* 5313; plateau to south of Nardouw Mountains, *Pearson* 5413; Oliphant's River Mountains: road near Baths, shrub 2 ft., fls. cochineal pink, *Stephens* 7009, 7010. [Collected also in Clanwilliam by *Mader* (No. 44) Herb. Macowan.]

RELHANIA, THUNB.

1. *R. squarrosa*, L'Herit. Sert. Angl. 24.

Cape: Gifftberg, 1–2000 ft., bush 1 ft. high, 7431; common at low levels, Leeuwfontein, 3188. Oliphant's River Mountains: On lower slopes of mountain behind Farmer's Baths, 1–2 ft., fls. yellow, 6958, 6971.

DISTRIBUTION.—Calvinia through Worcester to Swellendam and Mossel Bay.

2. *R. affinis*, Sond. in Harv. & Sond. Fl. Cap. iii. 300.

Cape: Between top of Leeuwfontein Pass and Hottentot's Kloof, 3203, 3209; roadside between Ceres and Leeuwfontein, 3249.

DISTRIBUTION.—Piquetberg and Worcester Divisions.

3. *R. sedifolia*, Harv. in Harv. & Sond. Fl. Cap. iii. 301.

Cape: Gifftberg, 1–2000 ft., bush 12 in. high, fls. yellow, 7435.

Khamiesberg: Wilgehout Ravine, bush 2 ft., fls. yellow, 6737.

Upper Region: 15 miles north of Alewyn's Fontein, on gneiss ridge, round bush 3 ft. high, 2489.

DISTRIBUTION.—Vanrhynsdorp and Clanwilliam Divisions.

4. *Relhania conferta*, Hutchinson, sp. nov. (fig. 3) affinis *R. sedifoliae*, Harv., sed foliis latioribus spatulato-obovatis, capitulis turbinato-cylindricis differt.

*Frutex* dense ramosus, ramis ascendentibus subscabridis dense foliatis. *Folia* conferta, plerumque alterna, spatulato-obovata, minute mucronata, ad basin sensim angustata, 4–5 mm. longa, 1·5–2·5 mm. lata, crasse coriacea. rigida, arete punctata, marginibus breviter pubescentibus. *Capitula* terminalia, solitaria vel rarius geminata, brevissime pedunculata, turbinato-cylindrica, 1 cm. longa, apice 7 mm. expansa. *Involucri bractearum* circiter 5-seriatae, ab extremo sensim longiores, exteriores elliptico-rotundatae, interiores lineari-oblongae, obtusae, usque ad 5 mm. longae, 1·25 mm. latae, nitidae, glabrae. *Receptaculum* planum, 1·25 mm. latum. *Paleae* lineares, subcutae, hyalinae, 5–6 mm. longae, glabrae. *Flores radii* pauci, inconspicui; corollae tubus cylindricus, glandulosus, 2·5 mm. longus; limbus oblongo-lanceolatus, 3 mm. longus; achenia cylindrica, 3 mm. longa,

glabra; pappi squamae lanceolatae vel subulato-lanceolatae, acutae, albae, hyalinae, 1.25 mm. longae. Flores disci circiter 15; achaenia pappusque ut in floribus radii; corollae tubus cylindricus, apicem versus leviter expansus, 4 mm. longus, inferne glandulosus; lobi ovati, subacuti, 0.65 mm. longi.

Khamiesberg: Rock crevices of upper western slopes of Sneeuwkop, Pearson & Pillans, 5797.

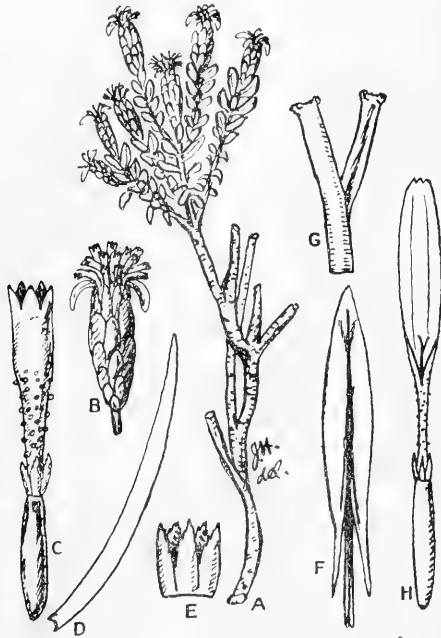


FIG. 3.—*Relbania conferta*, Hutchinson, n. sp. A, part of plant, nat. size; B, flower-head,  $\times 2$ ; C, flower,  $\times 6$  and D, its subtending bract,  $\times 6$ ; E, pappus,  $\times 6$ ; F, anther, and G, style-arms, greatly enlarged; H, ray flower, enlarged.

5. *R. pumila*, Thunb. Fl. Cap. ed Schult. 639.

Little Namaqualand: Common in sandy ground at Stinkfontein, 6516; Vaarsche Rivier, dry stony hills, 6504, 6510.

DISTRIBUTION.—Vanrhynsdorp and Oudtshoorn Divisions.

6. *R. apiculata*, Harv. in Harv. et Sond. Fl. Cap. iii. 303.

Cape: Mountain tops at Hottentot's Kloof, bush 1 ft., 4937, 4942.

DISTRIBUTION.—Ceres and Prince Albert Divisions.

LEYSSERA, LINN.

1. *L. gnaphalioides*, Linn. Sp. Pl. 1249.

Khamiesberg: Granite knoll at Brakdam, 5660.

DISTRIBUTION.—General in the Western and Cape Districts.

*L. gnaphalioides*, Linn., var. *gracilis*, Harv. in Harv. et Sond. Fl. Cap. iii. 294, ex descriptione.

Cape: Roadside between Hottentot's Kloof and Karoopoort, 4832; lower slopes of Kradouw Krantz, fls. yellow, 5283. Oliphant's River Mountains: foot of mountain near Baths, 6969.

DISTRIBUTION.—Tulbagh; evidently much rarer than the species.

2. *L. tenella*, DC. Prodr. vi. 279.

Little Namaqualand: In sand at Stinkfontein, 5520.

Bushmanland: Common on veld between Klipplaat and a point 10 miles to the north-east, prostrate, fls. yellow, 3304, 3403.

DISTRIBUTION: Eastward through the Upper Region to Stockenstrom Division; also collected by Burchell at Mossel Bay.

HETEROLEPIS, CASS.

1. *H. decipiens*, Cass. in Dict. Sci. Nat. xxi. 120.

Cape: Hillside at Leeuwfontein, 3208; between clefts in rocks, southern slopes above Pickenier's Pass, rare, spreading bush, 5188.

DISTRIBUTION.—South-western districts.

In Harvey's key to the *Compositae* in the "Flora Capensis," this plant works down to *Minurothamnus*, DC., a genus which was not seen by Harvey. I think from the description of *Minurothamnus* that it is very probably identical with *Heterolepis decipiens*.

PRINTZIA, CASS.

1. *P. Bergii*, Cass. in Dict. Sci. Nat. xliii. 324.

Cape: Giffberg, 1–2000 ft., bush 3–4 ft. high, 7430; Oliphant's River Mountains; foothills of Cold Bokkeveld opposite Warm Baths, 6947; kloof below the Baths, 6948.

DISTRIBUTION.—Widely spread throughout the Colony.

PEGOLETTIA, CASS.

1. *P. oxydonta*, DC. Prodr. vi. 481.

Little Namaqualand (Richtersveld): By the roadside on southern

slopes of pass between Daunabis and Bethany Drift, bush  $1\frac{1}{2}$ –2 ft., 6026.

Great Namaqualand: Near base of kopje on pass leading down to Gründoorn, 3130; Akham River, 4736; among stones in Akam River-bed, fls. yellow, 4747.

DISTRIBUTION.—Bushmanland and the South-West African Protectorate.

2. *P. polygalaeifolia*, Less. Syn. 200.

Little Namaqualand: Base of kopje at Klipplaat, 3301; kopjes near Nieuwefontein, bush 2 ft., fls. yellow, 3352.

Khamiesberg: Common on the upper North slopes of Reitkloof Mountain, 5708.

Bushmanland: Kweekfontein, granite hill, 3400 ft., bush 3–4 ft., 3799; near base of gneissic kopje between Bitterfontein and Nieuwfontein, 2000–2300 ft., 3851.

DISTRIBUTION.—Upper Region generally.

#### GEIGERIA, GRIESL.

1. *Geigeria pectidea*, Harv. in Harv. et Sond. Fl. Cap. iii. 127.

Great Namaqualand: Buchholzbrun, sandy river-bed, bush 1– $1\frac{1}{2}$  ft., fls. yellow, 3659; sandy river-bed near Dabaigabis, bush  $1\frac{1}{2}$  ft., fls. yellow, 4395; by river-bed between Ganus and Grundovra, 3300 ft., 4493; dry river-bed and saline flat, plains North of Ganus, shrub 1–2 ft., fls. yellow, 4506.

DISTRIBUTION.—Griqualand West.

2. *G. namaquensis*, Hutchinson, sp. nov. (fig. 4); affinis *G. vigintiquamae*, O. Hoffm., sed foliis denticulatis parce lanatis differt.

*Suffrutex* e basi ramosus, usque ad 0·35 mm. altus; rami rigidi, straminei, cortice subdeciduo induti; ramuli juniores foliati, puberuli, sicco sulcati. *Folia* oblanceolata vel lineari-oblanceolata, apice spinoso-acuminata, ad basin sensim attenuata, 2–4·5 cm. longa, 0·5–1 cm. lata, repando-denticulata, infra parce lanato-puberula; nervi laterales ascendentes, utrinsecus 3–4, infra conspicui. *Capitula* terminalia et in ramis unilateralibus disposita sessilia. *Involucri bractee* foliaceae, circiter 5-seriatae, oblongae vel spatulato-oblongae, usque ad 1 cm. longae, pubescentes vel subvillosae, basi induratae. *Flores* radii flavi; corollae tubus 2 mm. longus, glaber; limbus late oblongus, apice trifidus, 6 mm. longus, 2·75 mm. latus. *Flores disci* numerosi; corollae tubus 4 mm. longus; lobi lanceolati, subacuti, extra setulosos.

puberuli. *Achaenia* dense villosa. *Pappi squamae* e basi late elliptico subulato-accuminatae, 1.25 mm. longae, membranaceae.

Great Namaqualand: Sandstone at Sandverhaar, 3100 ft., fls. yellow, *Pearson*, 3702; sandy valley 20 km. north of Raman's Drift, 2400 ft., fls. yellow, *Pearson*, 4518.



FIG. 4.—*Geigeria namaquensis*, Hutchinson, n. sp. A, part of flowering shoot showing also the old persistent involucre; B, ray-flower,  $\times 5$ ; C, pappus scale from same,  $\times 16$ ; D, disk flower,  $\times 5$ .

3. *Geigeria monocephala*, Hutchinson, sp. nov.; affinis *G. vigintiquamae*, sed capitulis terminalibus duplo majoribus, in fructu depressissimo-globosis differt.

*Frutex* ramosus, 1-1.3 m. altus; rami albescentes, foliorum basibus persistentibus ornati, glabri, lignosi. *Folia* breviter decurrentia,

lineari-lanceolata, apice spinoso-acuminata, ad basin leviter angustata, 1.5–4.5 cm. longa, 3–6 mm. lata, integra, rigide chartacea vel subcoriacea, utrinque arete punctata et puberula; costa media utrinque prominens; nervi laterales suberecti, cum marginibus subparalleli, infra conspicui. *Capitula* discoidea, terminalia, sessilia, depresso-globosa, 1 cm. longa, 1–1.3 cm. diametro, in fructu depressissima et dura. *Involucri bracteae* exteriores leviter foliosae, e basi late ovato lanceolatae, spinoso-acuminatae, usque ad 8 mm. longae, interiores late ovatae, spinoso-apiculatae, omnes marginibus puberulis. *Flores* omnes tubulares; corollae tubus basi contractus, 5 mm. longus, glaber; lobi 5, lineari-lanceolati, subacuti, 1.75 mm. longi, extra setuloso-glandulosi; styli rami acuti, semiexserti. *Achaenia* dense et longe villosa. *Pappi squamae* lanceolatae, acute acuminatae, 2.25 mm. longae, membranaceae, superne margine minute dentatae.

Great Namaqualand: Banks of shallow stream course on stony plains 12 km. west of Sandverhaar, 3200 ft., straggling bush 3–4 ft., fls. yellow, *Pearson*, 4609.

#### ERIOCEPHALUS, LINN.

1. *E. punctulatus*, DC. Prodr. vi. 146.

Khamiesberg; Naras Ravine, bush 2 ft., foliage fragrant, rays white, common, 6708.

DISTRIBUTION.—Extends across the Kalahari and Central Regions to Transkei.

2. *E. umbellatus*, DC. Prodr. vi. 147.

Cape: Giftberg, 1–2000 ft., bush 9–12 in. high, 4277, 7453.

DISTRIBUTION.—Common throughout Cape Colony and Namaqualand.

3. *E. pubescens*, DC. Prodr. vi. 148.

Bushmanland: Granite knoll south of Kweekfontein water-holes 3200 ft., bush 3 ft., 3804.

Little Namaqualand: South of Pass between Grauwater and Klip Plaat, 2 ft., 3279; common on kopjes at Rietfontein, 2500 ft., bush 2–3 ft., 3769.

Bushmanland: Sand north of Raman's Drift, shrub 2–3 ft., 4047; granite slopes 18 km. west of Aus, 4210; Schakalskuppe, 5600 ft., 4243; common on sandy plains 25 km. north of Warmbad, bush 12–1½ ft. 486; south of Dabaigabis, 4291; 20 km. north of Raman's

Drift, 2400 ft., 4513; sandy plains at Schakalskuppe, 4500 ft., bush 2 ft., 4780.

DISTRIBUTION.—Vanrhynsdorp, Calvinia, and Murraysburg.

LASIOSPERMUM, LAG.

1. *L. radiatum*, Trev. Nov. Act. xiii. i. 205.

Cape: Nine miles from Ceres along the Leeuwfontein Road, 3505.

DISTRIBUTION.—Eastward to Albany.

ATHANASIA, LINN.

1. *A. parviflora*, Linn. Sp. Pl. 1182.

Cape: On sandy dunes on western side of foot of Giftberg, between Doorn River and Windhoek, 5396.

Little Namaqualand: Foot of granite boss between Mesklip and Blaustaasie, 5894; near summit of Vogelklip, 5934.

Khamiesberg: Summit of ridge opposite Klipfontein, 5957.

DISTRIBUTION.—Western and south-western districts.

2. *A. filiformis*, Linn. f. Suppl. 361.

Khamiesberg: Bottom of kloof on Middelkraal side of road between Middelkraal and Brakdam, bush 3 ft., 5600.

DISTRIBUTION.—Western and Cape districts,

3. *A. glabrescens*, DC. Prodr. vi. 88.

Cape: Doorn River-bed, bush 3-4 ft., 5405.

Bushmanland: Herb 4 ft. social, foot of granite knoll south of Kweekfontein, 3810.

DISTRIBUTION.—Oliphant's River (Drège).

4. *A. pubescens*, Linn. Sp. Pl. 1182

Cape: Upper southern slopes above Pickenier's Pass, bush 2 ft., fls. yellow, 5192.

DISTRIBUTION.—Western districts

5. *Athanasia flexuosa*, Thunb., var. *tomentella*, Hutchinson, var. nov.; a typo caulibus et pedunculis tomentellis differt.

Khamiesberg: Beacon Hill (2) two miles south-east of Leliefontein, about 5300 ft., bush 1½-2 ft., common on south-west slopes, 6352; upper northern slopes, Reitkloof Mountain, 5700; slopes of Sneeuwkop above Modderfontein, 3 ft., 5874; at foot of granite block between Mesklip and Blaustaasie, bush 4 ft., 5893; middle and upper slopes of Vogelklip, bush 4 ft., 5933.

Karoo: Sandy dry river-bank north of Gansfontein 1200 ft., bush 3-8 ft., 3989; river bed between Beukesfontein and Gansfontein, 1300 ft., bush 2-5 ft., 4919; locally common by roadside a little south of Bitterfontein, bush 3 ft., 5385.

6. *A. trifurcata*, Linn. Sp. Pl. 1181.

Cape: Along the Leuwfontein road from Ceres, 3512; roadside between Hottentot's Kloof and Karoopoort, 4834; Pickeiner's Pass, eastern slopes, 4 ft., fls. yellow, 5157, 5158.

DISTRIBUTION.—Variable species widely spread throughout the Colony.

7. *A. crithmifolia*, Linn. Sp. Pl. 1811.

Cape: Among palmiet in Oliphant's River at north end of Nardouw Kloof, tree 10-15 ft., 5333.

DISTRIBUTION.—Cape and western districts.

8. *A. linifolia*, Harv. in Harv. et Sond. Fl. Cap. iii. 198.

Bushmanland: Halfway between O'okiep and Sabies, in dry stream-bed, bush 4-5 ft., 4706.

DISTRIBUTION.—Western districts.

9. *Athanasia tomentella*, Hutchinson, sp. nov.; affinis *A. sertuliferae*, DC., sed foliis longioribus tomentellis plerumque angustioribus, involucri bracteis obtusioribus brevioribusque differt.

*Frutex* 1 m. altus; rami elongati, teretes, dense tomentelli, parce foliati. *Folia* linearia, acute mucronata, 2.5 cm. longa, 1 mm. lata, coriacea, dense tomentella. *Capitula* simpliciter corymbosa, pedunculata, ellipsoidea, 8 mm. longa, medio 4 mm. diametro; pedunculi graciles, 1 cm. longi, tomentelli. *Involucri bractee* 4-5 seriatae, oblongo-ellipticae, obtusae vel rotundatae, coriacea, extra dense tomentellae. *Flores* circiter 20; corollae tubus angustus, 1.5 mm. longus, extra glandulosus; pappi setae capillares, articulatae, 1 mm. longae; achaenia angularia, glabra. *Receptaculi* paleae lineares, membranaceae, acutissimae, 4 mm. longae.

Cape: Doorn River bed, bush 3 ft. high, *Pillans*, 5407.

## OEDERA, L.

1. *O. latifolia*, Less. Syn. Comp. 247.

Cape: Giffberg, 1-2000 ft., bush 1-2 ft. high; fls. yellow, 7402.

DISTRIBUTION.—Rather scattered, from Malmesbury eastward to Albany.



LIDBECKIA, BERG.

1. *L. quinqueloba*, Cass. in Diet. Sci. Nat. xxvi. 276 (1823).

(*Cotula quinqueloba*, Linn. f. Suppl. 377 (1781). *Lidbeckia lobata*, Willd. Sp. Pl. iii. pt. iii. 2163 (1800); Harv. in Harv. and Sond. Fl. Cap. iii. 155).

Cape: Oliphant's River Mountains; top of mountains beyond Baths, 1-1½ ft., 7000, 7001, 7002, 7003, 7004.

DISTRIBUTION.—Clanwilliam.

COTULA, GAERTN.

1. *C. coronopifolia*, Linn. Sp. Pl. 1257.

Cape: Biesjes River, marshy spots, 5243.

Upper Region: Kariooemfontein, in stream, 4989.

DISTRIBUTION.—Wet places throughout the Colony.

2. *C. bipinnata*, Thunb. Fl. Cap. ed. Schult. 696.

Khamiesberg: River bed at 3000 ft. on the Khamiesberg Plateau, fls. yellow, 6238.

DISTRIBUTION.—Western districts.

3. *C. sericea*, Thunb. Fl. Cap. ed. Schult. 696.

Cape: On slopes at Hottentot's Kloof, 4901.

DISTRIBUTION.—Aliwal North.

This is the first time that this plant has been gathered since it was collected by Thunberg and later by Drège on the Wittebergen, Aliwal North Division.

4. *C. affinis*, Schlechter, MSS.

Khamiesberg: In shade of rocks in damp places on upper western slopes of Sneeuwkop, 5777.

DISTRIBUTION.—Little Namaqualand.

5. *Cotula* sp.

Cape: Giftberg, growing in sand amongst flat rocks, 1-2000 ft., fls. yellow, 7407.

I have been unable to identify this species. The genus *Cotula* is much in need of critical revision, which I hope to carry out at an early date.

## CENIA, COMM.

1. *C. turbinata*, Per. Ench. ii. 465.

Cape: Oliphant's River Mountains; foot of mountain at right hand side of valley near Baths, 2 in. high, heads yellowish white, 6985; burnt ground, lower slopes of mountain behind Farmers' Baths, fls. yellow, 6986; without precise locality, 7710.

DISTRIBUTION.—Western and southern districts.

## ASAEMIA, HARV.

1. *A. axillaris*, Harv. in Harv. and Sond. Fl. Cap. iii. 187, name only in syn.; Icon. Plant. t. 2231.

Cape: Doorn River-bed, bush 3 ft., 5406.

Karoo: Dry stream-bed (saline) near rocky outcrop North of Stompiesfontein, bush 1-2 ft., 3072.

Bushmanland: River-bed near outspan a few miles East of Nieuwefontein, common shrub, 2-3 ft., 3410.

Upper Region: Irrigated land at Calvinia, 3963.

DISTRIBUTION.—Known previously from Touws River district and from Aberdeen near Graaff Reinet.

This plant is "said to cause fever in cattle of certain colours, but not in others" (*Pearson*).

## PENTZIA, L.

1. *P. globifera*, Hutchinson in Kew Bull. 1916, 251.

Upper Region: Loeriesfontein, ravine 2500 ft., fls. yellow, 4842.

Little Namaqualand: Mountain pass south of Klipplaat, 170 ft., also on sandy plains, 3862.

Bushmanland: Between Klipplaat and a point about 10 miles north-east, 3305.

DISTRIBUTION.—Common weed throughout South Africa.

2. *P. grandiflora*, Hutchinson in Kew Bull. 1916, 250.

Cape: Roadside between Clanwilliam and Lang Kloof, bush 1 ft., 5345; sand flat between Driefontein and Heerenlogement, fls. yellow, 6808.

DISTRIBUTION.—Clanwilliam to Namaqualand.

3. *P. tanacetifolia*, Hutchinson in Kew Bull. 1916, 253.

Cape: Sandy cornlands, Clanwilliam, 5340.

Karoo: Common in irrigated land at the "Bosch" near Sckurkraal, 3079.

Upper Region: Karieboemfontein, near stream, 4986; flat sandy ground between Calvinia and Holle River, 2500 ft., 3969; by side of Wagon track, Holle River, 2700 ft., 3971.

Little Namaqualand: Among *Arundo* in pool at Brakwater, 6072.

DISTRIBUTION.—Western districts from Capetown to Namaqualand.

4. *P. dichotoma*, DC. Prodr. vi. 138; Hutchinson in Kew Bull. 1916. 246.

Little Namaqualand: Vaarsche Rivier, dry stony hills, 6505.

DISTRIBUTION.—Namaqualand and Vanrhynsdorp.

5. *P. incana*, O. Kuntze, Rev. Gen. iii. ii. 166.

Khamiesberg: Twee Rivieren, very common near summit of hills east of Settlement, bush  $1\frac{1}{2}$ –2 ft. high, 6598.

Little Namaqualand: Pass south of Klipplaat, 1700 ft., shrub 1 ft. high, 3484.

Karoo: Near Nieuwefontein, aromatic bush 2 ft. high, fls. yellow, 3348. Without locality, 4221.

DISTRIBUTION.—General, excepting the extreme south-west.

6. *Pentzia argentea*, Hutchinson, sp. nov. (fig. 5); affinis *P. nanac*, Burchell, sed foliis minoribus flabellato-lobatis et nervosis facile distinguenda.

*Frutex* multiramis usque ad 0.75 m. altus; ramuli laterales plerumque breves, dense foliati, terminales longiores laxè foliati, pilis albidis dense adpresse tomentelli. *Folia* obtriangulari-flabellata, basi in petiolum brevem attenuata, usque ad 1 cm. longa, 5–7 mm. lata, firme chartacea, flabellatim 7–9-lobulata, nervosa, utrinque dense adpresse argenteo-tomentella et nigro-punctata, lobulis ovato-oblongis obtusissimis. *Capitula* terminalia, longe pedunculata; pedunculi usque ad 15 cm. longi, basin versus parce foliati, conspicue sulcati, adpresse puberuli. *Involucra* depresso-hemisphaerica, 1 cm. diametro; bractee numerosae, lineari-oblongae, apice et apicem versus membranaceae et hyalinae, circiter 6 mm. longae, adpresse pubescentes et parce nigropunctatae. *Flores* omnes tubulosi, numerosissimi; corollae tubus crassus, 1.5 mm. longus, glaber; lobi ovati, obtusi; achaenia acute quadrangularia, 2 mm. longa, glabra; pappus obliquus, tubulosus, membranaceus, dentatus, 1 mm. longus.

Bushmanland: Stony ground, Groot Rozybosch, 2800 ft., bush  $\frac{1}{3}$ – $\frac{1}{2}$  ft., fls. yellow, *Pearson*, 3832.

Great Namaqualand: Common in rock crevices between Dabaigabis and Gründoorn, 4200 ft., bush  $\frac{1}{2}$ –2 ft., fls. yellow, *Pearson*, 3170; base of kopje 20 km. North of Raman's Drift, 2400 ft., *Pearson*, 4529.

This species was also collected by Prof. Pearson (No. 7927) on his expedition to the Great Karasberg, where it was found at the Alt Ravine Wasserfall and at Krai Klufft.

I consider all the above specimens to be clearly distinct from *P. nana*, Burchell (*P. quinquefida*, Less., var. *nana*, Harv.), the type

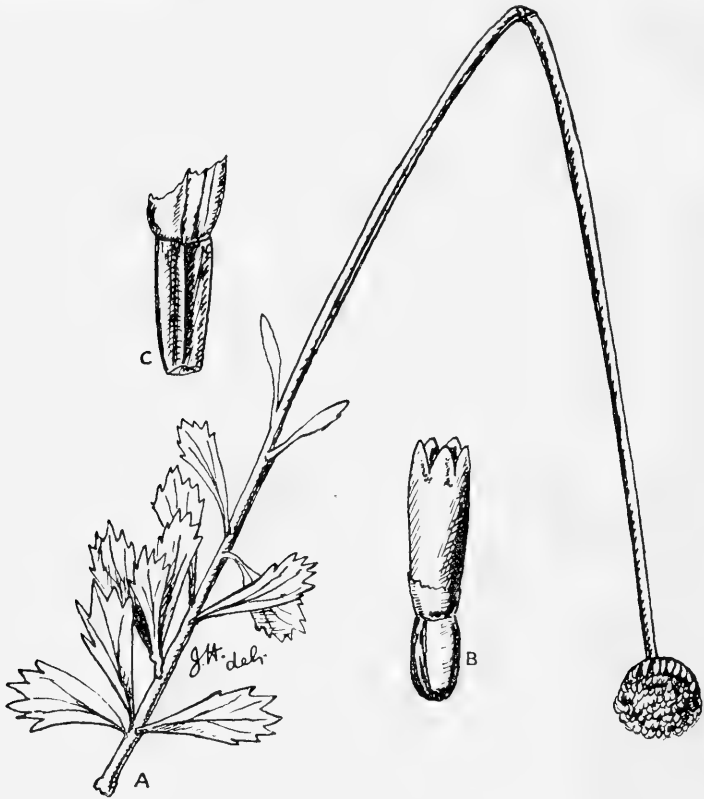


FIG. 5.—*Pentzia argentea*, Hutchinson, n.sp. A, flowering shoot, natural size; B, flower; C, achene and pappus.

of which is at Kew. In the latter the leaves are considerably larger, thick, and in outline quite truncate and regularly toothed only at the top; in *P. argentea* the leaves are always smaller, thinner, and much more deeply and irregularly flabellately toothed.

7. *Pentzia lanata*, Hutchinson, sp. nov. (fig. 6, c—e); affinis *P. globosae*, Less., sed ramis dense albo-lanatis, bracteis valde membranaceis, capitulis plerumque majoribus differt.

*Caulis* basi lignosus, durus, crassus; rami erecti vel ascendentes, dense albo-lanati, teretes. *Folia* pinnatipartita vel bipinnatipartita, usque ad 1.5 cm. longa, vix 1 cm. expansa, segmentis linearibus, breviter pubescentibus subacutis. *Capitula* terminalia, solitaria, longe pedunculata, discoidea; pedunculi ad 7 cm. longi, superne nudi, inferne parce foliati, apicem versus glabrescentes. *Involucri bracteae* circiter 4-seriatae, exteriores lineares, 2 mm. longae, interiores 3 mm. longae, oblanceolato-ellipticae, margine late hyalinae, fere glabrae. *Flores* numerosi; corollae tubus 1.5 mm. longus, medio parce glandu-

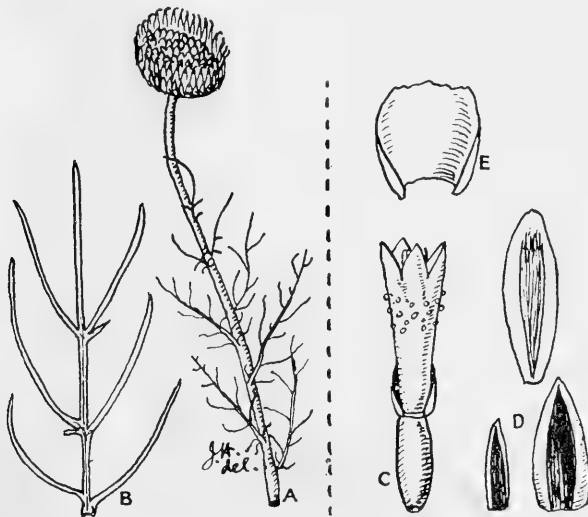


FIG. 6.—A, *Pentzia pinnatisecta*, Hutchinson, n.sp., nat. size; B, leaf of same,  $\times 2\frac{1}{2}$ ; C, flower of *Pentzia lanata*, Hutchinson, n.sp.; D, involucral bracts of same,  $\times 5$ ; E, pappus, enlarged.

losus; lobi 5, ovati. *Achaenia* 1.25 mm. longa, glabra. *Pappus* auriculiformis, 1.5 mm. longus, tenuiter membranaceus, margine crenulatus.

Great Namaqualand: Dry stream-bed of sandy plain west of Ganus, Pearson, 4488; sandy plains at Schakalskuppe, 4500 ft., fls. yellow, Pearson, 4781; [also collected by Schlechter (No. 8153) on the Knechts Vlagte (Little Namaqualand)].

8. *Pentzia pinnatisecta*, Hutchinson, sp. nov. (fig. 6 A–B); affinis *P. lanatae*, Hutchinson, sed foliis graciliter longe pinnatisectis, bracteis haud membranaceis differt.

*Caulis* ramiqve ut in *P. lanato* sed usque ad 30 cm. longi et rami

superne fere glabri. *Folia* pinnatisecta, usque ad 2 cm. longa, segmentis gracilibus acutissimis usque ad 8 cm. longis glabris vix 0.5 mm. crassis. *Capitula* discoidea, solitaria, terminalia, pedunculata; pedunculi fere ad apicem laxe foliati, puberuli. *Involucri bracteae* 4-5-seriatae, haud membranaceae, 4-5 mm. longae, lineari-subulatae, glabrae. *Flores* ut in *P. lanato*.

Great Namaqualand: Bush 3 ft. high, in dry stream-beds between Dabaigabis and Gründoorn, fls. yellow, *Pearson*, 3114; sandy river-bed 25 km. north of Warmbad, fls. greenish white, *Pearson*, 4307; Akam river-bed, *Pearson*, 4733.

HIPPIA, LINN.

1. *Hippia Bolusae*, Hutchinson, sp. nov. (fig. 7); affinis *H. gracili*, Less., var. *repenti*, Harv., sed foliis petiolatis palmatim 3-5-partitis,

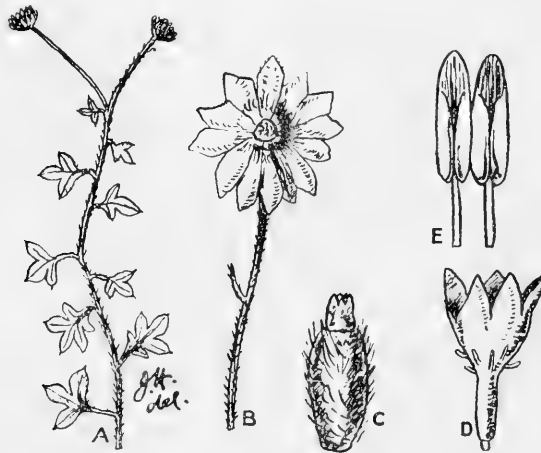


FIG. 7.—*Hippia Bolusae*, Hutchinson, n.sp. A, flowering shoot, nat. size; B, involucre laid open,  $\times 6$ ; C, female flower,  $\times 10$ ; D, male flower,  $\times 11$ ; E, stamens,  $\times 18$ .

lobis multo latioribus obovato-orbicularibus conspicue mucronatis facile distinguenda.

*Herba* e basi multe ramosa, debilis, ramis elongatis dense foliatis teretibus parce puberulis vel fere glabris. *Folia* petiolata, palmatim 3-5-partita, submembranacea, 0.5-1.5 cm. longa. 3-1 cm. lata, lobis obovato-orbicularibus vel oblongo-obovatis 1-nerviis mucronatis punctatis et saepe leviter pilosis; petioli 3-5 mm. longi, interdum alati. *Pedunculi* terminales, plerumque geminati, graciles, usque ad 2 cm. longi, folia superantes, breviter pubescentes. *Capitula* solitaria,

minima, late depresso-campanulata, circiter 3 mm. diametro et 2 mm. alta. *Involueri bractee* ovato-lanceolatae, acutae, circiter 1.25 mm. longae, parce puberulae. *Flores* ♀ 1-seriati; corolla brevissima, glabra; achaenia fertilia, leviter compressa, obovoidea 1.5 mm. longa, dense papilloso-pilosa. *Flores* ♂ pauci; corollae tubus apicem versus valde expansus, 2 mm. longus, lobis subacutis. *Achaenia* minuta.

Cape: Ceres Division; damp places at the head of Mitchell's Pass, Ceres, 1080 ft., fls. white, *Pearson*, 3534.

[Also collected by *Bolus* in October, 1873, in the same locality at about 1800 ft. (*Bolus*, No. 2616); *Rehmann*, No. 2662, from the mountains above Worcester, may also belong here; the leaf-lobes are a little narrow and not so abruptly mucronate as in the other specimens.]

This is a most charming and neat little plant which has been passing in herbaria under the name of *Hippia gracilis*, Less., var. *repens*, Harv. I consider it to be distinct from the type of this variety, which is at Kew, and it may readily be separated by its petiolate palmately 3-5-partite leaves with much broader conspicuously mucronate lobes. I have much pleasure in associating with it the name of Mrs. F. Bolus, who is sufficiently well known in connection with South African Botany to need further mention.

#### CINERARIA, LINN.

1. *C. aspera*, Thunb. Fl. Cap. ed. Schult. 672.

Khamiesberg: Under rocks on kopje south-west of Leliefontein Mission Station, 6303.

DISTRIBUTION.—South Upper Region and Karoo eastward to Stockenström.

2. *C. erosa*, Harv. in Harv. et Sond. Fl. Cap. iii. 309.

Cape: Among rocks on hill-tops at Hottentot's Kloof, 4900.

Karoo: Between Gansfontein and Pappekuil, 5035.

DISTRIBUTION.—South-western districts.

3. *C. canescens*, Wendl. Obs. ex Link. Enum. Hort. Berol. ii. 332.

Little Namaqualand: Lithophyte on granite rocks in crevices, Nieuwerust, 5512.

Little Bushmanland: In dry ravine 15 miles north of Alewyn's Fontein, 3000 ft., bush 1-2 ft., 3932.

DISTRIBUTION.—Previously collected by Drège and Whitehead in Little Namaqualand.

4. *C. lobata*, L'Herit. Sert. Angl. 24, t. 34.

Cape: Oliphant's River Mountains; foothills of Cold Bokkeveld; opposite Baths, heads yellow, 7005.

Khamiesberg: Khamiesberg plateau, in shade of granite block, 3000 ft., fls. yellow, 6239.

DISTRIBUTION.—Previously recorded mostly from the eastern districts.

5. *C. lyrata*, DC. Prodr. vi. 308.

Khamiesberg: Summit and upper south-western slopes of Sneeuw-kop, among rocks, 5762.

DISTRIBUTION.—Previously known only from the south-eastern districts, from Bedford to Orange River Colony and Natal.

## SENECIO, L.

1. *S. laxus*, DC. Prodr. vi. 381.

Cape: Giffberg, 1–2000 ft., 7449.

Khamiesberg: Bitterfontein, 6557; Kharkams, damp sandy places, 6636; Khoms Ravine, upper part among bushes, 6637; 6641.

DISTRIBUTION.—Little Namaqualand to Vanrhynsdorp Division.

2. *S. abruptus*, Thunb. Prodr. Fl. Cap. 159.

Cape: Oliphant's River Mountains; foot of mountains behind Farmers' Baths, fls. yellow, 6953.

DISTRIBUTION.—Paarl, Tulbagh, and Cape Divisions.

3. *S. repandus*, Thunb. Fl. Cap. ed. Schult. 683.

Cape: Mitchell's Pass, Ceres, 1080 ft., 3537. Oliphant's River Mountains: 7708; 7715.

DISTRIBUTION.—Cape districts.

4. *S. paarlensis*, DC. Prodr. vi. 383.

Cape: Oliphant's River Mountains; foot of mountains near Baths, fls. yellow, 6972.

DISTRIBUTION.—Paarl, Caledon, and Tulbagh Divisions.

5. *S. glutinosus*, Thunb. Prodr. Fl. Cap. 158.

Cape: Giffberg, 1–2000 ft., fls. yellow, 7406, 7656.

DISTRIBUTION.—Cape Division to Albany and in the Transvaal.



6. *S. arenarius*, Thunb. Fl. Cap. ed. Schult. 680.

Cape: Oliphant's River Mountains; kloof below Baths, fls. purplish-red, 6981.

DISTRIBUTION.—Western and South-western districts around the Cape Division.

7. *S. cakilefolius*, DC. Prodr. vi. 408.

Khamiesberg: Bitterfontein, common, rays light purple, 6491.

DISTRIBUTION.—Little Namaqualand.

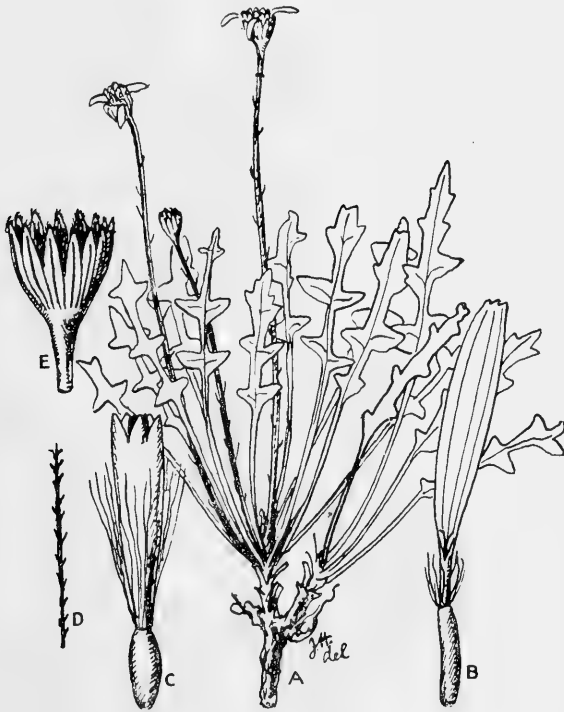


FIG. 8.—*Senecio crepidiformis*, n.sp. A, whole plant, nat. size; B, ray-flower,  $\times 6$ ; C, disk-flower,  $\times 8$ ; D, pappus-seta of same; E, involucre,  $\times 3$ .

8. *Senecio crepidiformis*, Hutchinson, sp. nov. (fig. 8); affinis *S. hastulato*, sed fere acaulis, foliis radicalibus et capitulis minoribus differt.

*Herba* pumila usque ad 11 cm. alta; rhizoma ? erectum, gracile, paucicephalum, petiolis persistentibus dense indutum. *Folia* omnia radicalia, longepetiolata, pinnatilobata, ambitu lineari-lanceolata, apice

subobtusa, petiolum includentia 4-5.5 cm. longa, 4-8 mm. lata, glabra, margine recurvata, lobulis lateralibus oblongis vel triangulari-oblongis obtusis. *Pedunculi* scapigeri, graciles, usque ad 12 cm. longi, glabri, bracteis parvis subulatis parce induti. *Capitula* radiata, tubuloso-campanulata, 6 mm. longa, vix 1 cm. expansa. *Involucri* bracteae circiter 12, ecalyculatae, lineares, subacutae, 3.5 mm. longae, 0.6 mm. latae, margine hyalinae, apice brevissime ciliatae. *Flores* radii pauci; corollae tubus cylindricus, 1.5 mm. longus, glaber; limbus lineari-oblongus, apice tridentatus, 5 mm. longus, striatus; pappus parvus. *Flores* disci numerosi; corollae tubus angustus, 3 mm. longus, striatus, glaber; lobi 5, lanceolati. *Achaenia* angusta, glabra. *Pappus* copiosus, albus.

Khamiesberg: Beacon Hill (2) two miles south-east of Leliefontein, in shade of rocks, middle slopes about 5200 ft., ray-fls. yellow, *Pearson*, 6377.

9. *Senecio Pearsonii*, Hutchinson, sp. nov. (fig. 9); species affinis *S. hypochoeridei*, DC., sed foliis minus serratis, achaeniis striatim papillois nec omnino pubescentibus differt.

*Herba* perennis usque ad 40 cm. alta; caules subsimplici vel superne parce ramosi, parce foliati, longitudinaliter sulcati, minutissime puberuli, e rhizomate horizontali foliorum basibus persistentibus dense induto orti. *Folia* radicalia erecta, linearia, basi vaginata, apice indurato-obtusa, usque ad 17 cm. longa, 3-6 mm. lata, sicco rigide coriacea et longitudinaliter rugulosa, marginibus revolutis repando-denticulatis, utrinque glabra; folia caulina bracteiformia, lineari-lanceolata, acuta, circiter 1.5 cm. longa, minute puberula. *Capitula* 5-9 in racemos vel subcorymbos disposita, disciformia, 1.5 cm. longa, flava. *Involucrum* campanulatum, 1.2 cm. longum, basi parce caliculatum; bracteae circiter 20-25, lineares, subacutae, marginibus membranaceis hyalinis, extra minute scabrido-puberulae. *Achaenia* angusta, 6 mm. longa, sicco nigra et costata, minute striatim albo-papillosa. *Pappus* gracilis, corollae aequilongus, albus, minute barbellatus. *Corollae tubus* 9 mm. longus, glaber.

Khamiesberg: Among rocks on granite kopje south-west of Leliefontein Mission Station, subsucculent, fls. yellow, *Pearson*, 6310.

10. *S. erosus*, Linn. f. Suppl. 370.

Cape: Oliphant's River Mountains, 7709.

DISTRIBUTION.—Western and south-western Districts.



FIG. 9.—*Senecio Pearsonii*, Hutchinson, n.sp. A, whole plant,  $\times \frac{1}{3}$  ;  
B, leaf, nat. size.

11. *S. hastulatus*, Linn. Sp. Pl. 1218.

Cape: Roadside between Hottentot's Kloof and Karooport, 4827.

Khamiesberg: Kharhams, damp shady places, 6711.

DISTRIBUTION.—Widely distributed throughout the Colony.

12. *S. cymbalarifolius*, Less., var. *rotundifolius*, DC. Prodr. vi. 438.

Cape: Top of Oliphant's River Mountains, beyond Baths, heads purplish-red, 6949; heads rust-coloured, 5955, 7707.

DISTRIBUTION.—Districts around the Cape Division.

A very beautiful plant even in the dried state, the under-surface of the leaves retaining its carmine-purple colour.

13. *S. incertus*, DC. Prodr. vi. 433.

Cape: Oliphant's River Mountains; near Baths, fls. white, 6876.

DISTRIBUTION.—Clanwilliam, Tulbagh, and Paarl Divisions.

14. *S. cinerascens*, Ait. Hort. Kew. ed. i. iii. 191.

Khamiesberg: Among granite blocks on hills east of Twee Rivieren, bush 2–3 ft., 6787; roadside on south side of pass between Bovesdorp and Groot Gaas, bush 3–4 ft. high (also in middle western slopes of Sneeuwkop), 5850; Riet Fontein, common on tops of hills, bush, 3–4 ft., 3449.

DISTRIBUTION.—Occurs also in Clanwilliam.

15. *S. pubigerus*, Linn. Pl. Afr. Rar. 21.

Cape: Oliphant's River Mountains; foothills of Cold Bokkeveld, heads yellow, 6988.

DISTRIBUTION.—Paarl, Caledon, and Cape Divisions.

16. *S. lyratus*, Linn. f. Suppl. 369.

Cape: Among Palmiet in Oliphant's River, about 10 ft. high, 5258; dry hillsides north of Hex River, among bushes, fls. white, 5259.

DISTRIBUTION.—Cape, Swellendam, and Uitenhage Divisions.

17. *S. juniperinus*, Linn. f. Suppl. 371.

Cape: Hill slopes above Hottentot's Kloof, 4914.

Khamiesberg: Marshy ground  $1\frac{1}{2}$  miles south-west of Leliefontein, 5000 ft., straggling bush 3 ft., 6337; damp places middle Khamiesberg plateau, north-east of Leliefontein, 4000 ft., 6345.

DISTRIBUTION.—Western and south-western districts generally.

18. *S. vestitus*, Berg. Cap. 282.

Khamiesberg: Among rocks on kopje south-west of Leliefontein, 3-4½ ft. high, 6200; Beacon Hill, 2 miles south-east of Leliefontein, among rocks near summit on south-west side, about 5400 ft., bush 2-3 ft., 6361, 6362; upper north-west slopes of Sneeuwkop, 5823A; summit of ridge of Reitkloof Mountain, bush 6 ft., 5698.

DISTRIBUTION.—Previously collected by Drège in Little Namaqualand.

19. *S. tenuilobus*, DC. Prodr. vi. 398.

Cape: Giftberg, 1-2000 ft., fls. creamish-white, 7440.

Khamiesberg: Upper southern slopes of Sneeuwkop, bush 4 ft. high, 5791; Reitkloof Mountain, near summit, northern slopes, 5704.

DISTRIBUTION.—Little Namaqualand and Stellenbosch.

20. *S. actinoleucus*, F. Muell. in Trans. Roy. Soc. Victoria, viii. 40. *S. leucoglossus*, Sond. in Harv. et Sond. Fl. Cap. iii. (1863), non F. Muell. (1860).

Cape: Oliphant's River Mountains; mountain side behind Baths shrub, fls. yellow, 6987.

DISTRIBUTION.—Ceres and Tulbagh Divisions.

21. *S. parvifolius*, DC. Prodr. vi. 396.

Khamiesberg: Beacon Hill (2), 6643.

DISTRIBUTION.—Little Namaqualand and Ceres.

22. *S. paniculatus*, Berg. Pl. Cap. 277.

Cape: Oliphant's River Mountains; road to Modderfontein, fls. yellow, 6978.

DISTRIBUTION.—Widely distributed almost over the whole Colony.

23. *S. angustifolius*, Willd. Sp. Pl. iii. 1973.

Cape: Veld beyond top of pass above Leeuwfontein, 3198; roadside between Hottentot's Kloof and Karooport, 4819.

DISTRIBUTION.—Clanwilliam and Tulbagh Divisions.

24. *S. niveus*, Less. Syn. 392.

Bushmanland: In sand about 8 miles south-west of Bitterfontein fls. yellow, 3867.

Little Namaqualand: South side of mountain pass south of Klipplaat, 1600 ft., coarse herb 3 ft. high, 3863; roadside between Mesklip and Blaustaassie, bush 2½ ft. high, 5892.

Upper Region: River-bed at Loeriesfontein, 2500 ft., 4861.

DISTRIBUTION.—Western and Cape districts.

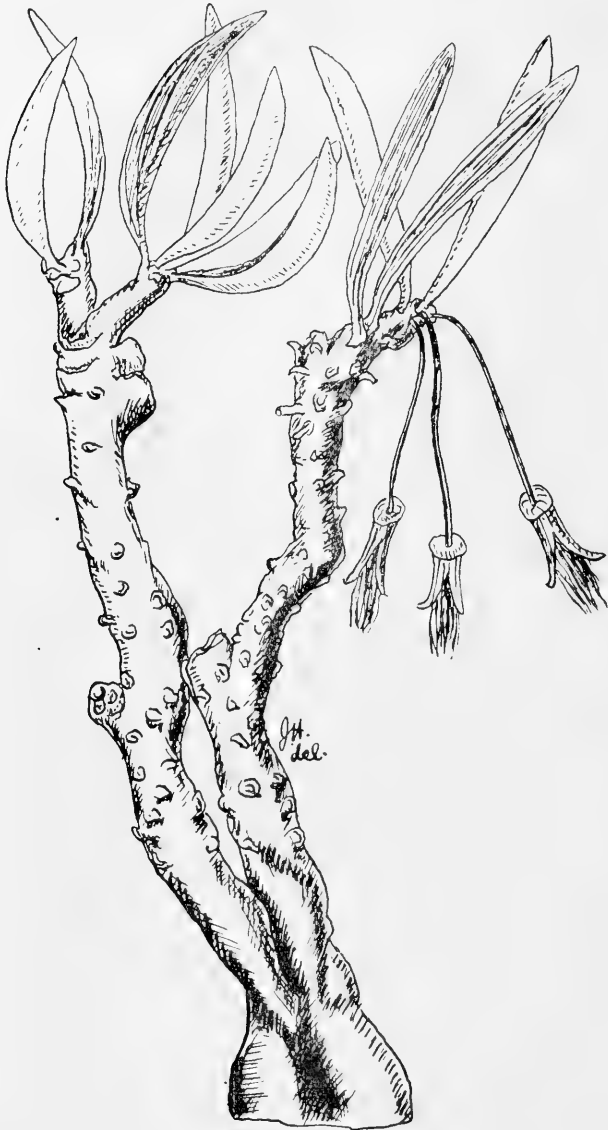


FIG. 10.—*Senecio crassicaulis*, Hutchinson, n.sp.; nat. size.

25. *S. longiflorus*, Sch. Bip. in Flora, xxviii. 499.

*Kleinia longiflora*, DC.; Harv. in Harv. and Sond. Fl. Cap. iii. 316.

Khamiesberg: Rietfontein, top of gneiss kopje, 3-4 ft. high, 3039.

Bushmanland: Among rocks on granite hills near Tweefontein, 3-4 ft. high, stems succulent, 3042; Agennys, lower slopes, 3000 ft., bush 3 ft., 3539.

DISTRIBUTION.—Griqualand West, Middelburg, Cradock, Graaff Reinet, Transvaal, and Ngamiland.

26. *Senecio crassicaulis*, Hutchinson, sp. nov. (fig. 10); affinis *S. cotyledoni*, DC., sed caulibus et ramis crassioribus, foliorum basibus persistentibus muricatis, involucri bracteis basi demum induratis et incrassatis concretis differt.

*Frutex* circiter 1 m. altus; caulis et rami crassi, carnosii, foliorum basibus persistentibus valde muricati, glabri. *Folia* carnosa lineari-lanceolata, acuta, 3.5-5 cm. longa, 3-4 mm. lata, carnosa, crassa, glabra. *Capitula* florifera non visa, fructifera pendula, pedunculata; pedunculi graciles, 2 cm. longi, brunnei, glabri. *Involucrum* cylindricum basi incrassatum, 1 cm. longum; bracteae sicco brunneae, lineares, sulcatae, glabrae; corollae non visae. *Achaenia* omnia fertilia, subcylindrica, 3 mm. longa, breviter pubescentia, apice annulo cartilagineo coronata. *Pappus* copiosus, albus, 1 cm. longus, fere laevis.

Little Namaqualand: High up on Rattel Poort Mountain, leaves succulent, shrub 3-4 ft., *Pearson*, 2987; last outspan south of Nieuwefontein, on gneissic kopje, *Pearson*, 3065.

Bushmanland: Lower slopes of kopje on sandy plain north-east of Klipplaat, 1600 ft., aromatic bush, 4 ft. high, fls. dead, *Pearson*, 3070; mountain slopes near Tweefontein, shrub 4 ft., *Pearson*, 3046.

27. *S. viridiflorus*, Hutchinson, sp. nov. (fig. 11); affinis *S. thermarum*, Bolus, sed foliis dentatis, capitulis majoribus, achaeniis longioribus differt.

*Rhizoma* lignosum, paucicephalum; caules erecti, 30 cm. longi, lignosi, flavi, glabri, teretes, basin versus foliati, superne in pedunculis nudis elongati. *Folia* sessilia, oblanceolata vel lineari-oblanceolata, apice obtusa, basi attenuata, 2-5 cm. longa, 0.5-1.5 cm. lata, rigide chartacea, obtuse repando-dentata vel integra, valde glauca, juniora pilosa demum glabra; costa media utrinque distincta, nervis lateralibus paucis arcuatis subdistinctis. *Capitula* flavo-viridia, inaequaliter longe pedunculata, discoidea, 1.5 cm. longa, circiter 1.2 cm. diametro; pedunculi usque ad 17 cm. longi, erecti, apicem versus incrassati, glabri. *Involucrum* late campanulatum, 1 cm. longum; bracteae circiter 10, inaequilatae, oblongae vel oblongo-lanceolatae, coriaceae, marginibus anguste membranaceis, usque ad 5 mm. latae, glabrae, extra indistincte striatae. *Achaenia* lineari-oblonga, 5 mm.



FIG. 11.—*Senecio viridiflorus*, Hutchinson, n. sp. A, part of flowering shoot and flower head, nat. size; B, corolla; C, anther; D, style arms; E, achene and pappus. Enlarged.

longa, 5-angulata, angulis dense papillosis, inter angulos glabra. Pappus corollae tubo aequilongus, albus, sericeus, minute barbellatus. Corollae tubus inferne anguste cylindricus, supra medium tubuloso-



campanulatus, 7 mm. longus, glaber; lobi 5, oblongo-lanceolati, obtusi, minutissime pubescentes. *Antherae* acutae. *Styli* ramis truncatis appendiculatis.

Great Namaqualand: Buchholzbrunn, among stones in river-bed, fls. greenish yellow, *Pearson*, 3636.

[Damaraland: Welwitsch, *Galpin & Pearson*, 7677.]

28. *S.* sp., near *S. othonnaeflorus*, DC.

Cape: Giftberg, 1-2000 ft., 7405.

This is perhaps a new species, but the material at hand is scarcely sufficient for an adequate description.

#### EURYOPS, CASS.

1. *E. Athanasiae*, Less. Syn. 394.

Cape: Giftberg, 1-2000 ft., frequent, tall bush 2-3 ft. high, 7444; Oliphant's River Mountains, foot of mountains near Baths, heads yellow, 6964.

DISTRIBUTION.—Piquetberg, Clanwilliam, and (according to Harvey) Tulbagh Divisions.

2. *E. Dregeanus*, Sch. Bip. in Flora, xxviii. 51.

Khamiesberg: Khamsoap Ravine, bush 2½-3 ft., 6536.

Little Namaqualand: Kopje at Nieuwfontein, 2700 ft., 3470.

DISTRIBUTION.—Little Namaqualand and Vanrhynsdorp Division.

3. *E. tenuissimus*, Less. Syn. 394.

Cape: Giftberg, on stony ground, 1-2000 ft., 7424.

Little Namaqualand: Summit of hill south-west of Chubiessis outspan (Richtersveld), 6188.

Khamiesberg: Vogelklip, just below the summit, 5925; middle and upper slopes of Zuurberg (Anegas), common shrub, 3-4 ft. high, 6266.

DISTRIBUTION.—Clanwilliam through the Karoo to Uitenhage.

4. *Euryops khamiesbergensis*, Hutchinson, sp. nov. (fig. 12); affinis *E. tenuissimo*, Less., sed foliis angustioribus longioribus subteretibus nec complanatis, pedunculis gracilibus, involucri bracteis numerosioribus differt.

*Frutex* 2-2.5 m. altus; rami foliorum basibus persistentibus arcte verrucosi; ramuli dense foliati, albo-lanati. *Folia* acicularia integra vel rarius pinnatisecta, apice acuta, basi breviter decurrentia, usque ad 7 cm. longa, subteretia, siccio verruculosa, glabra, plerumque dense



FIG. 12.—*Euryops khamiesbergensis* Hutchinson, n. sp. A, flowering shoot, nat. size; B, ray-flower; C, pappus seta from same; D, disk-flower and E, pappus seta. All enlarged.

gallifera. *Capitula* longepedunculata; pedunculi graciles, foliis breviores; basin versus interdum parce lanati, ceterum glabri. *Involucra* late campanulata; bracteae circiter 10, inferne connatae, circiter 5 mm. longae, parte libera ovato-triangulari acuminata dorso tricostata glabra. *Flores radii* circiter 3 cm. expansi, flavi; corollae tubus brevis; limbus lineari-lanceolatus, apice tridentatus, 1.2 cm. longus, 2.5 mm. latus, glaber; styli rami exserti. *Flores disci* numerosi; corollae tubus superne expansus, 1.5 mm. longus, glaber; lobi 5, lanceolati, obtusi, 1 mm. longi. *Achaenia* pubescentia. *Pappus* densus, barbellatus, albus.

Khamiesberg: Namaroup, shrub 6-8 ft., common among rocks, ray fls. yellow, *Pearson* 6594. [Also collected by the *Rev. W. Morris* (*Bolus Herb.* 5760) near O'okiep, Namaqualand, and by *Schlechter* (11102) at Brakdam, Little Namaqualand].

Most of the leaves in *Pearson's* and *Schlechter's* specimens are densely covered with galls.

5. *E. lateriflorus*, Less. Syn. 304.

Cape: Ascent of Pass above Leeuwfontein, 3199; between Leeuwfontein and Hottentot's Kloof, 3200.

Little Namaqualand: Summit of hill south-west of Chubiessis outspan (Richtersveld), 6186.

Bushmanland: Upper mountain slopes at Kweekfontein, 3700 ft., shrub 4 ft. high, "Rapace Bosch," 3817.

Khamiesberg: Common with Rhenosterbosch, chiefly on lower slopes of hills, south-west of Leliefontein Mission, 3-10 ft., 6315.

Upper Region: Plateau on top of Blaukrantz Pass, bush 3 ft., 3907.

DISTRIBUTION.—Karoo and Upper Regions generally.

6. *E. namaquensis*, Schlechter.

Upper Region: Upper slopes of ravines, Loeriesfontein, 2700 ft., 4859.

DISTRIBUTION.—Little Namaqualand.

7. *E. multifidus*, DC. Prodr. vi. 444.

Bushmanland: Common on slopes, Aggenys, bush 3 ft., 2939; Ougrabies, 3000 ft., common on upper slopes, bush 3 ft., 3570.

Khamiesberg: Beacon Hill 2, common bush 5 ft., fls. yellow, 6642.

Great Namaqualand: Schakalskuppe, hill tops, 5600 ft., 4230.

DISTRIBUTION.—Clanwilliam through the Karoo and Upper Region to Graaff Reinet.

## GYMNODISCUS, LESS.

1. *G. capillaris*, Less. Syn. 89.

Cape: Giffberg, 1-2000 ft., 7422; Oliphant's River Mountains; in alluvial sand of the river valley, 6992; on the road to Modderfontein, 6993.

DISTRIBUTION.—Cape and Western districts and at Mossel Bay.

2. *G. linearifolius*, DC. Prodr. vi. 469.

Khamiesberg: In old cornfields, Witsand, 6704.

DISTRIBUTION.—Great Bushmanland and Little Namaqualand.

## OTHONNA, LINN.

1. *O. Pavonia*, E. Mey. ex DC. Prodr. vi. 473.

Cape: Biesjes Rivier, roadside, shrub 3 ft., fls. yellow, 5165.

Khamiesberg: Plateau north-east of Leliefontein, about 4000 ft., shrub 2-3 ft., among rocks, 6339.

DISTRIBUTION.—Clanwilliam, Murraysberg to Graaff Reinet and Queenstown Divisions.

2. *O. ramulosa*, DC. Prodr. vi. 477.

Karoo: River-bed at Zoutpansdrift, 2000 ft., bush 4 ft. high, 5010; also seen between Hottentot's Kloof and Karooport (Cape).

DISTRIBUTION.—Worcester, Willowmore and Beaufort West.

3. *O. amplexicaulis*, Thunb., var. *denticulata*, Harv. in Harv. et Sond. Fl. Cap. iii. 335.

Cape: Giffberg, herbaceous plant 3-4 ft. high, fls. yellow, 7451, 7452.

DISTRIBUTION.—Clanwilliam to Paarl eastward to Uitenhage.

4. *O. cylindrica*, DC. Prodr. vi. 477.

Cape: Sand flats between Driefontein and Heerenlogement, bush 2-3 ft. high, fls. yellow, 6811.

DISTRIBUTION.—Occurs also in Clanwilliam and in the Great Karasberg.

5. *O. retrorsa*, DC., var. *linearifolia*, Harv. in Harv. et Sond. Fl. Cap. iii. 339.

Khamiesberg: forming a hemispherical cushion in rock crevices below summit on the western side of Sneeuwkop, 5808.

DISTRIBUTION.—Apparently confined to Little Namaqualand.

6. *O. amplexifolia*, DC. Prodr. vi. 480.

Cape: Oliphant's River Mountains, top of mountain behind Baths, in clefts of rocks in shade, fls. yellow, 6976.

DISTRIBUTION.—Tulbagh, Paarl and Worcester.

7. *O. macrophylla*, DC. Prodr. vi. 480.

Khamiesberg: Kharkams, damp shady places, 6584.

DISTRIBUTION.—Little Namaqualand and Van Rhynsdorp Division.

8. *O. floribunda*, Schlechter in Engl. Jahrb. xxvii. 214.

Khamiesberg: Hills above Twee Rivieren, bush with yellow fls., 6806.

DISTRIBUTION.—Little Namaqualand and Van Rhynsdorp.

9. *Othonna ovalifolia*, Hutchinson, sp. nov. (fig. 13); affinis *O. macrophyllae*, DC., sed foliis basi in petiolum brevem attenuatis, involucri bracteis longe acuminatus differt.

*Planta* usque ad 18 cm. alta; caulis basi (vel rhizoma apice?) arachnoideo-tomentosus, tricephalus. *Folia* fere omnia radicalia, ovato-elliptica, basi in petiolum brevem attenuata, apice acuta, 4–8 cm. longa, 1.5–5 cm. lata, distante repando-denticulata, coriacea, utrinque glabra, infra subglauca; costa utrinque prominens, ad apicem laminae sensim angustata; nervi laterales utrinsecus circiter 4, a costa sub angulo 45° abeuntes, utrinque prominuli, ramosi; petioli ad 1 cm. longi; folia caulina pauca, bracteiformia, ovato-lanceolata, ad 2 cm. longa, denticulata. *Pedunculi* laterales 1–4 cm. longi, striati, glauci, glabri. *Involucri bracteeae* circiter 14, oblongo-lanceolatae, subacute acuminatae, 8 mm. longae, 2 mm. latae, coriaceae, margine anguste membranaceae, apice puberulae, ceterum glabrae. *Flores radii* circiter 14, conspicui; corollae tubus cylindricus, 3 mm. longus, glaber; limbus lineari-oblongus, 1 cm. longus, 3 mm. latus, conspicue 4-nervius, apice trifidus; achaenia brevissima, angularia, fere glabra; pappus copiosissimus, albus, setis 5 mm. longis barbellatis. *Flores disci* numerosi; corollae tubus 4 mm. longus, glaber; lobi ovati, obtusi; achaenia sterilia, linearia, complanata, glabra; pappi setae paucae, 4 mm. longae, albae, minutissime barbellatae.

Khamiesberg: Among rocks near summit of Beacon Hill 2, fls. yellow, *Pearson*, 6670.

9. *O. cneorifolia*, Sch. Bip. in Flora, xxvii. 769.

Khamiesberg: Granite crevices of kopje, south-west of Leliefontein Mission Station, bush 3–4 ft., 6316; among rocks above streams Groenkloof, fls. white, 6616; near summit of Beacon Hill (2), fls.



FIG. 13.—*Othonna ovalifolia*, Hutchinson, n. sp. Whole plant, nat. size.

white, 6634; crevices of bare rock near summit of Vogelklip, bush 2½ ft. with slightly succulent leaves, 5935.

Little Namaqualand: Top of Rattel Poort Mountain, Shrub 3-4 ft., 2983.

DISTRIBUTION.—Previously known only from the above two districts.

10. *O. arbuscula*, Sch. Bip. in Flora, xxvii. 769.

Bushmanland: Gneissic kopjes near Nieuwefontein, woody, leafless at date of collecting (December 20th, 1908), 3492.

Khamiesberg: Common on middle and upper slopes of Zuurberg (Anegas), also very common on rocky slopes on Khamiesberg Plateau, bush 3-5 ft., with aromatic wood, 6261; middle and upper northern slopes Reitkloof Mountain, bush 2½ ft. high, 5712; upper south-west slopes of Vogelklip, common from base to summit, 5917.

Little Namaqualand: Middle slopes of the Rattel Poort Mountain, bush (leafless) 3-5 ft. high, exuding gum known as "Hottentot Glue," 2975.

DISTRIBUTION.—Previously known only from Clanwilliam and Calvinia Divisions.

11. *O. perfoliata*, Jacq. Hort. Schoenb. ii. 61, t. 240.

*Doria perfoliata*, Thunb. Fl. Cap. ed. Schult. 663.

Cape: Oliphant's River Mountains; top of mountains behind Baths, semi-succulent, 6966.

Khamiesberg: Among bushes at head of Khoms Ravine, 6717.

DISTRIBUTION.—Western and extreme South-western Districts.

12. *Othonna divaricata*, Hutchinson, sp. nov. (fig. 14); affinis *P. arborescenti*, Linn., sed minus carnosa, pedunculis multo brevioribus differt.

*Frutex* divaricatus, 1-1.25 m. altus; ramuli subdichotome furcati, breves, foliati, parce cano-pubescentes. *Folia* ambitu oblanceolata, ad basin sensim angustata, parce pinnatifida, apice triangularia, 2-4 cm. longa, 0.7-1.3 cm. lata, subcarnosa vel coriacea, lobulis lateralibus ovato-triangularibus acutis vel subacutis circiter 3 mm. longis et 2 mm. latis, utrinque glabra, 1-nervia. *Capitula* axillaria, solitaria, breviter pedunculata, turbinata, discoidea, 1 cm. longa et lata; pedunculi vix 1 cm. longi, satis graciles, glabri. *Involucri* bractee circiter 6, infra medium liberae, ovato-lanceolatae, subacutae, 0.8 cm. longae, 3 mm. latae, glabrae, margine membranaceae. *Pappus* florum radii albus, corollae fere aequilongus, barbellatus, florum disci minus copiosus et

brevior. *Corolla* 4 mm. longa, glabra. *Achaenia* radii 1 mm. longa glabra, *disci* linearia, 2 mm. longa.

Khamiesberg: Twee Rivieren, 500 ft. above settlement facing west, spreading bush 3–5 ft., not common, fls. scarce, *Pearson*, 6829.

13. *Othonna euphorbioides*, Hutchinson, sp. nov. (fig. 15); species insignis habitu *Euphorbiae*, foliis multo reductis, pedunculis bifurcatis demum spinescentibus valde distincta.

*Caules* robusti, crassi, breves, duri, pedunculis bifurcatis persistentibus spinosi, cortice laeve glabro obtecti. *Folia* reducta, pauca,

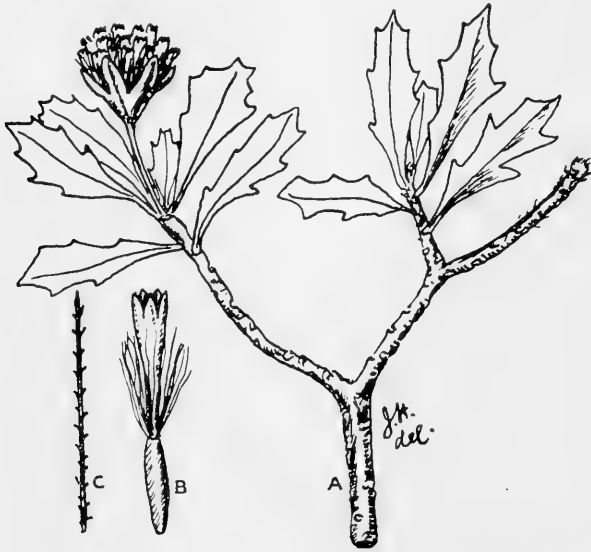


FIG. 14.—*Othonna divaricata*, Hutchinson, n. sp. A, flowering shoot, nat. size; B, flower; C, pappus bristle, both enlarged.

circum bases pedunculorum subverticillata, anguste oblanceolata, vel spatulato-oblanceolata, 1–1.3 cm. longa, 2–3 mm. lata, crassa et probabiliter carnosa, glabra, e pulvino cano-tomentoso orta. *Pedunculi* rigidi, superne plerumque bifurcati, ad 2.5 cm. longi, glabri. *Cavitula* minima, turbinato-campauulata, discoidea, circiter 5 mm. diametro. *Involucrum* 3 mm. longum, 5-lobatum, lobis ovato-triangularibus subacutis 1 mm. longis glabris. *Flores radii* breviter ligulati; corolla pappo brevior, apice bifida. *Achaenia* brevia, 1 mm. longa, crassa, glabra. *Pappus* copiosissimus, albus, plerumque 2.5 mm. longus, minute barbellatus. *Flores disci* steriles; corollae tubus 2 mm. longus, glaber; lobi oblongi, obtusi, 1 mm longi. *Achaenia* angusta,



elongata, glabra, 1.25 mm. longa. *Pappus* minus copiosus, ceterum ut in floribus radii.

Khamiesberg: In clefts of rocks, upper North-west slopes of Sneeuwkop, *Pearson & Pillans*, 5795; South-east slopes of Sneeuw-

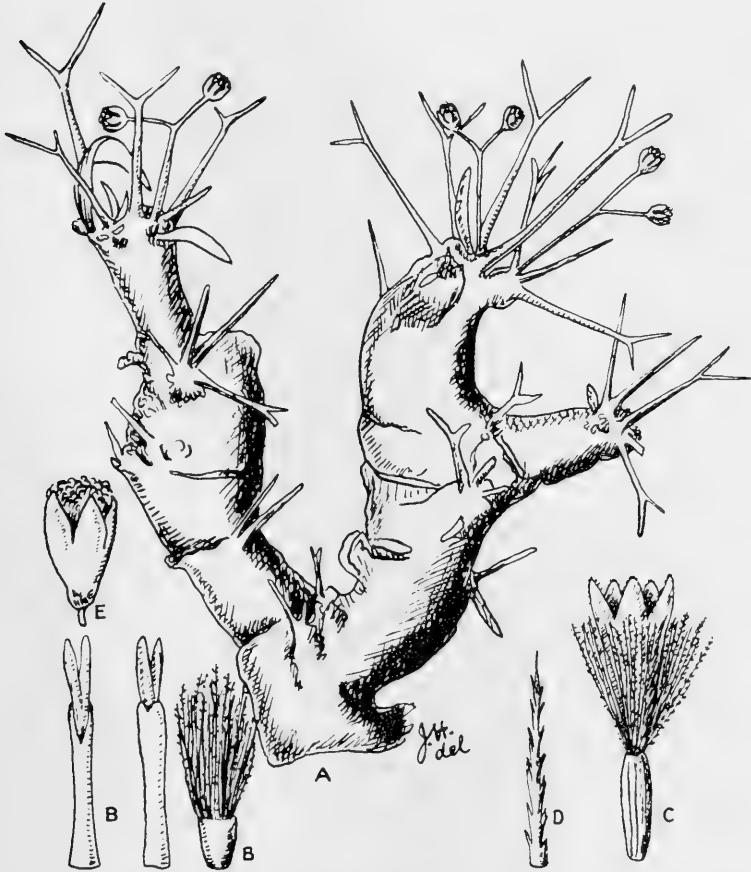


FIG. 15.—*Othonna euphorbioides*, Hutchinson, n. sp. A, flowering shoot, nat. size; B, female corollas and achene; C, male flower, and D, pappus seta of same; E, flower head,  $\times 4$ .

kop, above Modderfontein, rock crevices, *Pearson & Pillans*, 5858; cushion plant, 9 in. to 1 ft. high, in crevices of granite on Beacon Hill, North-west of Leliefontein, 5500 ft., *Pearson*, 6326.

This is a very remarkable species with the habit of a *Euphorbia*; the peduncles become indurated and spiny.

14. *Othonna papaveroides*, Hutchinson, sp. nov.; species caule basi dense arachnoideo-villoso, foliis radicalibus papaveriformibus distincta.

*Herbacea*, usque ad 35 cm. alta, basi dense arachnoideo-villosa. *Folia radicalia* pinnatisecta, usque ad 23 cm. longa, 6–8 cm. expansa, chartacea, glabra; rhachis plus minusve alatus, compressus; lobi utrinque 6–7, parce sinuato-lobati, lobulis minute mucronatis margine cartilagineis, tenuiter reticulati, usque ad 4 cm. longi et 3.5 cm. lati. *Scapus* solitarius, tricephalus; rami 3–6 cm. longi, glabri; bracteae late ovatae, circiter 5 mm. longae, intra dense intricato-villosae. *Capitula* subcampanulata, 1.3 cm. longa, circiter 2 cm. expansa. *Involucri bracteae* 8, lanceolatae vel oblongo-lanceolatae, 8–10 mm. longae, 3.5–4.5 mm. latae, carnosae, margine membranaceae, purpurascens, glabrae. *Flores radii* conspicui; achaenia cano-tomentosa; pappus amplus, 5–6 mm. longus, albescens; flores disci numerosi, steriles; achaenia elongata, striata, glabra; pappus depauperatus, 3 mm. longus; corollae tubus 4 mm. longus, glaber.

Cape: Giftberg, 1–2000 ft., *E. P. Phillips*, 7397, 7654.

#### DIMORPHOTHECA, VAILL.

1. *D. annua*, Less. Syn. 257.

Cape: Oliphant's River Mountains, 7712; near Toll, Pickenier's Pass, 5104; alluvial sand in Oliphant's River Valley, fls. yellow, 6951; sand flats between Driefontein and Heerenlogement.

Khamiesberg: Draaiklip, 6838.

DISTRIBUTION.—Western and Cape districts generally.

2. *D. nudicaulis*, DC. Prodr. vi. 71.

Cape: Oliphant's River Mountains; kloof below Baths, rays warm light brown outside, white inside, 6950.

DISTRIBUTION.—Western and south-western districts.

3. *D. cuneata*, Less. Syn. 257.

Khamiesberg: Khamsoap Ravine, round bush 2½ ft., rays yellow to yellowish-brown, 6540.

DISTRIBUTION: Chiefly Upper Region.

4. *D. polyptera*, DC. Prodr. vi. 73.

Bushmanland: Lower slopes East of Aus, 3000 ft., coarse bush 3–4 ft. 4718; Alewyn's Fontein, 2900 ft, 3328, 3338; without precise locality, 3440; 8 miles south-west of Bitterfontein, fls. yellow, 3865.

Little Namaqualand: Rattel Poort Mountain, straggling bush 4 ft. high, ray fls. yellow, 2968; veld between Klippalaat and a point about 10 miles to the north-east, 1600–1700 ft., 3306; sandy river-bed at Brakrivier, 1600 ft., fls. yellow, 3906; Modderfontein Pass (Richtersveld), 5992; TeAlee Mountains (Richtersveld), 6141.

DISTRIBUTION.—Also in Carnarvon Division.

5. *D. Dregei*, DC. Prodr. vi. 72.

Cape: Giftberg, 1–2000 ft., near stream, not common, fls. dirty white with a light purple streak on the outside of the ray-florets, 7421. Oliphant's River Mountains; top of mountains behind Baths, heads yellow, 6980.

DISTRIBUTION.—Clanwilliam.

6. *D. pinnata*, Harv. in Harv. et Sond. Fl. Cap. iii. 423.

Khamiesberg: Stinkfontein, ray fls. deep orange, purple at the base. disk yellow, 6568.

DISTRIBUTION.—Western districts.

7. *Dimorphotheca acutifolia*, Hutchinson, sp. nov.; affinis *D. aurantiaca*, DC., sed foliis acutis non scabrido-ciliatis differt.

*Herba* (annua ?) basi lignosa; caulis parce vel vix ramosus, usque ad 30 cm. longus, anguste alatus, glaber. *Folia* linearia, acuta, basi in caule decurrentia, 3·5–5 cm. longa, 2–4 mm. lata, parce denticulata vel integra, glabra, 1-nervia. *Capitula* solitaria, pedunculata, circiter 4 cm. expansa; pedunculus 3–4·5 cm. longus, nudus vel subnudus, apicem versus scabrido-puberulus. *Involuceri bractea*e circiter 12, 1-seriatae, lineari-lanceolatae, sensim et acute acuminatae, 1·2 cm. longae, 2·5 mm. latae, extra scabrido-puberulae, superne ciliatae, margine membranaceae. *Flores radii* 12, supra "flavi vel albi," infra rubro-brunnei vel virides; corollae tubus anguste cylindricus, 3 mm. longus, subvillosus; limbus 2–2·5 cm. longus, 6 mm. latus, 4-nervius, apice trifidus. *Achenia* matura non visa.

Cape: Giftberg, 1–2000 ft., locally frequent, bush 9–12 in. high, *Phillips*, 7434; alluvial sand of Oliphant's River Valley; ray fls. yellow with two green stripes down the back of each, *Stephens*, 6901; top of mountains behind Baths, ray fls. yellow inside, brown-striped outside, *Stephens*, 6952; same locality, ray fls. yellow, purple-veined outside, *Stephens*, 6957; heads white, reddish-brown below, *Stephens*, 6965.

8. *D. dentata*, Harv. in Harv. and Sond. Fl. Cap. iii. 423.

Cape: Giffberg, 1–2000 ft., shrubby, 9–12 in. high; fls. bright orange, 7425.

DISTRIBUTION.—Only known from Clanwilliam.

#### TRIPTERIS, LESS.

1. *T. glabrata*, Harv. in Harv. et Sond. Fl. Cap. iii. 425.

Bushmanland: Upper mountain slopes at Kweekfontein, 3700 ft., bush 4 ft., 3811.

DISTRIBUTION.—Clanwilliam, Van Rhyn's Dorp, and Little Namaqualand.

2. *T. sinuata*, DC. Prodr. vi. 456.

Little Namaqualand: Klipkalk, 6507; Vaarsche Rivier, dry stony hills, low bush  $\frac{1}{2}$ –1 ft., 6514.

Upper Region: Ravine at Loeriesfontein, 2500 ft., 4849 (also at Kopjeskraal).

Great Namaqualand: Stony places about 30 km. north of Raman's Drift, shrub 2 ft., fls. yellow, 4005.

DISTRIBUTION.—Little Namaqualand, Van Rhyn's Dorp, in the Upper Region (Carnarvon), and Karoo (Prince Albert and Willowmore).

3. *T. microcarpa*, Harv. in Harv. et Sond. Fl. Cap. iii. 427.

Cape: Common in dry river-bed South of Bakhuis, coarse herb 3–4 ft., 5443.

Bushmanland: Gneissic kopje 8 miles south or south-west of Bitterfontein, 3428.

Khamiesberg: Dry slopes of Khom's Ravine, ray yellow, with tinge of brown, 6482; Stinkfontein, common in sand, fls. yellow, 6569.

Little Namaqualand: Common among rocks in pass on south side of Klippalaat, coarse herb 5 ft. high, whole surface sticky, fls. yellow, 3286.

DISTRIBUTION.—Occurs also in Damaraland.

4. *T. clandestina*, Less. in Linnaea, v. 97.

Cape: Giffberg, 1–2000 ft., 7659.

Oliphant's River Mountains: Road to Modderfontein, 6954.

Khamiesberg: Sandy ground at Stinkfontein, rays yellow, dark-lined, 6570.

DISTRIBUTION.—A common weed in the Cape and western districts.

5. *T. petiolata*, DC. Prodr. vi. 457.

Cape: Oliphant's River Mountains, kloof below Baths, bush 2-3 ft. high, fls. yellow, 6963.

Khamiesberg: Khom's Ravine, dry slopes, 4500 ft., bush 2½ ft., 6481; Namaroep, diffuse bush, straggling over rocks and growing in large masses, fls. yellow, 6580.

DISTRIBUTION.—Malmesbury and Little Namaqualand.

6. *T. spinescens*, Harv. in Harv. et Sond. Fl. Cap. iii. 431.

Bushmanland: Sandy bed of DawEEP River at Rietfontein, bush 8-10 ft., fls. yellow, 6231.

DISTRIBUTION.—Murraysburg, Graaff Reinet, and Albert Divisions.

7. *T. karroica*, Bolus in Trans. S. Afr. Phil. Soc. xvi. 394.

Great Namaqualand: Crevices in kopje between Dabaigabis and Gründoorn, 4200 ft., aromatic bush, fls. yellow, 3157; Schakalskuppe, upper slopes, 5500 ft., bush 3-4 ft., 4232.

DISTRIBUTION.—Prince Albert Division.

8. *T. crassifolia*, O. Hoffm. in Engl. Bot. Jahrb. x. 280.

Great Namaqualand: Tschauchab, 4149; upper slopes of mountain north of Rotkuppe Station, bush 2 ft., fls. yellow, 4193; Rotkuppe 4464

DISTRIBUTION.—Collected at Angra Pequena by Schenck.

9. *Tripteris gracilis*, Hutchinson, sp. nov.; species ramulis gracilibus dense glanduloso-pubescentibus, foliis basi late auriculatis, capitulis minoribus distincta.

*Herba* 0.35 m. alta; *caulis* circiter 4 mm. crassus, glanduloso-pubescentibus; *ramuli* patuli, gracillimi, parce foliati, glanduloso-pubescentes. *Folia* alternata, oblanceolata, acuta, basi auriculata, circiter 4 cm. longa et 8 mm. lata, membranacea, crasse et parce dentata, utrinque pilis albis brevibus puberula; *nervi laterales* ascendentes, conspicui. *Capitula* parva, laxe racemosa; *pedunculi* basi bracteati, graciles, plerumque circiter 1 cm. longi, puberuli. *Involcri bractee* 1-seriatae, lineari-lanceolatae, acutae, dorso puberulae, marginibus latis hyalinis membranaceis, circiter 3.5 mm. longae. *Flores radii* flavi; *corollae* tubus brevis, villosus-pubescentibus; *limbus* 4-nerviis, circiter 0.5 mm. longus. *Styli rami* graciles, longe exserti; *achaenia* ambitu ellipsoidea, 3 mm. longa, complanata, marginibus membranaceis tripartita. *Flores disci*: *corollae* tubus inferne cylindricus, superne ampliatus et pubescens, 2.5 mm. longus; *lobi* acute lanceolati; *achaenia* abortiva.

Little Namaqualand: Deserted sheep kraal, Koets, *Pillans*, 5730; shade of rocks near stream on south side of pass between Bowesdorp and Grootgaas, *Pearson*, 5885.

Khamiesberg: Among grasses in river-bed on Khamiesberg Plateau at 3000 ft., *Pearson*, 6241.

10. *Triptervis nervosa*, Hutchinson, sp. nov.; affinis *T. amplexenti*, Harv., sed foliis basi haud auriculatis differt.

*Herba* circiter 0·7 m. alta; caulis simplex, crispato-puberulus. *Folia* obovato-oblongata, subacuta, basi cuneato-attenuata, 5–7 cm. longa, 2–2·5 cm. lata, subchartacea, crasse repando-dentata, prominenter trinervia, nervis parallelis, infra et margine puberula. *Capitula* laxa paniculata; pedunculi graciles, ad 2 cm. longi, tomentelli. *Involucri bracteae* 1–2-seriatae, lineares, acutae, 4–5 mm. longae, extra puberulae. *Flores radii* circiter 12, 1 cm. longi, flavi. *Flores disci* numerosi, glabri. *Achaenia radii* ambitu obovoidea, 1·5 cm. longa, latissime triangularata, glabra.

Great Namaqualand: Kopje 12 km. west from Sandverhaar, 3600 ft., fls. yellow, *Pearson*, 4614; among quartzite blocks, Akam River Basin, *Pearson*, 4751.

11. *Triptervis microtis*, Hutchinson, sp. nov.; affinis *T. microcarpae*, Harv., sed caulibus glabris, foliis non glandulosis, pedunculis longioribus differt.

*Suffrutex*; caulis sublignosus, sulcatus, glaber, superne parce ramosus. *Folia* ambitu oblanceolata, obtusa, ad basin in petiolum sensim attenuata, 4–6 cm. longa, 0·5–1·5 cm. lata, crasse repando-lobulata vel dentata, dentibus lanceolatis obtusis, glabra, prominenter trinervia. *Capitula* laxa corymbosa, pedunculata; pedunculi graciles, usque ad 3 cm. longi, parce puberuli. *Involucri bracteae* 2–3-seriatae, lineares, acute acuminatae, glabrae, marginibus anguste membranaceae, ad 4 mm. longae. *Flores radii* parvi. *Achaenia radii* triangularia, anguste vel vix alata, glabra, circiter 5 mm. longa.

Little Namaqualand: With *Arundo* at edge of pools at Brakwater, *Pearson*, 6073.

Identical with a plant distributed by Drège as “*T?* *microtis*” without definite locality.

#### OSTEOSPERMUM, L.

1. *O. moniliferum*, Linn. Sp. Pl. 1308.

Khamiesberg: Upper slopes of Zuurberg (Anegas), bush 4 ft., 6250; Wilgehout Ravine, common near top, bush 5 ft. high, 6798; near summit of Vogelklip, bush 3–4 ft., 5926.

Little Namaqualand: Plateau on south side of ridge opposite Klipfontein, bush 3 ft. high, 5954.

DISTRIBUTION.—Throughout the Colony, and in Tropical East Africa and the Zambesi Basin.

2. *O. coriaceum*, DC. Prodr. vi. 461.

Cape: Oliphant's River Mountains, top of mountain behind Baths, heads yellow, 7007.

DISTRIBUTION.—Tulbagh, Worcester, Knysna to Albany.

3. *O. muricatum*, E. Mey. ex DC. Prodr. vi. 464.

Bushmanland: Aggenys, sandy river-bed, bush 1 ft., 2938.

Great Namaqualand: Buchholzbrunn, conglomerate on river-bank, bush 1-1½ ft., fls. yellow, 3666.

DISTRIBUTION.—Upper Region and in Natal and Tropical Africa.

4. *O. subauritum*, DC. Prodr. vi. 464.

Cape: Giffberg, 1-2000 ft., fls. yellow, 7399.

DISTRIBUTION.—Paarl, Tulbagh, and Clanwilliam.

5. *O. plebium*, DC. Prodr. vi. 464.

Cape: Near top of Nardouw Kloof, western slopes, bush 2-3 ft., 5418.

DISTRIBUTION.—Only collected once previously by Drège on the Blauberg and Honig Valley, Clanwilliam; evidently a very rare species.

6. *O. polygaloides*, Linn. Mantissa, 480.

Cape: Oliphant's River Mountains, tops of mountains behind Baths, heads yellow, 7006.

DISTRIBUTION.—Cape Division to Riversdale.

#### URSINIA, GAERTN.

1. *U. anthemoides*, Gaertn. Fruct. ii. 463.

Cape: Giffberg, 1-2000 ft., frequent, ray fls. yellow, darker below, 7446.

Khamiesberg: Khamsoap Ravine, ray fls., yellow above, reddish beneath, 6544; wet ground at foot of Wilgehout Ravine, rays orange, 6804; near summit of Sneeuwkop, western side, 5772.

DISTRIBUTION.—Western and south-western districts generally.

2. *U. sericea*, N. E. Br. in Gard. Chron. 1887, i. 670.

*Sphenogyne sericea*, Less. Syn. 243; Harv. in Harv. et Sond. Fl. Cap. iii. 141.

Cape: Upper south-west slopes above Pickenier's Pass, foliage strongly scented, ray and disk fls. yellow, 5134.

DISTRIBUTION.—Piquetberg and Tulbagh.

3. *U. versicolor*, N. E. Br. in Gard. Chron. 1867, i. 670.

*Sphenogyne versicolor*, DC. Prodr. v. 681; Harv. in Harv. et Sond. Fl. Cap. iii. 139, sub *anthemoides*.

Khamiesberg: Upper western slopes of Sneeuwkop, 5778.

DISTRIBUTION.—Evidently endemic to Khamiesberg.

4. *U. calendulaeflora*, Benth. et Hook. f. Gen. Pl. ii. 456.

*Sphenogyne calendulaeflora*, DC. Prodr. v. 682; Harv. in Harv. et Sond. Fl. Cap. iii. 139.

Khamiesberg: Bitterfontein. ray fls. orange, 6559; Twee Rivieren, 6786.

DISTRIBUTION.—Also in Little Namaqualand.

5. *U. discolor*, N. E. Br. in Gard. Chron. 1887, 670

*Sphenogyne discolor*, Less. Syn. 243; Harv. in Harv. et Sond. Fl. Cap. iii. 145.

Cape: Mountain tops at Hottentot's Kloof, 4927.

DISTRIBUTION.—Caledon, Swellendam and Riversdale.

6. *U. chrysanthemoides*, Harv. in Harv. et Sond. Fl. Cap. iii. 152.

Cape: Oliphant's River Mountains; foot of mountain near Baths, ray-fls. cream, faint purple below, 6989.

DISTRIBUTION.—Colony generally.

7. *U. annua*, Less. Syn. 245.

Cape: Oliphant's River Mountains; foot of mountains near Baths, heads white, 6973.

Little Namaqualand: Cornfield weed, Klipfontein, 5958.

Upper Region: River bank at Loeriesfontein, 2800 ft., 4846.

Great Namaqualand: Sandy plain north of Schakalskuppe Station, 4225.

DISTRIBUTION.—Colony generally.



8. *U. paleacea*, Moench. Meth. 908.

*Sphenogyne paleacea*, Less. Harv. in Harv. et Sond. Fl. Cap. iii. 146.

Cape: In sand on plateau on summit of Nardouw Mountains, bush 2-3 ft., 5429.

DISTRIBUTION.—Western districts.

9. *U. cakilaefolia*, DC. Prodr. vi. 690.

Cape: Giftberg, 1-2000 ft., 7428.

Khamiesberg; Eenkoker, rays orange, 6742.

DISTRIBUTION.—Collected previously by Drège on the Giftberg.

#### CRYPTOSTEMMA, R. BR.

1. *C. calendulaceum*, R. Br. in Ait. Hort. Kew. ed. ii. v. 141.

Cape: Oliphant's River Mountains; foot of mountain near Baths, heads yellow, 6960.

Khamiesberg; Draaiklip, 6607.

DISTRIBUTION.—General in the Colony; frequently cultivated in many countries.

#### ARCTOTIS, LINN.

1. *A. acaulis*, Linn. Sp. Pl. ed. ii. 1306.

Cape: Giftberg, 1-2000 ft., frequent, ray-fls. yellow, reddish beneath, 7652.

DISTRIBUTION.—Widely spread in the South and South-west.

2. *A. bellidifolia*, Berg. Cap. 318.

Cape: In sand between Windhoek and Attis, viscid bush, 5380.

DISTRIBUTION.—Extreme south-western districts.

3. *A. laevis*, Thunb. Fl. Cap. ed. Schult. 708.

Cape: South aspect of hills between Hex River and outspan of November 26th, 5268.

Bushmanland: A few miles east of Nieuwfontein, gneissic kopje, bush 3 ft., fls. yellow, 3494.

Little Namaqualand: Crevices in Klipplaat Rock, 1600 ft., coarse herb 3-4 ft., fls. yellow, 3858.

Khamiesberg: South-eastern slopes of Sneeuwkop, above Modderfontein, 5879.

DISTRIBUTION.—Western districts.

4. *A. arborescens*, Jacq. Hort. Schoenb. ii. 23.

Cape: Oliphant's River Mountains, side of mountain behind Baths,  $1\frac{1}{2}$  ft., fls. vieux rose, 6878; 6977; foothills of Cold Bokkeveld, opposite Baths, heads purplish red, 6998.

DISTRIBUTION.—Uncertain.

5. *A. revoluta*, Jacq. Hort. Schoenb. ii. 24.

Khamiesberg: Roadside between Arkoep and Mesklip, 5914; middle south-eastern slopes of Zuurberg (Anegas), bush 2 ft., 6262.

DISTRIBUTION.—Uncertain.

6. *Arctotis Stephensae*, Hutchinson, sp. nov.; affinis *A. stoechadiifoliae*, Berg., sed fere acaulis, pedunculis brevioribus, foliis undulatis nec lobatis differt.

*Caulis* brevissimus, apice dense foliatus. *Folia* spathulato-obovata, apice rotundata, basin versus in petiolum alatum attenuata, 4–9 cm. longa, 1–3 cm. lata, obscure repando-denticulata, coriacea, utrinque dense albo-lanata, vix nervosa. *Pedunculus* breviter scapigerus, 3·5 cm. longus, adpresse lanatus. *Capitulum* circiter 4 cm. expansum. *Involucrum* late campanulatum, 1·8 cm. longum; bractee circiter 5-seriatae, exteriores lineares, acutae, 6–8 mm. longae, albo-lanatae, intermediae ovatae, acuminatae, interiores late oblongae, apice rotundatae, extra puberulae, superne membranaceae. *Flores radii flavi*, circiter 1·5 cm. longi; corollae tubus glaber, 3 mm. longus; limbus 1·2 cm. longus, 2·5–3 mm. latus, striatus; achaenia dense et longe villosa; pappi squamae oblongo-obovatae, 4 mm. longae, membranaceae, glabrae. *Flores disci* numerosi; achaenia pappusque ut in floribus radii sed multo minor.

Cape: Oliphant's River Mountains; road to Modderfontein, fls. yellow, *Stephens*, 6990

7. *A. namaquana*, Schltr.

Khamiesberg: Summit of pass between Garies and Middelkraal, bush  $2\frac{1}{2}$  ft., 5612; upper middle northern slopes, Reitkloof Mountain, 5697.

DISTRIBUTION.—As above

8. *A. sp.*

Cape: Giftberg, 1–2000 ft., 7404; low creeping herb, ray fls. bright yellow, reddish outside, 7633.

I have hesitated to describe this species until the genus *Arctotis* is thoroughly revised, a work which is much needed.

VENIDIUM, LESS.

1. *V. Wylei*, Harv. in Harv. & Sond. Fl. Cap. iii. 463.

Little Namaqualand: Sandy ground near foot of pass leading to Rietkloof, coarse spreading herb, 5679; cornfield weed at Klipfontein, 5959; sand by roadside between Anenous and Chubiessis outspan (Richtersveld), 5977; Vaarsche River, rays orange, 6777.

Khamiesberg: Bitterfontein, 6558.

DISTRIBUTION.—Western Region and extreme western Karroo.

Seems to be a variable species.

2. *V. semipapposum*, DC. Prodr. vi. 491.

Cape: Damp ground along Oliphant's River, straggling herb, 5256.

DISTRIBUTION.—Worcester, Tulbagh and Ceres, and (accord. to Harv.) neighbouring Divisions.

GORTERIA, GAERTN.

1. *G. calendulacea*, DC. Prodr. vi, 501.

Khamiesberg: Namaroep, common on slopes under bushes, branches prostrate, ray double, orange with a dark greenish velvety "eye," 6606.

DISTRIBUTION.—Recorded from Table Mountain by Drège.

2. *G. personata*, Linn. Sp. Pl. 1283.

Cape: Giftberg, not common, 1–2000 ft., fls. yellow with dark centre, 7408; sand flats between Driefontein and Heerenlogement, 6781; foot of Oliphant's River Mountains near Baths, fls. yellowish black, 6991.

DISTRIBUTION.—Cape districts and Mossel Bay.

3. *G. diffusa*, Thunb. Fl. Cap. ed. Schult. 697.

Khamiesberg: Brakdam, common,  $\frac{1}{2}$ –2 ft., rays deep orange above, black at the base, disk yellow, 6484; under rocks in damp places on Beacon Hill 2, 6690.

Bushmanland: Eenriet, lower rocky slopes, 3092.

Little Namaqualand: Klipfontein, prostrate cornfield weed, 5960.

DISTRIBUTION.—Southward to the districts around Cape Division.

4. *G. corymbosa*, DC. Prodr. vi. 501.

Bushmanland: Broken ground west of Pella Mountains, 2–4 in., 3550.

Great Namaqualand: Among quartzite blocks near Dabaigabis, ray fls. yellow, 4403.

DISTRIBUTION.—Also in Little Namaqualand.

## GAZANIA, GAERTN.

1. *G. othonnites*, Less. Syn. Comp. 45.

Little Namaqualand: Forming tufts in sand of river-bed a little south of Tweefontein, 2500 ft., 3773.

Upper Region: Karieboemfontein, forming "turf" in dry ground near water-furrow, 4987.

DISTRIBUTION.—Previously known from Piquetberg, Calvinia, and Little Namaqualand.

2. *G. pinnata*, Less. Syn. Comp. 43.

Cape: Giftberg, 1–2000 ft., 7437A; ray fls. orange with brown "eye-spots," "eye" black at base with two white spots above, 7658.

DISTRIBUTION.—Western districts.

3. *G. serrata*, DC. Prodr. vi. 510.

*G. pinnata*, Less., var. *serrata*, Harv. in Harv. et Sond. Fl. Cap. iii. 476.

Cape: Giftberg, 1–2000 ft., common, fls. reddish, 7437; Oliphant's River Mountains; Top of mountains behind Baths, fls. orange, 6852; foot of mountains near Baths, 6970, 7706.

DISTRIBUTION.—The above match exactly Drège's type collected in the Drakenstein Mountains, Paarl Division, and later by Rehmann.

4. *G. Lichtensteinii*, Less. Syn. Comp. 50.

Great Namaqualand: In dry sand a little north of Ganus, 3000–3200 ft., fls. yellow, 4498.

DISTRIBUTION.—Western districts.

## HIRPICIUM, CASS.

1. *H. echinulatum*, Cass. in Bull. Soc. Philom. 1820, 27.

Little Namaqualand: Near the base of Rattelpoort Mountain, bush 6 in. high, 2980; sandy flat at Alewyn's Fontein, shrub 6–12 in. high, 3344; common on sandy slopes, Alewyn's Fontein, fls. yellow, 3327; gneissic kopje at Klipplaat, 1600 ft., 3856.

Bushmanland: Granite kopjes a few miles east of Nieuwefontein, shrub 9–12 in. high, fls. yellow, 3416; Nieuwefontein, 2700 ft., on veld, fls. yellow, 3330, 3311.

Upper Region: Loeriesfontein, lower slopes, 3000 ft., bush 1 ft. high, fls. yellow, 4862.

DISTRIBUTION.—Also in Van Rhy'n's Dorp.

CULLUMIA, R. BR.

1. *C. bisulca*, Less. Syn. Comp. 82.

Cape: Bush 1 ft. high, on hilltops at Hottentot's Kloof, February, 4924; Giftberg, near streams at 1-2000 ft., bush 2-3 ft. high, fls yellow, 7432.

DISTRIBUTION.—Clanwilliam, through by Ceres to Caledon and Riversdale.

2. *C. ciliaris*, R. Br., var. *angustifolia*, Hutchinson, var. nov., a typo foliis angustioribus minus imbricatis differt.

Cape: Elephant's River Mountains, kloof behind Baths, *Stephens*, 7011.

There seems to be little difference between this plant and the typical form, which occurs in the districts around Cape Town, except that it has somewhat narrower and less closely imbricate leaves.

3. *C. rigida*, DC. Prodr. vi. 500.

Khamiesberg: Lower and middle slopes of Sneeuwkop, December, 5798; bush  $2\frac{1}{2}$ - $3\frac{1}{2}$  ft., growing with *Erica* and *Muraltia*, abundant in ravine near summit of Vogelklip, facing south-west, December, 5908; dry hill slopes, rays yellow, Groenekloof, September, 6526; straggly bush  $2\frac{1}{2}$  ft., upper slopes of Zuurberg (*Anegas*), 6260.

These are the first collections of this species since its discovery.

BERKHEYA, EHRB.

1. *B. carthamoides*, Willd. Sp. Pl. iii. 2274.

Cape: Upper south-west slopes above Pickenier's Pass, 5210.

DISTRIBUTION.—Cape and western districts generally.

2. *B. canescens*, DC. Prodr. vi. 507.

Little Namaqualand: ?Klipplaat, 1600 ft., 5024.

DISTRIBUTION.—Western districts.

3. *B. corymbosa*, DC. Prodr. vi. 507.

Bushmanland: Mountain slopes at Kweekfontein, 3300 ft., bush 3-7 ft., 3818.

Little Namaqualand: Common at Klipplaat, 1600 ft., bush 4 ft., 3861.

DISTRIBUTION.—Western districts.

4. *B. annectens*, Harv. in Harv. et Sond. Fl. Cap. iii. 509.

Bushmanland: Near outspan about 8 miles south-west of Bitterfontein, near abandoned cultivation, 3864.

Great Namaqualand: Saltflats between 25 km. north of Warmbad and next outspan, 4100. Without locality, 3670.

DISTRIBUTION.—Western districts.

5. *B. viscosa*.

*Stobaea viscosa*, DC. Prodr. vi. 517; Harv. in Harv. et Sond. Fl. Cap. iii. 497.

Little Namaqualand: Edge of cornlands, Brakdam, 5595.

Cape: Clanwilliam; sandbanks in river-bed below Kradouw Krantz, bush 5 ft. high, 5375.

DISTRIBUTION.—Only once previously collected by Drège in the Blaauberg, Clanwilliam.

6. *B. oppositifolia*.

*Stobaea oppositifolia*, DC. Prodr. vi. 517; Harv. in Harv. et Sond. Fl. Cap. iii. 497.

Khamiesberg: Twee Rivieren, hills east of hamlet, 6597.

Little Namaqualand: Alewyns Fontein, foot of kopje, among boulders, fls. yellow, 3315.

DISTRIBUTION.—Western districts.

7. *Berkheya Schinzii*, O. Hoffm., MSS.

Cape: Roadside between Hottentot's Kloof and Karoo Poort, 4824.

Upper Region: Lower slopes of Hantam Berg between Calvinia and Holle River, 3965.

DISTRIBUTION.—Western districts.

8. *Berkheya excelsa*, Hutchinson, sp. nov. (fig. 16); affinis *B. onobromoidei* (DC.), sed foliis caulinis angustioribus glabris, foliis bracteatis lanceolatis (nec late ovatis), involucri bracteis angustioribus differt.

*Planta excelsa*, usque ad 2 m. alta; caulis inferne circiter 1 cm. crassus, dense sulcatus, internodiis 4–5 cm. longis, glaber. *Folia* caulina ambitu linearia, 7–15 cm. longa, 3–4 cm. lata, coriacea, dense crasse spinoso-lobata, spinis 1 cm. longis, utrinque glabra, lobulis spinulosis, spinulis 2 mm. longis; costa basi latissima, 5 mm. lata, supra plana, infra paulum elevata. *Capitula* discoidea, paniculata, breviter pedunculata, circiter 3 cm. expansa; pedunculus 1.5–2 cm. longus, 1.5 mm. crassus. *Involucri bractee* circiter 5-seriatae, lanceolatae, spinoso-acuminatae, usque ad 1.5 cm. longae, spinuloso-marginatae,

minute puberulae. Flores numerosi; corollae tubus breviter et parce pubescens; lobi lineares, glabri. *Archaenia* anguste turbinata, 3.5 mm.

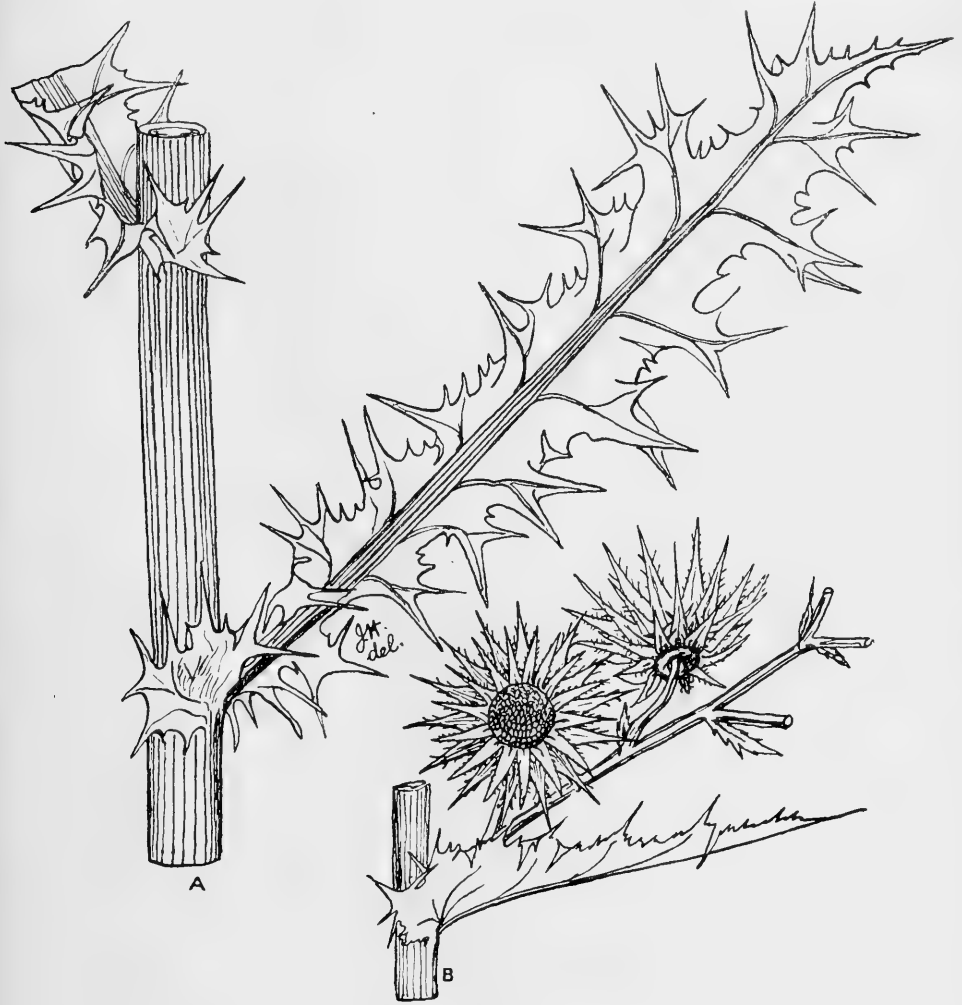


FIG. 16.—*Berkheya excelsa*, Hutchinson, n.sp. A, portion of stem showing alternate auriculate leaves, nat. size; B, portion of inflorescence, nat. size.

longa, costata, brevissime pubescentia. Pappi setae inaequales, oblongae, obtusae, alternae lineari-subulatae, 1 mm. longae.

Upper Region: Banks of Holle River, 2700 ft., 6 ft. high, Pearson, 3979.

9. *Berkheya Tysoni*, Hutchinson, sp. nov. ; species fruticosa, caulibus lignosis dense piloso-tomentosis, foliis semiamplexicaulibus glanduloso-puberulis distincta.

*Frutex* robustus, ramosus ; rami et ramuli dense piloso-tomentosi, teretes, dense foliati. *Folia* alterna, sessilia, semiamplexicaulia, oblongo-oblancoolata, spinoso-acuminata, ad basin paulum attenuata, 4-8 cm. longa, 2-4 cm. lata, spinoso-pinnatifida vel pinnatilobulata, spinis usque ad 8 mm. longis, utrinque subglanduloso-puberula ; costa supra plana, infra prominens, basi lata ; nervi laterales utrinsecus 6-7, a costa media sub angulo 45-70° abeuntes, ramosi ; venae utrinque prominentes. *Capitula* pauca, solitaria, terminalia vel ramulos terminata, usque ad 4.5 cm. diametro. *Involucri bractee* 6-7-seriatae, lanceolatae, spinoso-acuminatae, 1-2 cm. longae, spinoso-dentatae, coriaceae, utrinque puberulae. *Flores radii* circiter 2 cm. longi ; corollae tubus 4 mm. longus, extra pubescens ; achaenia abortiva 1 mm. longa, pubescentia ; pappus 1 mm. longus. *Flores disci* numerosissimi ; corollae tubus 6 mm. longus, parce pubescens ; lobi 5, oblongo-lineares, obtusi, glabri. *Achaemia* subcylindrica, adpresse pubescentia, 1.5 mm. longa. *Pajpi setae* subulatae, inaequales, usque ad 2 mm. longae.

Cape : Kradouw Krantz, first plateau facing West, on sides of large sandstone block, fls. yellow, *Pearson*, 5281 [Hex River Valley, in fissures of the rocks, 2000 ft., January, *Tyson*, 772 ; 759].

#### BERKHEYOPSIS, O. HOFFM.

1. *B. gorterioides*, Hutchinson, comb. nov.

*Berkheya gorterioides*, Oliv. et Hiern in Oliv. Fl. Trop. Afr. iii. 429.

*Berkheyopsis Pechuelii*, O. Hoffm. in Bolet. Soc. Brot. x. 181.

Great Namaqualand : Among quartzite in Akam river bed, rays yellow, 4750.

DISTRIBUTION.—Occurs also in Ngamiland.

#### DIDELTA, L'HERIT.

1. *D. spinosum*, Ait. Hort. Kew. iii. 256.

Little Namaqualand : Common on sandy road between Nieuwe Rust and Brakdam, bush 4-6 ft. ; leaves a little succulent ; fls. yellow, September, 6571.

DISTRIBUTION.—Western districts and Clanwilliam.



2. *D. carnosum*, Ait. l. c. 256.

Little Namaqualand: Brakrivier, banks of water furrow, 1600 ft., December, 4867. Bushmanland: North-east of Klipplaat, on veldt near Gneissic kopje, 3431.

Cape: Attis-River bel, 5382.

DISTRIBUTION.—Little Namaqualand to Saldanha Bay.

3. *D. tomentosum*, Less. Syn. 61.

Little Namaqualand: Dry river bed below Modderfontein Pass (Richtersveld), December, 5996.

DISTRIBUTION.—Also collected at Angra Pequena.

DICOMA, Cass.

1. *D. capensis*, Less. in Linnaea, v. 277.

Karoo: Prostrate in sand of river-bed at Draaikraal, 1700 ft., 4996.

Bushmanland: On red sand near outspan, 8 miles south-west or west of Bitterfontein, small plant 1 in. high, 3312; sandy valley leading down to Raman's Drift, branches prostrate, involucrel bracts green with white tips, 4698.

Little Namaqualand: Sandy slopes at Kamabies, 3000 ft., 3779; in sand, Rietfontein to O'okiep, 3460.

Great Namaqualand: About 20 km. north of Raman's Drift, 4045; sandstone at Sandverhaar, 3100 ft., 4684.

DISTRIBUTION.—Western districts and Kalahari region.

PERDICCIUM, Lag.

1. *Perdicium Taraxaci*, Vahl., in Skrivt. Nat. Hist. Selsk. i. ii. 9.

Cape: Oliphant's River Mountains; foothills of Cold Bokkeveld opposite Baths, heads white, 6997.

DISTRIBUTION.—Paarl, Malmesbury, and Clanwilliam and (according to Harvey) Stellenbosch.

2. *P. leiocarpum*, DC. Prodr. vii. 39.

Cape: Gifberg, in sandy places, 7423.

DISTRIBUTION.—Previously collected only by Drège between Pedros Kloof and Leliefontein, Little Namaqualand.

The indumentum on the lower surface of the leaves appears to be very deciduous, and cannot be regarded as a reliable distinguishing

feature separating this species from *P. taraxaci*, Vahl, the only other representative of the genus. The two may be readily separated by the nature of the achenes, these being quite smooth and tapering in *P. leiocarpum*, and densely puberulous and short in *P. Taraxaci*.

SONCHUS, L.

1. *S. oleraceus*, Linn. Sp. Pl. 1116.

Damaraland: North of the Swakop River, 3369.

DISTRIBUTION,—A cosmopolitan weed.

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17.—*A Revision of the South African Material of the Genus Cyphia*,  
Berg.—By E. P. PHILLIPS, M.A., D.Sc., F.L.S., Assistant.

THE genus *Cyphia* was founded by Bergius on the species *C. bulbosa*, of which a good figure is given in Burman's Pl. Afric. t. 38, fig. 2. Since then many species have been described and the genus monographed, the last important monograph being Sonder's in Harvey and Sonder, "Flora Capensis," vol. iii. The key to the species in the "Flora Capensis" and the descriptions of the species appeared to be such as to warrant a revision of the material, and with this end in view I undertook to examine the South African species. My thanks are due to Mrs. F. Bolus, B.A., of the Bolus Herbarium, South African College, Cape Town, and to Dr. S. Schönland, of the Albany Museum, Grahamstown, who kindly allowed me to examine the species in their respective collections. This, together with the material in the South African Museum Herbarium, has formed the basis of the revision. Owing to the difficulty of referring to all the literature, the synonymy is necessarily incomplete; the lack of types has not been so serious an obstacle as most of Zeyher's and Ecklon and Zeyher's specimens are in our collection.

The genus may be separated into two more or less distinct groups on the habit of the plants, *i. e.* whether erect or twining, but this character is not always constant as, *e. g.*, *C. assimilis* may be either erect or a twiner. Leaf characters, which proved useful in arranging the species into groups, did not lend themselves to separating the species, as, for example, in the natural group of closely allied species *triphylla*, *digitata*, *volubilis*, and *sylvatica*. The hairiness or otherwise of the anthers, which Sonder used to separate *assimilis* from *persicifolia*, is an unstable character, as sometimes in the same plant the anthers may be either glabrous or hairy.

The species of *Cyphia* are well distributed along the coastal belt from Clanwilliam to Natal. Some of the species do not extend beyond

Riversdale, and others not further south than Komgha, while some, again, pass from the South-western Region into the South-eastern Region. They are comparatively few in the Karroo, and those species which do occur there are species with a wide range of distribution, *e.g.* *volubilis*, *sylvatica*, *assimilis*. Only one species, *viz.* *assimilis*, occurs in the Kalahari proper, the others which are included under the "Kalahari Region" in the geography, are found on the higher parts of the Transvaal bordering the Drakensbergen. In the Houtbosch and Barberton areas six species are known to occur, four of which are also represented in the Eastern Region, such as Natal, East Griqualand, Pondoland, Tembuland, and the Transkei, one species is endemic (*C. transvaalensis*), and one is widely distributed (*viz.* *C. assimilis*). The latter species is the only one common to the typical Kalahari Region and the above areas. These few facts while not of much importance when considered by themselves, yet go to swell the evidence that Barberton, Houtbosch, in fact the whole of the mountainous part of Lydenburg and Zoutpansberg Districts in the Eastern Transvaal should not be included in the Kalahari Region, but have a greater affinity with the Eastern Region.

#### CYPHIA, Berg.

*Flowers* hermaphrodite. *Calyx-tube* adnate to the ovary, turbinate or campanulate, very rarely almost obsolete, glabrous, rarely hairy; lobes ovate to linear, entire, sometimes toothed, rarely pectinate. *Corolla* bi-labiate, tubular or segments free to the base, usually glabrous, very rarely hairy; corolla-tube rarely cylindric; lobes linear or lanceolate, acute or obtuse, sometimes acuminate. *Stamens* more than, or less than, half as long as the corolla; filaments either free to the base or sometimes slightly monadelphous at the base, terete or linear, usually widened below, usually hairy; anthers cohering round the style, usually pilose and bearded, sometimes glabrous. *Ovary* half-inferior, 2-locular, many ovuled; style passing gradually into the ovary, rarely almost obsolete; stigma capitate, terminal or oblique. *Fruit* partly enclosed by the persistent calyx-tube, many seeded.

Herbaceous perennials, often with tuberous roots. Stems erect or twining, leaves cauline or more rarely wholly radical, alternate, entire or divided, with margins serrated, toothed, crenate or entire, varying from linear to broadly ovate. Inflorescence lax, rarely very dense, either a distinct raceme at the end of the stem or the flowers arranged in a racemose manner in the axils of the upper leaves, rarely the inflorescence in 2-4-flowered umbels in the axils of the leaves. Bracts

various, from subulate to lanceolate, entire or divided, sometimes toothed, rarely pectinate; bracteoles 2, variously situated on the pedicels.

*Key to Species.*

- Stems erect, not evident twiners.
- Stem short; leaves radical; peduncles long and naked.
    - Leaves entire; calyx-lobes pectinate or toothed . . . . . 1. *Phyleuma*.
    - Leaves pinnatilobed, pinnatisect, or entire; calyx-lobes ciliate, not pectinate or toothed . . . . . 2. *incisa*.
  - Stems distinct; leaves cauline.
    - Leaves small, about 5 mm. long (rarely longer), subulate . . . . . 6. *linarioides*.
    - Leaves over 1 cm. long, not subulate.
      - Leaves elliptic or lanceolate, rarely linear; inflorescence a dense cylindric or oblong spike, if lax then the flowers either 2-3-nate or the whole plant densely pubescent . . . . . 4. *elata*.
      - Leaves linear or spathulate, rarely lanceolate, entire, rarely pinnatisect; inflorescence lax; flowers always solitary and plant never *densely* pubescent.
        - Leaves entire, linear or lanceolate; peduncles long, naked; bracts linear.
          - Peduncle, pedicels, and flowers pubescent.
            - Leaves pubescent; style almost obsolete, about 5 mm. long . . . . . 7. *Bolusii*.
            - Leaves glabrous; style distinct, about 3-5 mm. long . . . . . 8. *longifolia*.
          - Peduncle, pedicels, and flowers glabrous, rarely the pedicels scabro-pubescent . . . . . 9. *assimilis*.
        - Leaves entire, elliptic or spathulate; peduncles not long and naked; bracts oblong . . . . . 5. *oligotricha*.
        - Leaves palmatisect or pinnatisect, rarely serrated; peduncles long and naked; bracts 3-lobed . . . . . 3. *bulbosa*.
  - Plants twiners or scramblers, not erect.
    - Leaves simple, ovate or long-lanceolate, sometimes the uppermost leaves linear.
      - Plant with a long naked peduncle bearing the flowers.
        - Inflorescence over 20-flowered; stamens less than half as long as the corolla . . . . . 9. *assimilis*.
        - Inflorescence about 6-flowered; stamens more than half as long as the corolla . . . . . 8. *longifolia*, var. [ *Baurii*].
      - Flowers arranged up the stem in the axils of the leaves.
        - All the flowers solitary.
          - Leaves never closely crenate, not distinctly dark-veined beneath . . . . . 10. *heterophylla*.
          - Leaves closely crenate, distinctly dark-veined beneath . . . . . 11. *transvaalensis*.

- Flowers either all umbellate, or solitary and umbellate on the same plant.
- Calyx-lobes almost as long as the corolla, 3 times or more as long as the tube . . . . . 12. *corylifolia*.
- Calyx-lobes much shorter than the corolla, about half as long again as the tube.
- Corolla spotted with lilac . . . . . 13. *maculosa*.
- Corolla not spotted . . . . . 14. *natalensis*.
- Leaves simple or divided, linear, or leaf-lobes linear, rarely lanceolate or linear-lanceolate.
- Calyx-tube pubescent.
- Corolla albo-pubescent; stamens not half as long as the corolla.
- Corolla-lobes less than .5 cm. long; filaments flat, triangular-ovate . . . . . 15. *longiflora*.
- Corolla-lobes more than 1 cm. long; filaments terete . . . . . 16. *longilobata*.
- Corolla glabrous; stamens more than half as long as the corolla . . . . . 17. *Schlechteri*.
- Calyx-tube glabrous.
- Leaves digitately compound.
- Inflorescence distinctly marked off from the leafy stem; bracts subulate, sometimes 2-toothed at the base . . . . . 18. *triphylla*.
- Inflorescence not distinctly marked off from the leafy stem; bracts 3-5-lobed . . . . . 19. *digitata*.
- Leaves simple, very rarely digitately trifoliate; if so, then the stamens not half as long as the corolla, or the leaves 5-6 mm. broad.
- Stamens less than half as long as the corolla.
- Corolla regular, not bilabiate . . . . . 20. *zeyheriana*.
- Corolla bilabiate.
- Corolla-segments widened into a distinct limb wider than the claw; calyx-lobes broadly ovate, entire, very rarely toothed . . . . . 21. *volubilis*.
- Corolla-segments linear with the limb as broad as the claw; calyx-lobes ovate-linear 2-4-toothed at the base . . . . . 22. *Tysonii*.
- Stamens half as long or more than half as long as the corolla.
- Calyx-tube saucer-shaped (almost obsolete); lobes linear, obtuse . . . . . 23. *crenata*.
- Calyx-tube turbinate or campanulate, lobes ovate or sometimes ovate-linear, acuminate, acute.
- A more or less erect plant; leaves usually sessile . . . . . 24. *undulata*.
- A very evident twiner; leaves usually shortly petioled . . . . . 25. *sylvatica*.



1. *C. Phyteuma* (Willd., Spec. I, p. 953).

An acaulescent plant, 14–73 cm. high, with a globose root about 1.5 cm. in diameter. *Leaves* radical, 1.7–10 cm. long, .5–3.8 cm. broad, elliptic, oblong-elliptic, or oblanceolate, rounded or acute at the apex, attenuated at the base, distinctly veined beneath, glabrous or glandular-pubescent, with entire or undulating, rarely toothed margins. *Peduncles* 14–73 cm. long, terete, smooth or furrowed, bearing a few bracts, glabrous. *Inflorescence* racemose, 4–34 cm. long, bearing 3-many flowers. *Pedicels* about 1 mm. long. *Bracts* 3.5 mm. long, ovate-lanceolate, acute, distinctly veined, glabrous; bracteoles 2–3 cm. long, similar to the bracts. *Calyx-tube* 2–3 mm. long, turbinate or broadly campanulate, prominently ribbed, glabrous; lobes reflexed, 5.5–6 mm. long, ovate, acuminate, acute, with a prominent mid-rib and distinctly veined, with toothed or pectinate margins, glabrous. *Corolla* split to the base, composed of 2 long and 3 short segments; long segment 1.9 cm. long, 1.62 mm. broad, linear, broadened above, obtuse, with a distinct mid-rib and veining, glabrous; short segments 1.7 cm. long, otherwise similar to the longer. *Stamens* free or slightly cohering; filaments 4 mm. long, linear, villous; anthers 3 mm. long, linear, ciliate on the back. *Ovary* half-inferior; style 4–5 mm. long, .5 mm. in diameter, terete, glabrous; stigma oblique. *Fruit* half-inferior, ovoid, acuminate, enclosed in the lower half of the persistent calyx.

*Roem. and Schult., Syst., v, 476; Presl., in E. Mey. Comm. Pl., Drège, 292, in Eckl. and Zeyh. Enum., 388; A. DC. in DC., Prodr. VII, ii, 498; Sond., in Harv. and Sond., Fl. Cap. iii, 598; C. serrata, Spreng. Neue Entdeck., i, 274; Lobelia phyteuma, Linn., Sp. Pl., 1319; Thunb., Fl. Cap., 184.*

SOUTH-WESTERN REGION.—Piquetberg Division: Het Kruis, September, *Glover and Stephens in Percy Staden Memorial Expedition, 8746!*; Piquetberg Road Station, 350 ft., October, *Guthrie in Herb. Bolus, 13604!*; Piquetberg Mountains, 1–1500 ft., September, *Schlechter, 5205!* Malmesbury Division: Mooresberg, 500 ft., October, *Bolus!* Tulbagh Division: Near Ceres, 1500 ft., October, *Bolus, 8386!* Paarl Division: French Hoek, 1500 ft., October, *Phillips, 1203!* Cape Division: Table Mountain, October, *MacOwan, 2351!*; near Cape Town, October, *Bolus, 326!*; near the Wynberg Ranger's, October, *Wolley-Dod, 691!*; Lion's Head, September, *Zeyher!*; Green Point, October, *Pappe!* Caledon Division: Bot River, 700 ft., October, *Schlechter, 5522!*; damp plains at Houw Hoek, c. 500 ft., October, *MacOwan in Herb. Norm. Austro-Afric., 749!*; Buffelsjagrivier,

October, Zeyher, 3098!. Swellendam Division: Swellendam, October, Pappe!. Riversdale Division: Near Albertina, Muir in Herb. Bolus, 1127!; Riversdale, 700 ft., October, Bolus, 11325!.

The corolla is white tinged with blue and covered with minute blue spots.

2. *C. incisa* (Willd., sp. Pl. I, 953).

An acaulescent plant, 5-48 cm. high, with spherical swellings on the roots. Leaves radical, 2.5-10 cm. long, 7-2.5 cm. broad, elliptic, obovate, oblong, rarely lanceolate, rounded or obtuse at the apex, attenuated at the base, entire or subpinnatilobed, especially near the base, distinctly veined beneath, glandular-hispid. Peduncles solitary, rarely 2-4 from a stem, 10-40 cm. long, naked, terete, furrowed, glandular-pilose or glandular-pubescent. Inflorescence racemose, 4-14 cm. long, 3 to about 12 flowered. Pedicels 2-1.7 cm. long, terete, glandular-pilose. Bracts 2-4 mm. long, linear, obtuse, ciliated with long glandular hairs; bracteoles 1-2.5 mm. long, otherwise similar to the bracts. Calyx-tube 1.5-2 mm. long, campanulate, glandular-pilose; lobes 3.5-6 mm. long, linear, obtuse, ciliate with long glandular hairs. Corolla of 2 long and 3 short segments; segments 1.15-1.9 cm. long, linear, obtuse, pilose or pubescent inside near the base, sometimes with scattered hairs without. Stamens cohering at the base; filaments 4-5 mm. long, ovate below, becoming linear above, pilose; anthers 2.5-3.5 mm. long, linear-oblong, pilose on the back. Ovary  $\frac{1}{2}$  inferior; style 2.5-3 mm. long, linear, glabrous; stigma subglobose. Fruits 1.9 cm. long, ovoid, acuminate, glabrous, enclosed in the persistent calyx. Seeds 3 mm. long, 1.5 mm. broad, oblong, surrounded by a wide membranous wing 2 mm. broad.

Roem. and Schult. Syst. V, 476; Presl. in Eckl. and Zeyh. Enum., 388; A.DC. in DC. Prodr. VII, ii, 499; Sond. in Harv. and Sond., Fl. Cap. III, 598; Lobelia incisa, Thunb. Prodr. Pl., Cap. 39, Fl. Cap., 185.

SOUTH-WESTERN REGION.—Van Rhynsdorp Division: Oliphant's River, 400 ft., August, Schlechter, 5020!. Clanwilliam Division: Near Wupperthal, 2900 ft., October, Bolus!. Tulbagh Division: Mitchell's Pass, 1000 ft., September, Schlechter, 8965!. Cape Division: Camp's Bay, 300 ft., September, Bolus, 4977!; Lion's Rump, 950 ft., October, Bolus, 9322!.

var.  $\beta$  *Cardamines*, Phillips, comb. nov.

Leaves pinnate or pinnatisect, otherwise similar to the type. *C. Cardamines*, Willd., Sp. Pl. I, 953; Eckl. and Zeyh. Enum., 388; A.DC.

in DC. Prodr., VII, ii, 498; Sond., in Harv. and Sond., Fl. Cap. III, 599; *Lobelia cardamines*, Thunb., Fl. Cap., 185.

SOUTH-WESTERN REGION.—Cape Division: Camp Ground, 100 ft., September, Bolus, 3933!; Wolley-Dod, 196!; Green Point Common, September, Wolley-Dod, 1536!; Pappé!; Zeyher, 2425!; near Cape Town, c. 100 ft., September, Bolus, 3933!. Swellendam Division: River Zonder Einde, Zeyher!.

var.  $\delta$  *bracteata*, Phillips, var. nov.

Differs from the type and var.  $\beta$  in having broad leaf-like toothed bracts; the calyx lobes are not long-ciliate, and the peduncle bears a pair of leaves.

SOUTH-WESTERN REGION.—Cape Division: Near Kirstenbosch, 750 ft., October, Bolus, 7281!.

### 3. *C. bulbosa* (Berg., Descr. Fl. Cap., 172).

An erect plant 10–40 cm. high, simple or branched from near the base. Stems finely or densely pubescent, sometimes becoming almost glabrous. Leaves cauline, 7–5.2 cm. long, palmatisect, pinnatisect, or bipinnatisect, the leaf segments linear, rarely oblong, linear-oblong or obovate, obtuse, glabrous. Inflorescence 1.5–24 cm. long, cylindric, many-flowered. Bract 6.5 mm. long, trilobed or pinnatifid; middle lobe linear, obtuse, 3-nerved; side lobes 2–3 mm. long, subterete, apiculate; bracteoles situated just below the calyx, 2.5 mm. long, acuminate, acute. Pedicel 3 mm. long, terete, pubescent. Calyx-tube 2 mm. long, campanulate, pubescent; lobes 3–3.5 mm. long, linear, subacuminate, glabrous. Corolla bilabiate; tube 8 mm. long, glabrous; lobes 5 mm. long, lanceolate, obtuse. Stamens cohering in the lower half; filaments 6 mm. long, linear in the lowermost  $\frac{2}{3}$ , becoming subterete above, pilose; anthers ciliated or glabrous. Style 5 mm. long, ovate-acuminate in outline, glabrous; stigma conical. Fruit 1 cm. long, the lower portion enclosed in the persistent prominently ribbed calyx, ovoid, glabrous.

Roem. and Schult., Syst., v, 476; Presl., in E. Mey., Comm. Pl. Drège, 293, in Eckl. and Zeyh. Enum., 388; A.D.C., in DC., Prodr. VII, ii, 499; Sond., in Harv. and Sond., Fl. Cap., iii, 600; *C. bulbosa*, Berg., var. *pinnatifida*, Presl., in E. Mey., Comm. Pl. Drège, 297; *Lobelia bulbosa*, Linn., Sp. Pl., 1319; Thunb., Fl. Cap., 184. *Rapuntium tuberosum*, foliis multifidus, floribus spicatis, Burm. Afr., 99, t. 38, fig. 2.

SOUTH-WESTERN REGION.—Clanwilliam Division; Clanwilliam, Leipoldt, 207!. Malmesbury Division: Hopefield, 200 ft., September,

*Schlechter*, 5325!. Tulbagh Division: Ceres Road, *Tyson in Herb. MacOwan Austro-Afric.*, 6048!. Cape Division: Table Mountain, c. 500 ft., July, *Rogers*, 2435! September, MacOwan, 2340! and in *Herb. Norm. Austro-Afric.*, 93!, 1000 ft., August, *Tyson*, 2434!; Platteklip, August, *Wolley-Dod*, 195!; Green Point, October, *Pappe*!; Lion's Head, 400 ft., November, *Bolus*!; near Wynberg, September, *Bolus*, 3398!; Red Hill, August, *Rogers*, 11,246!; Simonstown, July, 800 ft., *Schlechter*, 1086!; Smithwinkel Bay, October, *Bolus*!. Caledon Division: Babyloon Toorn, August, *Zeyher*!. Swellendam Division: River Zonder Einde, October, *Pappe*!.

\**var. orientalis*, Phillips, *var. nov.*

Differs from the type in the leaves being usually bluntly serrated, the bracts 2-toothed at the base, and the calyx-lobes 2 mm. long and ovate.

SOUTH-WESTERN REGION.—Albany Division: Near Golf Links, Grahamstown, May, *Gane*, 7!.

4. *C. elata* (Harv., *Thes. Cap.*, ii, 39, t. 160).

An erect plant 10–84 cm. high. Stems terete, furrowed, pubescent, leafy. Leaves sessile, sometimes becoming smaller at the top of the stem, 1–10 cm. long, 3–4.3 cm. broad, oblong, elliptic, lanceolate, ovate-lanceolate, ovate or linear, acute or obtuse, rounded or narrowed at the base, glabrous or pubescent, with toothed or serrated margins, and with distinct veining beneath. Inflorescence usually compact, sometimes lax, 1.2–30 cm. long, cylindrical, oblong, sometimes almost globose. Flowers solitary or 2–3-nate. Bract 1.1–3.5 cm. long, linear or lanceolate-linear, acute or obtuse, pectinate or toothed; bracteoles 1.75–4 mm. long, linear, acute. Calyx-tube 1–1.5 mm. long, campanulate or turbinate, ribbed, slightly pubescent; lobes 2.5–5 mm. long, linear, acute, toothed, pubescent. Corolla-segments 4.5–8.5 mm. long, linear or oblong-linear, sometimes subacuminate, acute or obtuse, glabrous or pubescent. Filaments 2–3 mm. long, linear, broadened below, pilose; anthers 1.5–2.5 mm. long, oblong, pilose on the back. Style 2–2.5 mm. long, linear, glabrous; stigma clavate or oblique.

*Sond.*, in *Harv. and Sond.*, *Fl. Cap.*, iii, 601; *C. Gerrardi*, *Harv.*, in *Harv. and Sond.*, l. c.; *C. Wilmsiana*, *Diels*, in *Engl. Jahrb.*, xxvi, 112; *Cyphopsis elata*, *O. K.*, in *Rev. Gen.*, iii, 186.

KALAHARI REGION.—Transvaal: Stony Mountains at Houtbosch, c. 4900 ft., February, *Bolus*, 10990!; mountain tops among rocks,

\* The species and varieties marked with an asterisk are not represented in the South African Museum Herbarium.

Upper Moodies, Barberton, 5000 ft., February, *Galpin*, 791!; hillsides Barberton, 3000 ft., March, *Galpin*, 852!; Belfast, February, *Burt-Davy*, 1320!; Wonderfontein, Middleburg Division, 5600 ft., January, *Bolus*!; Volksrust, *Jenkins in Trans. Mus. Herb.*, 9313!.

EASTERN REGION.—Transkei: Hillsides among coarse grass, Willowvale, 1000 ft., April, *Pegler*, 1193!. Pondoland: Mount Engebobo, 4300 ft., February, *Bolus*!. East Griqualand: Near Clydesdale on slopes of Malowe Mountain, 4000 ft., February, *Tyson*, 2152!; on eastern slopes of Malowe Mountain, near Clydesdale, 3500 ft., *Tyson*, 2715!; Etemeeni, between Clydesdale and Ibisi River, 3500 ft., March, *Tyson*, 1205!; Insiswa, 6800 ft., January, *Schlechter*, 6491!; Inchanga, 3500 ft., September, *Schlechter*, 3252!. Natal, *Gueinzius*!; Inanda, *Wood*, 56!.

EASTERN MOUNTAIN REGION.—Natal: Van Reenen, 5000 ft., March, *Schlechter*, 6924; higher grassy slopes of the Mont-aux-Sources, c. 8100 ft., January, *Thode*, 31!. Basutoland: Leribe District, *Dieterlen*, 451!.

var. *oblongifolia*, Phillips, comb. nov.

Differs from the type in the long lax inflorescence, with the flowers solitary in the axils of the bracts.

*C. oblongifolia*, *Harv. and Soud., in Fl. Cap.*, iii, 601.

Swaziland: Grassy place in the "High Veld" near Mbabane, Dalriach District, c. 4-4800 ft., January, *Bolus*, 12,094!, *Rogers*, 11487!.

*C. elata*, *C. Gerrardi*, *C. oblongifolia*.

After a careful examination of the material in the Bolus Herbarium, the Albany Museum, and Cape Town, I have come to the conclusion that *C. elata* must be regarded as a very variable species. There are all stages in the type of the inflorescence: (1) A very compact inflorescence with a single flower in the axil of each bract; (2) a lax inflorescence with a single flower in the axil of each bract; (3) a lax inflorescence with 2-3 flowers in the axil of each bract; (4) a compact inflorescence with 2-4 flowers in the axil of each bract. The first type is represented by such specimens as *Tyson*, 2715, *Schlechter*, 3282, 6491; the second by *Bolus*, 12,094, and *Rogers*, 11,487; the third by *Hutton*, 212, *Galpin*, 791; the fourth by *Jenkins*, 9313, *Bolus*, 10,990, *Rogers*, 2701. All these forms are more or less linked up with one another, and I propose treating them as a single species, keeping out *Bolus*, 12,094, and *Rogers*, 11,487, as varieties on account of their distinct habit.

5. *C. oligotricha* (Schltr., in Eng. Jahrb., xxvii, 195).

Plant 12–15 cm. high, simple or branched from the base, with a somewhat thickened root. *Stems* glabrous. *Leaves* 1–2.5 cm. long, .25–1.2 cm. broad, spatulate, more rarely elliptic or ovate, obtuse, narrowed at the base, glabrous, usually entire, rarely with margins remotely toothed. *Inflorescence* 3–11 cm. long, many-flowered. *Flowers* solitary. *Bracts* similar to the leaves but smaller; bracteoles close under the calyx, 1.5 mm. long, ovate, acuminate, acute, glabrous. *Pedicel* 3 mm. long, terete, pubescent. *Calyx-tube* 1.5 mm. long, turbinate, scantily pubescent; lobes 2.5 mm. long, ovate, acuminate, acute. *Corolla-segments* 8.5 mm. long, linear, slightly broadened in the uppermost  $\frac{2}{3}$ , shortly acuminate, obtuse, glabrous. *Filaments* 3.5 mm. long, expanded at the base, linear above, pilose; anthers 2 mm. long, oblong, minutely apiculate, ciliate on the back. *Style* 2.5 mm. long, compressed, glabrous; stigma subglobose.

SOUTH-WESTERN REGION.—Bredasdorp Division: Zout River, 450 ft., July, *Schlechter*, 8105!.

6. *C. linarioides* (Presl., in Eckl. and Zeyh. Enum., 391).

An erect plant 15–52 cm. high. *Stem* glabrous. *Leaves* 2–7 mm. long (rarely 2 cm. long), linear, obtuse, mostly entire, sometimes 2–3-toothed, glabrous. *Racemes* 6–20 cm. long, 7–17-flowered. *Pedicels* .5–6 mm. long, glabrous or minutely puberulous. *Bracts* 1–2 mm. long, linear or subulate, subacute, glabrous, entire or 1–2-toothed near the base. *Calyx-tube* 1 mm. long, campanulate, ribbed, glabrous; lobes 1–1.25 mm. long, ovate, subacute, glabrous. *Corolla* unequal at the base; segments 8.5–9 mm. long, linear, and channelled below, broadened above, obtuse, glabrous. *Filaments* 3.5–4.5 mm. long, linear, pilose; anthers 1.5–2 mm. long, pilose. *Style* 2–4 mm. long, semiterete, glabrous; stigma capitate, pilose.

*Presl.*, in *E. Mey, Comm. Pl. Drège*, 294, *ex parte*; *A.D.C.*, in *DC., Prodr.*, VII, ii, 498; *Sond.*, in *Harv. and Sond., Fl. Cap.*, iii, 600; *C. campestris*, *Presl.*, in *Eckl. and Zeyh. Enum.*, 391; *C. cinarioides*, *Presl.*, in *E. Mey, l. c.*, 293 (evidently a misprint for *linarioides*); *C. tenuifolia*, *A.D.C.*, in *DC., Prodr.*, VII, ii, 495.

SOUTH-WESTERN REGION.—Tulbagh Division: Ceres Road Station, 500 ft., September, *Guthrie*, 3391!. Cape Division: Mountains round Constantia, c. 500 ft., May, *Schlechter*, 762!. Caledon Division: Zwartberg, *Ecklon and Zeyher*, 2438!. Bredasdorp Division: Elim, April, *Schlechter*, 7690!. Uitenhage Division: March, *Schlechter*, 2517!; *Ecklon and Zeyher*, 3088!. Port Elizabeth Division: Red

House, February, *Patterson*, 466. Albany Division: Grahamstown, *Cherry*, 933.

7. \**C. Bolusii* (Phillips, sp. nov.).

*Planta* erecta, 43 cm. alta. *Stirps* pubescens. *Folia* 3-5.2 cm. longa, .6-1.3 cm. lata, lanceolata vel lineari-lanceolata, apice subobtusata, pubescentia, marginibus serratis. *Pedunculus* 30 cm. longus, pubescens. *Inflorescentia* 7.5 cm. longa, circa 15-florifera. *Bracteae* 6 mm. longae, lineares, pilosae. *Pedicelus* 1.25 mm. longus, teres, pilosus. *Tubus calyci* 1 mm. longus, campanulatus, pilosus; lobi 2.5 mm. longi, lineares, ciliati. *Segmenta corollae* 5.25 mm. longa, ciliata. *Filamenta* 1 mm. longa, linearia, ciliata; antherae 1.5 mm. longae, oblongae, sparse ciliatae. *Stylus* .5 mm. longus; stigma obliquum.

*An erect plant* 43 cm high. *Stem* terete, furrowed, pubescent. *Leaves* 3-5.2 cm. long, .6-1.3 cm. broad, lanceolate or linear-lanceolate, subobtusate, distinctly veined beneath, pubescent, with serrate margins. *Peduncles* 30 cm. long, naked, terete, furrowed, pubescent. *Inflorescence* 7.5 cm. long, about 15-flowered. *Flowers* solitary, subsessile. *Bracts* 6 mm. long, linear, subacute, pilose; bracteoles at the base of the pedicels, 1.5 mm. long, subulate, with a few hairs on the margins. *Pedicel* 1.25 mm. long, terete, pilose. *Calyx-tube* 1 mm. long, campanulate, pilose; lobes 2.5 mm. long, linear, slightly broadened at the base, ciliate. *Corolla-segments* 5.25 mm. long, linear below, ovate and acuminate above, ciliate. *Filaments* 1 mm. long, linear, ciliate; anthers 1.5 mm. long, oblong, scantily ciliated on the back. *Style* .5 mm. long; stigma oblique.

KALAHARI REGION.—Swaziland: Grassy places in the "High Veld" near 'Mbabane in Dalriach District, 4800 ft., January, *Bolus*, 12093.

Very near *C. longifolia*, N.E. Br., but differs in having hairy leaves; the filaments and styles are also much shorter.

8. *C. longifolia* (N.E. Br., Kew Bull., 1908, 435).

*An erect simple plant*, 30-88 cm. high, rarely branched (*Bolus* 10,179), sometimes furrowed, glabrous or pubescent. *Leaves* 2.5-15 cm. long, 1.5-8 mm. broad, long linear, rarely linear-lanceolate, acute, produced at the base into a stem-ridge, venation distinct beneath, glabrous or scantily pubescent. *Peduncle* 10-27 cm. long, simple, very rarely (*Bolus* 10,179) branched, pubescent. *Inflorescence* lax, 2-20 cm. long, many-flowered. *Flowers* solitary in the axils of the bracts. *Bract* 4 mm. long, linear, acute, ciliated; bracteoles at base of the petiole, 1.5 mm. long, subulate, ciliate. *Pedicel* 3.5 mm. long, terete, pubescent.

*Corolla-segments* .9–1 cm. long, linear, broadening above, acuminate, subobtusate, pilose. *Calyx-tube* 1.5 mm. long, broadly campanulate, somewhat oblique, pilose; lobes 2.5 mm. long, lanceolate, acute, ciliate, 1–2-toothed near the base. *Stamens* slightly connate, more than  $\frac{1}{2}$  as long as the corolla; filaments 4 mm. long, linear, slightly broadened at the base, pilose; anthers 2 mm. long, oblong, ciliate on the back, slightly tufted at the apex. *Style* 3.5 mm. long, linear, glabrous; stigma capitate, hairy. *Fruit* 7 mm. long, 7 mm. in diameter, globose, prominently veined, glabrous.

KALAHARI REGION.—Transvaal: Pietersburg District, Modjadjes. December, *Rogers*, 18212!

EASTERN REGION.—Pondoland: Near Xalanga, 4600 ft., January, *Bolus*!; between Cala and Elliott, 5200 ft., January, *Bolus*, 10,179!; near Umtata, 2200 ft., February, *Bolus*!; Wildebeest or Inku River, 3500 ft., January, *Bolus*!. East Griqualand: Slopes of Malowe Mountain, 3000 ft., November, *Tyson*, 3092!. Natal: Zwartkop, 3–4000 ft., *Wood*, 10139.

Flowers cream (ex *Galpin*).

var. *Baurii*, Phillips, var. nov.

A more voluble plant than the type. *Leaves* 6–10 cm. long, .6–1 cm. broad, linear-lanceolate, with serrated margins. *Inflorescence* 6-flowered. This only differs from the type in habit.

EASTERN REGION.—Tembuland: Bazija, 2000 ft., January, *Baur*, 576.

9. *C. assimilis* (Sond., Fl. Cap., III, 600).

An erect simple plant, rarely branched, 20–75 cm. high. *Stems* terete, glabrous. *Leaves* 2–10 cm. long, 1–6.5 mm. broad, linear, obtuse, sometimes acuminate and subacute, glabrous, entire or remotely serrated or subcrenate on the margins. *Peduncle* 3–22 cm. long, glabrous. *Inflorescence* 1–35 cm. long, lax, 3–many-flowered. *Flowers* solitary. *Bract* 6–8 mm. long, linear or linear-lanceolate, acute or subobtusate, 2–5-toothed near the base, glabrous; bracteoles 2–4 mm. long, lanceolate or setaceous, glabrous. *Pedicel* 2.5–3.5 mm. long, terete, glabrous. *Calyx-tube* 1.5 mm. long, turbinate, ribbed, glabrous or pubescent; lobes 4 mm. long, linear or ovate, acuminate, subacute, 2–3-toothed, glabrous. *Corolla-segments* 1.35–1.7 cm. long, linear, obtuse, glabrous. *Stamens* subconnate, less than  $\frac{1}{2}$  as long as the corolla; filaments 2.5–4 mm. long, ovate below, linear above, ciliate; anthers 1.5–2.5 mm. long, oblong-linear, glabrous or ciliate. *Style* 3–4 mm. long, linear, glabrous; stigma pilose.



*C. linarioides*, Presl., var. *major*, Presl., in Eckl. and Zeyh. Enum., 391; *C. persicifolia*, Presl., in E. Mey., Comm. Pl. Drège, 296; Sond., in Harv. and Sond., Fl. Cap., iii, 599.

SOUTH-WESTERN REGION.—Albany Division: Grahamstown, Schlechter, 2605!. East London Division: East London, Rattray, 294!, near East London, c. 300 ft., May, Bolus, 7370!. Victoria East Division: Lovedale, February, W.G.B., 703!; Alice, Pappe!. Komgha Division: Near the Kei Mouth, 200 ft., July, Flanagan, 45!. King Williamstown Division: Below King Williamstown, 1200 ft., Sim, 243!. Stockenström Division: Eland's Berg, January–April, Scully, 186!.

CENTRAL REGION.—Queenstown Division: Klipplaats River, April, Zeyher, 2437!.

KALAHARI REGION.—Griqualand West: West Hill, Beaconsfield, c. 2000 ft., Schönland, 683!. Transvaal: Johannesburg, March, Guthrie, 3176!; Rustenburg, April, McLea in Herb. Bolus!; Barberton, east slopes of Saddleback Mountain, 4500 ft., March, Galpin, 1323!. Orange Free State: Parys, April, Grey, College Herb., 535!.

EASTERN REGION.—Pondoland: Between Umtata and St. John's, 3000 ft., February, Bolus, 10,178!; between Umtata and Mlengana, 3000 ft., February, Bolus, 10,180!; near Umtata, 3000 ft., January, Flanagan, 2847!. Tembuland: Bazija, 2–3000 ft., January, Baur, 583!?. East Griqualand: Near Maclear, 4700 ft., January, Bolus, 10,177!.

Flowers pinkish.

\*var. *latifolia*, Phillips, var. nov.

Differs from the type in the broad (·8–1 cm.) leaves, which are oblong or lanceolate in shape, otherwise agreeing in the floral characters.

SOUTH-WESTERN REGION.—East London, December, Rattray, 628!.

10. *C. heterophylla* (Presl., in Eckl. and Zeyh. Enum., 389).

A twining plant. Stem glabrous. Leaves petioled, rarely sessile, 2·2–5·4 cm. long, ·5–3·2 cm. broad, ovate, lanceolate or elliptic, usually subtrilobed (if not lobed, then never closely serrated), acute or subacute, rounded or slightly narrowed at the base, distinctly veined beneath, glabrous, with margins entire, subcrenate or remotely toothed. Inflorescence not sharply marked off from the stem, many flowered. Flowers solitary. Bracts ·5–2 cm. long, otherwise very similar to the leaves. Pedicels ·8–1·5 cm. long, terete, glabrous. Bracteoles usually alternating, sometimes opposite, usually situated

about the middle of the pedicel, sometimes at the base of the pedicel. *Calyx-tube* 1·5 mm. long, campanulate, glabrous; lobes 5 mm. long, ovate, acuminate, acute, reticulately veined, with a distinct mid-rib, glabrous. *Corolla* bilabiate; tube 9 mm. long, glabrous; lobes 7 mm. long, linear, obtuse or subobtuse, glabrous, *Stamens* joined below; filaments 6 mm. long, ovate in the lower half, terete above, pilose; anthers 2·5 mm. long, oblong, ciliate on the back. *Style* 4 mm. long, linear, glabrous; stigma capitate.

*Presl.*, in *E. Mey.*, *Comm. Pl.*, *Drège*, 297; *A.DC.*, in *DC.*, *Prodr.* VII, ii, 500; *Sond.*, in *Harv. and Sond.*, *Fl. Cap.*, iii, 602.

SOUTH-WESTERN REGION.—George Division: Sandy places near George, *Pappe*!, *Ecklon and Zeyher*, 2429!. Albany Division: Dassie Krauz, near Grahamstown, September, *Rogers*!.

11. \**C. transvaalensis*, Phillips, sp. nov.

*Stirps* glabra. *Folia* petiolata, 1·5–5 [cm. longa, 3–1·3 cm. lata, lanceolata, apice obtusa, basi subcuneata, subtus pallida nigranervosaque, glabra, marginibus crenata vel subserrata. *Flores* solitaires. *Pediculus* 4 mm. longus, teres, tenuiter pubescens vel subglaber. *Tubus calyci* 1·5 mm. longus, costatus, glaber; lobi 2·5 mm. longi, lineares vel lineari-ovati, apice subacuti, generaliter 2–4-dentati. *Segmenta corollae* 1·45–1·6 cm. longa, apice obtusa, intus sparse pilosa, marginibus minute ciliatis. *Stamina* basi connata; filamenta linearia, pilosa; antherae 2 mm. longae, pilosae. *Stylus* 2·5 mm. longus, compressus; stigma capitatum, obliquum. *Fructus* 7 mm. longus, 3–4 mm. latus, ovatus, costatus.

A twiner. *Stem* glabrous. *Leaves* petioled, 1·5–5 cm. long, 3–1·3 cm. broad, lanceolate, the young leaves lanceolate-linear, obtuse, subcuneate at the base, paler beneath and distinctly veined with dark veins, glabrous, and with the margins closely crenate or subserrate. *Flowers* solitary in the axils of the upper leaves. *Pedicels* 4 mm. long, terete, very finely pubescent or subglabrous. *Bracteoles* 1·5 mm. long, subulate, situated about the middle of the pedicel. *Calyx-tube* 1·5 mm. long, prominently ribbed, glabrous; lobes 2·5 mm. long, linear or linear-ovate, subacute, usually 2–4-toothed. *Corolla-segments* 1·45–1·6 cm. long, linear below, lanceolate in the uppermost quarter, obtuse, scantily pilose within, very minutely ciliate on the margins. *Stamens* connate below, less than  $\frac{1}{2}$  as long as the corolla; filaments 3 mm. long, linear, narrowing above, pilose; anthers 2 mm. long, linear, pilose on the back. *Style* 2·5 mm. long, compressed, glabrous; stigma capitate, oblique. *Fruit* 7 mm. long, 3–4 mm. in diameter

below, ovoid, obtuse, prominently veined on the lower half and partly enclosed by the persistent calyx, glabrous.

KALAHARI REGION.—Transvaal (Pietersburg District): In stony mountains at Houtbosch, c. 5200 ft., February, *Bolus*, 10,989!.

12. \**C. corylifolia* (Harv., Thes. Cap. ii, 39, Pl. 161).

A twiner. *Stem* sometimes furrowed, glabrous or minutely pubescent. *Leaves* petioled, 1·5–5·5 cm. long, 2–2·2 cm. broad, ovate or ovate-lanceolate, the youngest leaves lanceolate-linear, acuminate, acute, distinctly veined beneath, glabrous, with serrated margins; internodes 2·5–5·7 cm. long. *Flowers* umbellate in the axils of the upper leaves, very rarely solitary. *Peduncles* 6–3 cm. long, terete, minutely pubescent or subglabrous. *Pedicels* 2·5 mm. long, terete; pubescent or subglabrous. *Bracteoles* 1 mm. long, subulate. *Calyx-tube* 1·5 mm. long, turbinate, prominently ribbed; lobes 4 mm. long, linear, acute, glabrous. *Corolla-segments* 7 mm. long, linear, broadening at the base, obtuse, channelled, scantily pilose. *Stamens* more than  $\frac{1}{2}$  as long as the corolla; filaments 3·5 mm. long, linear, widened at the base, pilose; anthers 1·5 mm. long, elliptic, pilose on the back. *Style* 3 mm. long, subterete, glabrous; stigma capitate, terminal *Sond., in Harv. and Sond., Fl. Cap., iii, 601.*

KALAHARI REGION.—Transvaal, Mokapano Poort, 4700 ft., January, *Schlechter*, 4332!?

EASTERN REGION.—Natal, Karkloof, 5500 ft., February, *Schlechter*, 6834!.

13. \**C. maculosa* (Phillips, sp. nov.).

*Stirps* glabra. *Folia* paullo petiolata, 6·3 cm. longa, 1·5–1·1 cm. lata, lanceolata, apice basique acuta, glabra, marginibus integris vel remote subcrenatis; petiolus circa 2 mm. longus. *Flores* solitaires vel 2–3-nati. *Pediculus* 1 cm. longus, glaber. *Tubus calyci* 1 mm. longus, campanulatus, glaber; lobi 3 mm. longi, ovati, acuminati, apice acuti, 2–3-dentati, glabri. *Segmenta corollae* 1·3 cm. longa, 1–2 mm. lata, linearia, subacuminata, apice obtusa. *Stamina* basi connata; filamenta 5 mm. longa, basi dilata, pilosa; antherae 2·5 mm. longae, ciliatae. *Stylus* 4 mm. longus, teres, glaber; stigma capitatum.

A twiner. *Stems* terete, glabrous. *Leaves* shortly petioled, 6·3 cm. long, 1·5–1·1 cm. broad, lanceolate, the younger leaves sometimes linear-lanceolate, acute at the apex and base, with a distinct midrib, glabrous, with entire or sometimes remotely subcrenate margins; petiole about 2 mm. long. *Flowers* solitary or sometimes 2–3-nate in

the axils of the upper leaves. *Pedice*l 1 cm. long, glabrous. *Bracteoles* 1·5 mm. long, linear. *Calyx-tube* 1 mm. long, broadly campanulate, glabrous; lobes 3 mm. long, ovate, acuminate, acute, 2-3-toothed, glabrous. *Corolla-segments* white with lilac markings (*vide*, *A. Pegler*), 1·3 cm. long, 1-2 mm. broad, linear, subacuminate, obtuse, with a short blunt appendage. *Stamens*  $\frac{1}{2}$  as long as the corolla, connate at the base; filaments 5 mm. long, linear above, expanded below, pilose; anthers 2·5 mm. long, oblong, ciliate on the back. *Style* 4 mm. long, terete, glabrous; stigma capitate.

EASTERN REGION.—Transkei, 1000 ft., Summer, *A. Pegler*, 277!

14. *C. natalensis* (Phillips, sp. nov.).

*Stirps* glabra. *Folia* petiolata, 1·5-10 cm. longa, lanceolato-ovata vel lanceolato-lineararia, acuminata, apice acuta, basi cuneata, subtus venosa, glabra, marginibus serratis; petiolus 7-1·5 cm. longus, glaber. *Flores* umbellati, rare solitarii. *Pedunculus* 2-9 mm. longus, pubescens vel subglaber. *Pediculus* 3-6 mm. longus, pubescens vel subglaber. *Tubus calyci* 1·5 mm. longus, campanulatus, lobi 2 mm. longi, ovati, acuminati, apice acuti, subglabri. *Segmenta corollae* 1 mm. longa, lineararia, apice obtusa, glabra. *Stamina* basi connata; filamenta 4 mm. longa, lineararia, basi dilata, pilosa; antherae 2 mm. longae, ciliatae. *Stylus* 2·5 mm. longus, linearis; stigma capitatum.

A twiner. *Stem* glabrous. *Leaves* petioled, 1·5-10 cm. long, lanceolate-ovate to lanceolate-linear, acuminate, acute, cuneate at the base, veined beneath, glabrous, with serrated margins; petioles 7-1·5 cm. long, glabrous. *Flowers* umbellate in the axils of the leaves, rarely solitary. *Peduncles* 2-9 mm. long, pubescent or subglabrous. *Pedicels* 3-6 mm. long, pubescent or subglabrous. *Calyx-tube* 1·5 mm. long, campanulate; lobes 2 mm. long, ovate, acuminate, acute, subglabrous. *Corolla-segments* 1 mm. long, linear, obtuse, glabrous, the two upper broader than the others. *Stamens* cohering at the base; filaments 4 mm. long, linear, expanded at the base, pilose; anthers 2 mm. long, oblong, ciliate on the back. *Style* 2·5 mm. long, linear; stigma capitate.

EASTERN REGION.—Natal; Ixopo and Umzimkulu, 4000 ft., February, *Schlechter*, 6630!; edge of wood at Umkomaas 4-5000 ft., April, *Wood*!

15. \**C. longiflora* (*Schlechter*, Engl. Jahrb., xxvii, 194).

A twiner. *Stems* minutely and scantily puberulous. *Leaves* 1·2-2·5 cm. long, linear, subacute, with recurved margins, pubescent above, scantily pubescent below. *Flowers* arranged in a racemose

manner on the upper part of the stems, 1.5–3 mm. apart. *Bracts* similar to the leaves, not exceeding the corolla; bracteoles 2.5 mm. long, ovate, acuminate, acute. *Pedicels* 4–7 mm. long, terete, pubescent. *Calyx-tube* 2.5 mm. long, 4 mm. broad, campanulate, subtomentose; lobes 4 mm. long, 2 mm. broad at the base, ovate, acuminate, acute, with recurved tips, pubescent. *Corolla-tube* 9 mm. long, 2 mm. in diameter, ribbed, albo-pubescent; lobes 3 mm. long, 1.5 mm. broad at the base, ovate, acuminate, subobtuse, pappilose on the margins. *Stamens* inserted at base of corolla-tube; filaments 3–5 mm. long, triangular-ovate, membranous, shortly pilose; anthers 2.5 mm. long, linear in outline, pilose on back and tufted at the apex. *Ovary* reaching to tip of calyx-lobes; style 1 mm. long; stigma clavate.

WESTERN REGION.—Karoo Bergen, 2000 ft., August, *Schlechter*, 8246!

16. \**C. longilobata*, Phillips, sp. nov.

*Stirps* juvenis tenuiter sparseque pubescens, demum glabra. *Folia* ad 6 mm. longa, linearia, apice subacuta, super pubescentia, subtus pubescentia vel pilosa, marginibus paullo recurvis. *Bracteae* foliis similes, floris longiores. *Pediculus* 4–8 mm. longus, tenuis, pubescens. *Tubus calycis* 1.5 mm. longus, 3 mm. latus, campanulatus, costatus, pubescens; lobi 1.5 mm. longi, ovati, acuminati, apice acuti, pubescentes. *Tubus corollae* 6 mm. longus, 1–1.5 mm. latus, pubescens; lobi 1.5 cm. longi, lineares, apice subobtusii, pubescentes. *Filamenta* 2 mm. longa, basi dilata; antherae 2.5 mm. longae, lineares, glabrae. *Stylus* fere obsoletus; stigma capitatum.

A twiner. *Young stems* finely and scantily pubescent, at length becoming glabrous. *Leaves* up to 6 mm. long, linear, subacute, with slightly recurved margins, pubescent above, pubescent or shortly pilose below. *Flowers* arranged in a racemose manner up the stems, 2.5–3 mm. apart. *Bracts* similar to the leaves, exceeding the flowers; bracteoles 1–1.25 mm. long, subulate. *Pedicels* 4–8 mm. long, slender, terete, pubescent. *Calyx-tube* 1.5 mm. long, 2 mm. broad, campanulate, ribbed, pubescent; lobes 1.5 mm. long, ovate, acuminate, acute, not recurved at the tip, pubescent. *Corolla-tube* 6 mm. long, 1–1.5 mm. in diameter, pubescent; lobes 1.5 cm. long, linear, narrowed into a claw in the lowermost third, subobtuse, pubescent. *Stamens* inserted at the base of the corolla-tube; filaments 2 mm. long, terete, with a flattened triangular base; anthers 2.5 mm. long, linear, glabrous. *Style* almost obsolete; stigma capitate.

SOUTH-WESTERN REGION.—Oudtshoorn, April, *Miss Taylor* in *Albany Museum Herbarium*!

17. \**C. Schlechteri* (Phillips, sp. nov.).

*Stirps* glabra vel sparse pubescens. *Folia* 1·3–2·2 cm. longa, 2–3·5 mm. lata, linearia vel lineari-oblonga, super glabra, subtus glabra vel pilosa, marginibus longo spatio crenatis, dentatis, vel subintegris. *Bracteae* foliis similes, generaliter floris longiores. *Pediculus* 2·5 mm. longus, pilosus vel subtomentosus. *Tubus calyci* 1 mm. longus, 1·5 mm. latus, campanulatus, dense albo-pubescens; lobi 2 mm. longi, ·5 mm. lati, subacuminati, apice acuti, generaliter glabri, ciliati. *Segmenta corollae* 9 mm. longa, apice acuta, glabra. *Filimenta* 1 cm. longa, linearia, basi sensim dilata, pilosa; antherae 2·5 mm. longae, ciliatae. *Stylus* 3 mm. longus, linearis; stigma capitatum.

A twiner. *Stem* glabrous or scantily pubescent. *Leaves* 1·3–2·2 cm. long, 2–3·5 mm. broad, linear or linear-oblong, distantly crenate, toothed, or subtire, glabrous above, glabrous or shortly pilose beneath. *Flowers* arranged in a racemose manner up the stems, 1·5–3 mm. apart. *Bracts* similar to the leaves, usually exceeding the flowers; bracteoles 1·5 mm. long, linear, acuminate. *Pedicels* 2·5 mm. long, terete, pilose or subtomentose. *Calyx-tube* 1 mm. long, 1·5 mm. broad, campanulate, densely albo-pubescent; lobes 2 mm. long, ·5 mm. broad at the base, ovate, subacuminate, acute, usually glabrous or with a few scattered hairs, with the margins shortly ciliated. *Corolla* split into segments 9 mm. long, lanceolate above, narrowed into a linear claw below, obtuse at the apex, glabrous. *Stamens* more than  $\frac{1}{2}$  as long as the corolla; filaments 1 cm. long, linear, gradually widening towards the base, pilose; anthers 2·5 mm. long, ciliate on the back in the lower half. *Style* 3 mm. long, linear; stigma capitate.

WESTERN REGION.—Among bushes between Spektakel and O'okiep c. 3100 ft., September, *Bolus*, 9407!

SOUTH-WESTERN REGION.—Clanwilliam Division: Windhoek, 500 ft., August, *Schlechter*, 8351!. Tulbagh Division: Near Porterville Road, 400 ft., August, *Schlechter*, 10723!.

18. *C. triphylla* (Phillips, in Ann. S. Afr. Mus., xvi, i.).

A twiner. *Stems* terete, glabrous. *Leaves* shortly petioled, divided into 3, rarely more, segments to the base; segments ·5–5 cm. long, ·5–1 mm. broad, linear, obtuse, entire or more rarely remotely toothed, glabrous. *Petioles* 1–6 mm. long, glabrous. *Inflorescence* racemose, distinctly marked off from the leafy stem, many-flowered. *Flowers* usually horizontal or subpendulous. *Bracts* 3–5·5 mm. long, linear or linear-ovate, acute, sometimes 2-toothed at the base, otherwise entire, glabrous; bracteoles ·5 mm. long, subulate. *Pedicels* 2·5–3 mm.

long, slender, terete, glabrous; lobes 1-1.25 mm. long, ovate, acute, glabrous. *Corolla-segments* 7-8 cm. long, lanceolate above, becoming linear in the lower half, obtuse or subacute, glabrous. *Stamens* more than half as long as the corolla; filaments free, 3-4 mm. long, linear, slightly broadened at the base, and very finely ciliated on the broadened portion; anthers 1.5 mm. long, linear. *Style* 2.5-3 mm. long, compressed, glabrous; stigma capitate.

SOUTH-WESTERN REGION.—Port Elizabeth Division: Redhouse, May, *Patterson*, 466!.

CENTRAL REGION.—Murraysburg Division: Mountain slopes at Coetzier's Kraal, 4500 ft., March, *Tyson*, 236!. Somerset East Division: Stony places on the banks of the Klijn Visch River, *MacOwan*, 2790!. Graaff Reinet Division: Cave Mountain near Graaff Reinet, 4500 ft., March, *Bolus*, 13!. Queenstown Division: Near Queenstown, 3000 ft., February, *Flanagan*, 2879!.

EASTERN MOUNTAIN REGION.—Albert Division: Burghersdorp, February, *Pocock*, 127!. Aliwal North Division: Dry stony mountain sides, c. 4600 ft., April-May, Eland's Hoek, near Aliwal North, *Bolus*, 10,489!. Basutoland: Leribe, c. 6000 ft., January, *Dieterlen*, 945!.

A plant 1-2 ft. high; flowers light purple; a creeper (*vide F. Bolus*); flowers pink (*vide Madame Dieterlen*).

#### 19. *C. digitata* (Willd., Sp. Pl., I, 953).

A twiner. *Stems* glabrous, minutely puberulous, pubescent, or more rarely shortly and softly pilose. *Leaves* subsessile or shortly petioled, digitately lobed almost to the base; segments 3-5.5 cm. long, 1-4 mm. broad, linear, obtuse, glabrous. *Petiole* sometimes up to 7 mm. long, glabrous. *Inflorescence* racemose, not distinctly marked off from the leafy stem, many-flowered; flowers usually erect, but frequently horizontal. *Bracts* 8-1.5 cm. long, 3-5-lobed, glabrous; lobes linear, acute or obtuse, glabrous; bracteoles close beneath the calyx, 1-1.5 mm. long, ovate, acuminate, acute, glabrous. *Calyx-tube* 1.5 mm. long, campanulate, glabrous; lobes 2-3 mm. long, ovate, acute, glabrous. *Corolla-tube* 5-7.5 mm. long, glabrous; lobes 3-5 mm. long, ovate, ovate-lanceolate or lanceolate, obtuse or subacute. *Stamens* more than  $\frac{1}{2}$  as long as the corolla, very rarely less; filaments 3.5-5 mm. long, united at the base, linear, gradually broadened below, pilose; anthers 2.5 mm. long, oblong or linear in outline, ciliate on the back. *Style* 2.5-4 mm. long, terete or subterete, glabrous; stigma capitate.

*Roem. and Schult., Syst., v, 475*; *Presl., in Eckl. and Zeyh., Enum., 391, with var.*; *in E. Mey., Comm. Pl., Drège, 296*; *A.DC., in DC., Prodr. VII, ii, 500*; *Sond., in Harv. and Sond., Fl. Cap., iii, 603*; *C. angustifolia, Presl., in Eckl. and Zeyh., Enum., 389*; *C. dentariaefolia, Presl., in E. Mey., Comm. Pl., Drège, 295*; *Sond., in Harv. and Sond., Fl. Cap., iii, 603*; *C. angustifolia, A.DC., in DC., Prodr. VII, ii, 500*; *C. polydactyla, Presl., in E. Mey., Comm. Pl., Drège, 296*; *C. tomentosa, Presl., l. c., 295*; *Lobelia digitata, Thunb., Fl. Cap., 475*.

SOUTH-WESTERN REGION.—Clanwilliam Division: Near Brackfontein, *Ecklon and Zeyher, 2439!*; among bushes at Pakhuis, October, *MacOwan, 3296!*; Koudeberg Mountains, near Wupperthal, 2400 ft., October, *Bolus, 9055!*. Malmesbury Division: Malmesbury, 200 ft., September, *Schlechter, 5347!*; near Hopefield, c. 100 ft., September, *Bolus, 12,765!*; Groene Kloof, 300 ft., October, *Bolus, 4306!*. Tulbagh Division: Steendal, October, *Pappe!*. Worcester Division: Hex River Valley, 2000 ft., October, *Tyson, 634!*. Paarl Division: French Hoek, 1650 ft., October, *Phillips, 1202!*. Cape Division: near Constantia, *Ecklon and Zeyher, 1048!*; Rondebosch and Klassenbosch, July–August, *Ecklon and Zeyher, 2439!*; slopes of Lion's Head, 2500 ft., August, *Bolus!*, c. 390 ft., August, *Schlechter, 1337!*; above Groot Schuur, September, *Wolley-Dod, 194!*; slopes of Devil's Peak, 400 ft., September, *Bolus, 3796!*. Stellenbosch Division: Stellenbosch, *Pappe!*. Swellendam Division: River Zonder Einde, *Zeyher, 3091!*, 3095!

CENTRAL REGION.—Laingsburg Division: Zwartbergen, Seven Weeks Poort, 4–5000 ft., September, *Phillips, 1478!*

Flowers white with a bluish tinge; limb of the three anterior petals with a red mark at the base.

*Bolus, 9055*, is a form with exceptionally large bracts. In *Zeyher, 3095*, and *Phillips, 1478*, the stamens are less than half as long as the corolla.

20. *C. zeyheriana* (Presl., in E. and Z. Enum, 392).

A twiner. *Stems* glabrous. *Leaves* 1·4–3·6 cm. long, simple or digitately tri-partite, the lobes 5–1·5 mm. broad, linear, subobtuse, glabrous. *Inflorescence* arranged in a racemose manner up the stem. *Pedicels* 3–6 mm. long, terete, glabrous. *Bracts* similar to the leaves. *Calyx-tube* about 5 mm. long, glabrous; lobes 1 mm. long, ovate, acute or subacute, glabrous. *Corolla* not bi-labiate; tube 8–1·1 cm. long, cylindric, glabrous; lobes 4–8 mm. long, elliptic-lanceolate, subobtuse, glabrous. *Stamens* less than  $\frac{1}{2}$  as long as the corolla; filaments about 3 mm. long, linear, broadened and pubescent at the base;



anthers 2 mm. long, linear, glabrous. *Style* 2·5 mm. long, linear, narrowing above; stigma oblique, pubescent. *Sond., in Harv. and Sond., Fl. Cap., iii, 604, with var. C. Eckloniana, Presl., in E. and Z. Enum., 392.*

SOUTH-WESTERN REGION.—Van Rhynsdorp Division: Stony places near the Oliphant's River, 500 ft., August; *Schlechter, 4993 (or 2 ?)!* Clanwilliam Division: Brackfontein, *E. and Z., 2442.* Swellendam Division: River Sonder Einde, September, *Ecklon and Zeyher, 2441!*

CENTRAL REGION.—Ceres Division: Koude Bockveld, 4000 ft., September, *Schlechter, 8862!*

21. *C. volubilis* (Willd., Sp., Pl. I, 952).

A twiner. *Stem* sometimes ridged, glabrous, more rarely scantily pubescent. *Leaves* entire, rarely divided, 4–5·5 cm. long, 75–2 mm. broad, very rarely 4 mm. broad, linear, or if segmented then the segments linear, entire or rarely remotely toothed, obtuse, glabrous. *Inflorescence* arranged in a racemose manner up the stem. *Pedicels* 4–2 cm. long, terete, glabrous. *Bracts* 5–1·2 cm. long, linear-lanceolate, obtuse, distinctly 2-toothed at the base or 3–5-lobed; the lobes linear, obtuse; bracteoles 1–1·5 mm. long, ovate, obtuse or acute, glabrous. *Calyx-tube* 1·5–2 mm. long, campanulate or turbinate, ribbed, glabrous; lobes 2·5–4 mm. long, ovate, subacuminate, acute, glabrous. *Corolla-tube* 8–1·1 mm. long, glabrous; lobes 6–1·1 cm. long, linear or lanceolate, obtuse, glabrous. *Stamens* less than  $\frac{1}{2}$  as long as the corolla; filaments 2–4 mm. long, linear, flattened below, pilose; anthers 1–2 mm. long, linear or linear-oblong, ciliate on the back. *Style* 1·5–4 cm. long, compressed, glabrous; stigma pilose.

*Roem. and Schult., Syst., v, 475; A.DC., in DC. Prodr., VII, ii, 500; Sond., in Harv. and Sond., Fl. Cap., iii, 604; C. latipetala, Presl., l. c., 391; C. longipetala, Presl., l. c.; C. stenopetala, Diels, in Engl. Jahrb., xvi, 112; Cyphopsis volubilis, O.K., Rev. Gen., iii, 186; Lobelia volubilis, Linn., Suppl., 396; Thunb., Fl. Cap., 179.*

SOUTH-WESTERN REGION.—Van Rhynsdorp Division: Oliphant's River Bergen, 2000 ft., August, *Schlechter, 5093!*; Oliphant's River, 500 ft., August, *Schlechter, 8476!*; Gift Berg, 1–2000 ft., September, *Phillips, in Percy Sladen Memorial Expedition, 7480!* Clanwilliam Division: Koude Berg, near Wupperthal, 2400 ft., October, *Bolus, 9055!* Piquetberg Division: Piquetberg, 900 ft., *Schlechter, 5259!* Tulbagh Division: Tulbagh, *MacOwan!*; Ceres Road, Kluitjes Kraal, *Tyson, in Herb. Musei Austro-Afric., 6041!* Cape Division: Slopes of Table Mountain, 1500 ft., August, *Schlechter, 1307!*; Devil's Peak, 5–700 ft., August–September, *Tyson, 2348!*, *Bolus, 3797!*; near Ronde-

bosch, *Zeyher*! ? Lion's Head, 200 ft., August, *Schlechter*, 1336!; foot of Table Mountain, September, *MacOwan*, 2344!; slopes above Orange Kloof, Table Mountain, 1500 ft., *Schlechter*, 1307!; slopes over Klassenbosch, *Wolley-Dod*, 2939!; above Groot Schuur, September, *Wolley-Dod*, 193!; Wynberg Hill, 400 ft., October, *Bolus*, 7261!. Stellenbosch Division: Palmietrivier, *Ecklon and Zeyher*, 2440!; mountain slopes near Sir Lowry's Pass Railway Station, c. 400 ft., August, *Bolus*, 7482!. Caledon Division: Babyloon Toorn and Hemel en Aarde, *Zeyher*, 3094!; Zwartberg, 3000 ft., October, *Schlechter*, 5584!. Swellendam Division: River Zonder Einder, August-September, *Zeyher*, 3092!, 3093!. Riversdale Division: Garcia's Pass, September, *Phillips*, 385!. Bredasdorp Division: Near Elim, 300 ft., October, *Bolus*, 6921!. Robertson Division: Outeniqua Mountains, *Hops*, 12!.

Flowers blue (*Phillips*). Flowers mauve (*Hops*).

*Schlechter*, No. 4993 from the Oliphant's River is a form with broad (5-7 mm.) leaves which are palmately 3-lobed.

22. *C. Tysonii* (*Phillips*, sp. nov.).

*Stirps* glabra. *Folia* 1-7 mm. longa, 5-1.5 mm. lata, apice obtusa, glabra. *Inflorescentia* racemosa. *Pediculus* 1.5-4 mm. longus, glaber. *Bracteae* 3-7 mm. longae, lineares, interdum mucronatae basi que 2-3-dentatae. *Tubus calyci* 1-1.5 mm. longus, turbinatus vel campanulatus, costatus, glaber; lobi 1.5-2.5 mm. longi, ovato-lineares, apice acuti vel subacuti, 2-4-dentati. *Segmenta corollae* 1.5-1.6 cm. longa, linearia, apice obtusa, glabra. *Filamenta* 3-4 mm. longa, linearia, basi dilata, pilosa; antherae 2 mm. longae, lineares, ciliatae. *Stylus* 1.5-4 mm. longus, compressus, glaber; stigma capitatum, pilosum.

A twiner. *Stems* glabrous. *Leaves* 1-7 mm. long, 5-1.5 mm. broad, linear, obtuse, glabrous. *Inflorescence* racemose at the end of the stem. *Pedicels* 1.5-4 mm. long, terete, glabrous. *Bracts* 3-7 mm. long, linear, sometimes mucronate and 2-3-toothed at the base; bracteoles 1.5 long, linear, ovate-linear or ovate, acute, 1-3-toothed, glabrous. *Calyx-tube* 1-1.5 mm. long, turbinate or campanulate, ribbed, glabrous; lobes 1.5-2.5 mm long, ovate-linear, acute or subacute, 2-4-toothed. *Corolla-segments* 1.5-1.6 cm long, linear, obtuse, glabrous. *Stamens* less than  $\frac{1}{2}$  as long as the corolla; filaments 3-4 mm. long, linear, broadened at the base, pilose; anthers 2 mm, long, linear, ciliate on the back and tufted. *Style* 1.5-4 mm. long, compressed, glabrous; stigma capitate, pilose.

KALAHARI REGION.—Barberton District: Saddleback Mountain 4500 ft., March, *Galpin*, 1323!.

EASTERN REGION.—Tembuland: Cala, 4000 ft., Pegler, 1687!. East Griqualand: Grassy places round Kokstad, 5000 ft., March, Tyson, 1337!.

Root bulbous; flowers lilac (*vide* Miss A. Pegler).

23. *C. crenata* (Sond., in Fl. Cap., III, 602).

A twiner. *Stem* glabrous. *Leaves* subsessile, 2-4.5 cm. long 1.5-4 mm. broad, linear, subacute, entire or with the margins minutely and remotely serrated, narrowed at the base, glabrous. *Flowers* usually in clusters of 2-5, sometimes solitary. *Bracts* 3 mm. long, linear, subacute, glabrous; bracteoles 1 mm. long, subulate. *Pedicels* 2-5 mm. long, terete, glabrous. *Calyx-tube* almost obsolete, up to 5 mm. long, flat, glabrous; lobes 2-3.5 mm. long, linear or linear-lanceolate, obtuse, glabrous. *Corolla-tube* 5-5.5 mm. long, glabrous; lobes 2 mm. long, linear or ovate, acuminate, obtuse or subacute. *Stamens* more than  $\frac{1}{2}$  as long as the corolla; filaments 3.5 mm. long, linear, dilated and ovate at the base, pilose; anthers 1.5-2 mm. long, oblong or elliptic, ciliated on the back. *Style* 2-3 mm. long, terete, glabrous; stigma capitate.

*C. atriplicifolia*, Presl., in *Eckl. and Zeyh, Enum.*, 389; *C. dregeana*, Presl., in *E. Mey., Comm. Pl., Drège*, 294; *C. tortilis*, N. E. Br., in *Kew Bull.*, 1894, 356; *C. tenera*, Diels, in *Engl. Jahrb.*, xvi, 112; *Lobelia crenata*, Thunb., *Fl. Cap.*, 180?

WESTERN REGION.—Namaqualand Minor, Klipfontein, 3000 ft., September, Bolus in *Herb. Norm. Austro-Afric.*, 1193!.

SOUTH-WESTERN REGION.—Clanwilliam Division: Clanwilliam, Leipoldt in *Herb. Bolus*!. Cape Division: Simonstown, Ecklon and Zeyher, 2428!.

*C. crenata*, Presl., based on Drège's specimen, is an eastern plant, and is therefore more likely to be *C. sylvatica*, as suggested by Sonder.

24. *C. undulata* (Eckl., in S. Afr. Quart. Journ., 1830, 373).

A more or less erect plant. *Stem* glabrous. *Leaves* 7-10.5 cm. long, 1-7 mm. broad, linear, obtuse, with subentire or toothed margins, glabrous. *Inflorescence* distinct from the leafy stem. *Bracts* 3-4.5 mm. long, linear, acute or obtuse, 2-toothed at the base, glabrous; bracteoles 1 mm. long, subulate, lanceolate or ovate, acute, glabrous. *Calyx-tube* 1-1.5 mm. long, campanulate, glabrous or minutely scabridulous; lobes 1.5-2 mm. long, ovate or ovate-lanceolate, subacuminate acute or obtuse, glabrous. *Corolla-segments* 1-1.3 cm. long, linear

shortly acuminate, obtuse, glabrous, sometimes ciliated on the lower portion. *Stamens* more than  $\frac{1}{2}$  as long as the corolla; filaments 4–5 mm. long, linear above, ovate below, pilose; anthers 2–2.5 mm. long, elliptic, ciliate on the back. *Style* 2–3 mm. long, subterete, glabrous; stigma globose, pilose.

*Sond.*, in *Harv. and Sond.*, *Fl. Cap.*, iii, 603; *A.DC.*, in *DC.*, *Prodr.* VII, ii, 501; *C. angustifolia*, *Presl.*, in *Eckl. and Zeyher*, *Enum.*, 390; *C. anomala*, *Presl.*, *l. c.*

SOUTH-WESTERN REGION.—Uitenhage Division: Between Coega and Sundays River, *Ecklon and Zeyher*, 2434!; Eland's River, May–June, *Zeyher*, 937!, 3087!; Groot River, May, *Ecklon and Zeyher*, 2436!. Albany Division: Oatlands Park, Grahamstown, April, *Daly and Sole*, 144!.

CENTRAL REGION.—Somerset East Division: Grassy plains near Somerset East, c. 2500 ft., *MacOwan*, 1814!.

I doubt whether this is specifically distinct from *C. sylvatica*, *Eckl.* The only difference appears to be one of habit—*C. undulata* being a more or less erect plant, while *C. sylvatica* is a very evident twiner.

25. *C. sylvatica* (*Eckl.*, in *S. Afric. Quart. Journ.*, 1830, 373).

A twiner. *Stem* glabrous. *Leaves* usually shortly petioled, 1–8 cm. long, 1–1.6 cm. broad, linear, linear-lanceolate, ovate-lanceolate or lanceolate, acute or obtuse, entire, toothed or crenate on the margins, rarely distinctly 2-lobed at the base, glabrous. *Inflorescence* arranged in a racemose manner up the stem. *Bracts* sometimes subulate and shorter than the pedicels, sometimes similar to the leaves and longer than the corolla. *Pedicels* up to 1 cm. long, terete, glabrous. *Calyx-tube* 2 mm. long, campanulate, ribbed, glabrous; lobes 1.5 mm. long, ovate, subacute, unicostate, glabrous. *Corolla-tube* 8 mm. long, glabrous; lobes 3 mm. long, oblong-linear or lanceolate, subacute. *Stamens* more than  $\frac{1}{2}$  as long as the corolla; filaments 6.5 mm. long, subterete above, lanceolate in the lower half, glabrous or pilose; anthers 2.5 mm. long, oblong-linear, ciliate on the back. *Style* 3 mm. long, linear, glabrous; stigma globose, pilose.

*A.DC.*, in *DC.*, *Prodr.* VII, ii, 501; *Sond.*, in *Harv. and Sond.*, *Fl. Cap.*, iii, 602; *C. salicifolia*, *Presl.*, in *Eckl. and Zeyher*, *Enum.*, 390; *C. crenata*, *Presl.*, *Prodr. Monog. Lobel.*, 51?

SOUTH-WESTERN REGION.—Clanwilliam Division: Brackfontein, *Ecklon and Zeyher*, 2432!. George Division: 600 ft., March, *Schlechter*, 2394!. Oudtshoorn Division: Foot of mountains 20 miles from Oudtshoorn, August, *Britten*, 82!; Oudtshoorn, *Rogers*, 4645!. Uiten-

hage Division: Zwartkops River, May-June, *Ecklon and Zeyher*, 2427!, *Zeyher*, 3090!; Zuurberg, March, *Holland*, 32!. Port Elizabeth Division: *Bolus*, 2675!; Shoenmaaker's Kop, Port Elizabeth, *Patterson*, 566!. Albany Division: Grahamstown, March, *Schönland*, 297!; Kowie, *White in Herb. Albany Mus.*!; Alicedale, *Rogers*, 46!.

CENTRAL REGION.—Graaff Reinet Division: Mountain side east of Graaff Reinet, May, *Bolus*, 59!. Cradock Division: Near Cradock, 2700 ft., May, *Bolus*!. Somerset East Division: Near Somerset East, *MacOwan*!.

EASTERN REGION.—Komgha Division: Among shrubs near Komgha, 1200 ft., March, *Flanagan*, 453!. Natal, Botsàbelo, 4900 ft., December, *Schlechter*, 4084!. Pietermaritzburg, November, *Sim*, 4076!.

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18.—*The Genus Calpurnia, E. Mey. (Leguminosae).*—By E. P. PHILLIPS, M.A., D.Sc., F.L.S., Assistant.

CALPURNIA E. Mey.

*Calyx* campanulate, 5-dentate, the two upper lobes smaller and partly connate. *Vexillum* clawed; claw deeply channelled; limb bilobed at the apex and reflexed; alae clawed, oblong, obtuse; carina clawed, usually plano-convex in outline, obtuse. *Stamens* 10; filaments free or connate at the base, glabrous, or rarely pubescent; anthers small, oblong. *Ovary* stalked, glabrous, villous, or ciliate on the sutures, several ovuled; style arcuate; stigma small, capitate. *Legume* stalked, usually broadly linear, sometimes with a narrow wing on the ventral suture, tipped with the remains of the style.

Shrubs or small trees with yellow flowers, and glabrous or pubescent or more rarely villous branches. Leaves pinnately compound with 3–many pairs of leaflets; leaflets usually pubescent, more rarely softly tomentose, obtuse or retuse at the apex, frequently mucronate. Inflorescence racemose, axillary or terminal, frequently arranged in a paniculate manner, few to many-flowered, longer or shorter than the leaves.

A small genus of 7 known species which are mainly found in the eastern parts of South Africa. Three of the species have a wide range of distribution, while the remaining 4 are all local. *C. sylvatica*, for instance, extends from Somerset East to Colenso in Natal; *C. intrusa* from Komgha, through Pondoland, East Griqualand, and Natal into Basutoland, and as far north as Harrismith in the Orange Free State; *C. lasiogyne* has not been recorded further south than Natal, but is again found at Barbeton in the Transvaal and extends into Tropical Africa. *C. floribunda* has only been recorded from the Albany Division, *C. robinoides* from Basutoland, and *C. Woodii* from Natal. An incomplete specimen which appears to be a species of *Calpurnia* has been collected by Dr. J. Muir in the Riversdale Division, in which case the area of distribution would be extended westwards along the southern coastal belt.

I am much indebted to Mr. N. E. Brown, A.L.S., who kindly sent me a list of the material in the Kew Herbarium.

## Key to Species.

Flowers 1·3-2 cm. long when dried.

Ovary glabrous . . . . . 1. *sylvatica*.

Ovary adpressed-pubescent . . . . . 2. *lasiogyne*

Flowers less than 1 cm. long when dried.

Young branches and petioles softly tomentose.

Leaflets glabrous above; racemes rather laxly 6-12-flowered . . . . . 3. *villosa*.

Leaflets pubescent on both sides; racemes densely many-flowered . . . . . 4. *Woodii*.

Young branches and petioles glabrous or minutely adpressed-pubescent.

Leaves with 3 (rarely 4) pairs of leaflets; racemes less than 12-flowered . . . . . 5. *robinoides*.

Leaves with many (rarely 5 or 6) pairs of leaflets; racemes many-flowered.

Leaflets minutely apiculate; racemes in a leafless panicle; flowers 8-9 mm.; long, drying pale yellowish-white . . . . . 6. *floribunda*.

Leaflets distinctly mucronate; racemes in leaf-axils; flowers 6 mm. long, drying dark brownish . . . . . 7. *intrusa*.

1. *C. sylvatica* (E. Mey., Comm., p. 2).

*Branches* terete, glabrous, sometimes minutely pubescent. *Leaves* 7-17·5 cm. long, 4-8-jugate; leaflets ·9-4·7 cm. long, ·6-2·4 cm. broad, obovate, oblong, elliptic-oblong or elliptic, rounded or retuse at the apex, rounded or slightly narrowed at the base, glabrous or scantily puberulous above and beneath, shortly stalked on petioles 2-4 mm. long, the petiole of the terminal leaflet ·7-1·1 cm. long. *Inflorescence* racemose, axillary, as long as or shorter than the leaves, rarely exceeding the leaves. *Rachis* glabrous or minutely puberulous. *Bracts* ·5 mm. long, ovate, concave. *Pedicels* ·8-1·3 cm. long, glabrous or minutely puberulous, articulated just below the calyx. *Flower-buds* 7-9 mm. long, ellipsoid, obtuse; mature flowers 1·6-1·8 cm. long. *Calyx-tube* 5-6 mm. long, campanulate, conical at the base, glabrous or scantily puberulous; lobes 3 mm. long, 3 mm. broad, triangular-ovate, the two posterior lobes smaller, ciliated. *Vexillum* 1·5 cm. long, 8 mm. broad above, obovate, reflexed, glabrous; alae 1·7 cm. long, 6 mm. broad, oblong, rounded at the apex, with a linear claw 5 mm. long; carina 1·5 mm. long, 5·5 mm. broad at the widest part, plano-convex in outline, rounded at the apex, with a linear claw 6 mm. long. *Filaments* 1·6 cm. long, linear, broadening to the base; anthers oblong. *Ovary* stalked, 1·3 cm. long, 1·5 mm. broad, linear, 11-ovuled,



glabrous; style 5.5 mm. long, bent at right angles to the ovary; stigma minute, capitate. *Fruits* 8 cm. long, 1.2–1.4 cm. broad, linear, acutely mucronate at the apex, glabrous.

*Harv. and Sond., Fl. Cap., ii, 267; Sim., For. and For. Fl. Cape., 204, t. 54, fig. 2; Virgilia sylvatica, DC., Prodr. II, 98; Sophora sylvatica, Burch., Trans., ii, 146.*

SOUTH AFRICA.—Without locality, *Mund and Maire\**!, *Bowie*.

SOUTH-WESTERN REGION.—Somerset East Division: near Somerset East, 2300 ft., March, in open bush, *Bolus*, 346!. Uitenhage Division: Oliphant's Hoek and Adow, May–June, a small forest tree, *Zeyher*, 2234!, October–December, *Zeyher*, 1142!; Addow, *Zeyher\**!; Enon, *Drège\**!; Eland's River, December, *Patterson*, 944!. Albany Division: Port Alfred, May, *Rogers*!, 120 ft., May, *Schlechter*, 2741!, in woods round Grahamstown, *MacOwan*, 702!, near Grahamstown, *Atherstone\**!. Victoria East Division: *Cooper*, 311\*!.

SOUTH-EASTERN REGION.—Stockenstroom Division: Shady places at Kat River, November, *Zeyher*, 1142!; Katberg, *Shaw\**!. King William's Town Division: In woods on Mount Coke, 1200 ft., May, *Tyson*, 3062!; British Kaffraria, *Cooper*, 311\*!; East London, April, *Wormald*, 55!. Komgha Division: A small tree in woods near Komgha, 2000 ft., January, *Flanagan*, 127!, *Schlechter*, 6158!. Transkei: A shrub about 10 ft. high in woods near Kentani, 1200 ft., February, *Pegler*, 155!. Tembuland: Near Xalanga, 4700 ft., January, *Bolus*, 8897!. Natal: Colenso, *Rehmann*, 7145!; near Durban, May, *Collector*?!.

CENTRAL REGION.—Somerset Division: Bosch. Berg, *Burchell*, 3138\*!, 3233\*!.

## 2. *C. lasiogyne* (E. Mey., Comm., p. 3).

A tree 20 ft. high (*ex Galpin*). *Branches* pubescent. *Leaves* 8–17 cm. long, pinnate, 4–8-jugate; leaflets opposite or alternate, shortly petiolate, 1–3.8 cm. long, .35–.47 cm. broad, oblong, sometimes oblong-linear, rarely oblong-ovate, obtuse, rounded or slightly retuse at the apex, pubescent above and beneath. *Inflorescence* 8–15.5 cm. long, about 10–15-flowered. *Pedicels* 1.2–1.5 cm. long, pubescent. *Calyx-tube* 6 mm. long, campanulate, pubescent; lobes 3.5 mm. long, triangular-ovate, obtuse, pubescent within and without. *Vexillum* 2.1 cm. long, the limb bent at right angles to the claw; limb 9 mm. broad, oblong, deeply retuse at the apex; claw channelled; alae

\* The specimens marked with an asterisk are in the Kew Herbarium, a list of which was kindly sent me by Mr. N. E. Brown.

2.1 cm. long; limb 1.5 cm. long, 6 mm. broad, oblong; claw 6 mm. long, linear; carina 1.6 cm. long, 4 mm. broad, almost plano-convex in outline, obtuse; claw 7 mm. long, linear. *Filaments* 1.5 cm. long, dilated at the base; anthers 1 mm. long, oblong. *Ovary* stalked; stalk 5 mm. long, pubescent; ovary 7 mm. long, linear in outline, arcuate, shortly pilose; style 6 mm. long, semiterete; stigma small. *Fruit* 5–6 cm. long, .8–1 cm. broad, linear, tipped with the remains of the style, 4–6-seeded.

*Harv. and Sond., Fl. Cap., ii, 267; C aurea, Bkr., in Fl. Trop. Afr., ii, 252; Bull. Herb. Boiss. iv (1896), Append. II, 222; Virgilia aurea, Lam., iii, t. 326; DC., Prodr. II, 98; A. Rich., Fl. Abyss., i, 234; Podalyria aurea, Willd., Sp. Pl., ii, 502; Robinia subdecandra, L'Her. Stirpes, t. 75.*

SOUTH-EASTERN REGION.—Pondoland: Between Umtata River and St. John's River, *Drège\**!. Natal: Among bushes near Durban, 100–150 ft., September, *Wood, 102!*, *6125!*, *Krauss, 325!*, *Drège, Gueinzins!*; Umzimyati Valley. *Wood, 1344\**!, without precise locality, *Gerrard, 135\**!.

TRANSVAAL.—Rimer's Creek, Barberton, 4500–4800 ft., December, *Galpin, 1214!*; Zoutpansberg, Potatobosch, 4750 ft., January, *Burtt-Davy, 1208!*; between Delagoa Bay and Pretoria, August–September, *Bolus, 7753!*; Shilovane, *Junod, 580\**!.

3. *C. villosa* (Harv., in Harv. and Sond., Fl. Cap., II, 268).

Young branches softly tomentose, becoming glabrous with age. *Leaves* 2–5.5 cm. long, 3–6-jugate; petiole softly tomentose; leaflets 7–15 mm. long, 4–7 mm. broad, elliptic-oblong, rounded at both ends, apiculate or minutely mucronate, glabrous above, adpressed silky beneath. *Racemes* 3–5.5 cm. long, softly tomentose, 6–12-flowered. *Pedicels* 4–5 mm. long. *Calyx* of fully expanded flowers (not of buds) intruse at base, softly pubescent outside; tube and lobes each about 2.5–3 mm. long. *Corolla* glabrous; vexillum 1.1–1.2 cm. long, abruptly recurved at the 4 mm. long claw, with the obovate limb about 5 mm. broad; alae as long as the keel; claw 4 mm. long; limb 8 mm. long, falcate-lanceolate, auricled at the base, obtuse; carina about 1.1 cm. long, obtuse. *Stamens* and ovary not seen.

SOUTH AFRICA.—Without locality, *Mund and Maire*.

4. *C. Woodii* (Schinz, in Bull. Herb. Boiss. iv (1896), 426).

*Branches* whitish tomentose. *Leaves* 8–10 cm. long, 8–10-jugate; leaflets 1.3–2.5 cm. long, .7–1.2 cm. broad, oblong, rounded at the

base, apex rounded and shortly mucronate, densely pilose above and beneath, with the mid-rib distinct beneath, obscure above. *Inflorescence* racemose, a little shorter than the leaves. *Peduncle* pilose. *Pedicels* 6 mm. long, pilose. *Calyx-tube* 3 mm. long, pilose; lobes 2 mm. long, ovate, subacute, pilose. *Vexillum* 9 mm. long, 5·5 mm. broad, suborbicular, bilobed at the apex, with a linear channelled claw 4 mm. long; alae 1 cm. long, 3 mm. broad, oblong, rounded at the apex, with a linear claw 3 mm. long; carina 8·5 mm. long, 3·5 mm. broad, plano-convex in outline, with a linear claw 4 mm. long. *Filaments* 8 mm. long, linear; anthers 5 mm. long, oblong. *Ovary* shortly stalked, 5 mm. long, linear, densely villous; style 3 mm. long, slightly curved; stigma small, capitate.

SOUTH-EASTERN REGION.—Natal: Weenen County, South Downs, 5000 ft., December, *Wood*, 4377!; slopes of the Drakensbergen, 4300 ft., *Wood*, 3516\*!

5. *C. robinioides* (E. Mey., Comm., p. 2).

*Branches* glabrous. *Leaves* 5–10 cm. long, 3–4-jugate; leaflets 1·2–2·7 cm. long, 0·6–1·6 cm. broad, oblong, obovate, rounded and mucronate at the apex, sometimes retuse, slightly narrowed at the base, minutely pubescent, becoming almost glabrous with age, mid-rib prominent beneath, sunken above. *Inflorescence* axillary, 5–8 cm. long, shorter than the leaves. *Peduncle* minutely pubescent or almost glabrous. *Pedicel* 3·5 mm. long, articulating just below the calyx, terete, minutely pubescent. *Calyx-tube* 3 mm. long, campanulate, pubescent; lobes 1·5 mm. long, 2 mm. broad, triangular-ovate, the anterior lobe smaller, pubescent within and without. *Vexillum* 9 mm. long, 5 mm. broad, obovate, bifid at the apex, with a short claw 2 mm. long, channelled down the inner face and ciliate on the margins; alae 1·1 cm. long, 4 mm. broad, oblong, with a linear claw 2·5 mm. long; carina 1 cm. long, 4·5 mm. broad, almost plano-convex in outline, with a linear claw 2·5 mm. long. *Filaments* 8 mm. long, pubescent in the lowermost third; anthers 7·5 mm. long, oblong. *Ovary* stalked, 8 mm. long, with ciliated sutures; style 3 mm. long, arcuate; stigma small, capitate. *Fruits* 2·5–3 cm. long, 8 mm. broad, linear-oblong, reticulately veined, glabrous.

*C. sericea*, *Harv., Fl. Cap., ii*, 267.

EASTERN MOUNTAIN REGION.—Basutoland, *von Schlicht*, 82; Leribe, 5–6000 ft., *A. Dieterlen*, 584!. Aliwal North Division: On a rocky hill by the Kraai River, *Drège*\*!

6. *C. floribunda* (Harv., Fl. Cap., II, 267).

*Branches* ribbed and pubescent. *Leaves* 6–13 cm. long, 5–9-jugate; leaflets 0.8–2.6 cm. long, 0.5–1.2 cm. broad, oblong, rounded and retuse at the apex, slightly narrowed at the base, glabrous or with a very scanty and minute pubescence on one or both sides. *Inflorescence* 4.5–7 cm. long, racemose, densely massed in a paniculate manner at the ends of the branches, leafless. *Peduncle* pubescent. *Pedicels* 5 mm. long, terete, pubescent, articulating just below the calyx. *Calyx-tube* 3 mm. long, campanulate, pubescent; lobes 1 mm. long, ovate, pubescent without. *Vexillum* 1 cm. long, 4 mm. broad, oblong, retuse at the apex, with a channelled linear claw 3 mm. long, alae 1.1 cm. long, 3 mm. broad, oblong, rounded at the apex, with a linear claw 4 mm. long; carina 9 mm. long, 3 mm. broad, almost plano-convex in outline, rounded at the apex, with a linear claw 3.5 mm. long. *Filaments* 8–8.5 mm. long, linear; anthers 0.75 mm. long, oblong. *Ovary* stalked, 7 mm. long, 1 mm. broad, linear, villous; style 2.5 mm. long, arcuate; stigma small, capitate.

SOUTH-WESTERN REGION.—Albany Division: Between Bathurst and Grahamstown, *Glass*, 212!; Waaipplaats, near Grahamstown, May, *Collector*!?; roadside near Grahamstown, *Hutton*\*!

7. *C. intrusa* (E. Mey., Comm., p. 2).

*Branches* pubescent or shortly villous. *Leaves* 7–11 cm. long, 5–13-jugate, rarely 4-jugate; leaflets 0.7–2.1 cm. long, 0.45–1.3 cm. broad, oblong or elliptic, more rarely obovate, rounded at the base, with mid-rib prominent beneath and sunk above, pubescent above and beneath, rarely becoming glabrous. *Inflorescence* 6–15 cm. long, racemose, longer than the leaves. *Peduncle* pubescent. *Pedicels* 5 mm. long, terete, pubescent. *Calyx-tube* 2 mm. long, campanulate, pubescent; lobes 1 mm. long, ovate, subacute. *Vexillum* 6 mm. long, 3 mm. broad, bi-lobed at the apex, with a channelled linear claw 2.5 mm. long; alae 7.5 mm. long, 2 mm. broad, oblong, obtuse, with a linear claw 3 mm. long; carina 7 mm. long, 2.5 mm. broad, plano-convex in outline, obtuse, with a linear claw 3 mm. long. *Filaments* 6–6.5 mm. long, linear; anthers 0.5 mm. long, oblong. *Ovary* stalked, 4 mm. long, 0.75 mm. broad, linear, ciliated; style 2 mm. long, arcuate; stigma small, capitate. *Fruit* 1–5 cm. long, 0.3–1 cm. broad, mostly linear, sometimes ovate.

*Harv. and Sond., Fl. Cap., ii*, 268; *C. obovata*, *Schinz, in Bull. Herb. Boiss., iv* (1896), 426; *C. mucronulata*, *Harms ex Kuntze Rev. Gen.*

III, ii, 54; *Virgilia intrusa*, R. Br., in *Hort. Kew*, iii, 4; DC., *Prodr.* II, 98.

SOUTH-EASTERN REGION.—Kongha Division: Prospect Farm, Kongha, March, *Flanagan*, 277!, and in *MacOwan*, *Herb. Austro-Afric.*, 1450\*!. Tembuland: A shrub about 3 ft. high, near streams at Cala, 4000 ft., February, *Pegler*, 79!. Transkei: Woods between Gekau (Gecua) River and Bashee River, 2000 ft., *Drège*\*!; Bashee River, *Baur*, 575\*!; Tsomo River, *Mrs. Barber*, 814\*!; Butterworth, *Miss Pegler*, 1473\*!. East Griqualand: Mount Currie, near Kokstad, 5000 ft., March, *Tyson*, 1355!, and in *MacOwan and Bolus*, *Herb. Austro-Afric.*, 1248\*!. Natal: Currie's Post, 5000 ft., February, *Schlechter*, 6811!; grassy slopes at Umlass, 2000 ft., December, *Haygarth*, 220!; rocky hills, South Downs, 5000 ft., December, *Wood*!; Inanda, *Wood*, 956\*!; and without precise locality, 3522\*!; Ingunga, 3000 ft., *Schlechter*, 6310!.

EASTERN MOUNTAIN REGION.—Bester's Vlei, near Harrismith, 5400 ft., December, *Bolus*, 1856!; banks of rivers, Harrismith, *Cooper*, 856\*!, *Sankey*, 40!. Basutoland: Leribe, *A. Dieterlen*, 37!, *Phillips*, 835!.

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19. CONTRIBUTIONS TO OUR KNOWLEDGE OF THE FRESHWATER  
ALGAE OF AFRICA.\*

- (2) *A First Report on the Freshwater Algae mostly from the Cape Peninsula in the herbarium of the South African Museum.*—By F. E. FRITSCH, D.Sc. (Professor of Botany, East London College, University of London).

(With 43 figures in the text.)

A. INTRODUCTORY REMARKS.

THE literature dealing with the freshwater algal flora of the continent of Africa is by no means extensive; moreover, collectors have shown a preference for the Central and Northern parts and have almost completely ignored the South. Apart from two early papers by Rabenhorst† and Reinsch‡, we have, in more recent years, Nordstedt's valuable account§ of Algae, especially Desmids, found amongst museum-specimens of *Utricularia*, several of them collected at the Cape; a brief paper by Wille||, mainly on Algae from the Zambesi; and lastly, G. S. West's paper¶ on the freshwater Algae of the Percy Sladen Memorial Expedition in South-West Africa (1908–11).

The field is thus an almost untouched one; in fact, Cape Province has been less known from the point of view of its Freshwater Algae than almost any other important centre on the surface of the earth. It is therefore not surprising that the collections of Algae, dealt with in the subsequent pages, have yielded a number of very interesting forms, as instanced by the description of two new species of *Ecballo-*

\* The first paper (Some Freshwater Algae from Madagascar) of this series was published in the *Annales d. Biologie lacustre*, vii, 1914; no separate copies have been received owing to the outbreak of the European war.

† Rabenhorst, *Beitr. z. Kryptogamenfl. Südafrik.*, Pilze u. Algen, *Allg. deutsch. naturh. Zeit.*, i, 1855.

‡ Reinsch, *Contr. ad. fl. Alg. aq. dulc. Promont. Bon. Spei*, *Journ. Linn. Soc., Bot.*, xvi, 1877, p. 232.

§ Nordstedt, *De alg. nonnull., praeipue Desm., inter Utricularias, etc.*, *Lunds Univ. Arsskrift*, xvi, 1880.

|| Wille, *Ueb. einige v. J. Menyhardt in Südafrika gesamm. Süswasseralg.*, *Oesterr. bot. Zeitschr.*, 1903.

¶ G. S. West, in *Annals of the South African Museum*, ix, 1912, p. 61.

*cystis*, of a second species of *Sphaeroplea*, and by the rediscovery of *Hydrodictyon africanum*, already known from the work of Yamanouchi.\* The total number of new Algae described in the present report is nineteen species and six varieties, apart from a number of new forms, whilst the species here recorded number 238 in all (ninety-seven genera). Nevertheless, it is obvious that the list of species based on these collections cannot be regarded as typical of the algal flora of the Cape Peninsula, since several common genera are quite unrepresented, whilst of others only one or two species have been found. It is hoped to remedy this state of affairs in subsequent reports, but for the present it would be misleading to attempt any general consideration of the aspect of the freshwater algal flora.

All the collections dealt with in the present report were made in the year 1908, but owing to a misapprehension, considerable delay has arisen in working them out. The fifty-nine samples were collected from diverse localities by a number of different botanists, as will be seen by reference to the enumeration of samples which follows. This list is intended to serve as a general key to the collections, and in the subsequent systematic treatment only the numbers of the samples are given.

My thanks are due to Prof. H. H. W. Pearson, who first started sending me these collections, and to Dr. L. Péringuey, the Director of the South African Museum, who has continued the work. I am also exceedingly indebted to my colleague, Dr. E. J. Salisbury, who has drawn many of the figures illustrating the present report and has made several valuable suggestions.

#### B. ENUMERATION OF THE SAMPLES.

1. On a sloping granite rock, over which water was trickling, quite exposed to the sun, Kasteel's Poort Stream, Twelve Apostles' Range, about 1000 ft. above sea-level. January, 1908 (coll. E. P. Phillips). (*Mougeotia* sp., *Zygnema* sp., *Oscillatoria tenuis*, *Cosmarium capense*, var. *minor*.)

2. In a shallow mountain stream, well shaded by large trees, current very slow, below Long Kloof on the Twelve Apostles' Range, about 2000 ft. above sea-level. February, 1908 (coll. E. P. Phillips). (*Tribonema bombycinum*, f. *genuina*, various Desmids and Diatoms, especially species of *Eunotia*.)

3. Small stream by roadside, shaded by overhanging bush, Camps Bay, about five miles from Cape Town. March 1st, 1908 (coll.

\* Yamanouchi, Bot. Gazette, lv, 1913, p. 74.



E. P. Phillips). (*Spirogyra* sp., *Oscillatoria amphibia*, *Ulothrix variabilis*, various Desmids, *Navicula anglica*, *Euglena oxyuris*.)

4. The same. (*Oedogonium* sp., *Ulothrix gelatinosa* n. sp., species of *Scenedesmus*, *Navicula interrupta*, and numerous other species of the genus in less abundance, *Nitzschia* spp., *Euglena oxyuris*, and species of *Trachelomonas*.)

5. Stagnant pool, shaded by overhanging bush, Camps Bay. March 1st, 1908 (coll. E. P. Phillips). (*Vaucheria geminata*, *Anabaena inaequalis* (?), *Oscillatoria tenuis*, *Lyngbya kuetzingii* var. *distincta*, *Spirulina major*, species of *Closterium*, *Pleurotaenium ovatum* and *P. ehrenbergii*, *Pinnularia major* and *P. distinguenda*, diverse species of *Navicula* and *Nitzschia*, *Trachelomonas hispida*.)

6. The same, but Algae from green film over mud at bottom of pond. (*Oscillatoria tenuis* and *O. formosa*, *Anabaena oblonga*, *Spirulina major*, *Cylindrospermum alatosporum* n. sp., same Diatoms as in 5, together with *Mastogloia smithii* and *M. grevillei*.)

7. Green frothy scum on surface of water in a rather large hole in the bed of a small mountain stream, otherwise quite dry, well shaded by a large rock and surrounding bushes; in a deep valley on the Twelve Apostles, about 2000 ft. alt. March 8th, 1908 (coll. E. P. Phillips). (*Euastrum capense* n. sp., *Cosmarium punctulatum*, *Xanthidium brevispinum* n. sp., a few species of *Navicula*.)

8. On a sloping rock over which the water trickled rather swiftly (water from pool from which sample 9 was collected), a soft flocculent mass, position exposed to sun for greater part of day. Orange Kloof, below Tunnel Door, about 2000 ft. alt. (Table Mt.). March 8th, 1908 (coll. E. P. Phillips). (*Tribonema bombycinum*, *Ulothrix variabilis*, *Mougeotia* sp., *Scenedesmus bijugatus*, *Ecballocystis ramosa* n. sp., *Cosmarium capense* var. *minor*, *Spondylosium pygmaeum* var. *capensis*, *Staurastrum hexagonale* n. sp. and *S. punctulatum*, also other Desmids, *Eunotia bicapitata*, *Navicula rhomboides* and var. *saxonica*.)

9 and 10. In running water, on a flat rock, in a place where the water widened out into a shallow pool, same locality as 8. (*Tribonema bombycinum*, *Ulothrix variabilis*, *Bulbochaete* sp., much the same Desmids and Diatoms as in 8.)

11, 12, and 13. From a mountain spring in a hollow, forming a small pond, thickly overgrown with a water-weed, Orangezicht, above Cape Town (300 ft.). March 24th, 1908 (coll. E. P. Phillips). (*Microspora pachyderma*, *Microthamnion strictissimum*, species of *Trachelomonas*, *Phacus*, and *Lepocinclis*.)

14. Pond in Municipal Gardens, Cape Town, growing on stems and petioles of *Limnanthemum indicum*, Thw. April 13th, 1908 (coll.

E. P. Phillips). (A rich growth of unicellular and colonial forms mainly composed of *Scenedesmus quadricauda* and *S. acuminatus*, *Selenastrum gracile*, *Ankistrodesmus falcatus* and var. *spirilliformis*, *Cosmarium laeve*, *Microcystis* sp., a few Diatoms, species of *Trachelomonas* (including *T. radiosa* n. sp.), *Phacus*, and *Lepocinclis*.)

15. The same, but Algae growing on the brick walls of the pond. (*Phormidium valderianum*, *Coelastrum morus* f. *capensis*, *Oedogonium* sp., *Calothrix fusca*, and the same forms as in 14, but in smaller quantity, and together with *Pleurococcus koettlitzii*, *Achnanthes minutissima*, and species of *Gomphonema*.)

16. Small pool of water in the hollow of a rock, Table Mt., 3000 ft. alt. April 12th, 1908 (coll. E. P. Phillips). (*Mesotaenium chlamydo-sporum*, *Schizochlamys hyalina* n. sp., *Calothrix* sp., *Stigonema hormoides*.)

17. "Vlei" on Green Point Common, dry for the greater part of the year, but becoming filled during winter. Algae occurring in large masses on edge. April 28th, 1908 (coll. E. P. Phillips). (*Sphaeroplea africana* n. sp., *Oedogonium* sp.)

18. Large "vlei" at Maitland, about three miles from Cape Town; Algae submerged and free, forming patches of a light green colour. July 11th, 1908 (coll. E. P. Phillips). (*Sphaeroplea africana* n. sp.)

19. Small pond about 500 yards from the "vlei" of the previous sample. July 11th, 1908 (coll. E. P. Phillips). (*Ulothrix subtilissima*, *Scytonema mirabile*, *Ecballocystis simplex* n. sp., *Cosmarium capense* var. *minor*, *Staurastrum hexagonale* n. sp., *Cylindrocystis crassa*, *Mougeotia* spp.)

20. Same "vlei" as No. 18. (*Hydrodictyon africanum*.)

21. Valkenberg Vlei. June 28th, 1908 (coll. W. T. Saxton). (*Oedogonium* sp., *Trochiscia aspera*, *Ophiocytium arbuscula*, *Synedra pulchella*, species of *Gomphonema*.)

22. Small stream, Kloof Road, Cape Town (coll. W. T. Saxton). (*Zygnema* sp., *Oedogonium* sp., *Hormidium rivulare*.)

23. Valkenberg Vlei. June 3rd, 1908 (coll. W. T. Saxton). (*Spirogyra* sp., *Oedogonium* sp., *Aphanothece microspora*.)

24. Valkenberg Vlei. June 28th, 1908 (coll. W. T. Saxton). (*Spirogyra* sp., *Oedogonium* sp., *Cosmarium pseudobroomei* var. *convexum*, *C. subbroomei* var. *pseudo-pearsoni* n. var., *Closterium malinvernianum* f. *major*, *Eudorina elegans*, *Trachelomonas hispida*, *Peridinium* sp.)

25. Modder River, Orange Free State. June 29th, 1908 (coll. H. H. W. Pearson). (*Spirogyra* spp., *Oscillatoria limosa*, scanty Desmids, *Melosira varians*, species of *Epithemia*, *Cymbella*, *Navicula*, and *Nitzschia*.)

26. Orange River, Cape Province. June 25th, 1908 (coll. H. H. W. Pearson). (*Spirogyra* spp., *Nodularia harveyana*, *Closterium libellula*, *Cosmarium subbroomei* var. *pseudo-pearsoni*, species of *Nitzschia*, *Hantzschia amphioxys*.)

27. On a concrete dam, about two miles from Matjesfontein, Cape Province. June 22nd, 1908 (coll. H. H. W. Pearson). (*Tribonema bombycinum* f. *minor*, *Phormidium autumnale*, a few Diatoms).

28. Modder River, Orange Free State, free floating. July 28th, 1908 (coll. H. H. W. Pearson). (*Spirogyra* spp., *Synedra acus*.)

29, 29a, 30, 30a, Reit River, attached to *Myriophyllum*. July 28th, 1908 (coll. H. H. W. Pearson). (*Cladophora glomerata*, *Oedogonium boreale*, *Stigeoclonium prostratum* n. sp., *Gongrosira disciformis* n. sp., *Nostoc hederulae*, *Rivularia natans*, *Anabaena circinalis* (?), *Lyngbya rivulariarum*, *Coleochaete scutata*, *Aphanochaete repens*, *Cosmarium botrytris* and var. *tumidum*, *C. sexangulare* var. *subangulare* n. var., *C. perpusillum*, *Eudorinella wallichii*, *Apiocystis brauniana*, *Oocystis solitaria*, various Diatoms, mainly epiphytic.)

31. Riet River, Orange Free State, attached to Willow leaves. July 28th, 1908 (coll. H. H. W. Pearson). (Much the same as the four previous samples, with the absence of the Cyanophyceae).

32. Modder River, Orange Free State, with *Ranunculus*, etc. July 28th, 1908 (coll. H. H. W. Pearson). (*Zygnema stellinum*, *Spirogyra juergensii* and *S. hassallii*, *Anabaena catenula*, species of *Cosmarium*, *Navicula*, and *Nitzschia*).

33. Riet River, Orange Free State. July 28th, 1908 (coll. H. H. W. Pearson). (Very similar to samples 29, 29a, 30, and 30a.)

34. In a small pond, which was drying up, adjoining the "vlei," of No. 17, Green Point Common; Algae forming a frothy green mass. July 22nd, 1908 (coll. E. P. Phillips). (*Mougeotia* sp., *Spirogyra* sp., *Scenedesmus obliquus*.)

35. From another small pond, in the same locality as No. 34, where the water had completely dried up, leaving the Algae as a thick green carpet on top of the moist ground. (*Oedogonium* sp., *Spirogyra* sp., *Closterium acerosum*, *Cosmarium subbroomei* formae, *Amphora ovalis*.) (N.B.—Sample 34a is just the same as 35.)

36. Forming a green scum on the surface of the water of a pond formed by a natural spring in the Municipal Gardens, Cape Town. July 22nd, 1908 (coll. E. P. Phillips). (*Oedogonium pisanum*, *Chlamydomonas intermedia* and *C. reinhardi*, *Navicula cryptocephala*, *N. interrupta*, *Nitzschia palea*.)

37. In a little pool, formed by water flowing from a leaking water-pipe, Pipe Track, slopes of Table Mt., about 1000 ft. July 19th,

1908 (coll. E. P. Phillips). (*Mougeotia* sp., *Ulothrix variabilis*, *Schizothrix polytrichoides* n. sp., *Netrium oblongum* var. *cylindricum*.)

38. In a small streamlet, running as an overflow from a spring, Pipe Track, about 1000 ft. July 19th, 1908 (coll. E. P. Phillips). (*Mougeotia* sp., *Hormidium rivulare*.)

39. On a vertical rock, at side of an embankment, through which water was trickling, locality? July 19th, 1908 (coll. E. P. Phillips). (*Zygnema spirale* n. sp., species of *Oocystis* and *Scenedesmus*, *Ankistrodesmus falcatus* and var. *spirilliformis*, species of *Cosmarium*, *Aphanocapsa elachista* var. *conferta*.)

40. Victoria Falls, date unknown. (Presented by Dr. R. Marloth.) (*Nostoc pruniforme*?)

41. Growing among Moss on a sloping granite rock, over which a strong stream of water was running (stream quite dry during the summer), Pipe Track, slopes of Table Mt., about 900 ft. July 26th, 1908 (coll. E. P. Phillips). (*Mougeotia* sp., *Phormidium subfuscum*, *Lyngbya aerugineo-coerulea*, various Diatoms.)

42. Flocculent sediment at bottom of a small basin-shaped hollow in a rock, summit of Twelve Apostles, Table Mt., about 3000 ft. July 26th, 1908 (coll. E. P. Phillips). (*Dichothrix fusca* n. sp., *Scenedesmus cohaerens* n. sp., *Gloeocapsa rupicola*, *Pleurococcus antarcticus* f. *simplex*.)

43. Velvety covering on sand at bottom of a small stream, which was running to waste from a water-pipe, Tunnel Door, Slangoolie Ravine, Table Mt., about 2000 ft. July 26th, 1908 (coll. E. P. Phillips). (*Phormidium subfuscum*, *Oscillatoria amoena*, numerous Diatoms.)

44. Attached to *Crassula natans*, in a basin-shaped hollow on top of a high rock, which becomes filled with water during rains and heavy fogs, summit of Muizenberg Mts. August 3rd, 1908 (*Dichothrix spirale* n. sp., *Oedogonium* sp., *Chaetopeltis* sp., *Oocystis rupestris*, *Scenedesmus cohaerens* n. sp., *Euastrum pseudocoralloides* n. sp., *Chamaesiphon minimus*.)

45. Vlei at Lakeside. July, 1908 (coll. A. J. Ballatine). (*Cladophora crispata* forma?, *Oedogonium* sp., *Cocconeis pediculus*.)

46-48. Vlei at Mowbray, near Cape Town. August 20th, 1908 (coll. E. P. Phillips). (*Spirogyra maxima*?, *Oedogonium* sp., *Rhizoclonium hieroglyphicum*, *Ophiocytium majus*, *Tribonema bombycinum* f. *minor*, species of *Scenedesmus*, *Closterium leibleinii*, *Cyclotella operculata*, and numerous other Diatoms.)

49. Small pond, Green Point Common, near Cape Town (pond measuring only a foot or eighteen inches each way). August 20th, 1908 (coll. E. P. Phillips). (*Nostoc linckia*.)

50. Covering a rock, which was lying in a swampy piece of ground, with a thick greenish yellow slime, top of Kasteel's Poort, Table Mt., about 2500 ft. September 6th, 1908 (coll. E. P. Phillips.) (*Zygnema* sp., *Ulothrix subtilissima*, *Hormidium rivulare*, *Tribonema bombycinum* f. *minor*, *Anabaena* sp., *Cylindrocystis crassa* and *C. ornata* n. sp., *Netrium digitus*, *Penium phymatosporum* and *P. conspersum* var. *capense* n. var., *Cosmarium speciosum* var. *simplex*.)

51. Attached to roots of a plant, exposed in a small pool, same locality and date as No. 50. (*Zygnema ericetorum*, and a few Desmids and Diatoms.)

52-55. Muizenberg Vlei (in part growing on stem and leaf-sheath of *Typha*). (Coll. Miss E. Stephens). (*Tolypothrix tenuis*, *Lynbya major*, *Oedogonium crassum* and *O. crispum*, *Bulbochaete* sp., *Coleochaete scutata*, *Aphanochaete repens*, *Cladophora glomerata?*, a few Desmids and numerous Diatoms.)

56, 57. In a spring on Table Mt., 3000-3500 ft. (Coll. P. de Moll). (*Mougeotia* sp., *Ulothrix oscillarina*, *Hormidium subtile*, *Ecballocystis ramosa* n. sp., *Spondylosium pygmaeum* var. *capensis* n. var., *Eunotia lunaris*.)

### C. SYSTEMATIC ENUMERATION OF THE SPECIES OBSERVED.

NOTE.—The species are numbered separately under the individual genera, and in subsequent reports on the Algae of the Cape Peninsula, additional records of localities for these species will merely be given by reference to these numbers. I append for purposes of reference an

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## 1. ISOKONTAE.

### (a) CHLAMYDOMONADALES.

#### (2) CHLAMYDOMONADACEAE.

##### GENUS CHLAMYDOMONAS EHRENBERG.

1. *Chlamydomonas intermedia*, Chodat, Bull. Herbar. Boissier, ii, p. 590, Tab. XXII, XXIII; Wille, Algol. Notizen, xi, Nyt. Mag. f. Naturvidenskab, lxi, 1903, p. 142, Tab. IV, fig. 15.

Sample 36 (very common).

A small form, long. cell.,  $12\ \mu$ ; lat.,  $9\ \mu$ . The bulk of the material was in the *Palmella*-stage. No cilia could be detected on any of the ordinary individuals, so that the determination is not altogether certain.

2. *Chlamydomonas reinhardi*, Dangeard, Recherches s. l. Algues inf., Ann. Sci. Nat., sér. 7, Bot., vii, 1888, p. 130, Pl. XII, figs. 28-39; Wille, *loc. cit.*, p. 139, Tab. IV, fig. 9.

Sample 18 (?), 36 (?).

(NOTE.—Individuals of this genus, whose characters were not sufficiently clear for purposes of determination, were also observed in samples 8, 12, 13, and 31.)

### (5) VOLVOACEAE.

##### GENUS PANDORINA BORY.

1. *Pandorina morum* (Muell.), Bory, Hist. nat. Zoophytes, ii, Paris, 1824, p. 600.

Samples 31, 39.

##### GENUS EUDORINA EHRENBERG.

1. *Eudorina elegans*, Ehrenberg, Infusionsthier, 1831, p. 78, Pl. II, fig. 10.

Samples 24, 31, 33.

The colonies in samples 31 and 33 were 16-celled and consisted of small cells.

## GENUS EUDORINELLA LEMMERMANN.

1. *Eudorinella wallichii* (Turner), Lemmermann, Ber. Deutsch. Bot. Ges., xviii, 1900, p. 307. (Syn.: *Eudorina*? *wallichii*, Turner, K. Sv. Vet.-Ak. Handl., xxv, 1892, p. 155, Tab. XXI, fig. 10.) (Figs. 1, 2.)

Samples 30A, 31, 33.

The typical mature colony is composed of two series, each of four cells, enclosed within a spherical mass of transparent mucilage; the two series of cells lie in parallel planes, the cells of the one series alternating with those of the other (*cf.* Fig. 1 and Fig. 2, *d*). As a result, in a lateral view of the colony, one usually sees two cells of the one tier and three of the other (*cf.* Fig. 2, *a*). The cells of the mature colony are spherical, with a diameter of 8–9  $\mu$ ; they have a well-



FIG. 1.—Diagram to show the disposition of the cells in a typical mature colony of *Eudorinella wallichii* (Turner), Lemmermann, very much magnified.

marked pyrenoid and are provided with a slight papilla at the anterior end, from which the cilia doubtless arise (Fig. 2, *f*). Cilia were not mentioned in the original description by Turner (*loc. cit.*), based on Wallich's manuscript, but have been subsequently recorded by Lemmermann (*loc. cit.*); it is not quite clear, however, on what material his conclusions are based. I have been unable to observe cilia in the South African specimens, but there is no reason to doubt their presence. Each cell is surrounded by a distinct but delicate membrane of its own.

Frequent specimens showing formation of daughter-colonies were encountered. Prior to division the mucilage-envelope widens out somewhat and, at this stage, its limits are often more sharply marked than at any other time. It appears that in some cases the two tiers of cells separate from one another before or during division, but often the two tiers are readily recognisable up to the time of the formation of mature daughter-colonies (*cf.* Fig. 2, *b* and *e*); as will be seen from the figures, one or more cells of the mother-colony not uncommonly fail to divide. I have not been able to observe all the stages in the formation of daughter-colonies, but it appears as though here, as in



other Volvocaceae, a flat plate is first produced, the four peripheral cells of which at an early stage move forwards to form the second tier. At first the cells of the daughter-colonies are closely crowded together (Fig. 2, *b* and *e*), but later they diverge more or less and a spherical mucilage-envelope appears about them. The young cells are at first somewhat pear-shaped and only later become spherical.

It is not at all uncommon to find cells of the mother-colony dividing into more than eight units, but it has been difficult to determine the exact number of cells produced in these cases. In the samples con-

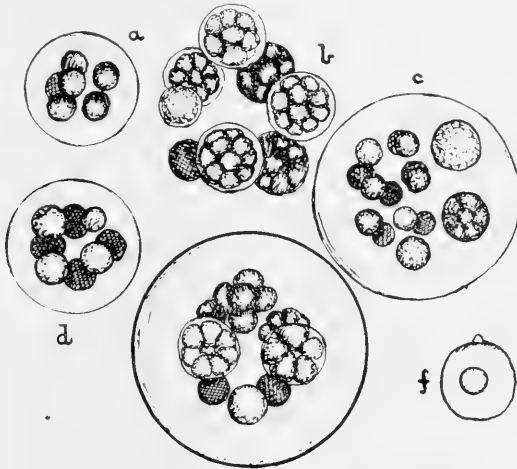


FIG. 2.—*Eudorinella wallichii* (Turner), Lemmermann. *a*. Mature colony, seen from the side. *d*. Ditto, front view. *b*, *c*, and *e*. Various stages in the formation of daughter-individuals; in *b* several of the cells show division into more than eight. *f*. Single cell, more strongly enlarged. *a-e*,  $\times 500$ ; *f*,  $\times 1000$ .

taining the *Eudorinella* 16-celled colonies were occasionally encountered, with an exactly spherical mucilage-envelope and with the cells arranged in very obvious groups of four in the four quadrants; the four cells of each group apparently lay in one plane. It may be that this is a variant of the normal type and that such colonies, by breaking up into four-celled groups, provide those stages in which series of but four cells are found forming daughter-colonies

In his Treatise on the British Freshwater Algae, G. S. West (p. 194), doubts the necessity of placing *Eudorinella* in a genus separate from *Eudorina*. In the very definite arrangement of its cells *Eudorinella*, however, appears as yet another variant of the Volvocaceous type, and as such its retention in a distinct genus seems advisable.

## (b) CHLORODENDRALES.

## (1) CHLORODENDRACEAE.

## GENUS ECBALLOCYSTIS BOHLIN.

1. *Ecballocystis ramosa*, n. sp. (Fig. 3.)

Thallus microscopicus, algis filamentosis pede gelatinoso, hyalino, rotundato vel subconico adhaerens. Cellulae ovoidales vel elliptico-oblongae, ca.  $2-2\frac{1}{2}$  plo longiores quam latae, membrana tenui, in utroque autem polo plus minus incrassata, chromatophora singula (?) laminaeformi, pyrenoidibus duobus concinne ordinatis, nucleo centrali. Divisio cellularum oblique et successive in 2, 4, vel 8 partes fit; interea membrana cellulae maternae augetur et in apice aperitur; deinde una vel duae e cellulis filialibus sursum procedunt et hiatus cellulae maternae pede gelatinoso (qui est eadem crassitudine qua poli) se adiungunt; cellulae filiales residuae in basi cellulae maternae restant vel plus minus in lineam disponuntur. Qua ratione coloniae amplae copiose ramosae oriuntur. Propagatio? (veresimile est zoosporas esse).

Cellulae maternae (*ante fissionem*), usque  $48 \times 20 \mu$ ; cellulae filiales (*ante divisionem*),  $21 \times 10$ ,  $25 \times 12$ ,  $27 \times 10$ ,  $31 \times 12$ ,  $31 \times 16$ ,  $33 \times 14$ ,  $48 \times 16 \mu$  (quae cellula pyrenoides multos habebat).

Sample 8 (rare), 56, 57.

The first beginnings of a colony of this interesting form are shown in Fig. 3, *a*. The oval cell has a thin membrane which is, however, more or less thickened at each pole. The thickening at the lower end is rounded or more or less conical and constitutes the base of attachment of the whole colony. At first it is not readily stained by methyl blue, but later, as it gradually broadens out into a mucilaginous pad

FIG. 3.—*Ecballocystis ramosa*, n. sp. *a*. First beginnings of a colony, the polar thickenings are well seen. *b*. A cell in which the contents have undergone oblique division, the upper half having divided again. *c*. A later stage in development, in which the mother-cell membrane has ruptured and one of the daughter-cells has shifted up to the opening. *d*. An older colony, showing two mother-cell membranes and two daughter-cells which have moved up to the opening in the mother-cell membrane and are in process of further division. *e*. Late stage in division prior to the rupture of the mother-cell membrane. *f*. Initial cell which has undergone two successive processes of rejuvenescence. *g*. A mother-cell which has divided into four parts and is irregularly bulged. *h*. Older colony in which the first cell divided into four parts, only two of the daughter-cells shifting to the aperture; of these one has divided into two, the other into three. *i*. A colony showing formation of reproductive cells (zoospores?). *j*. Division into four with shifting of two cells to the aperture. *k*. A large mature colony, showing rejuvenescence, and an instance of triple branching. The nucleus (shaded) and pyrenoids are shown in many of the figures. All figures  $\times 600$ .

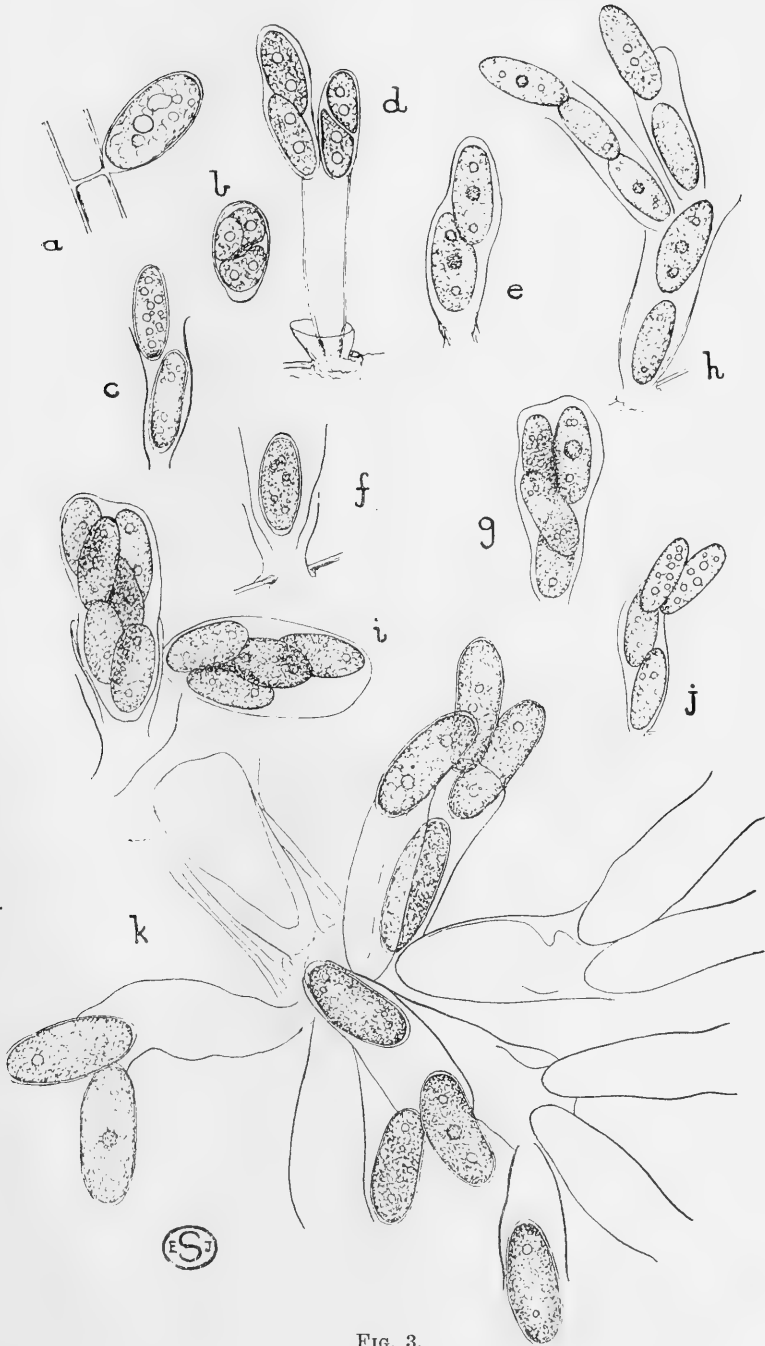


FIG. 3.

(Fig. 3, *d* and *h*), it takes up this stain easily and, ultimately in such stained material, appears as a more or less deep blue diffuse mass in which the lower end of the cell is embedded. The thickening of the other pole is in general not as pronounced, and appears to mark a region of gelatinisation of the membrane in which rupture subsequently takes place.

The development of the colony from this initial stage takes place as follows. The original cell gradually grows to quite considerable dimensions (as much as  $48 \times 20 \mu$ ), although division of the contents may set in before the maximum size is reached. The contents apparently contract slightly away from the membrane and thereupon undergo an oblique division into two, a new membrane appearing around the products (Fig. 3, *b*, *d*, and *e*). In many cases division does not proceed further; the membrane of the mother-cell ruptures at the apex, and one (Fig. 3, *c*), or both (Fig. 3, *d*), of the daughter-cells shift up to the neighbourhood of the opening and become attached there to the mother-cell membrane by a similar polar thickening, to that which effects attachment in the case of the initial cell. It does not appear, however, that these secondary points of attachment become as markedly mucilaginous as the primary one. The free ends of the ruptured mother-cell membrane are often more or less reflexed (Fig. 3, *c* and *h*). The daughter-cells grow and sooner or later divide again in a similar manner (Fig. 3, *d*), and in this way a repeatedly branched colony may arise.

It is not at all uncommon, however, for the initial cell to undergo successive division into four parts (Fig. 3, *b*, *g*, *h*, *j*) before rupture of the mother-cell membrane takes place. Some growth of the products of the first division appears to occur, as the mother-cell membrane in such cases generally appears more or less irregularly bulged out at various points (Fig. 3, *g*), a phenomenon which may even be observed in cases where division into but two parts has taken place (Fig. 3, *e*). Of the four products of division, one or two usually move up to the aperture of the ruptured mother-cell (Fig. 3, *h*, *j*), whilst the remainder tend to become disposed in a more or less linear series within the original mother-cell membrane (Fig. 3, *h*, *j*, *k*), one generally remaining at the base. Cases where three cells have moved up to the opening (as in the lower right hand part of Fig. 3, *k*) are rare.\* It seems

\* The colony shown in Fig. 3, *k* is somewhat unusual, and I am not certain how to interpret it. It may be the result of a number of zoospores settling down and germinating at the same spot (*i. e.* a collection of colonies), or it may be due to a considerable number of daughter-cells having shifted up to the opening of the mother-cell.

that only those cells which come to lie near the opening undergo further division.

Division into more than four parts has not been observed in the case of initial cells, but the production of eight daughter-cells is not at all uncommon in the later divisions of the colony (Fig. 3, *i*). I have not seen a case of division into more than eight parts. I am unable to say what is the exact fate of the products of such division into eight. The mother-cells containing them (Fig. 3, *i*) are generally very irregular in outline, and it is not uncommon to find cells of this form empty and with a very irregular split in the membrane, as often as not situated laterally (*cf.* the left hand upper part of Fig. 3, *k*). I am inclined to take the view that the products of division into eight are liberated *in toto* from the mother-cell and constitute the reproductive cells. It can hardly be doubted that the species under discussion propagates by means of zoospores, the epiphytic habit being difficult to understand on any other assumption. The products of division into eight were, however, generally clothed with a distinct, though thin, membrane; only in a few cases did they appear to be naked (*cf.* Fig. 3, *i*). The sediment, in samples 56 and 57, was examined, and a considerable number of free cells of *Ecballocystis ramosa* were encountered; all of these had a thin membrane. At the same time it should be mentioned that the smallest attached initial cells were of approximately the same dimensions as the products of division of cells into eight. It would only be possible to settle the method of reproduction fully on fresh material, and I am unable to go beyond the suggestion above made.

Rejuvenescence is an occasional feature of this species, although it is not nearly so frequent as in *E. simplex* (*cf.* below). In this case the contents of a cell acquire a new membrane without any division taking place, the original membrane of the cell breaking open apically and later appearing as a cup within which the new cell is attached (Fig. 3, *f*, and upper left hand portion of *k*).

As regards the individual cells, they are oval or elliptic-oblong in shape, the larger ones not uncommonly being slightly curved (Fig. 3, *k*). There appears to be a single plate-like chloroplast, which in the young cell invariably contains two pyrenoids, placed symmetrically in the middle line, either near the two ends of the cell (Fig. 3, *h*) or, more rarely, near the centre. Prior to division, each pyrenoid splits longitudinally into two (*cf.* Fig. 3, *g*), so that for a time the cell contains two pairs of pyrenoids. In some cases big cells have been encountered with quite a large number of pyrenoids; I suspect that these are cells about to divide into eight parts. There is a single,

rather large, spherical nucleus situated in the centre of the cell, midway between the two pyrenoids (Fig. 3, *e, g, h*). The protoplast is often provided with faint ridges, which give it a slightly striated appearance. The cell-contents stain a reddish-violet colour with iodine, which possibly indicates some special form of (amylaceous?) food-reserve.

The genus *Ecballocystis* was established by Bohlin (Algen d. ersten Regnell'schen Expedition, I. Protococcoideen, Bih. t. K. Sv. Vet.-Akad. Handl., xxiii, Afd. iii, No. 7, 1897, pp. 7-9, Tab. I, figs. 1-4) for a macroscopic form, described as *E. pulvinata*. *E. ramosa* shows many points of difference from Bohlin's species. In the first place it does not appear to form macroscopic colonies; although some of the colonies encountered were considerably more extensive than those shown in the figures, none of them would be visible to the naked eye. But there are other more important differences, viz. the complete absence of the prominent stratification of the membrane seen in *E. pulvinata*, the greater length of the cells as compared with their breadth, the fact that some of the daughter-cells nearly always shift right up to the opening of the mother-cell (the last two features leading to a much greater development of the colony, of our species, in the longitudinal direction than in the pulvinate form described by Bohlin), and the fact that division, in our species, appears to be oblique from the very first and not transverse, with shifting to an oblique plane, as in *E. pulvinata*.

Bohlin (*loc. cit.*, p. 9) considered his genus to be most closely allied to Stein's *Chlorangium*, and this suggested affinity is heightened by the discovery of *Ecballocystis ramosa*. Wille (Natürl. Pflanzenfam., Nachtr. z. i Teil, 2 Abt., 1909, p. 27) includes Setchell and Gardner's genus *Colinsiella* in *Ecballocystis*, but it seems doubtful whether this is warranted.

As far as I am aware the genus *Ecballocystis* has not been recorded by any other author, and it is interesting that the new records here given are, like Bohlin's, from the Southern Hemisphere.

2. *Ecballocystis simplex*, n. sp. (Fig. 4.)

Thallus microscopicus, algis filamentosis pulvinulo gelatinoso hyalino adhaerens. Cellulae elongatae, ovales, polis acutis vel saepe subpyramidatis, 3-6 plo longiores quam latae, membrana tenui, chromatophora singula (?), pyrenoidibus duobus (?) vel saepe pluribus. In cellula juvenali contentus membranam replet, mox tamen contentus a fine inferiore recedit, ita ut spatium, ut videtur vacuum, fiat; contentus contractus deinde membranam novam effingit, dum membrana

cellulae maternae in apice aperitur. Innovatione hac cellula gradatim a basi discedit. Divisio cellularum oblique plerumque in duas partes fit, et tum membrana cellulae maternae aperitur; una e cellulis filialibus sursum procedit et hiatus cellulae maternae se adjungit, altera cellula filialis plerumque in basi cellulae maternae manet. Coloniae parum ramosae et simplices sunt. Propagatio? (zoosporas divisione successiva magnae cellulae in partes plures probabile est).

Dimensiones cellularum maternarum:  $36 \times 9$ ,  $42 \times 11.5$ ,  $45 \times 9$ ,  $51 \times 12$ ,  $54 \times 10.5$ ,  $56 \times 12$ ,  $60 \times 12$ ,  $67 \times 10.5 \mu$ . Cellulae filiales (ubi plures efficiuntur; zoosporae?):  $18 \times 6$ ,  $21 \times 7.5 \mu$ .

Sample 19.

The characteristic feature of this species is the abundant and repeated occurrence of rejuvenescence. The initial cell of a colony is here attached to its substratum by a broad pad of mucilage (Fig. 4, *a, e, f, g*). In this species this does not appear to be derived from a thickening of the membrane, but rather to be an excretion from the lower end of the cell. The same seems to be true of the secondary points of attachment (Fig. 4, *a, f*), which appear as diffuse mucilage-areas, well seen after staining with haematoxylin. There is no noticeable thickening of the membrane at the ends of the very elongated cells.

The process of rejuvenescence appears to set in at a very early stage and to take place as follows: The cell undergoes more or less marked elongation, during which the protoplast gradually recedes from the lower end, while maintaining a close connection with the upper end. It appears that the space, which thus arises in the lower part of the cell, is empty, since attempts to disclose the presence of mucilage, by employing such stains as methyl blue, gave no result. This point should be easy to settle with fresh material. If the area at the lower end of the cell is really empty, we have a rather interesting case of growth of the cell, without any accompanying increase in the size of the protoplast. The extent of the space which thus develops is very variable; sometimes the protoplast only shifts upwards a little way before further events ensue (Fig. 4, *a, c, g*); in other cases, however, the cell may almost double its length before the process comes to a stop (Fig. 4, *b*).

When the elongation of the cell has reached its end, a new membrane appears around the contents and the original wall of the mother-cell breaks apically (Fig. 4). From Figs. 4, *c* and *g*, the frequency of this process of rejuvenescence can be gauged, and it will be realised that, by this process, the protoplast of the original cell gets carried away from the point of attachment, with more or less

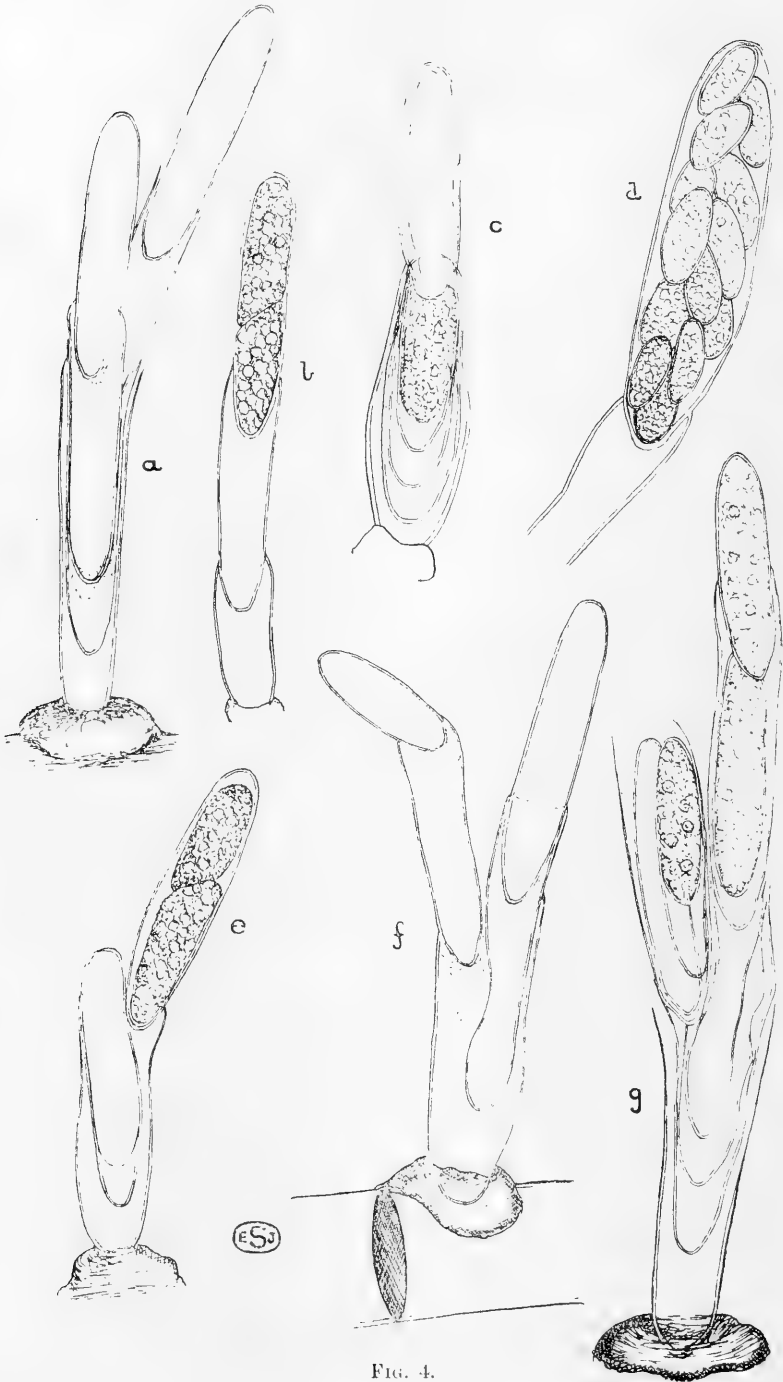


FIG. 4.



rapidity. The successive membranes of the cell are always plainly visible, and enable one to estimate the number of processes of innovation that have taken place. It is noticeable that the successive membranes fit more or less closely around one another at their ruptured ends (*cf.* especially Fig. 4, *a*), the wide apertures characteristic of *E. ramosa* not being encountered in this species.

Sooner or later, however, this process of rejuvenescence ceases and division of the protoplast ensues. With the exception of those cases, to be subsequently described as probable stages in reproduction, I have never observed division into more than two parts in this species. The plane of division is oblique (Fig. 4, *b*), as in *E. ramosa*. One of the products appears always to shift up to the rather narrow opening of the mother-cell, whilst the other remains near its base. This seems to be a constant feature of this species, although the basal cell may not uncommonly be subsequently carried up to the opening of the mother-cell by the process of rejuvenescence above described (Fig. 4, *a* and *f*); in fact (as in Fig. 4, *g*), it may sometimes ultimately overtop the sister-cell, which took up a position at the aperture. As a result of this method of division, and of the behaviour of the products, the colonies of *E. simplex* are far less abundantly branched than those of *E. ramosa*.

The terminal cells of the colonies in this species were not uncommonly found to have divided into a large number of small cells (long. 18–21  $\mu$ , lat. 6–7.5  $\mu$ ) (*cf.* Fig. 4, *d*). In several, but not in all cases, these cells appeared to be naked. As in *E. ramosa*, there is a probability that the production of these small cells marks a stage in the reproduction of the species.

The cells of the ordinary individuals are in general very much elongated, being not uncommonly six times as long as broad. The ends are rounded, or very frequently more or less markedly pointed. The lower ends of the cells, where they are surrounded by the attaching mucilage, are always distinctly attenuated. The cell-contents were very granular and difficult to decipher. Staining with iodine seemed to show a number of pyrenoids (4–6) in each cell, but I am not sure of the number. Some of the small (reproductive?) cells appeared to

FIG. 4.—*Ecbalocystis simplex*, n. sp. *a*. Colony showing rejuvenescence and branching; the mucilage-pads by means of which attachment is effected are shown. *b*. Initial cell which has undergone two processes of innovation and the protoplast of which is now undergoing oblique division. *c*. A cell which has undergone repeated rejuvenescence and has recently divided, one of the products of division having shifted up to the aperture of the mother-cell, whilst the other has remained within the latter. *d*. Formation of numerous division-products (reproductive cells?). *e*, *f*, and *g*. Typical instances of branched colonies, also showing good examples of innovation. All figures  $\times 600$ .

have but two pyrenoids, so that perhaps they multiply with the increase in size of the cell.

There is a certain degree of resemblance between *E. simplex* and Senn's *Chlorodendron* (*Euglenopsis* of Davis, Ann. of Bot., viii, 1894, p. 377), since here also the colony gradually elongates by the successive withdrawal of the protoplast towards the upper end of the cell. In *Chlorodendron*, however, the contracted protoplast is merely demarcated by the formation of successive septa across the mother-cell, and there is no repeated rejuvenescence, as in *E. simplex*. It is the repeated rupture of the mother-cell membranes that shows that this process in our Alga is nothing else than a modification of the usual mode of development in *Ecballocystis*, in which, however, the customary division of the protoplast fails to occur.

The discovery of these two new forms shows that the dendroid type is more frequent among the lower Isokontae than has hitherto been supposed. A satisfactory elucidation of the affinities of all these forms can, however, only be attained when the character of the swarmers is fully known.

### (c) TETRASPORALES.

#### (1) SPHAEROCYSTACEAE.

##### GENUS SPHAEROCYSTIS CHODAT.

1. *Sphaerocystis schroeteri*, Chodat, Études d. Biol. lacustre, Bull. d. l'Herb. Boissier, 1897, p. 292, Tab. IX; Alg. vert. de la Suisse, Berne, 1902, p. 114, Fig. 53.

Samples 8, 48.

#### (2) TETRASPORACEAE.

##### GENUS APIOCYSTIS NAEGELI.

1. *Apiocystis brauniana*, Naegeli, Gatt. einzell. Algen, 1848, p. 67, Tab. II, A, Fig. 1 (Fig. 5).

Samples 30A, 31, 33 (on *Cladophora glomerata*).

Diam. colon. in media parte, 63–136  $\mu$ ; long. colon. tot., 100–195  $\mu$ ; long. stip., 22–45  $\mu$ ; lat. stip. in media parte, 20–27  $\mu$ ; diam. cell., 6–10  $\mu$ .

The above dimensions are for mature colonies; young colonies were quite frequent. The stalk was on the whole broader and longer than

in the specimens figured by Naegeli. The cells generally exhibited a quite irregular arrangement. All the larger colonies had a mucilage-envelope, showing a denser peripheral layer of some thickness (Fig. 5).



FIG. 5.—*Apiocystis brauniana*, Naegeli.  $\times 750$ .

GENUS SCHIZOCHLAMYS A. BRAUN.

1. *Schizochlamys hyalina*, n. sp. (Fig. 6.)

Stratum molle, gelatinosum, subhyalinum, amplitudine plurium mm., cellulas parvas et multas intervallis variabilibus dispositas includens. Cellulae ante divisionem sphaericae, post divisionem plerumque ovaes, diam. 6–9  $\mu$ , sine pyrenoidibus, cum membrana tenui distincta, quae secretionem mucii in unam vel plures partes rumpitur. Segmenta membranae in mucio circumposito diu manent, coetus cellularum interdum pluribus segmentis ejusmodi circumdati sunt.

## Sample 16.

This Alga forms an extensive soft jelly, several millimetres in width, and, in the preserved condition, almost colourless, or at the best but a very pale green. The numerous cells are irregularly embedded at variable distances in the mucilage and are spherical before, but usually oval, after division (Fig. 6 A). I have been unable to detect a pyrenoid in the cells. The delicate membrane of the cells is burst, after the manner characteristic for the genus, into one or more pieces, and the fragments are found in smaller or larger numbers in the surrounding mucilage (Fig. 6).

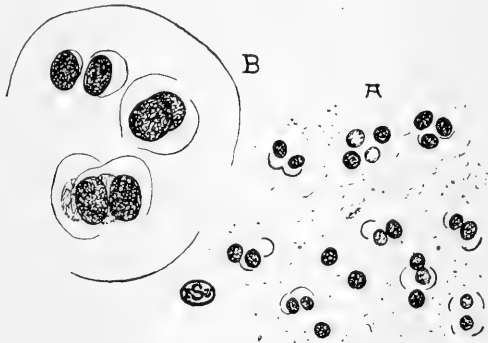


FIG. 6.—*Schizochlamys hyalina*, n. sp. A. Small portion of the jelly showing the irregular distribution of the cells and the fragments of cell-membrane which are cast off. B. A small portion of the same enlarged. A  $\times$  375, B  $\times$  750.

This species differs from the two hitherto known (*S. gelatinosa*, A. Br., and *S. delicatula*, West) in the almost colourless plant-mass, in the oval shape of the cells after division, and in the fact that the membrane is ruptured into a varying number of fragments.

## (d) PROTOCOCCALES.

## (3) EREMOSPHAERACEAE.

## GENUS EREMOSPHAERA DE BARY.

1. *Eremosphaera viridis*, De Bary, Unters. ueb. d. Fam. d. Conjug., 1858, p. 56, Pl. VIII, fig. 26.

Var. *minor*, Moore, New or little known unicell. Alg., Bot. Gaz., xxxii, 1901, p. 311, Pl. X, fig. 3.

Sample 25 (rare).

Diam. cell., 36–50  $\mu$ .

(4) HYDRODICTYACEAE.

GENUS PEDIASTRUM MEYEN.

1. *Pediastrum tetras* (Ehrenb.), Ralfs, Ann. and Mag. Nat. Hist., xiv, 1844, p. 469, Pl. XII, fig. 4; Brit. Desm., 1848, p. 182, Tab. XXXI, fig. 1 (Syn.: *P. ehrenbergii*, Corda, Alman. de Carlsbad, 1839, p. 138, Tab. II, fig. 8).

Sample 39 (rare).

2. *Pediastrum duplex*, Meyen, Nov. Act. Leop.-Carol. Ak., xiv, 1829, p. 772, Pl. XLIII, figs. 6-20 (Syn.: *P. pertusum*, Kuetz.).

Sample 39 (rare), 48 (very rare).

Var. *reticulatum*, Lagerheim, Öfvers. K. Vet.-Akad. Foerhandl., 1882, No. 2, p. 56, Tab. II, fig. 1.

Samples 14 and 15 (very rare).

3. *Pediastrum boryanum* (Turp.), Menegh., Monogr. nostoch. Ital., Att. R. Ac. Sci. Torino, Ser. 2, v, p. 210.

Sample 18 (rare).

Recorded from the Karroo by G. S. West.

GENUS HYDRODICTYON ROTH.

1. *Hydrodictyon africanum*, Yamanouchi, Bot. Gaz., lv, 1913, pp. 74-79, figs. 1-6.

Sample 20 (*N.B.*—This is not the same locality as that from which Yamanouchi has recorded the species).

The material was in an early stage of development, the broadly oval coenocytes being arranged to form marked nets. Long. coenocyt., 1430-1650  $\mu$ ; lat. coenocyt. ad med., 715-780  $\mu$ . A few slightly older stages, in which the constriction between the coenocytes was more pronounced, were also observed. This species is evidently quite common in the Cape Peninsula, as the writer has material from various localities and hopes to be able to extend Yamanouchi's description in a subsequent communication.

(5) CHLORELLACEAE.

GENUS TROCHISCIA KUETZING.

1. *Trochiscia aspera* (Reinsch), Hansgirg, Ueb. d. Suesswasseralg.-Gatt. *Trochiscia*, etc., Hedwigia, xxvii, 1888, p. 128 (Syn.: *Acanthococcus asper*, Reinsch).

Sample 21 (rare).

## (6) OOCYSTACEAE.

## GENUS OOCYSTIS NAEGELI.

1. *Oocystis solitaria*, Wittrock, in Witttr. et Nordst., Alg. exsicc., No. 244, Bot. Notiser, 1879, p. 27; Printz, Uebers. ueb. d. Gatt. *Oocystis*, Nyt. Mag. f. Naturvidenskab., li, 1913, p. 183, Tab. V, figs. 36-39.

Samples 29, 29A, 30, 30A, 31, 33, 39 (rare in the last).

Long. cell., 19-34  $\mu$ ; lat. cell., 11-20  $\mu$ . Except in sample 39, very few colonies were observed.

2. *Oocystis rupestris*, Kirchner, Beitr. z. Algenfl. v. Wuerttemberg, p. 169, Tab. II, fig. 2; Printz, *op. cit.*, p. 174, Tab. IV, figs. 7-9.

Sample 44 (common).

Long. cell., 11-25  $\mu$ ; lat. cell., 6-12  $\mu$ .

3. *Oocystis naegelii*, A. Braun, Alg. unicell., etc., 1855, p. 94; Printz, *op. cit.*, p. 178, Tab. V, fig. 64.

Sample 39 (rare).

## (7) SCENEDESMACEAE.

## GENUS SCENEDESMUS MEYEN.

1. *Scenedesmus obliquus* (Turp.), Kuetzing, Syn. Diat., Linnaea, viii, 1833, p. 609; Brunthaler, Syst. Uebers. ueb. d. Chloroph. Gatt. *Scenedesmus*, Meyen, Hedwigia, liii, p. 165, fig. 1 (Syn.: *S. acutus*, Meyen).

Samples 34, 39.

Var. *dimorphus*, Rabenhorst, Flor. Europ. Alg., etc., iii, 1868, p. 64 (Fig. 7, c-d).

Samples 4, 14, 15, 48.

Previously recorded from South Africa by Wille and by G. S. West from Gansfontein, Ceres Division.

For comments on the relation between this form and *S. acuminatus* (Lagerh.), Chodat, see under the latter species. In sample 34 there occurred the form known as *Dactylococcus infusionum*, Naegeli, which is now almost generally regarded as a stage of *S. obliquus*.

2. *Scenedesmus acuminatus* (Lagerh.), Chodat, Algues vertes, etc., 1902, p. 211, Fig. 88. (Syn.: *S. falcatus*, Chodat, Nuova Notarisia, 1895, p. 89; *Selenastrum acuminatum*, Lagerheim, Öfvers. K. Vet.-Akad. Föerhandl., 1882, No. 2, p. 71, Tab. III, figs. 27-30). (Fig. 7, a).

Samples 14, 15.

Long. cell., 24–34  $\mu$ ; lat. cell., 3–4.5  $\mu$ . The Alga in question always consisted of four acuminate cells, with hyaline tips, the two middle ones straight, with flat outer and curved inner faces, the two outside ones more or less strongly curved (Fig. 7, *a*). No other number or arrangement of the cells was observed, except for single cells or groups of two or three, no doubt produced by breaking up of the colonies. It should particularly be emphasised that the attenua-

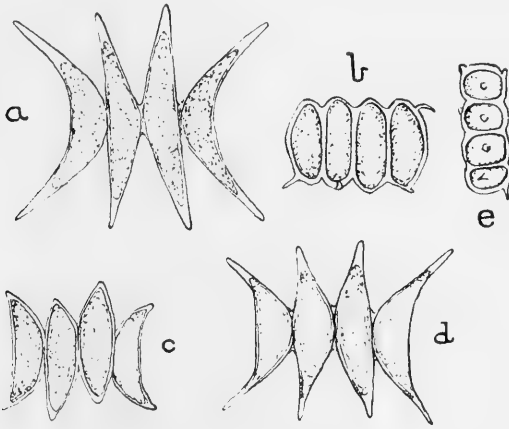


FIG. 7.—*a*. *Scenedesmus acuminatus* (Lagerh.), Chod. *b*. Front view, and *e*, end view of *S. quadricauda* (Turp.), Bréb. var. *dispar* (Bréb.), Brunthaler. *c*. Ordinary form, and *d*, extreme form of *S. obliquus* (Turp.), Kuetz. var. *dimorphus*, Rabenh. All figures  $\times 900$ .

tion of the cells extends almost continuously from the middle to the two ends, and that the prolonged apices are always colourless, the chloroplast only occupying the broader part of the cell. In most cases this is due to the fact that the acuminate ends are strongly thickened, the lumina being more or less completely obliterated. In my material the four cells were always placed edge to edge, but Lagerheim (*loc. cit.*), Chodat (*loc. cit.*), and Turner (Freshwater Algae of East India, K. Sv. Vet.-Ak. Handl., xxv, No. 5, 1892, Tab. XX, fig. 30) show them as partly overlapping.

It appears from specimens\* examined at the British Museum that this species has a tendency to depart from the typical *Scenedesmus*-grouping and at times to show quite an irregular bunching of the cells. It is probably this feature which has led to its being inter-

\* Viz. Wittrock et Nordstedt, Alg. exsicc., No. 441; Wittrock, Nordstedt, et Lagerheim, Alg. exsicc., No. 1242; and Hauck et Richter, Phycol. universalis, No. 692. Some of these show 8-celled biserial colonies of *S. acuminatus*.

puted as a *Selenastrum* by Lagerheim and others. In all the specimens examined, however, the irregular groups of cells did not partake of the character of a *Selenastrum*, in which it is characteristic for the cells to be arranged back to back; rather, in these irregular forms of *S. acuminatus*, the cells are arranged anyhow (which of course may include an occasional *Selenastrum*-like grouping) and bear more resemblance to an *Ankistrodesmus* (*Raphidium*) than to a *Selenastrum*. Moreover, in *Selenastrum* the chloroplast appears to fill the cell completely.

The form figured by West in his *British Freshwater Algae* (p. 225, Fig. 95, E-G), under the name of *Selenastrum acuminatum*, Lagerh., does not appear to me to be the same as the form originally described and figured by Lagerheim under that name. The grouping is that typical of a *Selenastrum*, the cells are often much more strongly curved, and they do not have hyaline tips, the cell-contents extending to the very apex. This form I have also seen at the British Museum (on a slide labelled "No. 852, Bowness, Lake District, W. & G. S. West"). For West's form I suggest the name of *Selenastrum westii*, nov. nom.

Brunnthaler (*op. cit.*, p. 170) regards *Scenedesmus dimorphus*, Kuetzing (= *S. obliquus* (Turp.), Kuetz., var. *dimorphus*, Rabenh.) as synonymous with *S. acuminatus* (Lagerh.), Chod. There can be no doubt that some of the forms described as *S. obliquus*, var. *dimorphus*, are referable to *S. acuminatus* (e.g. the form in Fig. 10, p. 274, in E. Teiling, *Schwed. Planktonalg.*, I, Bot. Tidsskrift, vi, 1912), but it seems open to question whether the true var. *dimorphus* of *S. obliquus* is not really distinct from *S. acuminatus*. There are the following important differences between these two forms. In *S. obliquus*, var. *dimorphus*, the tips appear more definitely as outgrowths of the cells (*cf.* Fig. 7, *c* and *d*), the latter narrowing down rather suddenly to produce them. Further, the central cells are fusiform, with both inner and outer surfaces curved (Fig. 7, *c*, *d*), whereas in *S. acuminatus* the outer surfaces are always flat; the outer cells in the var. *dimorphus* have the outer faces flat for a considerable distance and are not uniformly curved as in *S. acuminatus*. Finally, the outgrowths are in general far shorter (Fig. 7, *c*), and only rarely attain to a length approaching that found in *S. acuminatus* (Fig. 7, *d*).

3. *Scenedesmus quadricauda* (Turp.), Brébisson, Alg. Falaise, 1835, p. 66; Brunnthaler, *op. cit.*, p. 168, Fig. 16.

Forma *typica*.

Samples 14, 15, 18, 39, 48.



Recorded from [the Holle River, Calvinia Division, by G. S. West ; from the Cape by Beinsch.

Var. *dispar* (Bréb.), Brunthaler, *op. cit.*, pp. 168, 171 (Syn. : *S. dispar*, Bréb.) (Fig. 7, *b* and *e*).

Sample 48 (together with the type, not uncommon).

This certainly appears to be only a variety of *S. quadricauda*. The degree of development of the spines is rather variable; in some cases they are so short that it is difficult to recognise them.

4. *Scenedesmus bijugatus* (Turp.), Kuetz., Syn. Diat., *loc. cit.*, p. 607. (Syn. : *S. obtusus*, Meyen).

Var. *seriatus*, Chodat, Alg. vertes, etc., p. 212.

Samples 4, 8 (here common), 9, 10.

Var. *alternans* (Reinsch), Hansgirg, Prodr. Algenfl. v. Boehmen, 1886, p. 114; Chodat, *loc. cit.*, p. 213. (Syn. : *S. alternans*, Reinsch).

Samples 39, 48, 50.

The type has been recorded from Papekuil, Ceres Division and Little Namaqualand, by G. S. West.

5. *Scenedesmus cohaerens*, n. sp. (Fig. 8).

Coloniae maximae, e 4 vel numerosis (usque 100) cellulis quaterne dispositis constantes. Cellulae oblongo-ellipticae, polis rotundatis vel paullo acutis, a vertice visae rotundae; membrana paullo incrassata, polis incrassatis; contentus cellularum non satis cognitus, pyrenoide nullo, chromatophora facile dissoluta. Divisio cellularum semper perpendiculariter in axe longitudinali in 4 partes fit; cellulae filiales intra membranam maternam (quae diu visibilis est) manent et mox similiter dividuntur. Qua ratione coloniae magnae laminaeformes oriuntur. Cellulae filiales plerumque in planitie eadem qua cellula materna dividunt, sed interdum per loci mutationem alterutrius cellulae filialis altera planitierum divisionis in altera perpendicularis est. Propagatio dissolutione coloniae magnae in colonias quadricellulares seu cellulas singulas fit.

Dimensiones cellularum:  $10 \times 4.5$ ,  $18 \times 6$ ,  $20 \times 9$ ,  $22 \times 11$ ,  $24 \times 12 \mu$ ; crass. cell., ca.  $7.5 \mu$ ; lat. coloniarum quadricellularum, 18–37  $\mu$ .

Samples 42, 44.

This remarkable species occurs in various forms or stages of development, viz. as single cells, small four-celled colonies, and huge plate-like colonies of anything up to 100 cells (*cf.* Fig. 8, *a*). The development of the latter can be easily followed up. The single cells (Fig. 8, *c*) are elliptic-oblong in shape, with rounded or slightly

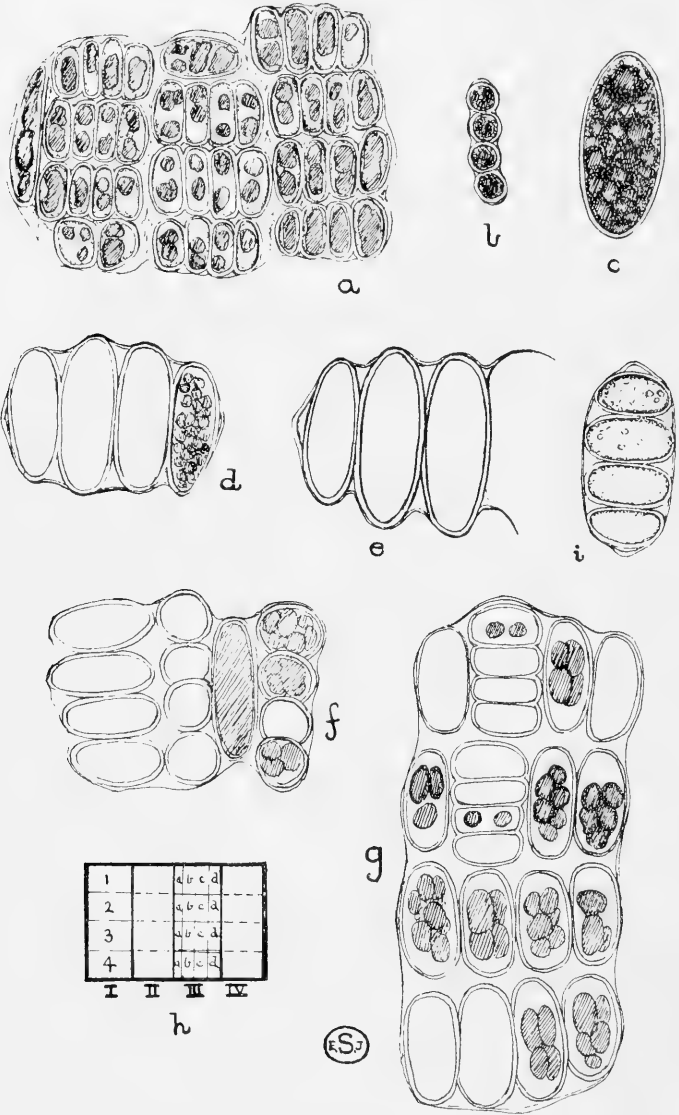


FIG. 8.

pointed ends, and a membrane which, in older cells, shows two distinct layers and slight thickening at the poles, although at first uniformly thin. Such cells give rise to four-celled stages by division of the contents into four at right angles to the longitudinal axis of the mother-cell (Fig. 8, *i*). At first the membrane of the latter preserves its elliptical outline and can easily be traced right round; the polar thickenings are also very plain in such stages (Fig. 8, *i*). Later, however, as the daughter-cells increase in size, the membrane becomes bulged out opposite the cells and appears invaginated between them, and it is now not always easy to trace it all the way round (Fig. 8, *d* and *e*). The original polar thickenings are always more or less obvious, and are also plainly seen in end-views (Fig. 8, *b*); the latter show the cells to be spherical in section. After reaching a certain size the daughter-cells in their turn divide (always in a plane at right angles to that of the mother-cells). By a repetition of this process large plate-like colonies gradually arise, like those shown in Fig. 8, *a* and *g*. The membrane of the original mother-cell is even recognisable in such late stages (Fig. 8, *a, f, g*), but the walls of the successive daughter-cells are not by any means so plainly evident, and appear to undergo gelatinisation at an early stage. In many cases all the daughter-cells lie in the same plane (Fig. 8, *a* and *g*), but colonies are not rarely to be found in which some of the secondary groups lie in a plane perpendicular to that of the others (Fig. 8, *f*). This appears to be due to a shifting of one or more of the products of a certain stage of the division-process through a right angle, the actual division, as far as I have seen, always taking place in a plane at right angles to that of the momentary mother-cell. As the figures show, one or more of the cells of a given group not uncommonly fail to divide (Fig. 8, *a, f, g*).

FIG. 8.—*Scenedesmus cohaerens*, n. sp. *a*. Large mature colony, in which only three of the original cells of the four-celled mother-colony have divided (the undivided one is on the left); in the second group from the right the uppermost cell has again failed to divide. *b*. Four-celled colony, seen from the end, showing the investing membrane of the original mother-cell. *c*. Single cell. *d* and *e*. Mature four-celled colonies, in which the investing membrane of the mother-cell is plainly visible, as well as the lateral (originally polar) thickenings; in *e* the right-hand cell has escaped from the surrounding membrane. *f*. A young colony, produced from a four-celled one by division of three of the cells, two of these having shifted through a right angle, so that the four-celled groups produced by them are in a plane perpendicular to that of the original colony. *g*. A large mature colony, showing various phases of division. *h*. Diagram to explain the formation of the large plate-like colonies; I-IV, 1-4, and *a-d* various steps in the process of subdivision. *i*. A young four-celled colony in which the mother-cell membrane is not as yet distended by the growth of the daughter-cells. All figures except *h*  $\times$  750.

Reproduction takes place by breaking up of the large colonies into four-celled groups or by the liberation of single cells (Fig. 8, *e*).

The cell-contents were very poorly preserved. I have been unable to recognise a pyrenoid, nor am I able to state the nature of the chloroplast; the latter apparently readily fragments into two or more parts (Fig. 8, *a* and *g*).

As regards shape of cells, this species comes very near to *S. bijugatus* (Turp.), Kuetz., but it differs from all known species of the genus in the cohesion of successive generations of cells to form giant colonies. Moreover, the method of division is different.

Selk (Beitr. z. Kenntn. d. Algenfl. d. Elbe u. ihres Gebietes, Jahrb. Hamburg. Wiss. Anst., xxv, 1907, 3 Beiheft, p. 6 *et seq.*) appears to have observed a similar form bearing the characteristics of *S. hystrix*, Lagerh., although it is not quite clear from his description whether the colonies are produced in exactly the same way. He describes it as a forma *cohaerens* of *S. hystrix*, regarding it merely as a growth-form.

#### GENUS SELENASTRUM REINSCH.

1. *Selenastrum gracile*, Reinsch, Abhandl. Naturhist. Ges. Nuernberg, iii, 1866, p. 65, Tab. IV, fig. 3, *a-b*.

Samples 14, 15.

#### GENUS COELASTRUM NAEGELI.

1. *Coelastrum sphaericum*, Naegeli, Gatt. einzell. Algen, 1849, p. 98, Tab. V, C, fig. 1.

Sample 39 (rare).

Recorded from the Karroo by G. S. West.

2. *Coelastrum microporum*, Naegeli, in A. Braun, Alg. unicell., etc., 1855, p. 70; Senn, Bot. Zeit., lvii, 1899, p. 53, Pl. II, figs. 11-17.

Sample 57 (very rare).

3. *Coelastrum morus*, W. & G. S. West, Algae from Central Africa, Journ. Bot., xxxiv, 1896, p. 381, Tab. 361, fig. 4.

Forma *capensis*, nov. form. (Fig. 9)

Cellulis varie dispositis, verrucis paucioribus et inter se remotis. Diam. cell., 10-11  $\mu$ ; altit. verrucae, 2-2.5  $\mu$ .

Samples 14 (rare), 15 (rather common, epiphytic, and even endophytic in the stratum of *Phormidium valderianum*).

There seems little doubt that this form was actively multiplying within the stratum of the *Phormidium* in sample 15, although some

of the colonies were quite free. The spherical cells are connected together by processes which are broader and shorter than the warts which occur on the free surface of the cells (Fig. 9, *a-c*). These warts were emarginate-truncate, as in the specimens recorded by Messrs. W. & G. S. West; but they were certainly fewer (the largest number observed on a single cell being 16) and further apart (*cf.* Fig. 9). In many cases they appear to widen out slightly from the base. The length of these warts varies considerably in different specimens, the dimensions given above being the maximum ones.

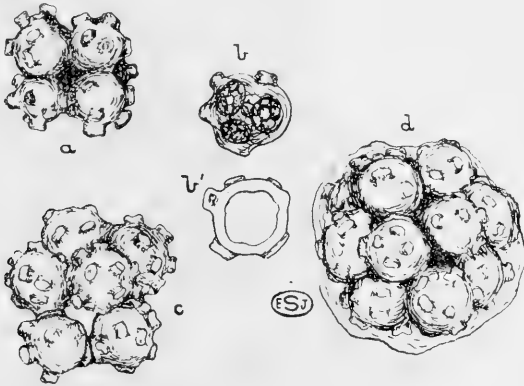


FIG. 9.—*Coelastrum morus*, W. and G. S. West, forma *capensis*, nov. form. *a, c, d.* Various forms of the colonies; in *d* the colony is still enclosed within the membrane of the mother-cell. *b.* Single cell, showing warts and the broad process for attachment to neighbouring cells; the contents are undergoing division. *b*<sup>1</sup>. Cell in optical section, showing the thick membrane. All figures  $\times 750$ .

The cells were grouped in very various ways, which is probably a result of the mode of life. Apart from typical *Coelastrum*-groupings (Fig. 9, *d*), irregular colonies were frequent (Fig. 9, *c*). Not uncommonly the cells were found in two superposed groups of four (Fig. 9, *a*), the four cells of each tier being separated in the middle by a quadrilateral space, so that a surface-view of such a colony appeared much like a *Crucigenia*. The details of the cell-contents were not very clear, but the cells appeared to have a single pyrenoid. The membrane is strongly thickened (Fig. 9, *b*<sup>1</sup>).

#### GENUS DICTYOSPHAERIUM NAEGELI.

1. *Dictyosphaerium chrenbergianum*, Naegeli, Gatt. einzell. Algen., 1849, p. 74, Tab. II, E.

Sample 14 (very rare).

## GENUS ANKISTRODESMUS CORDA.

## (RHAPHIDIUM KUETZ.)

1. *Ankistrodesmus falcatus* (Corda), Ralfs, Brit. Desm., 1848, p. 180.  
(Syn.: *Rhaphidium fasciculatum*, Kuetz.; *R. polymorphum*, Fresen.,  
var. *falcatum*, Rabenh.)

Samples 14, 31, 39, 48.

Var. *spirilliformis*, G. S. West, Brit. Freshw. Algae, 1904, p. 224.  
(Syn.: *Rhaphidium polymorphum*, Fresen., var. *spirale*, W. & G. S.  
West, Notes on Freshw. Alg., I, Journ. Bot., xxxvi, 1898, p. 6.)

Samples 14, 32, 39.

*Addendum*: Genus of doubtful position.

## PLEUROCOCCUS, MENEGH.

1. *Pleurococcus antarcticus*, W. & G. S. West, *emend.* F. E. Fritsch,  
Freshw. Alg., National Antaret. Exped., Nat. Hist., VI, 1912,  
p. 13.

Forma *simplex*, F. E. Fritsch, *loc. cit.*, p. 14, Pl. I, figs. 30, 31, 33.

Sample 42 (among Cyanophyceae).

Diam. cell., 16-25  $\mu$ ; crass. membr., 1.5-2.5  $\mu$ . Quite typical  
specimens, with a thick, indistinctly stratified membrane and the  
usual oil-drops. The cells were without pyrenoids.

2. *Pleurococcus koettlitzii*, F. E. Fritsch, *loc. cit.*, p. 15, Pl. I, figs.  
36-42.

Sample 15 (on surface of *Phormidium valderianum*, rather rare).

The discovery of this and the preceding species, both hitherto known  
only from the Antarctic, in other parts of the Southern Hemisphere  
is of some interest. The cells showed similar groupings, the same  
distribution of fat, and the same dimensions as in the Antarctic  
specimens. Oval cells were very common, and in a few cases the  
contents were reddish (*cf. loc. cit.*).

(e) ULOTRICHALES.

(1) ULOTRICHACEAE.

GENUS ULOTHRIX KUETZING.

1. *Ulothrix variabilis*, Kuetzing, Spec. Algar., 1849, p. 346; Heering, Ulotrichales, Microsporales, Oedogoniales, in A. Pascher, Suesswasserfl. Deutschlands, Oesterreichs, u. d. Schweiz, vi, 1914, p. 32, fig. 27.

Samples 3 (rare), 8, 9, 10, 37.

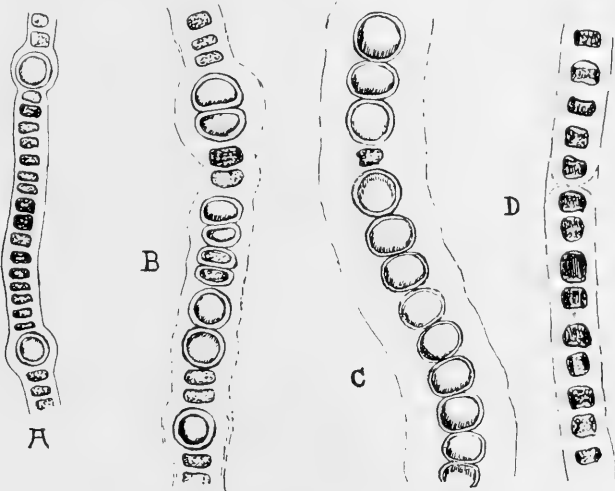


FIG. 10.—*Ulothrix oscillarina*, Kuetz. A-C. Filaments showing formation of akinetes. D. Filament showing splitting. All figures  $\times 800$ .

2. *Ulothrix subtilissima*, Rabenhorst, Krypt. Flor. v. Sachs., etc., I, 1863, p. 263; Heering, *op. cit.*, p. 31, fig. 26.

Samples 19, 50.

The form in sample 50 had thick gelatinous walls.

3. *Ulothrix oscillarina*, Kuetzing, *op. cit.*, p. 346; Heering, *op. cit.*, p. 32 (fig. 10).

Samples 56 and 57 (common).

I believe I am right in referring the material in these samples to this little-known species. The filaments were rather variable in width, many of them being 10–11  $\mu$ , but others as narrow as 7 or 8  $\mu$ . The cells in many of the filaments were very flat (one-third to half as long as broad) (*cf.* Fig. 10, A), whilst in others they were much longer

(Fig. 10, *D*) (up to twice as long as broad). The chloroplast appeared as a broad, girdle-shaped band, covering more than half the circumference of the cell, and, in many cases at least, contained two pyrenoids. The cell-wall always appeared to be more or less mucilaginous (in some cases so markedly so that the longitudinal edges of the filaments were ill-defined, *cf.* Fig. 10, *B* and *D*). There was sometimes a very faint constriction between the cells. In most of these respects there is agreement with the diagnosis in Heering (*op. cit.*). Wille (*Bidr. t. Sydamerikas Algflora, I-III, Bih. K. Sv. Vet.-Akad. Handl., viii, No. 18, 1884, Tab. III, figs. 96-98*) also figures this species with cells of very variable length, faint constriction, and gelatinous walls. Moreover, the habitat is a likely one for the species.

At rare intervals the filaments widened out considerably, and here consisted of more than a single row of cells. At these points rather irregular division appeared to have taken place, as the cells were not arranged in an orderly manner. The walls were always strongly mucilaginous at such places.

In quite a considerable number of the filaments akinete-formation was taking place. These akinetes were either produced singly (Fig. 10, *A, B*), or in chains (Fig. 10, *C*), often of some length. The single akinetes were always absolutely spherical; those produced in chains were often a little flattened where in contact with one another, or showed an oval shape, being elongated either in the transverse or the longitudinal direction. Each akinete was provided with a firm, thick membrane, and had opaque, more or less homogeneous contents. The diameter of these akinetes (without the surrounding mucilage-sheath) was on the average  $12\ \mu$ . Many of them appeared to have undergone division into two (Fig. 10, *B*).

In a number of the filaments obvious splitting into short lengths of several cells was taking place (Fig. 10, *D*). Altogether, although there were some very long filaments, the majority were of no very considerable length.

#### 4. *Ulothrix gelatinosa*, n. sp. (Fig. 11.)

Filis vegetativis juvenalibus  $10-15\ \mu$  latis, inter cellulas saepe leviter constrictis, cellulis 3-4 plo longioribus quam latis, membrana incrassata non lamellata,  $1.5-3\ \mu$  crassa; filis vegetativis senioribus  $25-37\ \mu$  latis, inter cellulas interdum constrictis, cellulis tam longis quam latis vel dimidio latioribus, membrana valde incrassata gelatinosa non lamellata,  $5-9\ \mu$  crassa. Chromatophora in cellulis, junioribus in media cellula modo cinguli, marginibus integris; in cellulis senioribus tota cellula plena est chromatophora, quae est



eadem forma, sed semper cum marginibus in processibus plus minus elongatis productis, ita ut in Chaetophoraceis; pyrenoide singulo vel pluribus. Nucleo centrali. Propagatio?

Sample 4.

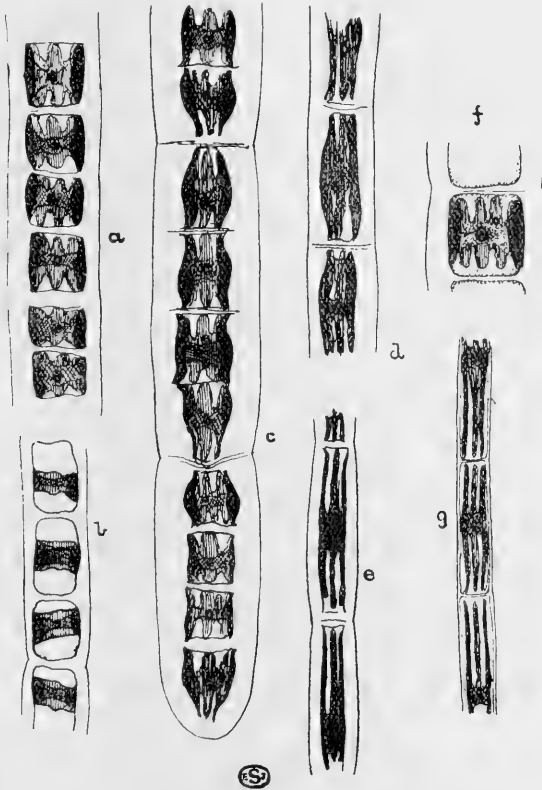


FIG. 11.—*Ulothrix gelatinosa*, n. sp. *a*. Middle-aged, *b* young, and *c* mature filaments; *d*, *e*, and *g* filaments in various stages of development; *f*, single cell of a mature filament showing the character of the chloroplast, etc. In Fig. *b*, the type of chloroplast, typical of the young filament, is shown; in Figs. *a*, *c*, and *f* that typical of the mature condition; whilst Figs. *d*, *e*, and *g* represent intermediate conditions. The central nucleus is shown in many of the cells; both nucleus and pyrenoids are seen in Fig. *f*. All figures  $\times 600$ .

This species is characterised by the very marked gelatinisation of the walls in the older filaments, as well as by the shape of the chloroplast. The latter is at first a curved median girdle (like that of many other species of the genus), occupying only a small part of the length of the cell, and extending for rather more than half way round the

circumference (Fig. 11, *b*). Sooner or later, however, this chloroplast becomes drawn out at either end into a number of processes, which extend the entire length of the cell, so that at this stage the chloroplast fills the whole of the latter (Fig. 11, *a, c-g*); it will be plain from the figures that this development of the chloroplast does not go hand in hand with the gelatinisation of the longitudinal walls (*cf.* especially Fig. 11, *g*). The number of processes of the chloroplast seems to vary between four and six, and they often run to a more or less marked point (*cf.* Fig. 11, *c*). At this stage the chloroplast is very similar to that of many Chaetophoraceae, especially that of *Draparnaldia*, in which, however, the processes are generally more numerous. Even in the older stages the main body of the chloroplast retains its girdle-form (Fig. 11, *a, c*). In the young stage the chloroplast appears to have but a single pyrenoid, but later on there are certainly several small ones (Fig. 11, *f*). The round nucleus is relatively large and occupies a central position (Fig. 11, *a, c, f*).

In the young filaments the cells are several (3-4) times longer than broad (Fig. 11, *b, e, g*), but, as gelatinisation of the longitudinal walls proceeds, the cells become shorter, their breadth at this stage often exceeding their length (Fig. 11, *a, c*). The longitudinal walls may at first be quite thin (Fig. 11, *g*), but thickening sets in sooner or later (*cf.* Fig. 11, *d* and *e*). The original septa, produced before this thickening occurs, are even in the mature filaments found extending right across from one edge to the other, but the septa subsequently formed do not do so (Fig. 11, *c*). In the fairly young filament there is often distinct constriction between some of the cells (Fig. 11, *b* and *e*). These points of constriction persist, even in the mature condition, but there are no constrictions evident between the later-formed cells (Fig. 11, *a, c*). The original points of constriction appear, in the older filaments, to mark places of weakness, at which the filaments readily split, and this may possibly represent one method of reproduction of this species (Fig. 11, *c*). The thickening of the longitudinal walls is very markedly mucilaginous, but the bounding cuticle always remains distinct (*cf.* Fig. 11); there is no indication of stratification in these walls at any stage. The transverse walls do not in general become markedly mucilaginous, although slight gelatinisation is not infrequent.

As far as I am aware the type of chloroplast characteristic of the mature filaments of this species has not hitherto been observed in the genus *Ulothrix*, or for the matter of that in any member of the Ulotrichaceae. This, taken together with the very marked gelatinisation

of the longitudinal walls and the possible occurrence of reproduction by fission, may ultimately warrant the establishment of a distinct genus for this species.

GENUS HORMIDIUM KLEBS.

(ULOTHRIX, SECT. HORMIDIUM, KUETZ.)

1. *Hormidium subtile* (Kuetz. ?), Heering, Suesswasserfl. Deutschlands, Oesterreichs, u.d. Schweiz, vi, 1914, p. 47, fig. 54. (Syn.:

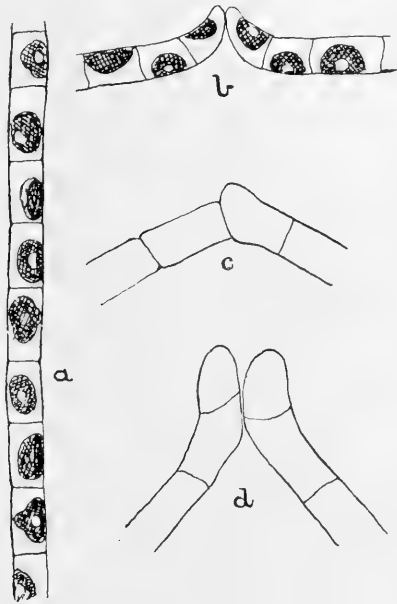


FIG. 12.—*Hormidium subtile* (Kuetz. ?), Heering. a. Part of an ordinary filament. b-d. Stages in splitting. All figures  $\times 800$ .

*Stichococcus subtilis*, Klercker, Ueb. zwei Wasserformen v. *Stichococcus*, Flora, lxxxii, 1896, p. 92 *et seq.*, Tab. VI, figs. 1-8; *Ulothrix subtilis*, Kuetz. *pro parte*). (Fig. 12.)

Samples 56, 57.

It would appear that comprised in Kuetzing's *Ulothrix subtilis* there are two distinct forms, viz. a true *Ulothrix* with quadriciliate macrozoospores, and another aquatic form with biciliate\* macrozoo-

\* Cf. Hazen, Ulotrich. and Chaetoph. United States, Mem. Torrey Bot. Club, xi, 1902, pp. 158, 159.

spores (such forms being included as *Pseudulothrix* by Pascher, Stud. ueb. d. Schwaermer enig. Suesswasseralgen, Bibl. Botan., Heft. 67, 1907, p. 106). Heering (*loc. cit.*) includes this and other biciliate species in the genus *Hormidium*, a number of whose species are terrestrial. He bases this on the fact, that these latter species of *Hormidium* likewise have biciliate macrozoospores, and on certain other resemblances in cell-structure and mode of reproduction between the two sets of forms.

The specimens in samples 56 and 57 agree in habitat and characters altogether with the figures and description given by Klercker and Heering. The cell-wall is delicate; the cells vary from a little longer than broad to three times as long as broad, and are from 5 to 7.5  $\mu$  in diameter. The chloroplast is very characteristic, being a circular or elliptical plate, according to the shape of the cell, and containing a small, pale, central pyrenoid (*cf.* Fig. 12). It seems likely that the elliptical shape of the chloroplast presages division. The extent of the chloroplast is very variable; sometimes it almost fills the cell, in other cases only part of it. Curious knee-like bendings are not uncommon and appear to mark stages in the splitting of the threads (Fig. 12, *b-d*).

2. *Hormidium rivulare*, Kuetzing, Phycol. german., 1845, p. 192; Heering, *op. cit.*, p. 47, Fig. 56. (Syn.: *Ulothrix rivularis*, Kuetzing, Spec. Alg., 1849, p. 346; *Hormiscia hieronymi*, Lemmermann, Zur Algenfl. d. Riesengebirges, Forschungsber. a. d. Biol. Stat. Ploen, iv, 1896, p. 104).

Sample 50 (Fig. 13); resting-stages in samples 22, 38, and 39 (Fig. 14).

This is a more robust form than *H. subtile*, the diameter of the filaments, in the present material, being 7–10  $\mu$ ; the cells are as long as broad or up to twice as long. The walls are considerably thickened (Fig. 13), even the septa being affected in some cases. There is a faint constriction between the cells. The chloroplast is nearly always circular (Fig. 13) and only occupies a small part of the length of the cell, being situated either in the middle or near one end. The pyrenoid is more prominent than in *H. subtile*. In many cases the chloroplast exhibits two lateral arms projecting from the circular main portion on either side (Fig. 13, *a, c, d*); all transitions from a purely circular chloroplast (Fig. 13, *b*) to one showing pronounced arms can be found. Knee-like bendings (Fig. 13, *e*) were not as frequent as in the previous species.

This and the preceding species, together with *Hormidium fluitans* (Gay), Heering (*Stichococcus fluitans*, Gay, Bull. Soc. Bot. d. France, xl,

p. clxxiv) constitute the aquatic members of the genus *Hormidium*, as enumerated by Heering (*op. cit.* p. 47). Apart from the character of the zoospores and the *Hormidium*-like aspect of the cells, the species



FIG. 13.—*Hormidium rivulare*, Kuetz., ordinary filaments. Fig. e shows a knee-like bending. All figures  $\times 750$ .

in question also differ from *Ulothrix* in the occurrence of ready splitting of the filaments and in the nature of the chloroplast. Although the latter is not properly known in *H. stuitans*,\* in the other two species it differs markedly from that of *Ulothrix* in its circular or

\* To judge by the figures in T. E. Hazen, *Ulothrix*, and *Chaetoph.* United States (Mem. Torrey Bot. Club, xi, 1902, Pl. XXII, figs. 7-9), however, the chloroplast is not nearly so sharply defined in this species.

elliptical shape. This distinctive character of the chloroplast strengthens the grounds for separating these species from *Ulothrix*, but it also raises the question, whether an inclusion in the genus *Hormidium*, which has a chloroplast more like that of *Ulothrix*, is advisable. It may be that a distinct genus should be established to accommodate these species, but before arriving at a conclusion on this point I prefer to await examination of material of *H. fluitans*. Attention may be drawn to the fact that special forms of chloroplasts are not unknown in the Ulotrichales, a good instance being furnished by

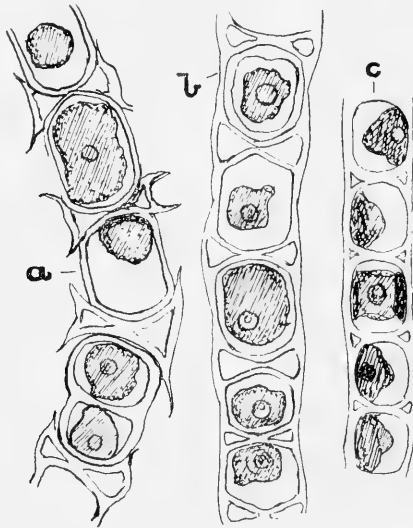


FIG. 14.—*Hormidium rivulare*, Kuetz. Resting-stages from sample 22. *a*, *b*, and *c* represent progressively younger stages. All figures  $\times 1000$ .

the genus *Mesogerron* (F. Brand, *Hedwigia*, xxxviii, 1899, pp. 181–184), which shows some remote points of resemblance to the species just discussed. The genus *Stichococcus* is probably best restricted to those species in which a filamentous tendency is little marked, the cells being isolated and only, at times, forming short threads.

In samples 22 and 38, and more rarely in 39, there occurred a filamentous form, which I take to represent a resting-stage of *H. rivulare* (Fig. 14), the more as ordinary filaments of this species were intermingled with it and various transitional conditions could be found.

The filaments (diam.  $10 \mu$ ) have the appearance of having passed through a resting-stage, involving the formation of akinetes, but unaccompanied by any dissociation of the threads. In part the walls of

the threads were almost uniformly thickened all round (Fig. 14, *c*), but in most cases the transverse septa were especially strongly thickened, assuming a biconcave form (Fig. 14, *b*); sometimes a faint stratification of the thickening could be recognised. In others of the filaments the longitudinal walls had undergone rupture at many points, a new membrane having appeared around the cell-contents and elongation having taken place, with or without division (Fig. 14, *a*). The original thickened biconcave septa, with the adhering strips of the longitudinal walls, look very much like H-pieces and led me at first to interpret the material as a species of *Microspora*. The tapering ends of these strips often stood off from the surface of the filaments and gave them a ragged appearance (Fig. 14, *a*). The cells were in part very short, sometimes half as long as broad. The character of the chloroplast, where it could be distinctly seen, agreed with that of the vegetative filaments of this species (*cf.* Fig. 14, *c*).

In 1895, Schmidle (Weitere Beitr. z. Algenfl. d. Rheinebene u. d. Schwarzwaldes, Hedwigia, xxxiv, 1895, p. 69, figs. 4-5) described a form under the name of *Microspora lauterborni*, which bears a considerable resemblance to the stages just described; the habitat is also somewhat similar. The principal difference lies in the fact that the filaments in Schmidle's species are often spiral in their course and that his figures show distinct H-shaped ends to the threads. Schmidle does not describe or figure the cell-contents, so that his reference of this species to *Microspora* must be regarded as somewhat uncertain. It is not impossible that it is a stage similar to that above described, although whether it belongs to our species or to another is difficult to settle.

## (5) MICROSPORACEAE.

### GENUS MICROSPORA THURET.

1. *Microspora pachyderma* (Wille), Lagerheim, Zur Entwickel. einig. Confervaceen, Ber. Deutsch. Bot. Ges., v, 1887, p. 415. (Syn.: *Conferva pachyderma*, Wille).

Samples 11, 12, 13.

Diam. fil., 9-11  $\mu$ . The filaments were in part provided with a brown incrustation of iron compounds, which is a character of the nearly allied *M. rufescens* (Kuetz.), Lagerh.; in other respects, however, they approached more closely to *M. pachyderma*.

## (6) CLADOPHORACEAE.

## GENUS RHIZOCLONIUM KUETZING.

1. *Rhizoclonium hieroglyphicum* (Kuetz.), Stockmayer, Ueb. d. Algengatt. *Rhizoclonium*, Verh. k.k. Zool. Bot. Ges. Wien., xl, 1890, p. 578; Kuetzing, Phyc. germ., 1845, p. 206.

Sample 47 (uncommon).

Previously recorded by Wille from South Africa.

## GENUS CLADOPHORA KUETZING.

1. *Cladophora glomerata* (L.), Kuetzing, Phyc. germ., 1845, p. 212. Samples 29, 29a, 30a, 31, 33 (in all of these attached to *Myriophyllum*, etc.), 54 (?), 55 (?).

2. *Cladophora crispata* (Roth), Kuetzing, Phyc. generalis, 1843, p. 264.

Sample 45 (forma ?).

I do not feel certain of the specific determination of this form. The material consisted of coarse, stout, main branches (diam. up to 150  $\mu$ ), with a thick stratified membrane. From many of these main branches secondary ones, always definitely lateral, arose from the upper end of every cell. These secondary branches were slender (diam. 22–27  $\mu$ ), had a relatively thin membrane, and were invariably more or less markedly pointed. The majority of these secondary branches consisted of but a single cell, but here and there longer ones were encountered, such branches being very frequently curved. Ramification of the main branches was not very common, and was either lateral or dichotomous.

## (7) SPHAEROPLEACEAE.

## GENUS SPHAEROPLEA AGARDH.

1. *Sphaeroplea africana*, n. sp. (Figs. 15, 16.)

Filis vegetativis latis, inter cellulas plerumque evidenter constrictis, cellulis valde elongatis, 6–18 plo longioribus quam latis, saepe plus minus doliformibus, chromatophoris parvis et numerosis, in annulis vel saepe irregulariter (raro spiraliter) dispositis, pyrenoidibus sparsis, nucleis parvis numerosis, membrana longitudinali tenui, septis plus minus incrassatis, e processibus digitatis irregularibus introrsum crescentibus constantibus. Oogonia cum oosphaeris sphaericis numerosissimis varie dispositis, foraminibus paucis et parvis saepe



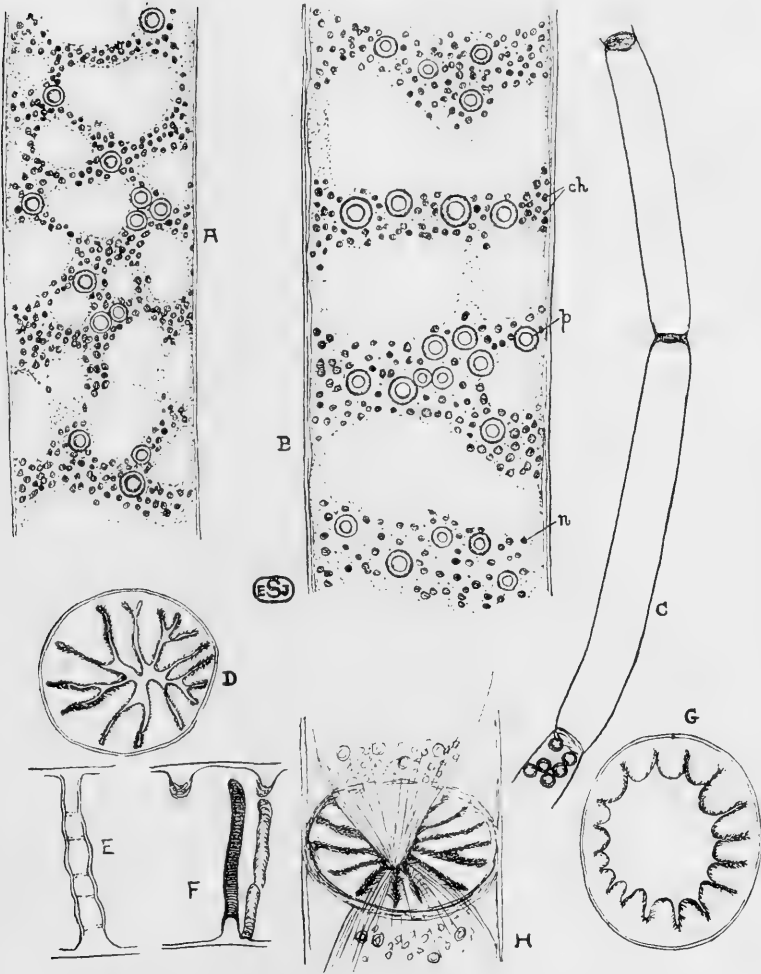


FIG. 15. — *Sphaeroplea africana*, n. sp. A and B. Parts of two "cells" showing the varied disposition of the contents; *ch*. Chloroplasts; *n*. Nucleus; *p*. Pyrenoid; the nuclei are shown black, the chloroplasts shaded. C. Small part of a filament, to show the customary constriction at the septa; at the lower end a part of an oogonium, with a number of oospores, is seen. D. Single septum, seen from the surface, showing the ingrowing finger-like processes. E. Septum in optical section. F. Imperfect septum. G. Early stage in septum-formation. H. Oblique view of septum, showing its structure and the apparent continuity of the protoplasm through it. All figures  $\times 550$ , except Fig. C, which is  $\times 130$ .

transverse elongatis. Antheridia non satis cognita, monoica vel dioica. Oosporae sphaericae vel oavales, membrana incrassata alata, bi- vel raro tri- vel quadri-angulares. Post fecundationem membrana tenuis arcta oosporam induit; intra eam membrana matura oosporae evolvit, postea membrana prior rumpit et in vicinitate manet.

Lat. cell. veg. in media parte, 42–78  $\mu$ ; lat. cell. veg. in septis 19–54  $\mu$ ; lat. oogon., 39–60  $\mu$ ; lat. oosph., 10–21  $\mu$  (plerumque 18–21  $\mu$ ); lat. oosp. a latere, 20  $\times$  12, 27  $\times$  15, 27  $\times$  18, 33  $\times$  21  $\mu$ ; lat. oosp. a superficie cum ala, 21, 24, 24  $\times$  22, 25, 25  $\times$  21, 28  $\times$  24, 33  $\mu$ .

Samples 17, 18.

Apart from *Hydrodictyon africanum*, this is probably the most interesting form that the freshwater algal flora of South Africa has yet yielded.

The unbranched filaments are of very considerable length and consist of "cells," which are in general much elongated (12–18 times as long as broad), although very short ones are occasionally met with. In the majority of cases the "cells" are much narrower at the septa than in the middle, so that their shape is more or less that of an elongated barrel (Fig. 15, *C*); these customary dimensions are illustrated by the table on p. 528. Filaments are, however, also found in which this constriction at the septa is scarcely marked, and even the reverse is occasionally encountered, the threads being widest at the septa (*e. g.* in two cases noted the width of the threads at the septa was 40 and 45  $\mu$  respectively, the width of the appropriate "cells," at their middle, 20 and 30  $\mu$  respectively).

The chlorophyll-apparatus is composed of numerous small irregular grains, only a small percentage of which contain pyrenoids; the latter are rather large and spherical (Fig. 15, *A* and *B*). The chloroplasts and pyrenoids stained readily with methyl blue. In general the arrangement of the chlorophyll-apparatus is very irregular (Fig. 15, *A*), although a disposition in transverse rings, such as is customary in *S. annulina* (Roth), Ag., is not uncommon (Fig. 15, *B*). In a few cases the chloroplasts were arranged in a spiral manner over short stretches. The more or less irregular strands of protoplasm containing the chloroplasts are separated from one another by large clear vacuoles (Fig. 15, *A* and *B*). The rather irregular distribution of the chloroplasts, involving occasional massing at certain points, whilst some of the small protoplasmic strands are quite devoid of them, hints at the possibility of streaming of the protoplasm. Momentary staining with Ehrlich's haematoxylin and subsequent treatment with Orange G shows numerous small nuclei of a deep purple colour, in contrast to the pale

bluish-purple of the chloroplasts (Fig. 15, *A* and *B*); the nuclei are irregularly scattered among the chloroplasts.

The longitudinal walls are in general very thin, recalling those of a *Vaucheria*. In some cases they exhibited a faint longitudinal striation, but this is very probably due to contraction. The septa are of a very peculiar character. In typical cases they appear to arise primarily by the apposition of a complete ring of thickening on the inner side of the longitudinal wall (*cf.* Fig. 15, *G*). From this primary ring a considerable number of thick finger-like processes arise (Fig. 15, *G*) and gradually grow inwards towards the centre (Fig. 15, *D*). Whether a complete constriction of the protoplast is thereby effected must remain doubtful. In many cases, at least, there is an obvious central aperture, through which the protoplast, though much narrowed down, extends uninterruptedly (Fig. 15, *H*). It was not uncommon to find that the protoplast had contracted considerably away from the walls, both longitudinal and transverse, but in such cases a mass of protoplasm often remained clinging on one or both sides of the septum, a fact which also speaks for continuity of the protoplasm. I have also been unable to settle whether the finger-like processes fuse laterally or whether narrow interspaces persist between them; there is much to suggest that the latter is often the case, but the point could only be settled finally by investigation of fresh material. In some cases the septa appear as in Fig. 15, *E*, and Fig. 16, *H*; here it looks as though a secondary thickening membrane had been deposited, on either side of the septum, and possibly in these cases a true septum is ultimately constituted.

Apart from the normal "septae" just described, numerous irregularities were observed. Very often the processes do not grow in a regular radial manner towards the centre, but overlap and become entangled with one another in various ways (Fig. 16, *E*, *G*, and *H*). A not uncommon condition is that in which one or more of the processes, either only on one or on both sides of the septum, after growing inwards in a radial direction, turns out at right angles, leading to the development of a central hump, on one or both sides (Fig. 16, *F*). Again, frequent instances were encountered, in which successive processes arose near together from the longitudinal walls, without forming a proper septum (Fig. 15, *F*). In extreme cases (Fig. 16, *J*) this leads to the formation of very short "cells," often only a very small fraction of the normal length. Short knob-like ingrowths, of a similar nature to the processes, are to be encountered at many points in the course of the "cells" (*cf.* Fig. 15, *F*).

The processes themselves appear to be homogeneous, although

occasionally a very faint stratification was seen. In the normal septa the processes gradually taper from without inwards (Fig. 15, *D, H*), but very often they are irregularly thickened, certain parts, which stand out as knobs or beads, being thicker than the rest.

The question may be raised whether this *Sphaeroplea* is really septate in the true sense of the word, and whether the apparent septa are not merely transverse groups of strengthening bars, analogous to the "cellulose-strands" of *Caulerpa*. Some evidence has been produced above to show that, normally, the "septata" are probably not closed, and their mode of formation is certainly not comparable to that usually found in filamentous Algae. The diverse abnormal conditions also lend countenance to the view that we are not dealing with real septa.

The often marked inflation of the cells beyond the "septata" (*cf.* the table below) is probably an indication of the existence, in the living Alga, of a considerable osmotic pressure, to which the thin longitudinal walls would readily respond. The constricted septata appear as so many points of strengthening, preventing an undue inflation of the coenocyte. An investigation of fresh material would, however, be necessary to establish the correctness of this view.

Table of Dimensions of Vegetative "Cells" of *S. africana*.

		(Dimensions in $\mu$ .)											
Width at middle	.	60	66	66	60	78	65	45	48	51	42	45	45
Width at septum	.	33	45	30		54	51	36	27		36		19

It is obvious from Heinricher's (Zur Kenntn. d. Algengatt. *Sphaeroplea*, Ber. Deutsch. Bot. Ges., i, 1883, p. 433 *et seq.*, Tab. XII) account that similar conditions obtain also in *S. annulina* (*loc. cit.*, pp. 434, 435). Here, however, there appear to be no constrictions at the septata, and I can find no exact evidence in Heinricher's paper that the latter are produced by a number of separate processes. A

FIG. 16.—*Sphaeroplea africana*, n. sp. *A*. A particularly elongated oogonium, with numerous oospheres (*o.*). *B*. Oospores in various stages of development. *a*. In surface-view, showing the broad, crinkled wing; *b*, in side-view; *c*, quadrangular; *d*, triangular oospore; *d'*, young oospore, showing the mode of development within the thin membrane first formed. *w*. Wing. *C*. Small part of an oogonium, with a number of mature oospores in surface- and side-view. *ap.* One of the apertures in the wall of the oogonium. *D*. Small part of an oogonium, showing an aperture (*ap.*) in surface-view. *E, F, G*, and *H*. Various kinds of abnormal septata, *cf.* the text. *J*. Small part of a filament, showing the abnormal formation of a very short cell (*s*). Figs. *A* and *J*  $\times$  140, the remainder  $\times$  600.

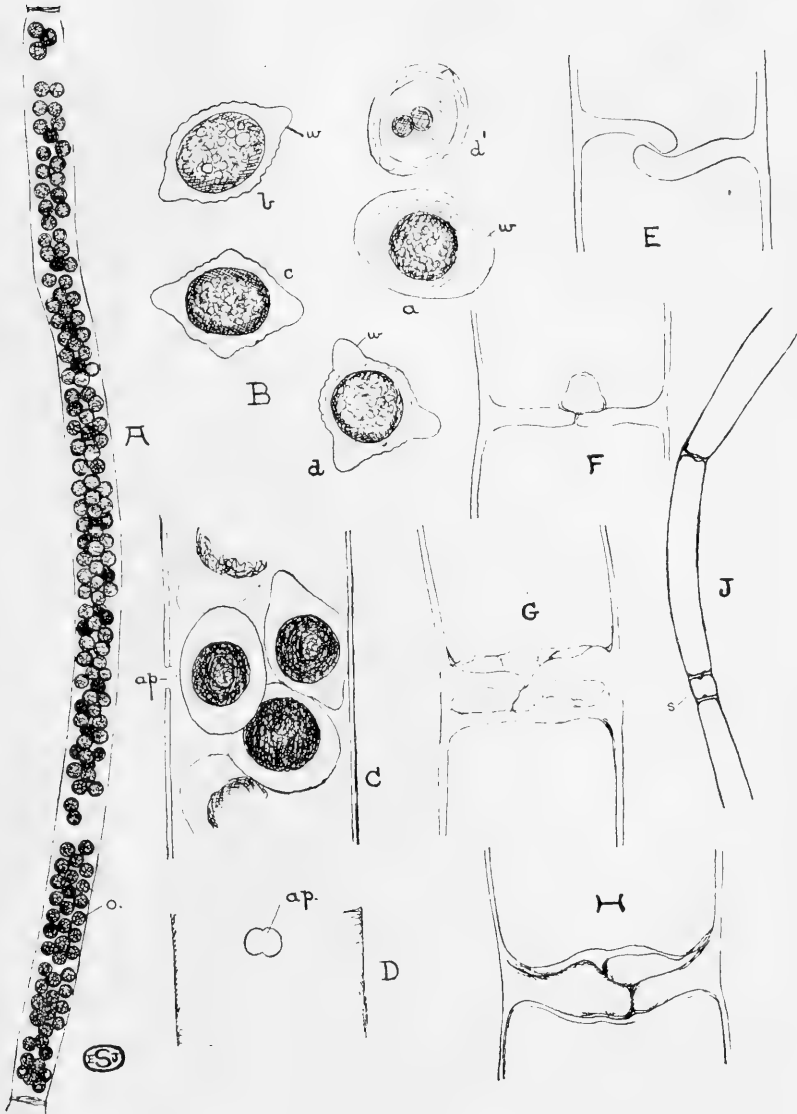


FIG. 16.

comparative investigation of the mode of septum-formation in the two species would be of much interest.

The material of *S. africana* provided numerous oogonia, both unfertilised and fertilised, and what were probably antheridia. The oogonia, like the vegetative "cells," are of very diverse length, and either occurred singly or in short series. In general they are characterised by the formation of a very large number of oospheres; in the case shown in Fig. 16, *A* there were 155 female cells present, and it is not unlikely that this number may be exceeded. On the other hand, oogonia are also to be found with a relatively small number of oospheres. In such cases the latter are arranged in a single or double row, whilst, when numerous, the oospheres are in great part very closely packed and may form a number of irregular longitudinal series (Fig. 16, *A*). Sometimes they are polygonal through mutual pressure, but mostly they are quite spherical. As a general rule, the entire protoplast is used up in the production of the oospheres (as in Fig. 16, *A*), but occasionally a small shrunken mass of protoplasm remains. One or more central pyrenoids could be detected within the oospheres. The latter are relatively constant in diameter (18–21  $\mu$ ), though in the large oogonia smaller oospheres are always to be found. The apertures formed in the oogonial wall are not numerous, and are small and often ill-defined; they frequently show an irregular edge, and commonly, at least, are not circular, but wider in the transverse than in the longitudinal direction (*e.g.* in one case  $4.5 \times 6 \mu$ ) (Fig. 16, *C, D, ap.*).

Either in the same or in different filaments there occurred cells with dense, fine, granular contents, and provided with apertures similar to those of the oogonia. It is very likely that these represent the antheridia. Numerous small spindle-shaped bodies, observed in some of these cells, may have been spermatozoids, but the cells in question were not sufficiently well preserved to make sure of this point.

It appears that, after fertilisation, the oospore becomes clothed by a thin membrane which fits closely round the contents. Within this the development of the membrane of the mature oospore takes place (Fig. 16, *B, d<sup>1</sup>*), and, when the latter is completed, the first-formed membrane is ruptured and cast off; in some of the oogonia such empty primary membranes could be recognised in the neighbourhood of almost every oospore.

The oospores are as closely packed as the oospheres (*cf.* Fig. 16, *C*). The contents are spherical or commonly oval (Fig. 16, *B*) and include from one to three pyrenoids. They exhibited no special coloration, but

that may be due to the solvent action of the preservative. A large number of ill-defined bodies in the contents are probably food-reserves. The membrane is invariably winged, the normal type of oospore having a single median wing, appearing circular or elliptical when seen from the surface (Fig. 16, *B, a*, and *C*), and as two blunt outgrowths in optical section (Fig. 16, *B, b*, and *d*<sup>1</sup>). In surface-view the wing shows a fine crinkling, in the form of short wavy lines over its entire surface (Fig. 16, *B, a*). Seen from the edge the part of the membrane, not protruded into the wing, has a crenate outline (Fig. 16, *B, b, d*<sup>1</sup>). Side by side with this type, which was by far the commonest, other oospores could be found, in the same oogonium, in which the membrane was protruded into three (Fig. 16, *B, d*) or even four (Fig. 16, *B, c*) outgrowths, although such forms are not exactly common.

In contrast to *S. annulina* (Roth), Ag., the new species is distinguished by (*a*) the customary irregular arrangement of the chlorophyll-apparatus; (*b*) the usual occurrence of marked constriction at the septa; (*c*) the peculiar structure and mode of development of the septa; (*d*) the mature oospores which differ very markedly from those of the other species; and (*e*) the development of the mature oospore within a thin primary membrane.

## (*f*) CHAETOPHORALES.

### (1) CHAETOPHORACEAE.

#### GENUS STIGEOCLONIUM KUETZ. (MYXONEMA FRIES).

##### 1. *Stigeoclonium prostratum*, n. sp. (Fig. 17.)

Thallus epiphyticus, plantis aquaticis adhaerens. Pars procumbens thalli valde evoluta, filis ramosis dense aggregatis, sed raro stratum parenchymaticum crassitudine unae cellulae formantibus; fila repentia copiose ramosa, ramis singulis procumbentibus, saepe unilateralibus, ex paene quaque cellula nascentibus, ramulis paucis et e paucis cellulis constantibus; cellulis partium procumbentium rectangularibus, 1-2½ plo longioribus quam latis, superne aut rectis aut convexis. Pars adscendens exigua, e pilis sparsis hyalinis, saepe longissimis, acutis vel obtusis, in basi paullo tumidis, saepe septatis, non ramosis, vel passim e ramulis brevibus, saepe confertis, 1-5-(saepe 3)-cellularibus, non ramosis et non in pila productis, constans. Chromatophora pyrenoideæ singulo.

Lat. cell. fil. reptant., 5–7  $\mu$ ; long., 7–16  $\mu$ ; altit., 5–12  $\mu$ ; lat. cell. fil. adscend., 5–8  $\mu$ . Long. tot. ramul. adscend., ca. 30  $\mu$ ; long. pil. adscend., plus quam 400  $\mu$ .

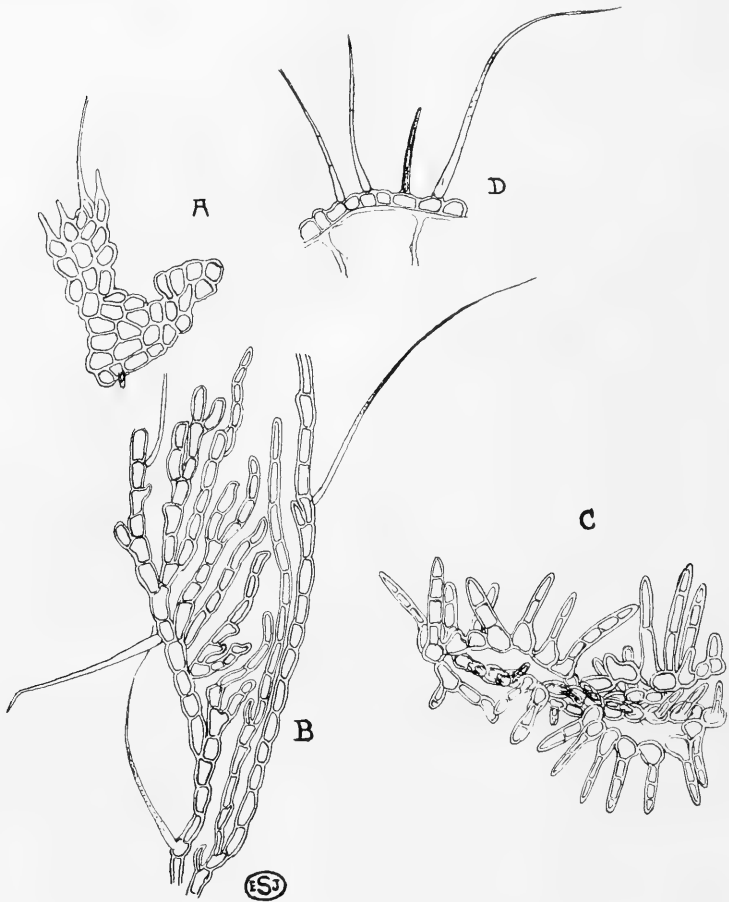


FIG. 17.—*Stigeoclonium prostratum*, n. sp. A. Small part of the attached base, showing the rare development of a pseudo-parenchymatous structure and a short hair. B. Part of the prostrate thallus, showing the characteristic method of branching and a number of hairs. D. Section through the creeping base and a small part of the substratum; a number of hairs are also shown. C. Small part of the creeping base, showing the development of numerous short ascending branches. B and C are from different parts of the same specimen. All figures  $\times 750$ .

Samples 29, 30a (in both cases on *Myriophyllum*).

The identity of the more markedly epiphytic species of *Stigeoclonium* (*Myxonema*) is by no means easy to establish, owing to the



evidently varying development of the creeping base and of the upright system. I have been unable, however, to convince myself that the present form belongs to any of the species hitherto described, and I am therefore led to add one more to the already long list of species of this genus.

*Stigeoclonium prostratum*,\* as the specific name indicates, is one of those species in which the creeping base is very strongly developed, at the expense of the upright system. The base, which appears to be purely epiphytic, forms a very extensive and richly branched system, readily seen on the surface of the substratum with a magnifying glass. In general the branches, although very close to one another (Fig. 17, B), are nevertheless quite distinct, but at some points the branching is so dense that a one-layered parenchymatous stratum arises (Fig. 17, A), an apparently rather unusual condition. In parts of the branched base the ramification is very distinctly unilateral (Fig. 17, B), one branch, but apparently not more than one, arising from almost every cell of the main axes. The secondary branches are short and, at the best, bear but short (often only one- or two-celled) branches of the third order (*cf.* Fig. 17, B).

The upright system is very scantily developed and takes two forms. At certain points, where the creeping base is more laxly branched, numerous short, 1-5-celled (commonly 3-celled) branchlets arise in a semi-radial manner, projecting in all directions from the substratum (Fig. 17, C). These points of development of upright branchlets occur at wide intervals, separated by long stretches in which the base is purely procumbent. The upright branchlets are more or less pointed at the ends, but I have never observed them to be drawn out into a hair, nor are they, as far as I have seen, ever branched (*cf.* Fig. 17, C). The second form taken by the upright system is that of simple hairs, often of very considerable length (more than 400  $\mu$  in some cases). These hairs arise at quite irregular intervals from the creeping base, often have a slight basal inflation, and are provided with very scanty contents (Fig. 17, B, D). In many cases they are septate, but I have been unable to convince myself that this is always the case. In part they are drawn out into a point (Fig. 17, B), in part they have a blunt termination (Fig. 17, D).

The cells of the creeping portion are in general rectangular in shape, whilst in section they either appear elongated parallel to the substratum, or their outer wall is more or less convexly arched (Fig. 17, B, D); where a parenchymatous disc is formed, the shape of the

\* Referred to under the name of *Myxonema prostratum* in New Phytol., xv, 1916, p. 236, fig. 1, e.

cells becomes more irregular (Fig. 17, A). The chloroplast appears to have but a single pyrenoid.

This species stands near to the *Stigeoclonium farctum* of Berthold (Unters. ueb. d. Verzweig. einig. Suesswasseralg., Nova Acta K. Leop.-Carol. Ak. d. Naturf., xl, No. 5, 1878, pp. 201, 202, Tab. II, figs. 1-5), which, like our species, bears short bunched branches and irregularly scattered hairs, arising from the highly developed creeping portion. The principal differences are: (a) The radial method of branching of the procumbent portion and the apparently customary formation of a pseudo-parenchymatous disc; (b) the proportionally wider and shorter cells of the creeping base; (c) the longer and less pointed vertical branches, which may in rare cases be branched; and (d) the absence of a swelling at the base of the hairs. Berthold's description also gives the impression that the development of upright branches is much more abundant than in our form. The writer has described a var. *simplex* of *S. farctum*, Berthold (Obs. on the young plants of *Stig.*, Beih. Bot. Centralbl., xiii, 1903, p. 376 *et seq.*, Tab. XI, figs. 1-14), which is, however, more remote from our species than *S. farctum* itself.

Moebius (Ueb. einig. in Portorico gesamm. Suessw.-u. Luft.-Alg., Hedwigia, xxvii, 1888, p. 239, Tab. IX, fig. 3) has described an epiphytic species (without name) of *Stigeoclonium*, growing on leaves of *Potamogeton occidentalis*; this is, however, much more like *S. farctum* than our species.

Hansgirg's *Stigeoclonium pygmaeum* (Prodr. d. Algenfl. v. Boehmen, i, 1888, p. 69, fig. 28), which he subsequently (*op. cit.*, ii, 1893, p. 217) regarded as a variety of *S. farctum*, appears as quite a different form, and Heering (*op. cit.*, p. 85) is no doubt right in maintaining it as a distinct species. Collin's *S. subsimplex* (The Green Algae of N. Amer., Suppl., Tuft's Coll. Studies, iii, No. 2, pp. 90-92, fig. 6) appears to be closely allied to Hansgirg's species.

#### GENUS MICROTHAMNION NAEGELI.

1. *Microthamnion strictissimum*, Rabenhorst, Krypt. Flora v. Sachsen, etc., 1863, p. 266; Fl. Europ. Alg., etc., iii, 1868, p. 375.

Samples 11, 12, 13.

2. *Microthamnion kuetzingianum*, Naegeli, in Kuetzing, Spec. Alg., 1849, p. 352.

Sample 36.

GENUS GONGROSIRA KUETZING.

1. *Gongrosira disciformis*, n. sp. (Fig. 18.)

Thallus epiphyticus, plantis aquaticis adhaerens, calce incrustedatus, densus, forma disci circularis vel saepe valde irregularis, diametro raro plus quam 1 mm.; in sectione transversa plus minus deplanato-con-

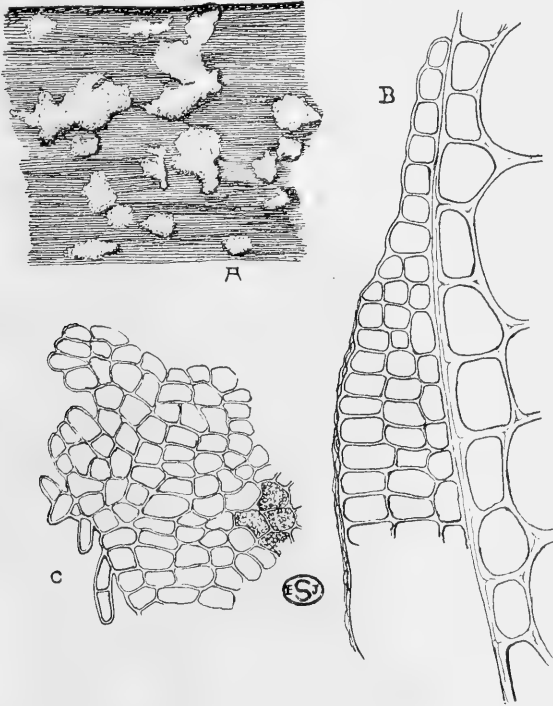


FIG. 18.—*Gongrosira disciformis*, n. sp. A. Small part of the surface of the *Myriophyllum* showing the form of the thalli of the epiphyte. B. Section through the surface of the substratum, showing a part of one of the convex cushions. C. Small part of the edge of a thallus seen from the surface A  $\times 12$ ; B and C  $\times 375$ .

vexus (altit. max.  $50 \mu$ ). Pars procumbens thalli e filis valde ramosis (ramis brevibus interdum imperfecte segregatis), parenchymatice aggregatis, constans. Pars adscendens e filis numerosis brevibus erecte vel oblique dispositis, cum parte procumbente pulvinulum densum efficientibus. Cellulis, diam. ca.  $9-12 \mu$ , 1-2-plo longioribus quam latis, membrana modice incrassata, forma variabili, granulis amyloaceis parvis confertis, pyrenoidibus?

Samples 29A (here largely overgrown by Cyanophyceae), 30A (in both cases on *Myriophyllum*).

This species forms small white spots on the surface of the stems of *Myriophyllum*. These spots, which are readily recognisable with the naked eye, sometimes appear rounded, but more often they are like streaks or even highly irregular in shape (Fig. 18, *A*), which is probably in part due to confluence of thalli. They rarely extend for more than 1 mm. in any direction. In transverse section (Fig. 18, *B*) they appear as flattened convex cushions, closely adpressed to the substratum.

The details of construction are only easily deciphered, after the plentiful incrustation of carbonate of lime has been removed with weak acid. A richly branched system of threads creeps on the substratum (Fig. 18 *C*) and gives origin to numerous erect or obliquely ascending short branches which, together with the creeping system, form the disc-like thalli (Fig. 18, *B*). I have been unable to establish certainly whether the upright threads are branched, but the procumbent ones branch again and again, with the result that an almost parenchymatous stratum (Fig. 18, *C*) is produced, in which the individual threads are only plainly distinguishable near the edge. Some of the short branches are not completely separated off from their relative main axis. It appears that all the branches are held together by a matrix which remains after decalcification.

The cells are of varying shape, often longer than broad, and have a moderately thick membrane (Fig. 18, *C*). They were crowded with numerous small starch-grains which rendered all other features of the cell-contents obscure.

This species seems to come nearest to *G. schmidlei*, P. Richter (Neue Algen de Phyk. univers., fasc. xiii, Hedwigia, xxxiv, 1895, p. 22, figs. *a*, *b*, *c*), which, however, forms larger and more convex cushions. Other points of difference are: (*a*) The abundant ramification of the upright branches; (*b*) the often greater length of the cells; and (*c*) the absence of contents in the lower cells of the branches.

#### GENUS APHANOCHAETE A. BRAUN.

##### (HERPOSTEIRON NAEGELI.)

1. *Aphanochaete repens*, A. Braun, Betracht. ueb. d. Erschein. d. Verjueng., etc., 1851, p. 196, footnote. (Syn.: *Herposteiron confervicola*, Naeg.).

Samples 29 and 33 (on *Cladophora glomerata*), 39 (on *Zygnema spirale*, n. sp.), 53 and 54 (on *Oedogonium* spp.).

(2) CHAETOSPHAERIDIACEAE.

GENUS CHAETOSPHAERIDIUM KLEBAHN.

1. *Chaetosphaeridium globosum* (Nordst.), Klebahn, Pringsh. Jahrb., xxv, 1893, p. 306, Tab. XIV, figs. 5-10. (Syn.: *Herposteiron globosa*, Nordst.; *Aphanochaete globosa*, Wolle).

Samples 39 (rare, epiphytic on *Zygnema spirale*, n. sp.), 53 (very rare, on *Oedogonium* spp.).

(4) COLEOCHAETACEAE.

GENUS COLEOCHAETE BRÉBISSON.

1. *Coleochaete scutata*, Brébisson, Ann. Sci. nat., sér. 3, Bot., i, 1844, p. 29, Pl. II, figs. 1-7.

Samples 29, 29A, and 30A (on *Myriophyllum*), 53 (on *Oedogonium* sp.).

(5) CHAETOPELTIDACEAE.

GENUS CHAETOPELTIS BERTHOLD.

1. *Chaetopeltis* sp. (?). (Fig. 19.)

Sample 44 (on *Dichothrix spiralis*, n. sp.).

I have been at a loss as to the systematic position of this form, but think the reference to the Chaetopeltidaceae may prove correct, although in the present material (even when stained) it has been impossible to recognise any of the characteristic hairs.\* The Alga occurred as roughly circular discs or somewhat elongated convex cushions (typical dimensions: 120 × 90, 200 × 108, 230 × 96 μ), generally attached to the abundant *Dichothrix*, often at the points of branching of the latter (Fig. 19). In some cases the shape was a rather irregular one, with a number of projecting lobes. The com-

\* According to Berthold (Ueb. d. Verzw. einig. Süsswasseralg., loc. cit., p. 217), the formation of these hairs is very variable in *Chaetopeltis orbicularis*, Berth., old plants being sometimes devoid of them for a considerable length of time.

ponent cells are large, generally nearly isodiametric (diam. up to  $27\ \mu$ ), and have a thick gelatinous-looking wall, usually showing prominent stratification (Fig. 19); the middle lamella sometimes presented a granular appearance. A definite, though delicate, cuticle can with some difficulty be traced round a great part of the periphery of each group. The cell-contents were highly granular and no details of structure could with certainty be made out, although in material

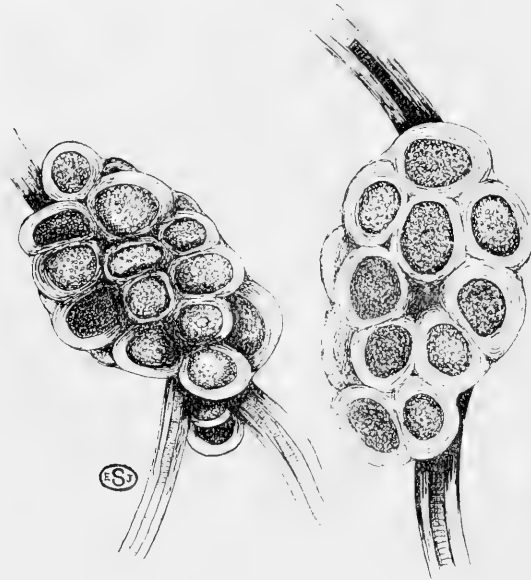


FIG. 19.—*Chaetopeltis* sp. (♀). Two typical thalli growing on *Dichothrix*. Both figures  $\times 500$ .

stained with methyl blue there seemed to be a single parietal chloroplast.

In general, the arrangement of the cells displayed no evident regularity, but a faint radiate disposition was sometimes recognisable in the subcircular discs. In some cases the cells fitted closely together, without interspaces, but usually they were not so closely arranged (Fig. 19) and even partly overlapped one another. The cells were often in a single layer, though here and there certainly in more than one layer. In some of the thalli certain of the peripheral cells were becoming detached, which may possibly indicate a reproductive phase.

It will probably be best to defer further discussion of this form until it has been possible to study it more fully.

(g) OEDOGONIALES.

(1) OEDOGONIACEAE.

GENUS OEDOGONIUM LINK.

1. *Oedogonium crassum* (Hass.), Wittr.; Hirn, Monogr. u. Iconogr. d. Oedogoniaceen, 1900, p. 139, Tab. XVIII, fig. 99.

Samples 53, 54, and 55 (common).

Crassit. cell. veget., 40-63  $\mu$ ; altit., 3-4 plo major.  
,, oogon., 72-84  $\mu$ ; ,, 120-133  $\mu$ .  
,, oospor., 66-72  $\mu$ ; ,, 85-90  $\mu$ .  
,, cell. antherid., 40  $\mu$ ; ,, 9-10  $\mu$ .

The dimensions are slightly larger than those given by Hirn. In samples 54 and 55 a few male threads were observed, but in none of them were the antheridia more than 6-celled, and the contents were too disintegrated to show the number of sperms.

2. *Oedogonium crispum* (Hass.), Wittr.; Hirn, *op. cit.*, p. 159, Tab. XXV, fig. 138.

Samples 53, 54, and 55 (not very common).

Crassit. cell. veget., 12-15  $\mu$ ; altit., 3-5 plo major.  
,, oogon., 36-50  $\mu$ ; ,, 49-60  $\mu$ .  
,, oospor., 40-46  $\mu$ .

3. *Oedogonium pisanum*, Wittr.; Hirn., *op. cit.*, p. 181, Tab. XXIX, fig. 175.

Sample 36.

Crassit. cell. veget., 8-15  $\mu$ ; altit., 2-4 plo major.  
,, oogon., 27-32  $\mu$ ; ,, 40-45  $\mu$ .

The basal attaching cell was very much elongated. The apex of the filaments was usually gradually attenuated to a long hair, the cells becoming progressively longer and narrower until the terminal, very much elongated hair-cell, with very scanty contents, was reached.

4. ? *Oedogonium boreale*, Hirn, *op. cit.*, pp. 275, 276, Tab. XLVII, fig. 300; forma

Samples 29, 30a.

I have some little doubt whether the *Oedogonium* in these samples is really Hirn's species, which, as far as I am aware, has hitherto only been recorded from Finland. My determination is based on the finding of a single oogonium with dwarf-males (crass. oogon., 55  $\mu$ ; altit. oogon., 69  $\mu$ ; crass. nannandr., 20  $\mu$ ; altit., 27  $\mu$ ). The vege-

tative cells (crass., 18–21  $\mu$ ; altit., 4–7 plo major) were markedly capitellate and rather thick-walled. The oogonium was pear-shaped, with a thick stratified wall, and opened by a broad slit about one-quarter of the way from the apex. Owing to the dense contents, the structure of the oogonium-wall could not be distinguished. The dwarf-males were ovate, not obovate, and were provided with a small apiculus.

(Note.—Sterile, and consequently indeterminable, material of this genus was encountered in many of the samples, viz. 4, 5, 14, 15, 17, 19, 21, 22, 23, 24, 34A, 35, 41, 44, 45, 46, 47, 48.)

#### GENUS BULBOCHAETE AGARDH.

(Note.—Only sterile material of this genus was encountered, in samples 10, 39, 53, and 54, in the last two cases epiphytic on *Oedogonium crassum*.)

### (h) SIPHONALES.

#### (2) VAUCHERIAEAE.

##### GENUS VAUCHERIA DE CANDOLLE.

1. *Vaucheria geminata*, Walz.; Heering, Süßwasseralg. Schleswig-Holsteins, etc., ii, Jahrb. d. Hamburg. Wiss. Anst., xxiv, 1906, p. 154, fig. 79.

Sample 5 (fertile).

### (i) CONJUGATAE.

#### (1) MESOTAENIACEAE.

##### GENUS MESOTAENIUM NAEGELI.

1. *Mesotaenium chlamydosporum*, De Bary, Unters. ueb. d. Fam. d. Conjugaten, 1858, p. 75, Tab. VII, D; W. & G. S. West, Monogr. of the Brit. Desm., Ray Soc., i, 1904, p. 52, Pl. IV, figs. 4–14.

Sample 16.

Already recorded by Reinsch from the summit of Table Mountain.



GENUS CYLINDROCYSTIS MENEGH.

1. *Cylindrocystis crassa*, De Bary, *op. cit.*, pp. 37, 74, Tab. VII, Fig. C, 1-12; W. & G. S. West, *op. cit.*, i, 1904, p. 59, Pl. IV, figs. 33-38 (Fig. 20, A).

Samples 8, 9, 19, 50 (here common), 51.

Long. cell., 30-50  $\mu$ ; lat. cell., 18-25  $\mu$ .

In sample 50 the individuals mostly had thick membranes, whilst large masses of fat occurred in the cells, which were evidently in more or less of a resting condition (Fig. 20, A). Side by side with specimens of the typical shape were others in which one end was more or less truncate, whilst the other was broadly rounded; one end was sometimes rather broader than the other (Fig. 20, A, the two left-hand individuals).

2. *Cylindrocystis ornata*, n. sp. (Fig. 20, C.)

C. mediocris, cellulis diametro ca. duplo longioribus, in media parte modice constrictis; semicellulis ovalibus, prope mediam partem latis-simis, polis rotundatis vel exigue truncatis; membrana rubescente, granulis parvis numerosis in tota superficie obtecta; chromatophora processibus paucis magnis, pyrenoide singulo.

Long. cell., 54-57  $\mu$ ; lat. cell., 27-30  $\mu$ .

Sample 50 (rare).

This species is distinguished from all those hitherto described by the form of the cell and the granulation of the membrane. The latter is faintly reddish and provided with numerous fine granules, which cover it uniformly (Fig. 20, C).

GENUS NETRIUM NAEGELI.

1. *Netrium digitus* (Ehrenb.), Itzigs. & Rothe; W. & G. S. West, *op. cit.*, i, 1904, p. 64, Pl. VI, figs. 14-16.

Samples 2 (very rare), 50.

Long. cell., 180-210  $\mu$ ; lat. cell., 45-54  $\mu$ .

2. *Netrium oblongum* (De Bary), Luetkemuller, Zellmembr. d. Desm., Beitr. z. Biol. d. Pfl., viii, 1902, p. 407; W. & G. S. West, *op. cit.*, i, 1904, p. 66, Pl. VIII, figs. 1-3. (Syn.: *Penium oblongum*, De Bary.)

Var. *cylindricum*, W. & G. S. West, Notes on Freshw. Alg., iii, Journ. Bot., 1903, p. 8, Pl. CDXLVI, fig. 10; *op. cit.*, p. 67, Pl. V, fig. 7.

Samples 8, 9, 37, 50.

Forma *curvata*, nov. form (Fig. 20, B).

Cellulis exacte cylindricis, sed plus minus evidenter curvatis, polis rotundatis. Long., 48–72  $\mu$ ; lat., 15–17  $\mu$ .

Samples 8, 9, 50.

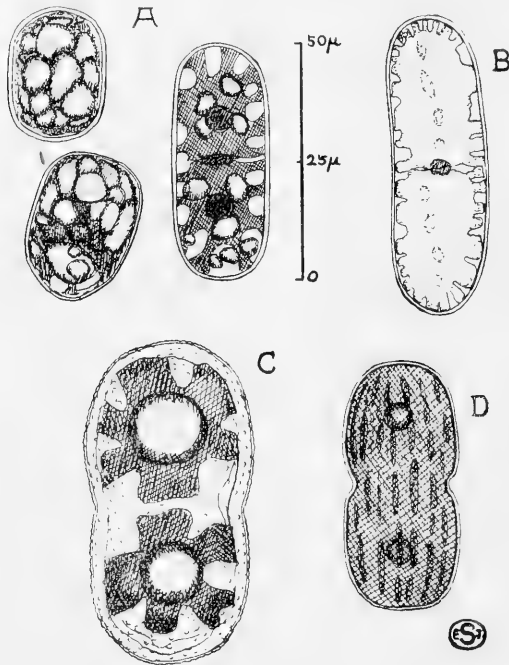


FIG. 20.—A. *Cyliandrocyctis crassa*, De Bary, from sample 50, *cf.* text, p. 541. B. *Netrium oblongum* (De Bary), Luetk., var. *cylindricum*, W. & G. S. West, forma *curvata*, n. f. C. *Cyliandrocyctis ornata*, n. sp. D. *Penium phymatosporum*, Nordst., forma. C and D  $\times 750$ . Magnification of A and B shown by the scale.

## (2) DESMIDIACEAE.

### GENUS PENIUM BRÉBISSON.

1. *Penium margaritaceum* (Ehrenb.), Bréb.; W. & G. S. West, *op. cit.*, i, 1904, p. 83, Pl. VIII, figs. 32–35.

Var. *irregularius*, W. & G. S. West, *Freshw. Alg. Orkneys and Shetlands*, Trans. & Proc. Bot. Soc. Edinburgh, xxiii, 1905, pp. 14, 15, fig. 23.

Sample 4.

Long. cell., 90  $\mu$ ; lat., 18  $\mu$ . The cell-membrane is colourless, the

granules are small, numerous, and scattered; otherwise like the type. The dimensions are smaller than those given in the original diagnosis, but G. S. West (Alg. Yan Yean Reservoir, Journ. Linn. Soc., Bot., xxxix, 1909, p. 53) has already described a smaller form.

2. *Penium phymatosporum*, Nordst.; W. & G. S. West, *op. cit.*, i, 1904, p. 91, Pl. VI, figs. 9-11.

*Forma paullo latior*, lateribus leviter convexis, constrictione mediana plane manifesta. Long. cell., 39-43  $\mu$ ; lat., 18-21  $\mu$  (Fig. 20, D).

Sample 50 (not uncommon).

The specimens differ from the typical ones in having faintly convex sides and a slightly greater breadth in proportion to the length; the

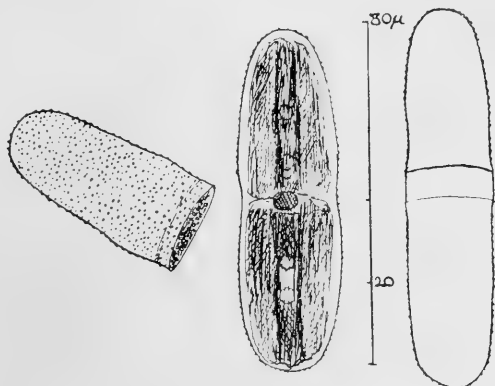


FIG. 21.—*Penium conspersum*, Wittr., var. *capense*, nov. var.

median constriction is also rather more pronounced (Fig. 20, D). This form may be compared with one figured by Borge (Ueb. trop. u. sub-trop. Suesswasserchlorophyc., Bih. K. Sv. Vet.-Ak. Handl., xxiv, Afd. 3, No. 12, Tab. I, fig. 7), which, however, lacks the faint longitudinal striations.

The chloroplast appears to be provided with a considerable number of longitudinal ridges, which exhibit frequent interruptions (Fig. 20, D).

3. *Penium conspersum*, Wittrock, Gotlands och Oelands Soetvattensalg., Bih. K. Sv. Vet.-Ak. Handl., i, 1872, p. 66.

Var. *capense*, nov. var. (Fig. 21).

Semicellulis inflatione exigua, spatio variabili a media cellula posita munitis; membrana achroa; alioqui typo similis est. Long. cell., 65-96  $\mu$ ; lat., 18-22  $\mu$ .

Samples 50 (not uncommon), 51.

I believe this form is referable to Wittrock's *P. conspersum*, of which, however, I have seen no figure. It tallies with the description of this species, except in the fact that the semicells almost constantly exhibit a more or less marked inflation, some little distance above the base, so that the cell is narrower at its middle than further towards the poles (Fig. 21). Moreover, the membrane is colourless. Each chloroplast had two pyrenoids, and there was often a conspicuous mass of fat at either end of the cell. The extremities of the cells vary considerably in the degree of rounding.

Nordstedt (Desm. arctoeae, Ofvers. K. Vet.-Ak. Foerhandl., 1875, No. 6, p. 14) also describes the membrane as colourless, and Schmidle (Alg. Brasilien, Hedwigia, xl, 1901, p. 47) does the same for var. *americanum*, Nordst., in which, however, Schmidle figures (*loc. cit.*, Tab. III, figs. 1, 2) the granules as being much less densely arranged than in the type or the variety above established.

#### GENUS CLOSTERIUM NITZSCH.

1. *Closterium parvulum*, Naegeli, Gatt. einzell. Algen., 1849, p. 106, Tab. VI. C, fig. 2; W. & G. S. West, *op. cit.*, i, 1904, p. 133, Pl. XV, figs. 9-12.

Samples 2, 8, 52.

Distances between apices, 108-126  $\mu$ ; lat., 12-13  $\mu$ .

2. *Closterium leibleinii*, Kuetz.; W. & G. S. West, *op. cit.*, i, 1904, p. 141, Pl. XVI, figs. 9-14.

Samples 5, 25, 48.

Some of the specimens had only two pyrenoids in the one chloroplast or the other. The species has been recorded from Little Namaqualand by G. S. West.

3. *Closterium moniliferum* (Bory), Ehrenb.; W. & G. S. West, *op. cit.*, i, 1904, p. 142, Pl. XVI, figs. 15, 16.

Sample 24.

Recorded from Little Namaqualand by G. S. West.

4. *Closterium malinvernianum*, De Not.; W. & G. S. West, *op. cit.*, i, 1904, p. 145, Pl. XVII, figs. 5, 6.

Forma *major*, nov. form. (Fig. 22).

Differt a typo polis paullo plus incurvatis, inflatione ventrali indistincta, margine ventrali fere recta usque ad apices incurvatos. Apicibus inter se distantibus. 600  $\mu$ ; lat. cell., 112  $\mu$ .

Sample 24 (rare).

I have only seen very few specimens of this form, which in dimensions and shape is more like *C. ehrenbergii*, Menegh. (cf. especially the var. *concauum* of Schmidle, in Engler's Bot. Jahrb., xxiii, 1897, p. 256), whilst the yellowish-brown colour and fine striation of the membrane

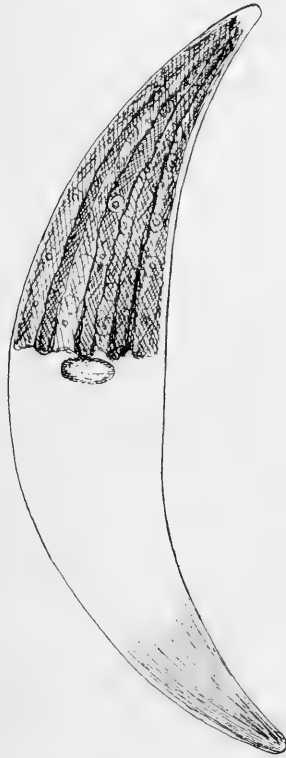


FIG. 22 — *Closterium malinvernianum*, De Not., forma major, nov. form.,  
× 180.

bring it nearer to *C. malinvernianum*, De Not. Towards the ends of the cells the striae give the impression of being composed of numerous minute granules.

5. *Closterium acerosum* (Schrank), Ehrenb.; W. & G. S. West, *op. cit.*, i, 1904, p. 146, Pl. XVIII, figs. 2-5.

Samples 3, 34A, 35.

The specimens in sample 3 had very markedly truncate apices (lat. apic., 6  $\mu$ ), although otherwise typical; some of the individuals were, however, rather short (long. cell., 255-480  $\mu$ ; lat., 36-37  $\mu$ ). The specimens with a truncate apex were described by Gutwinski as var.

*truncatum*, but Messrs. West (*loc. cit.*, p. 148) consider that the character is so variable that it is not enough to warrant a special variety; in sample 3, however, all the specimens seen possessed this character to a very pronounced extent. G. S. West has already recorded *C. acerosum* from other parts of South Africa.

6. *Closterium libellula*; Focke, *Physiol. Stud.*, 1847, p. 58, Tab. III, fig. 29. (Syn.: *Penium libellula* (Focke), Nordst.; W. & G. S. West, *op. cit.*, i, 1904, p. 73, Pl. VII, figs. 6, 7).

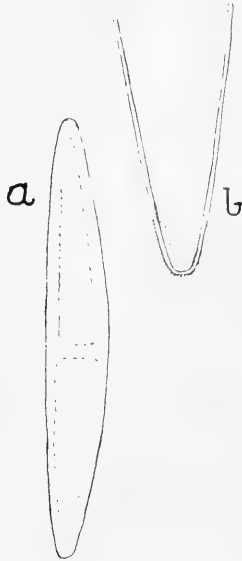


FIG. 23.—*Closterium pritchardianum*, Arch., forma *minor*, n. form.  
*a.* Entire cell, showing the general shape. *b.* Apex of a semi-cell, more strongly enlarged. *a*  $\times$  220; *b*  $\times$  600.

#### Sample 26.

Long. cell., 220–375  $\mu$ ; lat., 39–51  $\mu$ ; lat. apic., 6–9  $\mu$ . Some of the individuals had unequally convex sides.

7. *Closterium pritchardianum*, Arch.; W. & G. S. West, *op. cit.*, i, 1904, p. 172, Pl. XXII, figs. 6–14.

Samples 5, 26.

Forma *minor*, nov. form. Long. cell., 264–285  $\mu$ ; lat., 36–40  $\mu$ . Margine ventrali fere recta, polis vix recurvis (Fig. 23).

Samples 5, 26.

I have been in some doubts about the reference of these specimens to *C. pritchardianum*, but seeing that the general form of the cell and

the striation and punctation of the membrane (Fig. 23, *b*) is that characteristic of this species, and that the apices are very similar, it seems justified. *C. pritchardianum*, which is widely represented in South Africa, is evidently very variable in size, since specimens have been encountered from other localities attaining a length of 1700  $\mu$  (forma *gigantissima*).

In sample 5 there also occurred individuals which approached somewhat to var. *madagascariensis*, F. E. Fritsch (Freshw. Alg. Madagascar, Ann. d. Biol. lacustre, Tab. VII, fasc. i), but differed from it in two respects, viz. (*a*) in being in part shorter and proportionally broader (long., 550-700  $\mu$ ; lat., 48-55  $\mu$ ), and (*b*) in the almost straight ventral margin. Such forms tend to link up var. *madagascariensis* and also forma *maxima*, Nordstedt (Nonnullae alg. aq. dulc. brasil., Öfvers. K. Sv. Vet.-Ak. Foerhandl., 1877, No. 3, p. 16) with the type.

#### GENUS PLEUROTOAENIUM NÆGELI.

1. *Pleurotaenium ehrenbergii* (Bréb.), De Bary, *op. cit.*, p. 75: W. & G. S. West, *op. cit.*, i, 1904, p. 205, Pl. XXIX, figs. 9-11.

Samples 3, 5.

Previously recorded by Nordstedt from the Cape.

2. *Pleurotaenium ovatum*, Nordstedt, Nonnull. alg. aq. dulc. brasil., Öfvers. K. Sv. Vet.-Ak. Foerhandl., 1877, No. 3, p. 18. (Syn.: *Docidium ovatum*, Nordstedt, Desmid., in E. Warming, Symb. ad. fl. Brasil., centr. cogn., Vid. Med. Nat. Foren. Kjobenhavn, 1869, p. 205, Tab. III, fig. 37).

Sample 5.

Previously recorded by Nordstedt from the Cape.

#### GENUS EUASTRUM EHRENBERG.

1. *Euastrum capense*, n. sp. (Fig. 24.)

E. parvum, circiter  $1\frac{1}{4}$  plo longius quam latum, profunde constrictum, sinu angusto-lineari extremo paullo ampliato. Semicellulae obscure trilobae, sinu late concavo inter lobos; lobo polari lato, apice plus minus convexo, incisura mediana non profunda extus ampliata, marginibus lateralibus apicis plus minus concavis, angulis apicalibus dente exiguo munitis, marginibus lateralibus lobi polaris subparallelis; lobis lateralibus bilobulatis, iis superioribus rotundatis, iis inferioribus plus minus truncatis etiam leviter emarginatis, lobulo utroque plerumque dente exiguo instructo; semicellulis plerumque granulis

ca. 9 intra lobum lateralem utrumque, et granulis 4-5 intra angulum apicalem utrumque, tumore centrali nullo. A latere visae globoso-ellipticae, apice rotundato, tumore parvo prope basin utrobique. A vertice visae ellipticae, polis ca. 5-6 dentibus exiguis munitis, inflatione mediana aliquantula acuta. Long. cell., 36  $\mu$ ; lat. cell. med., 27-30  $\mu$ ; lat. lob. pol., 21  $\mu$ ; lat. isthm., 8  $\mu$ ; crass., 17-18  $\mu$ .

Samples 7 (very common), 8, 14, 51.

This species appears to be not uncommon in the Cape Peninsula. It is distinguished by the character of the apex from all the other

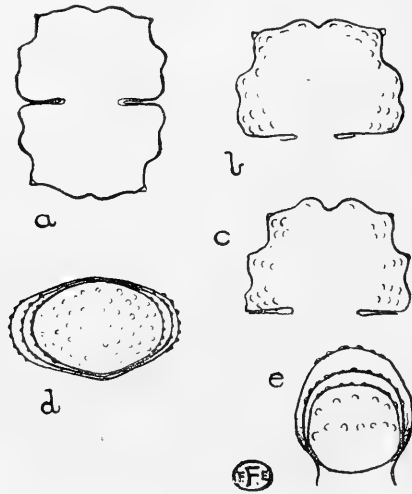


FIG. 24.—*Euastrum capense*, n. sp. a, b, c. Cells and semi-cells in front view, showing varying shape of apex, the granulation, and the small teeth. d. End-view. e. Semi-cell in side-view. All figures  $\times 800$ .

*Euastra* of small dimensions, and the end-view is also rather characteristic. It belongs to the species without elaborate ornamentation, and may best be compared with *E. binale* (Turp.), Ehrenb. (especially forma *gutvinskii*, Schmidle), *E. elegans* (Bréb.), Kuetz., and *E. dubium*, Naegeli, with the last of which it perhaps shares most points of resemblance.

As the figures show, the shape of the apex is somewhat variable (Fig. 24, a-c), and the amount of granulation also varies to some extent in different individuals.

2. *Euastrum denticulatum* (Kirchn.), Gay; W. & G. S. West, *op. cit.*, ii, 1905, p. 56, Pl. XXXIX, figs. 1-4. (Syn.: *E. amoenum*, Gay.)

Samples 12, 24 (very rare).



3. *Euastrum pseudocoralloides*, n. sp (Fig. 25).

E. minutum, circiter  $1\frac{1}{2}$  plo longius quam latum, profunde constrictum, sinu angusto-lineari extremo vix ampliato. Semicellulae subquadratae, trilobae, incisuris lateralibus subprofundis subampliatis; lobo polari lato, apice complanato et plus minus distincte undulato, incisura mediana extrorsum ampliata non profunda, angulis apicalibus in lobulo acuto membrana leviter incrassata productis; lobis latera-

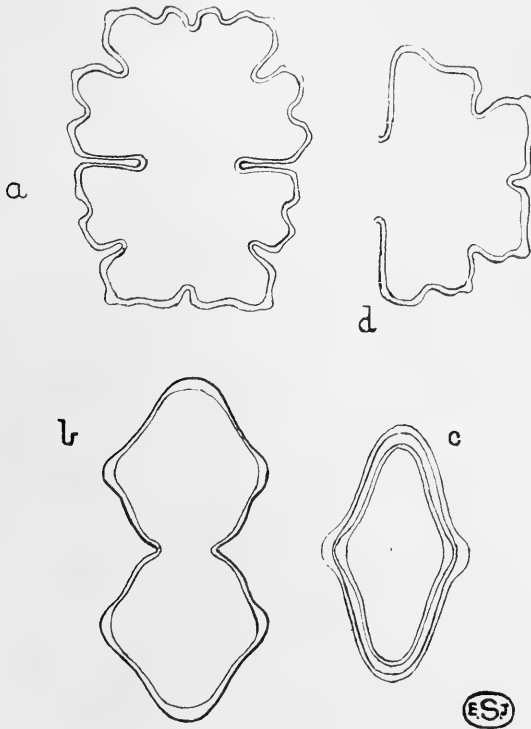


FIG. 25.—*Euastrum pseudocoralloides*, n. sp. a. Front-view. b. Side-view. c. End-view. d. Immature (?) semi-cell in front-view. All figures  $\times 1400$ .

libus bilobulatis, iis superioribus eadem forma quam iis lobi polaris, iis inferioribus oblique truncatis; semicellulis granulis et tumore centrali destitutis, membrana laevi. A latere visae ovatae, inflatione mediana (ubi membrana incrassata) distincta, marginibus superioribus concavis, apicibus rotundatis incrassatis. A vertice visae ellipticae, inflatione mediana valde distincta.

Long. cell., 24–25  $\mu$ ; lat. cell., 18–21  $\mu$ ; lat. isthm., 5–6  $\mu$ ; crass. 9–10  $\mu$ .

Sample 44 (rare).

This species, of which only few individuals were seen, evidently belongs to the group of species comprising *E. coralloides*, Joshua, *E. plesiocoralloides*, W. & G. S. West, *E. triqibberum*, W. & G. S. West, and *E. geometricum*, W. & G. S. West. All of these are characterised by the deep incisions between the polar and the lateral lobes, often accompanied by a rather deep apical incision, rendering the semicells more or less markedly 4-lobed, a feature which is not so well seen in the present species. The differences between *E. pseudocoralloides* and the other species just enumerated are sufficiently obvious without special mention, in particular the smooth membrane and the characteristic side- and end-views are very distinctive. Another very marked feature is the shape of the upper lateral and apical lobules; the lower lateral lobules appear to be merely truncated (Fig. 25, *a*). The semicell shown in Fig. 25, *d* either represents a simplified form of *E. pseudocoralloides* or, more probably, an immature stage. The extent of development of the apical undulations is, however, certainly subject to some slight degree of variation.

#### GENUS COSMARIUM CORDA.

1. *Cosmarium granatum*, Bréb.; W. & G. S. West, *op. cit.*, ii, 1905, p. 186, Pl. LXIII, figs. 1-3.

Samples 39, 45 (rare), 48 (very rare), 52 (very rare).

Long., 27-35  $\mu$ ; lat., 20-27  $\mu$ ; lat. isthm.; 5-7  $\mu$ .

2. *Cosmarium pseudatlanthoideum*, West; W. & G. S. West, *op. cit.*, ii, 1905, p. 191, Pl. LXIII, figs. 16, 17.

Sample 39.

Long., 24-25  $\mu$ ; lat., 18-19; lat. isthm., 6  $\mu$ .

The dimensions are rather larger than usual, but the form of the cells was exactly as in Fig. 17 in Messrs. West's monograph. This species comes very close to some forms of *C. granatum*, Bréb.; *cf.* also *C. aequale*, Turner, which, however, has a different end-view and is larger.

3. *Cosmarium capense*, De Toni, Sylloge Algarum, etc., i, 1899, p. 969. (Syn.: *C. pyramidatum*, Bréb., subsp. *capense*, Nordstedt, De Alg. nonnull., praecipue Desm., etc., Act. Univ. Lund., xvi, 1880, p. 6, Tab. I, fig. 8.)

Var. *minor*, nov. var.: Long., 45-54  $\mu$ ; lat., 33-36  $\mu$ ; lat. isthm., 11-12  $\mu$ ; crass., 24-27  $\mu$ . Semicellulae a vertice visae ellipticae, axis

major ca. triplo longior quam axis minor; a latere visae elliptico-oblongae, lateribus fere parallelis, polis leviter rotundatis (Fig. 26).

Samples 1, 8, 9, 19.

This species is evidently of common occurrence in the Cape Peninsula. The characteristic features are the rounded basal angles, the convex sides which gradually converge more and more markedly from the base to the apex, and the slightly flattened and retuse apex (Fig. 26). There are two pyrenoids in each semicell. The flattened apex varies considerably in width and the retuse character is sometimes more sometimes less pronounced.

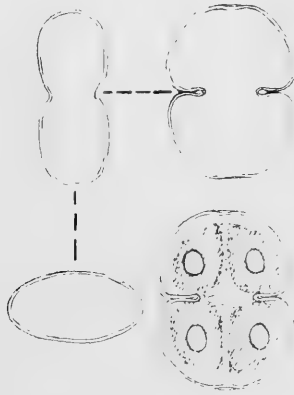


FIG. 26.—*Cosmarium capense*, De Toni, var. *minor*, nov. var. × 600.

The specimens are appreciably smaller than those originally described by Nordstedt (*loc cit.*), although Messrs. West (On some Desm. of the United States, Journ. Linn. Soc., Bot., xxxiii, 1897, p. 301, Pl. XVII, fig. 3) have already recorded a forma *minor*, whose dimensions approximate more closely to those of the specimens found in the present collections. The most important differences as compared with Nordstedt's specimens, however, lie in the shape of the side- and end-views (Fig. 26). The end-view is a narrower and more elongated ellipse, whose ends are not so markedly rounded, whilst in side-view the almost parallel sides of the semicells are noteworthy. In the latter respect our specimens are like a form described by Borge (Ueb. trop. u. subtrop. Suesswasser-chlorophyc., Bih. K. Sv. Vet.-Ak. Handl., xxiv, Afd. iii, No. 12, p. 22, Tab. II, fig. 50), which is, however, considerably larger and has an end-view like that of Nordstedt's specimens. Borge's form has a punctate membrane, and in this connection it may be mentioned that the individuals in the present samples in some cases

had a very obscurely punctate membrane, although generally nothing of the kind could be discerned.

4. *Cosmarium holmiense*, Lundell, Desm. Suec., Nov. Act. reg. soc. scient. Upsala, Ser. 3, viii, 1871, p. 49, Tab. II, fig. 20; W. & G. S. West, *op. cit.*, iii, 1908, p. 1, Pl. LXV, figs. 1, 2.

*Forma ad var. integrum*, Lund. accedens. Long., 54–58  $\mu$ ; lat., 33–35  $\mu$ ; lat. isthm., 15–17  $\mu$  (Fig. 27).

Sample 50 (very rare).

Only two specimens were observed which agreed with the type, except in the nature of the apices; these were either slightly retuse or slightly convex, the two forms occurring on the two semicells of the same individual (Fig. 27). These specimens should be compared with

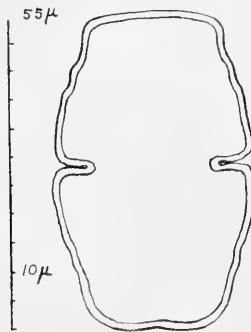


FIG. 27.—*Cosmarium holmiense*, Lund., forma.

a form of var. *integrum*, Lund., described by Borge (Beitr. z. Algenfl. v. Schweden, 2, Bot. Notiser, 1913, p. 16, Tab. I, fig. 10), which, however, lacks the small undulations of the lateral margins.

5. *Cosmarium obtusatum*, Schmidle, Engler's Bot. Jahrb., xxvi, 1898, p. 38; W. & G. S. West, *op. cit.*, iii, 1908, p. 7, Pl. LXV, figs. 13, 14. Sample 32 (rare).

Side by side with specimens showing typical dimensions (long., 63  $\mu$ ; lat., 51  $\mu$ ; lat. isthm., 15  $\mu$ ), others were observed which were relatively broader (long., 66  $\mu$ ; lat., 60  $\mu$ ; lat. isthm., 15  $\mu$ ). The apex was moreover, in some cases, faintly undulate. It is possible that these variations indicate a distinct form. *C. obtusatum* has been recorded from the Karoo by G. S. West.

6. *Cosmarium quadratum*, Ralfs; W. & G. S. West, *op. cit.*, iii, 1908, p. 57, Pl. LXX, figs. 6–8.

*Forma* apice leviter retuso, membrana levissime punctata. Long., 49  $\mu$ ; lat., 25  $\mu$ .

Sample 7 (rare).

Compare with forms described by Lundell (Desm. Suec., *loc. cit.*, p. 47) and Nordstedt (Freshw. Alg. New Zealand, etc., K. Sv. Vet.-Ak. Handl., xxii, 1888, p. 55, Tab VI, fig. 5).

7. *Cosmarium sexangulare*, Lundell, Desm. Suec., *loc. cit.*, p. 35, Tab. II, fig. 23; W. & G. S. West, *op. cit.* iii, 1908, p. 81, Pl. LXXII, fig. 3.

Var. *subangulare*, nov. var. (Fig. 28, a, b).

Magnitudine ca. dimidio ea typi; semicellulis obscure 7-angulis, lateribus superioribus e marginibus duabus fere rectis et obscure delimitatis constantibus; angulis lateralibus bene demarcatis, rotundatis vel subacutis; apicibus interdum leviter retusis.

Long. cell., 18-25  $\mu$ ; lat., 15-21  $\mu$ ; lat. isthm., 4-5  $\mu$ ; crass., 12  $\mu$ .

Samples 29, 30A, 31, 39.

This variety is distinguished by its retuse apex, and especially by the fact that the upper lateral margins consist of two, almost flattened edges, forming a very wide angle with one another (Fig. 28, b). In the former respect it resembles forma *minima*, Nordst., with which it also agrees to some extent in its dimensions; in this form, however, the upper lateral margins are retuse.

8. *Cosmarium perpusillum*, West, Alg. W. Ireland, Journ. Linn. Soc., Bot., xxix, 1892, p. 148, Tab. XXI, fig. 2; W. & G. S. West, *op. cit.*, iii, 1908, p. 88, Pl. LXXII, figs. 22, 23. (Fig. 28, d-h.)

Samples 29, 29A (very rare), 30A, 31, 39.

Long., 18-20  $\mu$ ; lat., 15-18  $\mu$ ; lat. isthm., 3-4  $\mu$ ; crass., 9  $\mu$ .

It appears that the specimens in these samples belong to the above species, although they exhibit considerable variation in several respects, apart from being larger. Typical specimens have subhexagonal semi-cells, with the lower lateral margins slightly retuse and the upper lateral margins provided with one median crest; the apex is generally slightly retuse. I have in no case observed so marked a protrusion of the lateral angles, as is figured by Messrs. West in their monograph.

Considerable variation is firstly exhibited in the degree of divergence of the lower lateral margins, which in some cases (Fig. 28, e, f) become almost subparallel, giving the lower part of the semicell the rectangular appearance characteristic of *C. meneghinii*, Bréb. Further, whilst in many individuals these lower margins are typically retuse (Fig. 28, e), in others they are almost, if not quite, straight (Fig. 28,

*d, g*). As the figures show, there are often appreciable differences between the two semicells, and even between the two sides of a semicell, in both these respects.

Other variations concern the upper lateral margins. They may lack the median crest and have a more or less concave edge (Fig. 28, *f, g*), which may sometimes, however, be almost straight (Fig. 28, *g*, the right-hand side of the lower semicell). In this respect also there may be diversity on the two sides of the same semicell.

Lastly, the apex varies considerably in breadth and in the degree of development of the retuse character, being sometimes practically truncate (Fig. 28, *d-g*).

In those forms, in which the lower lateral margins become sub-

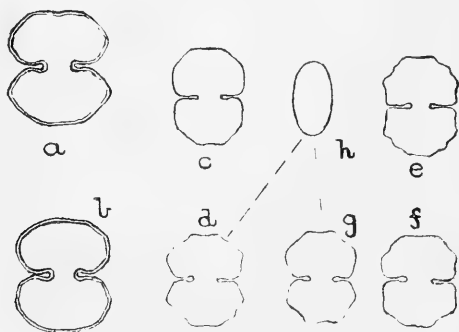


FIG. 28.—*a, b*. *Cosmarium sexangulare*, Lund., var. *subangulare*, nov. var.  
*c*, *C. rectangularis*, Grun., forma. *d-h*. *Cosmarium perpusillum*, West,  
formae (*h*, end-view). All figures  $\times 800$ .

parallel, the cell is proportionally rather longer than broad (long., 20-21  $\mu$ ; lat., 16-17  $\mu$ ). Such specimens (Fig. 28, *e, f*), except for the frequent presence of the median crest on the upper lateral margins, approach very closely to *C. meneghinii*, Bréb., and it may be questioned whether *C. perpusillum*, West, would not better be placed as a variety of the former species, since it appears to be connected with it by a whole series of transitional forms in the South African flora. Forms somewhat resembling those here described have been recorded under *C. meneghinii*, Bréb., by Borge (Alg. d. ersten Regnell. Exped., ii, Desmid., Arkiv. f. Bot. i, 1903, p. 98, Tab. III, fig. 24), and Raciborski (De nonnull. Desmid. Polonia, Pamiętnik Wyd. Ak. Umiej. w. Krakow, x, 1885, Tab. XI, fig. 5); cf. also var. *nanum*, Wille (W. & G. S. West, *op. cit.*, p. 93, Pl. LXXII, fig. 34).

It should be added that there are no appreciable differences in the side- and end-views of the specimens shown in Fig. 28, *d-g*,

these views closely resembling those shown by Messrs. West (*cf.* Fig. 28, *h*).

9. *Cosmarium meneghinii*, Bréb.; W. & G. S. West, *op. cit.*, iii, 1908, p. 90, Pl. LXXII, figs. 29–32.

*Forma* marginibus lateralibus inferioribus leviter divergentibus; alioqui typo et non var. *nano* Wille similis est. Long., 24  $\mu$ ; lat., 15  $\mu$ ; lat. isthm., 5  $\mu$ .

Sample 19 (rare).

10. *Cosmarium rectangulare*, Grun.; W. & G. S. West, *op. cit.*, iii, 1908, p. 54, Pl. LXX, figs. 1, 2.

*Forma* apicibus interdum leviter refusis, membrana laevi. Long., 20  $\mu$ ; lat. 15  $\mu$ ; lat. isthm., 3–4.5  $\mu$  (Fig. 28, *c*).

Sample 31 (rare).

A small form, which appears rather as an extreme condition of the forms of *C. perpusillum*, West, shown in Fig. 28, *e, f.* Messrs. West (Alg. Centr. Afr., Journ. Bot., xxv, 1896, p. 379, Tab. 361, fig. 14) have described a var. *africanum* of *C. rectangulare*, which is, however, proportionally longer.

11. *Cosmarium laeve*, Rabenhorst, Fl. Europ. Alg., iii, 1868, p. 161; W. & G. S. West, *op. cit.*, iii, 1908, p. 99, Pl. LXXIII, figs. 8–19.

*Forma* membrana laevi. Long., 18–30  $\mu$ ; lat., 15–21  $\mu$ ; lat. isthm., 3.5–5  $\mu$ ; crass., 10  $\mu$ .

Samples 14, 52, 54, 55.

Var. *septentrionale*. Wille, Ferskvandsalg. Novaja Semlja, etc., Öfvers. K. Vet.-Ak. Föerhandl., 1879, No. 5, p. 43, Tab. XII, fig. 34; W. & G. S. West, *loc. cit.*, p. 102, Pl. LXXIII, figs. 22–25.

Sample 52.

The type has been recorded from Little Namaqualand by G. S. West.

12. *Cosmarium punctulatum*, Bréb.; W. & G. S. West, *op. cit.*, iii, 1908, p. 206, Pl. LXXXIV, figs. 13, 14, and Pl. CII, fig. 22.

Samples 2 (rare), 7, 10 (rare), 29 (rare).

The abundant individuals in sample 7 were very typical; long., 32–36  $\mu$ ; lat., 28–30  $\mu$ ; lat. isthm., 8–10  $\mu$ ; crass., 17–18  $\mu$ . Some had a slightly concave apex. In many cases the end-view showed a slight median non-granulated inflation. This species has been recorded by Reinsch from the Cape.

Var. *subpunctulatum* (Nordst.), Boergesen; W. & G. S. West, *loc.*

*cit.*, p. 209, Pl. LXXXIV, figs. 15-20. (Syn.: *C. subpunctulatum*, Nordst.).

Samples 25, 26, 29, 29A, 30A, 31, 33, 48.

Long., 25-26  $\mu$ ; lat., 21-22  $\mu$ ; lat. isthm., 7-8  $\mu$ .

The dimensions are rather smaller than those typical for this variety. Most of the specimens, which were in no case numerous, possessed the form shown in Fig. 17 on Pl. LXXXIV of Messrs. West's monograph, the apex being generally quite or almost quite smooth.

13. *Cosmarium subcrenatum*, Hantzsch; W. & G. S. West, *op. cit.*, iii, 1908, p. 228, Pl. LXXXVI, figs. 10-14.

Samples 26, 31, 32, 33, 48.

Long., 28-38  $\mu$ ; lat., 25-30  $\mu$ ; lat. isthm., 7-11  $\mu$  (usually about 9  $\mu$ ). In some of the individuals the apical undulations were rather indistinct.

14. *Cosmarium subprotumidum*, Nordstedt; W. & G. S. West, *op. cit.*, iii, 1908, p. 231, Pl. LXXXVI, figs. 19-21.

Var. *gregorii* (Roy & Biss.), W. & G. S. West, *loc. cit.*, p. 232, Pl. LXXXVI, figs. 23-25 (Syn.: *C. gregorii*, Roy & Biss.).

Samples 14, 21 (?), 33.

Long., 21-24  $\mu$ ; lat., 21-22  $\mu$ ; lat. isthm., 6-7  $\mu$ . Typical specimens closely resembling Fig. 24 in Messrs. West's monograph. The type has been recorded from the Tanganyika region by G. S. West.

15. *Cosmarium speciosum*, Lundell, Desm. Suec., *loc. cit.*, p. 34, Tab. III, fig. 5; W. & G. S. West, *op. cit.*, iii, 1908, p. 247, Pl. LXXXIX, figs. 1-3.

Var. *simplex*, Nordstedt, Desm. Spetsberg., etc., Öfvers. K. Sv. Vet.-Ak. Föerhandl., 1872, No. 6, p. 31, Tab. VI, fig. 12; W. & G. S. West, *loc. cit.*, p. 250, Pl. LXXXIX, fig. 6.

Sample 50 (rare).

Long., 36-42  $\mu$ ; lat., 27-30  $\mu$ ; lat. isthm., 12-15  $\mu$ .

16. *Cosmarium botrytis*, Menegh.; W. & G. S. West, *op. cit.*, iv, 1912, p. 1, Pl. XCVI, figs. 1, 2, 5-15.

Samples 5, 25, 29, 30A (here in part approaching var. *depressum*, W. & G. S. West), 33.

Long., 62-73  $\mu$ ; lat., 55-63  $\mu$ ; lat. isthm., 17-18  $\mu$ . Recorded from the Karoo by G. S. West.

Var. *tumidum*, Wolle, Desm. United States, 1884, p. 75, Tab. XVII, figs. 3-5; W. & G. S. West, *loc. cit.*, p. 5, Pl. XCVII, figs. 2, 3. (Syn.: *C. subbotrytis*, Schmidle).

Samples 29, 29A, 31.

Long., 63-72  $\mu$ ; lat., 54-60  $\mu$ ; lat. isthm., 15-16  $\mu$ .



17. *Cosmarium pseudobroomei*, Wolle; W. & G. S. West, *op. cit.*, iv, 1912, p. 22, Pl. C, figs. 7, 8, and Pl. CIII, fig. 7.

*Forma ad var. convexum*, W. & G. S. West *accedens*, sed fere tam longum quam latum. Long., 37–40  $\mu$ ; lat., 36–39  $\mu$ ; lat. isthm., 11  $\mu$ . Sample 24.

This form resembles the type more nearly in its dimensions, but the lateral margins are pronouncedly convex and the apex is slightly convex. The granules are arranged in evident vertical series.

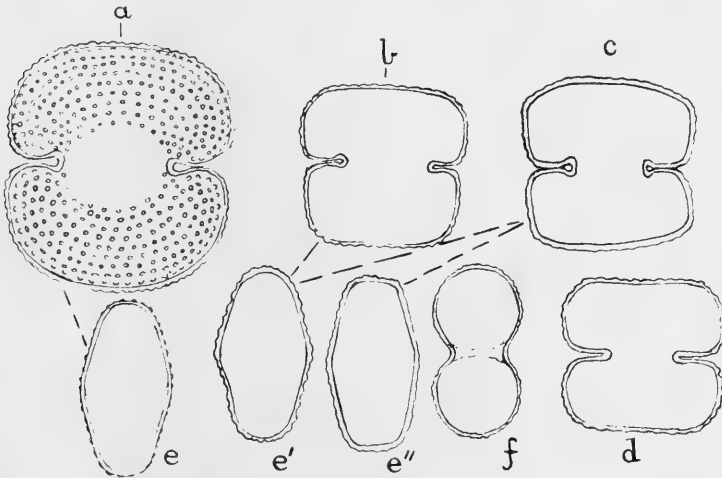


FIG. 29.—*Cosmarium subbroomei*, Schmidle, formae. *a*. Forma typica, front-view. *b* and *d*. Forma pseudo-quadrangulum, front-views. *c*. Forma pseudo-conspersum, front-view; *e*, *e'*, *e''*, diverse end-views, the appropriate specimens to which they belong being indicated by interrupted lines. *f*. Individual in side-view. The complete granulation is only shown in Fig. *a*. All figures  $\times 1000$ .

18. *Cosmarium subbroomei*, Schmidle, Beitr. z. Algenfl. d. Schwarzwald. u. Rheineb., Ber. naturf. Ges. Freiburg i. B., vii, 1893, p. 104, Tab. V, figs. 22–24; W. & G. S. West, *op. cit.*, iv, 1912, p. 23, Pl. C, figs. 10, 11.

*Formae diversae*, pro parte ad *C. quadrangulum*, Lund., et *C. conspersum*, Ralfs *accedens* (Fig. 29).

Samples 34A, 35, 48.

The reference of the specimens in the above samples to *C. subbroomei*, Schmidle, is based solely on the end-view and the character of the granulation. As far as the shape in front-view of these specimens is concerned, they might be referred to *C. quadrangulum*, Lund., *C. conspersum*, Ralfs, or even to *C. margaritatum* (Lund.), Roy & Biss., since individuals showing the shape characteristic of these species, on

one or both semicells, were always to be found (Fig. 29, *a-d*). These three species are, however, all distinguished by having an end-view without a trace of median inflation, whereas all the types of cell-form shown in Fig. 29 had an end-view with a slight median enlargement; in fact, although large numbers of individuals were examined, all showed this character quite distinctly. It may be mentioned that the end-view was, in general, much more like that shown by Messrs. West in Fig. 11 (*loc. cit.*, Pl. C) than that depicted by Schmidle. A peculiar form of end-view, with flattened poles, only noticed in connection with a front-view of the *consersum*-type, is seen in Fig. 29, *e''*.

As regards the granulation, the granules were, in the vast majority of cases, of the fine type figured by Schmidle and Messrs. West. In sample 48, however, occasional individuals with a coarser granulation, more like that of *C. quadrum*, Lund., were observed; some of these individuals also showed reduction of the granulation in the middle of the apex, such as is characteristic for this species. In correspondence with the larger size of the specimens (*cf.* below), the granules were more numerous than in Schmidle's or Messrs. West's forms. Moreover they covered practically the whole surface of the semicells in a uniform manner. In general they were arranged in concentric series (Fig. 29, *a*), as in Messrs. West's specimens, although occasional individuals showed them in more or less obvious vertical series.

These diverse forms may be enumerated as follows:

(*a*) Forma *typica* (Fig. 29, *a, e*): Long., 48–52  $\mu$ ; lat., 47–50  $\mu$ ; lat. isthm., 14–15  $\mu$ ; crass., 22–24  $\mu$ . Dimensions of individual specimens: 48  $\times$  49, 52  $\times$  48, 50  $\times$  47, 51  $\times$  50, 48  $\times$  48, 50  $\times$  50  $\mu$ .

(*b*) Forma *pseudo-quadrum* (Fig. 29, *b, d, e'*): Long., 48–51  $\mu$ ; lat., 44–49  $\mu$ ; lat. isthm., 13–15  $\mu$ . Dimensions of individual specimens, 48  $\times$  48, 51  $\times$  50, 48  $\times$  49, 48  $\times$  44  $\mu$ .

(*c*) Forma *pseudo-consersum* (Fig. 29, *c, e', e''*): Long., 47  $\mu$ ; lat., 48  $\mu$ ; lat. isthm., 14  $\mu$ .

In view of the fact that a large percentage of the individuals showed a shape in front-view very similar to that of *C. quadrum*, Lund. (including even a faintly retuse apex in some cases, Fig. 29, *d*), the question arises as to whether *C. subbroomei*, Schmidle, would not better be regarded as a variety of *C. quadrum*, Lund., with several forms. It may be well, however, to await further observations before arriving at a definite conclusion on this point.

Var. *pseudo-pearsoni*, nov. var. (Fig. 30).

Differt a typo cellulis ca.  $1\frac{1}{2}$  plo longioribus quam latis, semicellulis ovato-pyramidatis, lateribus convexis et convergentibus, apice indistincte truncato, granulis parvis numerosis in seriebus confertis con-

centricis ordinatis; a vertice visis, ellipticis, polis late rotundatis, inflatione mediana distincta subacuta. Long., 50–60  $\mu$ ; lat., 43–50  $\mu$ ; lat. isthm., 12–15  $\mu$ .

Samples 24, 26.

This variety shows considerable resemblance to *C. pearsoni*, G. S. West (Freshw. Alg. Percy Sladen Mem. Exped., Ann. S. Afr. Museum, ix, 1912, p. 87, Pl. I, fig. 42), and the name is intended to bring out this fact. It differs from this species (*a*) in the end-view, which is practically that typical for *C. subbroomei*; (*b*) in the somewhat coarser granulation; and (*c*) in the fact that the granules are arranged in obvious concentric series. Moreover the individuals are smaller. The

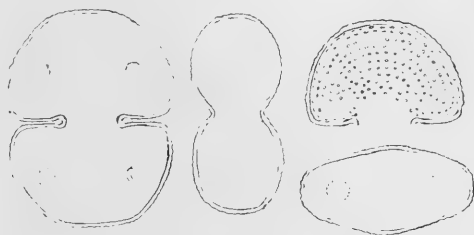


FIG. 30.—*Cosmarium subbroomei*, Schmidle, var. *pseudo-pearsoni*, nov. var.  $\times 750$ .

variety may also be compared with *C. botrytis*, Menegh., *C. radiosum*, Wolle, and *C. intermedium*, Delp.

#### GENUS XANTHIDIUM EHRENBERG.

I. *Xanthidium brevispinum*, n. sp. (Fig. 31.)

X. subparvum, ca. tam longum quam latum, profunde constrictum, sinu angusto-lineari, extremo vix ampliato. Semicellulae late trapezi-formes, angulis inferioribus late rotundatis, angulis superioribus acutis (utrisque serie spinarum 3 instructis); lateribus convexis convergentibus, superne fere rectis vel interdum concavis (serie spinarum 3 vel plurium ad angulum lateralem instructis); apicibus truncatis rectis; semicellulis intra angulum basalem spinis parvis 3–5 et intra apicem spinis parvis diverse dispositis (plerumque in medio et intra angulum superiorem utrumque) instructis; prope media semicellula area diverse scrobiculata. A vertice visae subrhomboideae, polis latis rotundatis seriebus tribus spinarum 3 instructis, ad medium utrobique valde incrassatae spina bifurcata munitae; a latere visae ?

Long., 42  $\mu$ ; lat. max. sine acul., 42  $\mu$ ; lat. apic., 27  $\mu$ ; lat. isthm., 12  $\mu$ ; crass., 23  $\mu$ .

Sample 7 (very rare).

I have unfortunately been unable to obtain a side-view of this species, but it is sufficiently different from those hitherto described to warrant the establishment of a distinct form. In general shape the semicells are not unlike those of *X. antilopaenum* (Bréb.), Kuetz., but they differ from them in the very short spines, in their rather different arrangement, and in the end-view; cf. also *X. mayori*, G. S. West (Contrib. to our knowl. Freshw. Alg. Columbia, Mem. Soc. neuchâteloise d. Sc. nat., v, 1914, p. 1041, Pl. XXII, fig. 41).

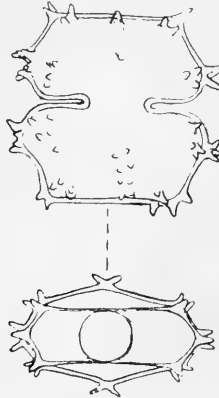


FIG. 31.—*Xanthidium brevispinum*, n. sp.  $\times 600$ .

#### GENUS ARTHRODESMUS EHRENBERG.

1. *Arthrodesmus incus* (Bréb.), Hassall, Brit. Freshw. Alg., 1845, p. 357, Tab. LXXXV, fig. 10; W. & G. S. West, *op. cit.*, iv, 1912, p. 91, Pl. CXIII, figs. 13–15.

Sample 54 (very rare).

Long. cell. sine spin.,  $18 \mu$ ; lat. cell. sine spin.,  $15 \mu$ ; crass.,  $9\text{--}10 \mu$ .

#### GENUS STAURASTRUM MEYEN.

1. *Staurastrum striolatum* (Naeg.), Arch.; W. & G. S. West, *op. cit.*, iv, 1912, p. 177, Pl. CXXVII, figs. 1–5.

Sample 2 (rather rare).

Long.,  $28\text{--}30 \mu$ ; lat.  $24\text{--}25 \mu$ ; lat. isthm.,  $9 \mu$ . In some specimens the apex of the semicell, in front-view, appeared very faintly convex. The vertical view was always absolutely typical.

2. *Staurastrum punctulatum*, Bréb.; W. & G. S. West, *op. cit.*, iv, 1912, p. 179, Pl. CXXVII, figs. 8–11, 13, 14.

Sample 8 (rather common).

Long.,  $33\ \mu$ ; lat.,  $26\ \mu$ ; lat. isthm.,  $12\ \mu$ . All individuals triangular in end-view.

3. *Staurastrum hexagonale*, n. sp. (Fig. 32.)

*S. subparvum*, circiter  $1\frac{1}{3}$  plo longius quam latum, modice constrictum, sinu acutangulo late aperto. Semicellulae transverse hexagonae, angulis lateralibus leviter productis, angulis omnibus plus minus rotundatis; apicibus rectis truncatis; marginibus lateralibus superioribus fere rectis, marginibus lateralibus inferioribus rectis vel leviter concavis. A vertice visae tri- vel quadrangulares, angulis rotundatis, lateribus plus minus concavis. Membrana in parte centrali semicellularum laevis, sed angulis granulis parvis rotundatis,

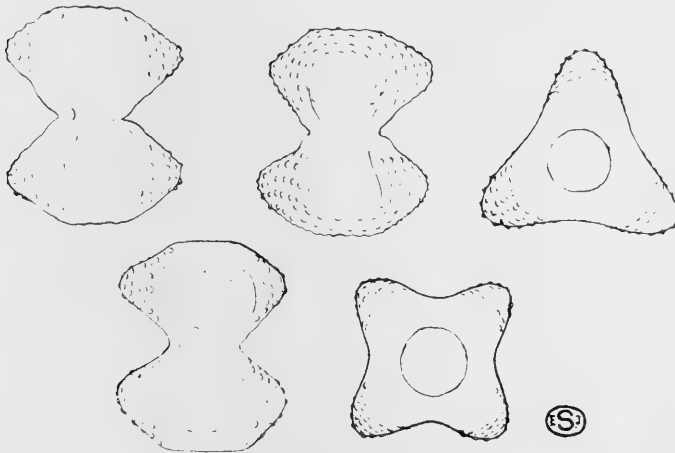


FIG. 32.—*Staurastrum hexagonale*, n. sp.  $\times 750$ .

concentrice dispositis, munitis, iis in apice anguli utriusque paullo majoribus, plus minus acutis, etiam dentiformibus.

Long.,  $33\text{--}36\ \mu$ ; lat.,  $25\text{--}30\ \mu$ ; lat. isthm.,  $10\text{--}12\ \mu$ ; crass.,  $19\text{--}20\ \mu$ . Samples 8, 19.

This species is characterised by the hexagonal shape of the semi-cells in front-view (Fig. 32). In this respect it differs markedly from the nearly allied *S. punctulatum*, Bréb. Other points of distinction are: (a) The more marked rounding of the ends and the concavity of the sides in end-view; (b) the absence of granules from the central part of the semi-cells; (c) the tooth-like character of the granules at the ends; and (d) the proportionally greater length. In outline it bears some resemblance to *S. angulosum*, Schmidt (which, however, I only know from the inadequate figures in Migula, Krypto-

gamenfl., vi, 1907, Tab. XXVII, B, fig. 2), and to *S. subamoenum*, Maskell (Trans. New Zealand Inst., xxi, 1888, p. 22, fig. 37), from both of which it however differs in important respects. Compare also *S. tristichum*, Elfv.

4. *Staurastrum gracile*, Ralfs, Brit. Desm., 1848, p. 136, Tab. XXII, fig. 12.

Samples 14, 15, 21, 24, 52 (rare in all cases).

Long.,  $36\ \mu$ ; lat. cum proc.,  $60\ \mu$ ; lat. sine proc.,  $20\ \mu$ ; lat. isthm.,  $12\ \mu$ .

#### GENUS SPONDYLOSIUM BRÉBISSON.

1. *Spondylosium pygmaeum* (Cooke), West, Freshw. Alg. W. Ireland, Journ. Linn. Soc., Bot., xxix, 1891, p. 116. (Syn.: *Sphaerozosma*

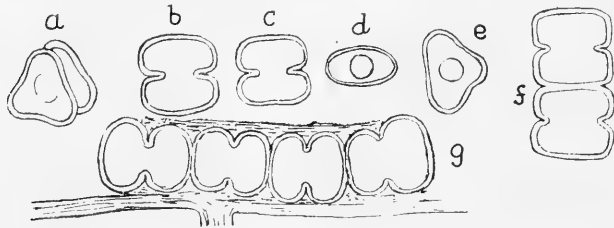


FIG. 33.—*Spondylosium pygmaeum* (Cooke), West, var. *capensis*, nov. var. *a, d, e*, cells and semicells in end-view; *b, c*, isolated cells; *f, g*, chains. All figures  $\times 750$ .

*pygmaeum*, Cooke (Brit. Desm., 1887, p. 5, Pl. II, fig. 5), non Rabenh.) (Fig. 33).

Samples 8 and 10 (in clusters on surface of *Tribonema bombycinum*), 57.

The cells are rather larger than those recorded by Cooke (long.,  $11-12\ \mu$ ; lat.,  $10-12\ \mu$ ; lat. isthm.,  $4-5\ \mu$ ; crass.,  $6\ \mu$ ) and were rarely connected in chains of more than three or four (Fig. 33, *g*), often merely forming irregular groups attached to the surface of the substratum. Numerous isolated cells were encountered, and in sample 57 practically no chains were observed. In some of the longer chains a tightly-fitting mucilage envelope could be distinguished (Fig. 33, *g*). As regards shape of cell, the apices were, on the whole, rather flatter than appears in Cooke's figures. Whilst in many cases the end-view was a broad ellipse, numerous individuals were encountered in which it was triangular (*cf.* Fig. 33, *a, d, e*). In view of these differences, the form in the present material should perhaps be distinguished as a var. *capensis*, nov. var., with the following diagnosis:

Differt a typo cellulis majoribus, apicibus plus minus complanatis, isthmo latiore; a vertice visis ellipticis vel triangularibus, angulis rotundatis. Cellulis aut singulis aut in filis brevibus dispositis, saepe algis filamentosis adhaerentibus.

Attention may be drawn to the similarity between these specimens and *Cosmarium minimum*, W. & G. S. West (*op. cit.*, iii, 1908, p. 66, Pl. LXXI, figs. 1, 2), as well as *C. inconspicuum*, W. & G. S. West (*loc. cit.*, ii, 1905, p. 164, Pl. LXI, figs. 1, 2). Both of these show certain differences, but in view of the capacity of *S. pygmaeum* to exist in the non-filamentous condition, the possibility of some of these minute *Cosmaria* being forms or varieties of this species should be kept in sight. Another form that bears some resemblance to the specimens of *S. pygmaeum* with triangular end-views is *Staurastrum coarctatum*, Bréb., var. *curtum*, Nordstedt (Vid. Medd. Nat. Foren. i. Kjobenhavn, 1869, p. 224, Fig. 50).

### (3) ZYGNEMACEAE.

#### GENUS SPIROGYRA LINK.

1. ? *Spirogyra maxima* (Hass.), Wittrock, Bot. Notiser, 1882, p. 57; Borge, Zygneales, in Suesswasserfl. Deutschl., Oesterreichs u. d. Schweiz, ix, 1913, p. 55, fig. 46. (Syn.: *S. orbicularis* (Hass.), Kuetz.)

Samples 46, 47.

Diam. fil., 150–170  $\mu$ . Many of the filaments were in process of conjugation, but none had formed any zygospores. The characters of the vegetative filaments, however, altogether agree with the above species.

2. *Spirogyra juergensii*, Kuetzing, Phycol. german., 1845, p. 222; Borge, *op. cit.*, p. 23, fig. 23; Petit, Spirog. d. env. d. Paris, 1880, pp. 16, 17, Pl. V, figs. 6, 7.

Sample 32 (not very common).

Diam. fil., 24–25  $\mu$ ; lat. zygosp., 30  $\mu$ ; long. zygosp., 54–60  $\mu$ .

The specimens agree exactly in vegetative and reproductive characters with the description in Petit (*loc. cit.*). The fructifying cells are very slightly inflated to accommodate the zygospores. Some authorities regard this species as a form of *S. porticalis* (Muell.), Cleve (Syn.: *S. quinina* (Kuetz.), Kirchn.), but it seems sufficiently distinct to warrant a separate species.

3. *Spirogyra hassallii* (Jenner), Petit, *op. cit.*, p. 12, Pl. II. figs. 6–8; Borge, *op. cit.*, p. 19, fig. 11.

Sample 32 (rather rare).

Diam. fil., 30  $\mu$ ; lat. zygosp., 42–54  $\mu$ ; long. zygosp., 96–114  $\mu$ . The material was rather scanty, so that a slight doubt attaches to this determination. The cells were, however, invariably provided with two chloroplasts, the conjugation was always lateral, and the fructifying cells were not very strongly inflated. The dimensions of the zygospore are larger than those given by Petit, but agree with those recorded by Teodoresco (Fl. algol. d. l. Roumanie, Beih. Bot. Centralbl., xxi, Abt. ii, p. 194). The membrane was rather thick and showed a faint stratification.

(Note.—Sterile, and therefore indeterminable, species of *Spirogyra* were also observed in the following samples: 3, 5, 21, 23 (a species with very wide flat cells, diam. about 150  $\mu$ , shorter than long, and often not more than  $\frac{1}{2}$  as long as broad, 4–6 spirals, with several large pyrenoids, describing from  $\frac{1}{2}$  to 1 turn—probably a form of *S. maxima*), 42 (a species, with folded ends, more or less elongated cells with one chloroplast in the shape of a very wide spiral, making several turns, diam. cell., 41–42  $\mu$ ), 25, 26, 28, 32, 34, 34A, 35).

#### GENUS ZYGNEMA AGARDH.

1. *Zygnema ericetorum* (Kuetz.), Hansgirg, Prodr. d. Algenfl. v. Boehmen, i, 1886, p. 155; Borge, *op. cit.*, p. 37, fig. 61. (Syn.: *Zygonium ericetorum*, Kuetz.)

Sample 51.

I tentatively refer this form to the above species, on account of the form of the chloroplast, which is that typical for *Z. ericetorum*, as described by West and Starkey (New Phytol., xiv, 1915, p. 205). The cells were often very flat, from one-half to twice as long as broad, whilst the chloroplast only occupied a small region in the centre of the cell. The chloroplast had one, or more commonly two, pyrenoids. The cell-membrane was moderately thickened, the specimens appearing to belong to the forma *aquatica*. Diam. cell., 30–33  $\mu$ . There were no constrictions between the cells.

2. *Zygnema stellinum* (Vauch.), Agardh, Syst. Alg., 1824, p. 77; Borge, *op. cit.*, p. 36, fig. 57.

Sample 32 (abundant, with numerous immature and mature zygospores).

3. *Zygnema (Zygonium) spirale*, n. sp. (Fig. 34.)

Fila vegetativa cellulis rectis,  $1\frac{1}{2}$ -6plo longioribus quam latis, membrana vix incrassata, chromatophoris duabus stellatis formae vulgaris; conjugatione scalariformi, cellulis copulantibus plus minus



altera versus alteram curvatis, ita ut margo exterior cellulae copulantis concavus sit; filo altero inter copulationem circo alterum spiraliter torquato; zygosporis latum tubum copulantem fere replentibus; membranae cellularum copulantium et tubi copulantis lamellis plus minus gelatinosis appositis incrassantur et, ut videtur, integumentum zygosporae faciunt.

Diam. cell., 18–25  $\mu$ ; dist. inter margin. exter. cellularum copulantium (*i. e.* diam. zygosp.), 48–54  $\mu$ ; crass. zygosp. a latere, 30–36  $\mu$ ; crass. membr. zygosp. a latere, usque 5  $\mu$ .

Sample 39 (rather common).

The appearance of the ordinary vegetative cells of this species and of filaments, not in process of conjugation, is like that of any of the other common species of the genus (Fig. 34, *h*). There are two stellate chloroplasts, rather near together, with a small round nucleus in the central bridge of protoplasm. The membrane is in no way markedly thickened and there is no constriction between the cells, the outer margins of the threads forming perfectly straight lines.

The peculiarities arise in connection with conjugation. In a few cases conjugating threads have been encountered in which the wide conjugation-tubes were fully established, without any of the characteristic thickenings of the membrane having as yet arisen (Fig. 34, *c*), but this is certainly unusual. Although my material contained none of the preliminary stages, to judge by subsequent appearances, the method of conjugation is a combination of the scalariform type usual in *Zygnema* and of the geniculate type, characteristic of *Mougeotia* (Fig. 34, *a-d*). There is no doubt that definite conjugation-tubes are put out, but at the same time the conjugating cells evidently bend slightly towards one another. This is evidenced by the fact that every conjugating cell was markedly concave on its outer surface, a change which is very striking when, as in Fig. 34, *c*, an unconjugated cell, which is straight, occurs in the course of a conjugating filament. The conjugation-tube is in general very wide. It may be mentioned here that conjugation of one filament with two or three others was not uncommonly observed.

A second, most characteristic feature of the conjugation-process, which has led to the specific name given to this Alga, is that the two filaments are always twisted spirally upon one another (Fig. 34, *e*). This was noticed with unfailing regularity, wherever some length of filaments was involved in the conjugation-process. I have been unable to discover the cause of this phenomenon, but it is obviously a definite character of the species.

At some stage during the conjugation-process marked thickening of

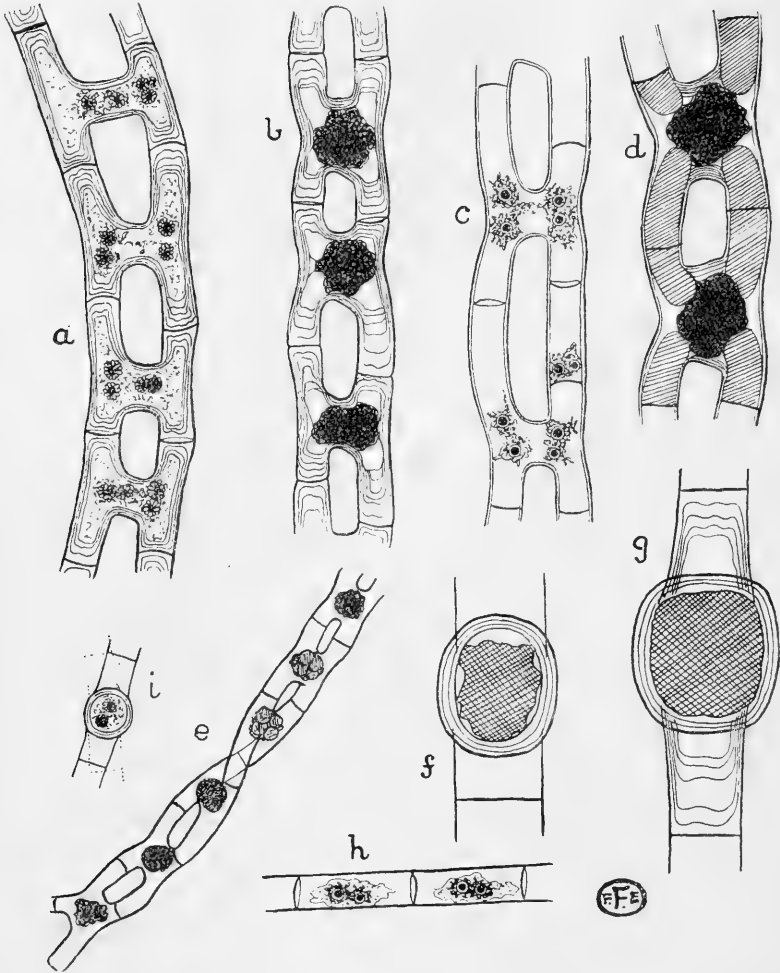


FIG. 34.—*Zygnema spirale*, n. sp. *a*. Portion of two filaments in process of conjugation, showing the development of the membrane-thickenings. *b*. Conjugating threads, showing three zygospores. *c*. Conjugating threads, without membrane-thickenings. *d*. Two conjugating threads, stained with methyl blue, showing two zygospores and the membrane-thickenings. *e*. Two threads in conjugation, showing the spiral twisting. *f*, *g*. Zygospores, in side-view. *h* Ordinary vegetative cells. *i*. A zygospore in side-view, showing the outlines of the two conjugating cells. *a*, *b*, *c*, *d*, *h*, and *i*,  $\times 215$ ; *e*,  $\times 105$ ; *f* and *g*,  $\times 530$ .

the membranes takes place. These are of a very complicated nature. In the first place a dense cylinder of thickening gradually develops all round the inner face of the wall of the conjugation-tube (Fig. 34, *b, d, f, g, i*). Simultaneously, appreciable thickening arises on the inner side of the concave wall of each conjugating cell at a point opposite the conjugation-tube (Fig. 34, *b* and *d*; in the latter this thickening is left unshaded). It would appear that this thickening gradually increases until it extends right up to the fused protoplasts of the conjugating cells, within the conjugation-tube (*cf.* Fig. 34, *b*, especially the second zygospore, and Fig. 34, *d*). Both of the zones of thickening mentioned show more or less marked stratification. Further, as the protoplasts pass towards the conjugation-tube, the empty ends of the conjugating cells become filled with an, usually irregularly stratified, mass of an obviously different texture (Fig. 34, *a, b, d, g*) to that of the thickenings previously described. This is borne out by staining with methyl blue, when the extensive thickening in the ends of the cells rapidly takes on an almost homogeneous deep blue colour, whilst the remaining thickening is much more faintly stained (Fig. 34, *d*). In all probability the thickening in the ends of the cells is semi-mucilaginous in character, a view which is in accordance with its appearance. The figures show that the extent of development of these thickenings in the ends of the conjugating cells is rather variable, a larger or smaller part of the lumen being left unoccupied. Even this, however, appears to contain some mucilage, as methyl blue stains the whole empty cell-cavity almost uniformly (Fig. 34, *d*).

Owing to the spiral twisting of the conjugating threads, it is easy to obtain a side-view of the zygospore. In such a view (Fig. 34, *f, g, i*) the zygospore appears provided with a uniform, thick, stratified membrane, formed by the thickening of the wall of the conjugation-tube. In the ordinary aspect of the zygospore (*e. g.* Fig. 34, *d*) this would form a vertical girdle, whilst the thickenings on the walls of the conjugating cells, opposite the conjugation-tube, would form an incomplete equatorial girdle. There does not, however, usually appear to be a complete membrane encircling the zygospore in front-view (Fig. 34, *b, d*), since at the points where the latter faces towards the four ends of the conjugating cells there does not seem to be any covering, apart from the mucilage above mentioned (*cf.* Fig. 34, *d*). The integument of the zygospore would thus consist of two broad encircling bands of dense membrane-thickening at right angles to one another, whilst the gaps are filled out by the paired halves of the conjugating cells, with their mucilaginous thickening. It seems probable that, after conjuga-

tion is complete, the filaments dissociate in such a way that the paired ends of the conjugating cells remain, for a time at least, in connection with the zygospore. Unfortunately, however, the material did not contain any stages older than those figured, although an occasional tendency to split between the successive cells of filaments with mature zygospores was observed. In a very few cases I have seen stages in which it looked as though a dense strip of membrane might also be developing round the zygospore opposite the lumina of the conjugating cells. It is of course possible that none of the zygospores in the material had attained to complete maturity, which would also explain the highly irregular shape of the contents (Fig. 34, *b*, *d*). That the very peculiar thickening of the membranes above described plays a great part in the constitution of the wall of the zygospore can, however, scarcely be doubted. Non-conjugating cells, in threads which are conjugating, are not thickened in any way.

The species is specially distinguished by the method of conjugation, by the spiral twisting of the conjugating threads, by the very complex membrane-thickenings of the conjugating cells, and by the character of the zygospore. It is possible that the peculiarities in the method of conjugation, combined with those of the zygospore, will ultimately warrant the establishment of a separate genus, but a more detailed study is necessary to settle that point.

A remote comparison may be instituted with *Z. pachydermum*, W. & G. S. West (On some Freshw. Alg. from the W. Ind., Journ. Linn. Soc., Bot., xxx, 1894, p. 266, Pl. XIII, figs. 1-16), a species which West and Starkey now regard as synonymous with *Z. ericetorum* (*loc. cit.*, p. 203). There are many marked differences. Somewhat similar membrane-thickenings occur in some species of *Debarya* (*e. g.* *D. hardyi*, G. S. West).

(*Note.*—Sterile species of *Zygnema* were present in samples 1, 22, 24, 46, and 50.)

#### (4) MESOCARPACEAE.

##### GENUS MOUGEOTIA AGARDH.

1. ? *Mougeotia gracillima* (Hass.), Wittr.; Borge, *op. cit.*, p. 43, fig. 76.

Sample 34 (sterile).

Diam. fil., 6-7  $\mu$ ; cells 15-20 times as long as broad.

(*Note.*—Sterile species of this genus were also observed in samples 1, 3, 8, 19, 37, 38, 41, 50, 56, 57.)

## II. HETEROKONTAE.

### (4) TRIBONEMACEAE.

#### GENUS OPHIOCYTIUM NAEGELI.

1. *Ophiocytium majus*, Naegeli, Gatt. einzell. Algen, 1848, p. 89, Pl. IV, A, fig. 2; Heering, Suesswasseralg. Schleswig-Holsteins, etc., i, 1906, p. 120, fig. 25.

Sample 48.

2. *Ophiocytium parvulum* (Perty), A. Braun, Alg. unicell., etc., 1855, p. 55; Heering, *op. cit.*, p. 124, fig. 31.

Sample 2 (very rare).

3. *Ophiocytium arbuscula* (A. Braun), Rabenhorst, Fl. Europ. Alg., etc., iii, 1868, p. 68; Heering, *op. cit.*, p. 116, fig. 22. (Syn.: *Sciadium arbuscula*, A. Braun.)

Sample 21 (on *Oedogonium* sp.)

Many of the individuals showed good stages in aplanospore-formation.

#### GENUS TRIBONEMA DERBÈS ET SOLIER.

1. *Tribonema bombycinum*, Derbès et Solier, Mém. sur q. points d.l. physiol. d. algues, Suppl. aux Comptes rendues, i, 1856, p. 18; Heering, *op. cit.*, p. 131, fig. 36. (Syn.: *Conferva bombycina*, Ag.)

Forma *genuina*, Wille.

Samples 2, 7 (rare), 8, 9, 10.

Forma *minor*, Wille.

Samples 27, 46, 48, 50.

## III. CYANOPHYCEAE (MYXOPHYCEAE).

### (a) CHROOCOCCALES.

#### (1) CHROOCOCCACEAE.

#### GENUS CHROOCOCCUS NAEGELI.

1. *Chroococcus minutus* (Kuetz.), Naegeli, Gatt. einzell. Algen, 1849, p. 46; Forti, Sylloge Myxophycearum, 1907, p. 14.

Sample 42 (scattered among other Algae, rare).

Previously recorded by Wille from South Africa; by G. S. West from Great Namaqualand.

GENUS GLOEOCAPSA KUETZING.

1. *Gloeocapsa rupicola*, Kuetzing, Spec. Alg., 1849, p. 221; Forti, *op. cit.*; p. 38.

Sample 42 (not uncommon).

GENUS APHANOCAPSA NÆGELI.

1. *Aphanocapsa elachista*, W. & G. S. West, On some Freshw. Algae from the W. Ind., Journ. Linn. Soc., Bot., xxx, 1894, p. 276, Pl. XV, figs. 9, 10; Forti, *op. cit.*, p. 73.

Var. *conferta*, W. & G. S. West, Period. Phytoplankton Brit. Lakes, Journ. Linn. Soc., Bot., xl, 1912, p. 432, Pl. XIX, fig. 1.

Sample 39.

Long. colon., 81–144  $\mu$ ; lat., 68–105  $\mu$ ; diam. cell., 1.5–2.5  $\mu$ .

GENUS APHANOTHECE NÆGELI.

1. *Aphanothece microspora* (Menegh.), Rabenhorst, Fl. europ. Alg., ii, 1865, p. 64; Forti, *op. cit.*, p. 84.

Sample 23.

Diam. cell., 5.5–6  $\mu$ ; long. cell., 10–11  $\mu$ . This *Aphanothece* seems to accord best with the above species. The cell-contents were very slightly, but invariably, granular, and the general mucilage was distinctly yellowish in places.\* I can find no mention of these features in any of the published descriptions. The sheaths of the individual cells were mostly completely diffuent, but were visible at a few points. This species certainly comes close to *A. naegelii*, Wartm.

GENUS MICROCYSTIS KUETZING.

1. *Microcystis* sp.

Samples 14, 15 (abundant).

This is possibly a form of *M. aeruginosa*, Kuetz. (Syn.: *Clathrocystis aeruginosa* (Kuetz.), Henfrey), which is known to be very variable. The small, free-floating colonies, surrounded by a distinct mucilage-envelope, were in general roughly spherical, but sometimes of irregular outline (diam. of spherical colonies, 18–30  $\mu$ ; dimensions of elongated colonies, 27  $\times$  21, 33  $\times$  24, 48  $\times$  24  $\mu$ ); occasionally it looked as though such colonies were breaking up into smaller ones. The cells were minute (diam., 1.5–3  $\mu$ ), spherical or slightly oval, and

\* This is also the case in specimens of this species (J. E. Tilden, S. Pacific Algae, No. 3) examined at the British Museum; they differ only in the smaller size of the cells.

either had homogeneous pale blue-green contents or some or all of the cells were provided with gas-vacuoles. The cells were not very densely arranged, being generally separated by more than their own diameter from one another.

The different species of *Microcystis* are so imperfectly known that it is very difficult to decide on the position of this form; it comes near to those species which have free-floating, more or less spherical colonies, e. g. *M. protogenita* (Bias), Rabenh., *M. olivacea*, Kuetz., etc., in which, however, the cells are generally much more densely crowded. In the relatively remote spacing of the cells our form approaches the smaller species of *Aphanocapsa* (e. g. *A. elachista*, W. & G. S. West), which are altogether very hard to separate generically from *Microcystis*. I am not, however, aware that a development of gas-vacuoles has been recorded in the former genus.

There is also a resemblance to *Aphanocapsa grevillei*, Rabenh., var. *microgranula*, W. West (Algae W. Ireland, Journ. Linn. Soc., Bot., xxix, 1891, p. 199, Pl. XVIII, fig. 9), which might perhaps be better referred to the genus *Microcystis*.

#### GENUS GOMPHOSPHAERIA KUETZING.

1. *Gomphosphaeria lacustris*, Chodat, Bull. d. L'Herbier Boissier, vi, 1898, p. 180, fig. 1; Forti, *op. cit.*, p. 99.

Sample 39 (rare).

#### GENUS MERISMOPIEDIA MEYEN.

1. *Merismopedia glauca* (Ehrenb.), Naegeli, Gatt. einzell. Alg., 1849, p. 55, Pl. I, D, fig. 1; Forti, *op. cit.*, p. 105.

Sample 25 (very rare).

Previously recorded by Wille from South Africa; by G. S. West from Little Namaqualand.

### (b) CHAMAESIPHONALES.

#### (1) CHAMAESIPHONACEAE.

#### GENUS CHAMAESIPHON BRAUN & GRUNOW.

1. *Chamaesiphon incrustans*, Grun.; Rabenhorst, Fl. europ. Alg., ii, 1865, p. 149; Forti, *op. cit.*, p. 136.

Sample 29 (on *Oedogonium boreale*).

2. *Chamaesiphon minimus*, Schmidle, Beitr. z. Algenfl. Afrikas, Engler's Bot, Jahrb., xxx, 1902, p. 62; Forti, *op. cit.*, p. 138.

Sample 44 (forming a dense layer on *Dichothrix spiralis*, n. sp.).

### (c) HORMOGONEALES.

#### (1) OSCILLATORIACEAE.

##### GENUS OSCILLATORIA VAUCHER.

1. *Oscillatoria limosa*, Agardh; Gomont, Monogr. d. Oscillariées, Ann. Sci. nat., sér. 7, Tab. XVI, 1893, p. 210, Pl. VI. fig. 13.

Sample 25.

Diam. trich., 13–18  $\mu$ . Recorded from Holle River, Calvinia Division, by G. S. West.

2. *Oscillatoria tenuis*, Agardh; Gomont, *op. cit.*, p. 220, Pl. VII, figs. 2, 3.

Samples 1, 5, 6.

Diam. trich., 4–6  $\mu$ . Recorded from Holle River, Calvinia Division and Little Namaqualand, by G. S. West.

3. *Oscillatoria amphibia*, Agardh; Gomont, *op. cit.*, p. 221, Pl. VII, figs. 4, 5.

Sample 3 (rare).

Diam. trich., 2–3  $\mu$ .

4. *Oscillatoria amoena*, Gomont, *op. cit.*, p. 225, Pl. VII, fig. 9.

Sample 43 (rather rare).

Diam. trich., 4  $\mu$ .

5. *Oscillatoria formosa*, Bory; Gomont, *op. cit.*, p. 230, Pl. VII, fig. 16.

Sample 6.

Diam. trich., 4–5  $\mu$ . Recorded from Little Namaqualand by G. S. West.

##### GENUS SPIRULINA TURPIN.

1. *Spirulina major*, Kuetzing, Phyc. generalis, 1843, p. 183; Gomont, *op. cit.*, p. 251, Pl. VII, fig. 29.

Samples 5, 6, 32.

Recorded from Little Namaqualand by G. S. West.



GENUS PHORMIDIUM KUETZING.

1. *Phormidium valderianum*, Gomont, *op. cit.*, p. 167, Pl. IV, fig. 20.

Sample 15.

2. *Phormidium subfuscum*, Kuetzing, *op. cit.*, p. 195; Gomont, *op. cit.*, p. 182, Pl. V, figs. 17-20.

Samples 41, 43.

Diam. trich., 9-10  $\mu$ . The apex of the trichomes was rather variable, being either rounded and without a calyptra or, more commonly, with a typical conical or hemispherical calyptra. In a considerable number of cases the conical calyptra was inequilateral. The degree of attenuation of the apex also varied very considerably.

3. *Phormidium autumnale*, Gomont, *op. cit.*, p. 187, Pl. V, figs. 23, 24. (Syn.: *P. uncinatum*, Gom.)

Sample 27.

GENUS LYNGBYA C. AGARDH.

1. *Lyngbya major*, Menegh.; Gomont, *op. cit.*, p. 144, Pl. III, fig. 15.

Sample 52.

Diam. trich., 12-16  $\mu$ .

Previously recorded by Wille from South Africa; by G. S. West from Little Namaqualand.

2. *Lyngbya aerugineo-coerulea*, Gomont, *op. cit.*, p. 146, Pl. IV, figs. 1-3.

Samples 37, 41.

Diam. trich., 6  $\mu$ .

3. *Lyngbya rivulariarum*, Gomont, *op. cit.*, p. 148.

*Forma paullo latior, apice curvato et interdum leviter attenuato.* Diam. fil., usque 1  $\mu$ . (Fig. 35.)

Sample 30 (in the mucilage of *Rivularia natans*).

I have not seen a figure of *Lyngbya rivulariarum*, but I have little doubt that this form is closely allied to it. The sheath was very thin and closely fitting (Fig. 35, *b*), and but rarely obvious. The cells were non-granular, had very hyaline septa, and were several times longer than broad. Constriction between the cells was, in general, not at all well-marked; in fact, in the ordinary filaments, it was often extremely difficult to recognise the limits of the individual cells. In the case of short pieces of thread (hormogonia?), however, the con-

striction was quite evident and the limits of each cell were plainly discernible. (Fig. 35, *e*.)

The threads were twisted in various ways (Fig. 35, *a*, *d*), not uncommonly looping round those of the *Rivularia*, and were never straight for any considerable distance. A very marked feature was the almost constant deflection of the apex of the filament (Fig. 35, *a*, *e*), and in many cases this was accompanied by a slight attenuation. (Fig. 35, *e*.)

It seems possible that the *Oscillatoria subtilissima* of Kuetzing (Spec. Alg., p. 238) which Gomont (*op. cit.*, p. 240) places among the

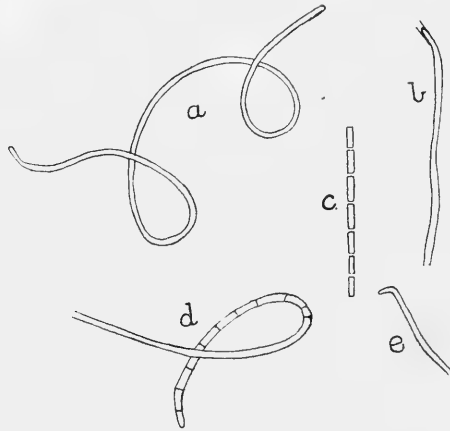


FIG. 35.—*Lyngbya rivulariarum*, Gomont, forma.  $\times 750$ .

“species inquirendae,” may be a form of this *Lyngbya*. The sheath, at least in my material, would be so readily overlooked that the form might easily be referred to *Oscillatoria*, and the remaining characters are not opposed to this view.

4. *Lyngbya kuetzingii*, Schmidle, Algol. Not., iv, Allgem. bot. Zeitschr., 1896, p. 58; Forti, *op. cit.*, p. 280.

Var. *distincta* (Nordst.), Lemmermann, Algenfl. d. Sandwich-Inseln, Engler's Bot. Jahrb., xxxiv, 1905, p. 620 (Syn.: *L. subtilis*, W. West; *L. distincta*, Schmidle).

Sample 5.

Diam. fil.,  $1.3\ \mu$ . I follow G. S. West (Rep. Freshw. Alg. Third Tanganyika Exp., Journ. Linn. Soc., Bot., xxxviii, 1907, p. 174) in accepting the above synonymy; if the latter is correct, the var. *distincta* is evidently variable in two respects, viz. length of cell and nature of the cell-contents. In W. West's original diagnosis (Alg.

Lake Distr., Journ. Roy. Microscop. Soc., 1892, p. 29) of *L. subtilis* he gives: "lat. fil., 1.5-1.8  $\mu$ " and "cytoplasmate pallide aerugineo et homogæneo, articulis diametro duplo"; subsequently (Freshw. Alg. W. Ind., Journ. Linn. Soc., Bot., xxx, 1894, p. 274) he gives: "lat. fil., 1.4  $\mu$ ." Schmidle for his *L. distincta* states (*loc. cit.*, p. 58): "Faeden ca. 1.8  $\mu$  dick. Zellen so breit als lang, oder etwas længer oder kuerzer, mit granuliertem blaugruenem Inhalt, oft sehr undeutlich."

My specimens had homogeneous cell-contents and the individual cells were by no means always easily visible. The cells were about two times as long as broad. They thus corresponded most closely with W. West's original form.

#### GENUS SCHIZOTHRIX KUETZING.

##### 1. *Schizothrix polytrichoides*, n. sp. (Fig. 36.)

*S. aquatica*, solitaria, stratum non formans et calce non indurata; filis principalibus magnis, ceteris gradatim diminutis, omnibus tortuosis et valde elongatis, parce ramosis; vaginis amplis (in ramis ultimis saepe aretis), primo firmis et incrassatis, plus minus fusciscentibus, tum plus minus irregularibus et diffluentibus, hyalinis, semper longissime attenuatis; trichomatibus saepe laete aerugineis, permultis intra vaginam ramorum majorum (saepe in fasciculis 1-3 distinctis), 1-pluribus intra vaginam ramorum minorum, saepe plus minus subparallelis, interdum inter se torquatis; trichomatibus ad dissepimenta non constrictis, apicibus attenuatis, acutis vel calyptra conica munitis; protoplasmate plus minus granuloso; dissepimentis saepe lineis granulorum obductis.

Crass. ram. major., 70-80  $\mu$ ; crass. ram. ult., 12-21  $\mu$ ; crass. trich., 3.5-6  $\mu$ ; cell.  $\frac{1}{2}$ -1 $\frac{1}{2}$  plo longior. quam lat.

##### Sample 37.

This species, which, owing to the coloration of the sheaths in the younger parts, must be regarded as a true *Schizothrix* (Sect. *Chromosiphon* Gomont), differs from all those hitherto described in the very large number of trichomes contained within the sheath of the principal branches. In some of the latter more than fifty trichomes (Fig. 36, *D*) can be counted, and, even in the smaller branches, they may be numerous (15-20). In the main filaments the numerous trichomes do not necessarily occur in a single bundle (as in Fig. 36, *D*); often, there are several distinct bundles of trichomes, more or less anastomosing with one another and sooner or later running out into separate branches (Fig. 36, *A*). The trichomes are very densely placed and

often run almost parallel for long distances (Fig. 36, *B*), but at other points they are more or less coiled round one another (Fig. 36 *D*). In rare cases filaments were observed twining about one another in a rope-like manner, as in *S. funalis*, W. & G. S. West.

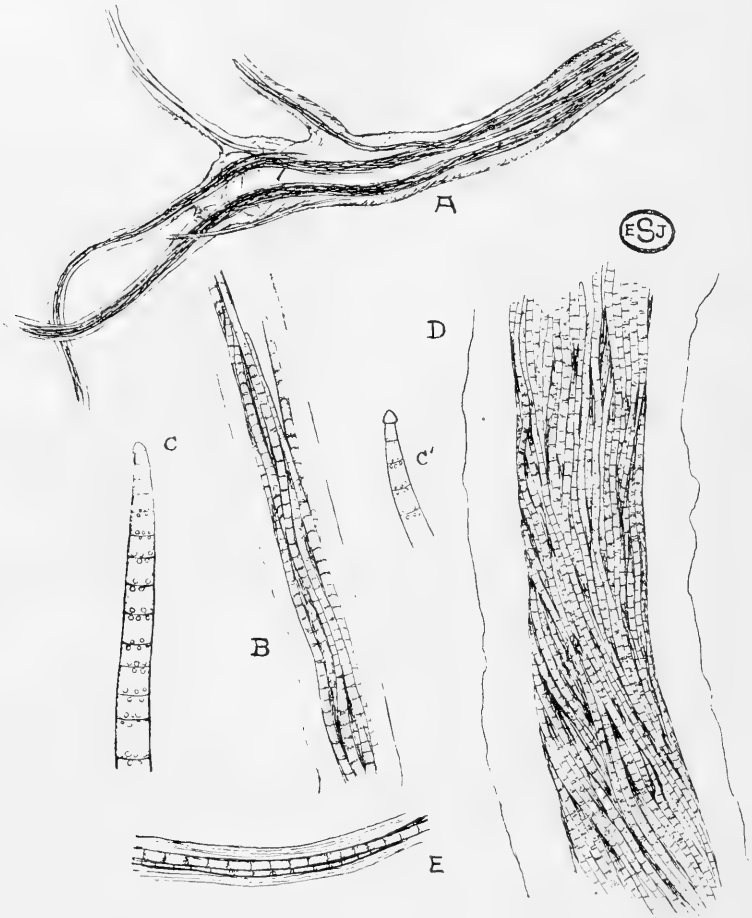


FIG. 36.—*Schizothrix polytrichoides*, n. sp. *A*. Small part of a branched filament, to show the general habit. *B*. One of the smaller branches. *C*, *C'*. Two separate trichomes. *D*. Part of a larger branch. *E*. Portion of a smaller branch to show the thickened sheath. *A*,  $\times 95$ ; *B*, *D*, and *E*,  $\times 450$ ; *C* and *C'*,  $\times 780$ .

The sheaths in the younger branches are narrow, not uncommonly have a thickened edge, which is generally smooth, and are of a brownish colour (Fig. 36, *E*). In the older parts, however, the sheath becomes more or less diffuent, has a thin and often highly

uneven edge, which is frequently obscured by the adhesion of numerous foreign particles, and is generally very wide, standing off considerably from the mass of contained trichomes (Fig. 36, *B* and *D*); the brown colour appears to become lost, as these older sheaths are hyaline. The character of the trichomes will be sufficiently plain from the diagnosis and the figures (Fig. 36, *C*, *C'*), without further description. The individual close-fitting sheaths of the trichomes are sometimes plainly visible.

The only species of *Schizothrix* that at all approach this one in the number of trichomes within the sheath are *S. mexicana*, Gom., *S. fragilis*, Gom., *S. rupicola*, Tilden (Minnesota Algae, i, 1910, p. 153, Pl. VI, fig. 25), and *S. (Hypheothrix) calida*, De Wildeman (Algues Buitenzorg, 1900, p. 30, Pl. XV, figs. 1-4), all of which are, however, markedly distinct in other respects; nor are the trichomes nearly as numerous as in our species.

## (2) NOSTOCACEAE.

### GENUS NOSTOC VAUCHER.

1. *Nostoc hederulae*, Menegh.; Bornet et Flahault, Revis. d. Nostoc. hétérocyst., Ann. Sci. Nat., Bot., Sér. 7, vii, 1888, p. 189. (Syn.: *N. punctiforme* (Kuetz.), Hariot).

Samples 29, 29a, 33 (attached to *Cladophora* and other aquatic plants).

2. *Nostoc linckia* (Roth), Bornet et Flahault, *op. cit.*, p. 192.

Sample 49 (? , no spores).

3. *Nostoc pruniforme* (Linn.), Ag.; Bornet et Flahault, *op. cit.*, p. 215.

Sample 40 (Victoria Falls!).

### GENUS NODULARIA MERTENS.

1. *Nodularia harveyana* (Thwaites), Thuret; Bornet et Flahault, *op. cit.*, p. 243.

Sample 26 (not very abundant among *Spirogyra*).

Recorded from Little Namaqualand by G. S. West.

### GENUS ANABAENA BORY.

1. *Anabaena circinalis*, Rabenh.; Bornet et Flahault, *op. cit.*, p. 230.

Sample 30 (? , in the mucilage of *Rivularia natans*, no spores).

2. *Anabaena inaequalis* (Kuetz.), Bornet et Flahault, *op. cit.*, p. 231.

Sample 5 (? epiphytic on *Vaucheria*), 33 (? epiphytic on *Cladophora*).

A form with bundles of straight parallel filaments (diam. up to  $8\ \mu$ ), frequently enclosed within a common sheath whose edge was often granular; apparently always epiphytic.

3. *Anabaena catenula* (Kuetz.), Bornet et Flahault, *op. cit.*, p. 232.

Sample 32.

Lat. cell. veget.,  $6\ \mu$ ; lat. heterocyst,  $7-7.5\ \mu$ ; lat. spor.,  $8-9\ \mu$ ; long. spor.,  $15\ \mu$ .

4. *Anabaena oblonga*, De Wildeman, *Algues rapp. par M. J. Massart d'un voyage aux Ind. néerland.*, Ann. Jard. Buitenzorg, 1 Suppl., 1897, p. 50; *Algues Buitenzorg*, 1900, p. 27; Forti, *op. cit.*, p. 447. (Fig. 37, *a-c*).

Sample 6 (rare, among *Cylindrospermum alatosporum*, n. sp.)

Diam. cell. veget.,  $3.5-4\ \mu$ ; diam. heterocyst,  $5.5\ \mu$ ; long. heterocyst.,  $8-10\ \mu$ ; lat. spor.,  $6\ \mu$ ; long. spor.,  $9-13.5\ \mu$ .

The specimens agree well with De Wildeman's diagnosis, except for the fact that the spore-membrane shows no yellow colour. De Wildeman does not describe the shape of the spores, although he gives dimensions which are quite in accordance with those recorded above. The spores were cylindrical with flat or slightly rounded ends, and were not uncommonly a little contracted in the middle, after the manner of those of *A. catenula*, Bornet et Flahault (Fig. 37, *a, b*); they were always remote from the heterocysts. The apical cell of the trichome is more or less pointed (Fig. 37, *c*). This species undoubtedly comes near to *A. inaequalis*, Bornet et Flahault, but differs from it in the shape of the heterocysts and of the spores.

(Note.—Specimens of *Anabaena*, that were not determinable, were also encountered in samples 2, 3, 4, 7, 8, 10, 29, 30, 50, 51).

#### GENUS CYLINDROSPERMUM KUETZING.

1. *Cylindrospermum alatosporum*, n. sp. (Fig. 37, *d-h*.)

Stratum tenue, laete aeruginosum, limo affixum; trichomatibus dense aggregatis, valde elongatis, subparallelis vel saepe flexuosis, ad dissepimenta levissime constrictis; cellulis tam longis quam latis vel ad duplo longioribus, quadratis vel rectangularibus; polis truncatis, contentu aeruginoso plus minus granuloso; cellula apicali rotundata; heterocystis ellipticis vel subconicis, saepe segmentis membranae numerosis circumdatis; sporis plerumque singulis, interdum pluribus,

oblongis vel ellipticis, membrana interiore valde incrassata lutea, membrana exteriori alaeformi pellucida striis radiantibus munita ad fines subtruncata, contenu grosse granuloso.

Diam. cell. veget., 3·5–4  $\mu$ ; diam. heterocyst., 5  $\mu$ ; long. heterocyst.,

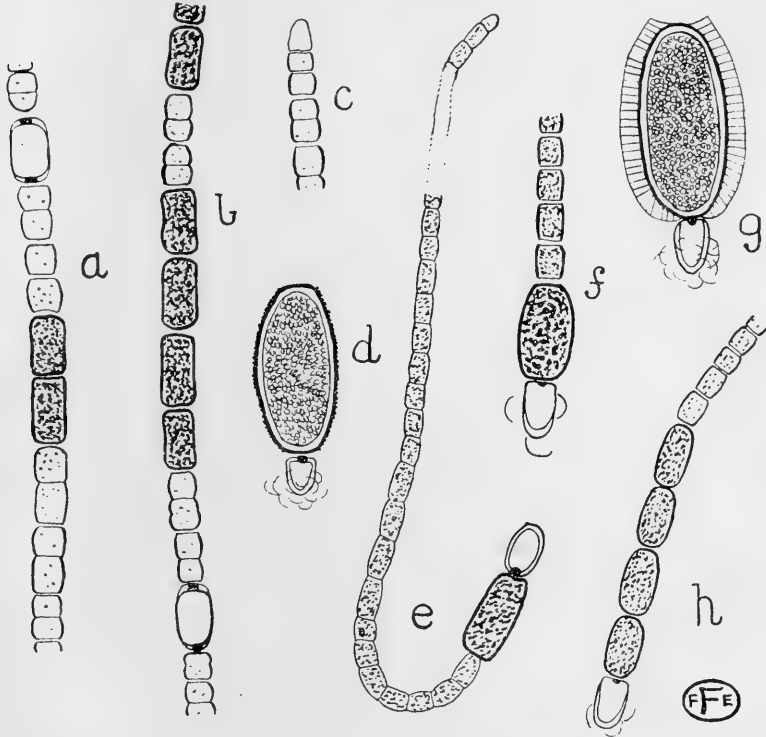


FIG. 37.—a-c. *Anabaena oblonga*, De Wildeman. a and b. Trichomes with spores. c. Apex of a trichome. d-h. *Cylindrospermum alatosporum*, n. sp. d. Mature spore, with heterocyst, showing the irregular remains of the outer membrane of the spore. e. Trichome, with young spore. f. Ditto. g. Mature spore, with double membrane and basal heterocyst, showing segments of membrane which have been shed. h. Trichome with a series of young spores. All figures  $\times 900$ .

7·5–10  $\mu$ ; diam. spor. sine membr. ext., 9–11  $\mu$ ; cum membr. ext., 16–21  $\mu$ ; long. spor., 20–30  $\mu$ .

Sample 6.

This species forms a bright blue-green stratum on the mud, the stratum being composed of large numbers of densely aggregated trichomes, which are in part subparallel, but in other places highly flexuous and intercoiled. The heterocysts are elliptical (Fig. 37, e), or

more commonly subconical (Fig. 37, *d, f, g*), and are characterised by repeated shedding of the membrane, sporiferous filaments always showing large numbers of such segments of the membrane in the immediate neighbourhood of the heterocysts (Fig. 37, *d, f, g*).

The spores are usually produced singly (Fig. 37, *d, e, f, g*), but trichomes with a whole series (up to 5) of spores (Fig. 37, *h*) are not uncommon. As the cell forming the spore increases in size its membrane thickens very considerably and gradually takes on a yellowish colour (Fig. 37, *e, f, h*). Later a very characteristic second envelope appears about the spore; this takes the form of a broad transparent wing-like structure, traversed by numerous radiating lines (Fig. 37, *g*) and provided with a smooth thin edge. This outer envelope is principally developed at the sides of the spore and scarcely extends round the two ends, where it appears either truncate, or more commonly concave at the upper, and somewhat rounded at the lower, end (Fig. 37, *g*). It seems that, later, this second envelope shrinks and then is merely recognisable as an irregular frayed edge to the inner spore-membrane (Fig. 37, *d*). It is probable that the outer spore-envelope is of a mucilaginous nature, since it stains readily with methyl blue.

As far as I am aware, only one species of *Cylindrospermum* (viz. *C. catenatum*, Ralfs), exhibiting production of spores in series, has hitherto become known, and this shows numerous differences from our species. The most characteristic feature of the latter, however, lies in the nature of the spore-membranes. An outer envelope something like that of *C. alatosporum* appears to occur also in *C. stagnale* (Kuetz.), Bornet et Flahault, although of different shape; there are, moreover, other points of distinction from this species. A granulated episporium, like that ultimately realised in the spores of our species (Fig. 37, *d*), is found in *C. majus*, Kuetz., *C. tropicum*, W. & G. S. West, *C. goetzii*, Schmidle, etc., although whether it arises in the same way as in *C. alatosporum* is not evident (*cf.* also Woloszyńska, Stud. üb. d. Phytoplankton d. Viktoriasees, Hedwigia, lv, 1914, p. 206, Tab. VIII, fig. 14).

### (3) SCYTONEMATACEAE.

#### GENUS SCYTONEMA AGARDH.

1. *Scytonema mirabile* (Dillw.), Bornet, Nostoc. hétérocyt. d. Syst. Alg. d. C. Agardh, etc., Bull. Soc. Bot. d. France, xxxvi, 1889, p. 12; Forti, *op. cit.*, p. 517. (Syn.: *S. figuratum*, Ag.)

Sample 19.



GENUS TOLYPOTHRIX KUETZING.

1. *Tolypothrix tenuis*, Kuetz., emend. Schmidt, Cyanophyceae Daniae, Bot. Tidsskrift, xxii, 1898-99, p. 413. (Syn.: *T. lanata* (Desv.), Wartm.)

Samples 52-55.

(4) STIGONEMATACEAE.

GENUS STIGONEMA AGARDH.\*

1. *Stigonema hormoides* (Kuetz.), Bornet et Flahault, *op. cit.*, sér. 7, v, 1887, p. 68.

Sample 16 (rare).

(5) RIVULARIACEAE.

GENUS RIVULARIA (ROTH) AGARDH.

1. *Rivularia natans* (Hedwig), Welw.; Bornet et Flahault, *op. cit.*, sér. 7, iv, 1886, p. 369. (Syn.: *Gloeotrichia natans* (Hedw.), Rabenh.)

Sample 30 (young colonies attached to water-plants).

GENUS CALOTHRIX AGARDH.

1. *Calothrix fusca* (Kuetz.), Bornet et Flahault, *op. cit.*, sér. 7, iii, 1886, p. 364.

Samples 14 (on aquatics), 15 (on *Phormidium valderianum*).

(Note.—Specimens of this genus that were not determinable also occurred in samples 16, 29, and 29a.)

GENUS DICHOTHRIX ZANARDINI.

1. *Dichothrix fusca*, n. sp. (Fig. 38.)

Filis in caespites penicillatos dense aggregatis, rupibus affixis (?), ad 750  $\mu$  longis, e basi angusta gradatim patescentibus; filis et pseudoramis fere rectis, raro paulo flexuosis; pseudoramis elongatis adpressis, sed apicem versus divergentibus; vaginis crassis, lamellosis, apicem versus gradatim attenuatis, sed semper apertis, hyalinis vel plus minus lutescentibus etiam luteo-fuscescentibus; trichomatibus contentu dense granuloso et saepe brunneo, ad dissepimenta non constrictis, apicem versus gradatim attenuatis, sed non in pilum productis, cellulis tam longis quam latis vel brevioribus; heterocystis singulis vel raro binis, basilaribus, hemisphaericis.

\* Undeterminable specimens of this genus were also present in sample 42.

Crass. fil. ram. apical., 9–12  $\mu$ ; crass. trich., 6–9  $\mu$ ; lat. heterocyst., 9–12  $\mu$ ; crass. vag. ad bas., usque 5  $\mu$ .

Sample 42.

The species of *Dichothrix* and their relation to those of the genus

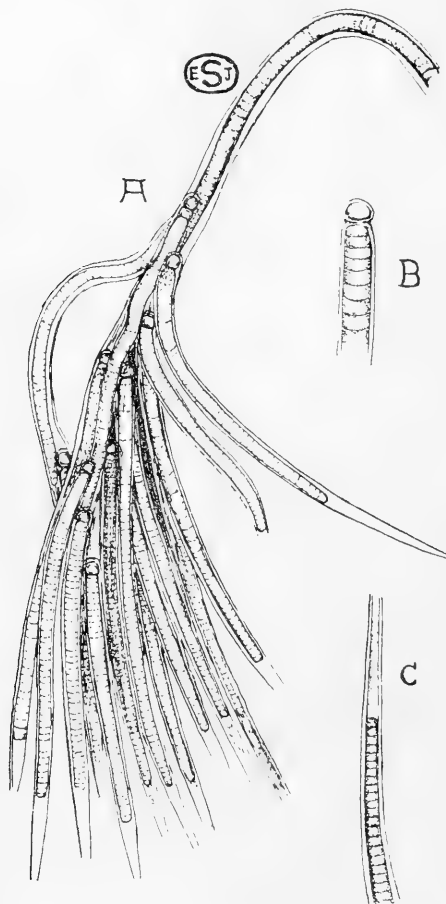


FIG. 38.—*Dichothrix fusca*, n. sp. A. Entire plant, showing the habit and the general character of the filaments. B. Base, and C, apex of a single filament. A,  $\times 195$ ; B and C,  $\times 370$ .

*Calothrix* are so imperfectly known that I must confess to some hesitation in describing the form in sample 42 as a new species. I have, however, been unable to convince myself of the correspondence of the latter with any of the forms hitherto described. *D. fusca* belongs to that group of species in which the sheaths gradually taper

from the base to the apex (Fig. 38, *A* and *C*), and, amongst these, comes nearest to *D. baueriana* (Grun.), Bornet et Flahault and *D. olivacea* (Hooker), Bornet et Flahault; from the former it differs in

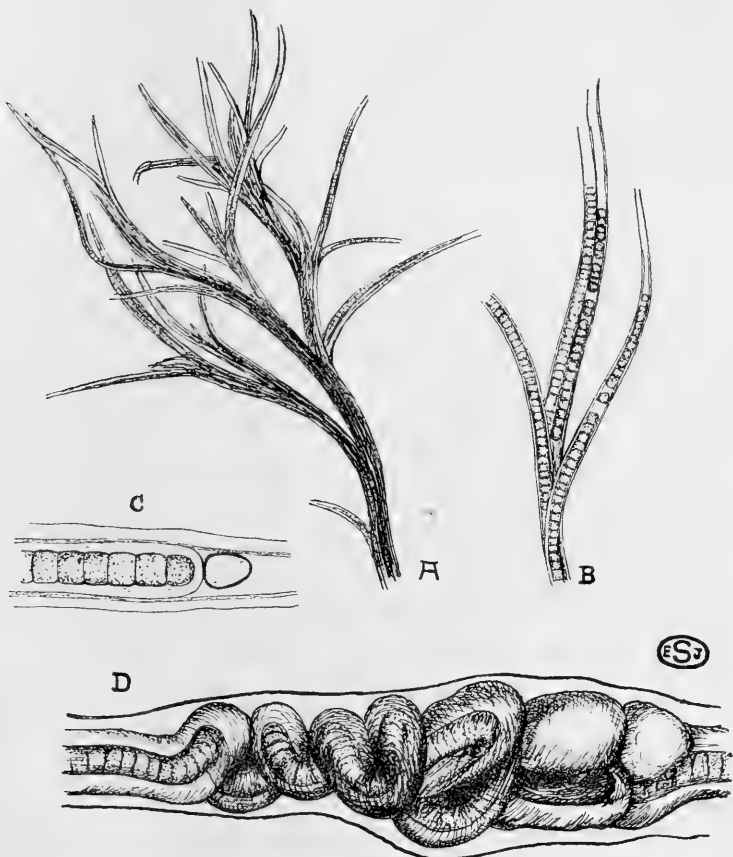


FIG. 39.—*Dichothrix spiralis*, n. sp. *A*. View of an entire (small) plant to show the general habit. *B*. Small portion more strongly enlarged. *C*. Base of a trichome, with a heterocyst. *D*. Part of a filament to show the frequent spiral coiling of the trichomes. *A*  $\times$  60; *B*  $\times$  330; *C* and *D*,  $\times$  660.

the character of the sheath and the absence of a terminal hair to the trichomes, from the latter in the same respects, as well as in the nature of the cell-contents.

2. *Dichothrix spiralis*, n. sp. (Fig. 39.)

Filis in caespites irregulares ad  $1500\ \mu$  longos aggregatis, plantis affixis, e basi angusta patescens; filis et pseudoramis plus minus

flexuosis; pseudoramis elongatis, patescentibus, saepe primo adpressis; vaginis crassis, plus minus lamellosis, parte exteriori diffuente hyalina, parte interiori firma fusca vel nigro-fusca, apicem versus attenuatis, semper apertis; trichomatibus saepe 2-3 parumper intra eandem vaginam (iis deinde divergentibus vel evanescentibus), nonnunquam rectis nonnunquam spiraliter contortis, contentu granuloso, ad dissepimenta constrictis, apicem versus paullo attenuatis, non in pilum productis, cellulis tam longis quam latis vel brevioribus; heterocystis singulis, basilaribus, conicis vel subhemisphaericis.

Crass. fil. ram. apical., 12-16  $\mu$ ; crass. trich., 5-7  $\mu$ ; lat. heterocyst., 6-7  $\mu$ ; crass. vag., usque 6  $\mu$ .

Sample 44.

This is a larger species than *D. fusca* and is characterised by more markedly divergent and flexuous branches (Fig. 39, *A*). As a result, the plant presents a more irregular appearance, and fails to exhibit the pronounced penicillate habit of the previous species. There are two other distinctive features, viz. the nature of the sheath and the remarkable spiral coiling of the trichomes (Fig. 39, *D*). The sheaths consist of a diffuent outer portion which is colourless, and of a much firmer inner portion which is deep brown to blackish-brown (Fig. 39, *C*). The sheaths are in general thick, the trichomes being very narrow, as compared with the width of the filaments (Fig. 39, *C, D*). The spiral inrolling of the trichomes is a local phenomenon, but is sufficiently frequent not to escape one, even in a cursory examination. The sheaths are often irregularly inflated at the points where this spiral inrolling occurs. It is to be noticed that the inner coloured portion of the sheath is involved in the spiral torsion, only the outer hyaline part being unaffected (Fig. 39, *D*).

#### IV. BACILLARIEAE (DIATOMALES).

##### (*a*) CENTRICAE.

##### (1) MELOSIRACEAE.

##### GENUS MELOSIRA AGARDH.

1. *Melosira varians*, Ag.; Van Heurck, Synops. Diat. Belg., 1880-85, p. 198, Pl. LXXXV, figs. 10, 11, 14, 15.

Samples 25 (rather common, with auxospores), 33 (rare).

(2) COSCINODISCACEAE.

GENUS CYCLOTELLA KUETZING.

1. *Cyclotella operculata*, Kuetz.; Van Heurck, *op. cit.*, p. 214, Pl. XCIII, figs. 22-28.

Samples 25, 31, 33, 48.

(b) PENNATAE.

A. FRAGILARIOIDEAE.

(4) FRAGILARIACEAE.

GENUS SYNEDRA EHRENBERG.

1. *Synedra pulchella*, Kuetz.; Van Heurck, *op. cit.*, p. 149, Pl. XL, figs. 28, 29.

Samples 21, 24 (in both cases on *Oedogonium* sp.), 30a, 31, 33 (on *Cladophora glomerata*, etc.), 54.

2. *Synedra ulna* (Nitzsch), Ehrenb.; Van Heurck, *op. cit.*, p. 150, Pl. XXXVIII, fig. 7.

Samples 25, 29, 29a, 31, 32, 33, 52, 54.

Previously recorded from South Africa by Wille, and by G. S. West from Holle River, Calvinia Division; Gansfontein, Ceres Division, and Little Namaqualand.

3. *Synedra acus* (Kuetz.), Grun.; Van Heurck, *op. cit.*, p. 151, Pl. XXXIX, fig. 4.

Samples 14, 28, 32, 52-55.

Previously recorded by Wille from South Africa; by G. S. West from Little Namaqualand.

4. *Synedra radians* (Kuetz.), Grun.; Van Heurck, *op. cit.*, p. 151, Pl. XXXIX, fig. 11.

Samples 31 and 33 (on *Cladophora glomerata*).

(5) EUNOTIACEAE.

GENUS EUNOTIA EHRENBERG.

1. *Eunotia diodon*, Ehrenb.; Rabenhorst, Fl. Europ. Alg., i, 1864, p. 69, fig. 16; Van Heurck, *op. cit.*, Pl. XXXIII, fig. 6.

Sample 10 (rather rare).

Long., 84  $\mu$ ; lat., 15-16  $\mu$ .

2. *Eunotia (Himantidium) pectinalis*, Kuetz.; Van Heurck, *op. cit.*, p. 142, Pl. XXXIII, figs. 15, 16.

Samples 8, 9, 10, 41, 52, 54, 55.

Particularly good specimens in sample 10, here together with vars. *minor*, Kuetz. and var. *impressa*, O. Muell. The species has previously been recorded from South Africa by G. S. West.

3. *Eunotia lunaris* (Ehrenb.), Grun.; Van Heurck, *op. cit.*, p. 144, Pl. XXXV, figs. 3, 4, 6a. (Syn.: *Synedra lunaris*, Ehrenb.)

Samples 2 (on *Tribonema bombycinum*), 56, 57 (on *Hormidium subtile*).

4. *Eunotia bicapitata*, Grun.; Van Heurck, *op. cit.*, Pl. XXXV, fig. 11. (Syn.: *Synedra biceps*, W. Smith, Brit. Diatom., i, 1853, p. 69, Pl. XI, fig. 83) (*fig. nostr.* 40, *h, h'*.)

Samples 2, 8, 9, 10 (in all cases on *Tribonema bombycinum*).

This form appears to be not uncommon in the Cape Peninsula, forming characteristic stellate bunches attached to filamentous Algae. There can be no doubt about their reference to the genus *Eunotia*. The valves are little curved, as in the figures cited above, and have a rather thick wall, and slightly inflated, somewhat recurved extremities; the inflation is more marked on the convex than on the concave side (Fig. 40, *h*). The punctate striae extend across the valves without interruption. The valves vary considerably in size, being 140–240  $\mu$  long and 6–8  $\mu$  broad. Van Heurck suggests that this is a variety of *E. flexuosa*, Kuetz. (forms of which were also present in sample 10), but it would seem a better policy to regard this species as a variety of *E. bicapitata*, Grun. There is considerable resemblance between the latter and *E. (Himantidium) major* (W. Sm.), Rabenh. (*H. majus*, W. Smith, *op. cit.*, ii, p. 14, Pl. XXXIII, fig. 286), and the two may possibly be different habit-forms of the same species.

## B. ACHNANTHOIDEAE.

### (1) ACHNANTHACEAE.

#### GENUS ACHNANTHES BORY.

1. *Achnanthes minutissima*, Kuetz.; Cleve, Synops. Naviculoid Diat., ii, K. Sv. Vet.-Ak. Handl., xxvii, No. 3, 1895, p. 188; Van Heurck, *op. cit.*, p. 131, Pl. XXVII, figs. 37, 38.

Samples 10 (on *Tribonema*), 14 and 15 (on *Oedogonium*), 31 (on *Cladophora*), 52–55 (on *Tolypothrix*).

Recorded from Little Namaqualand by G. S. West.

2. *Achnanthes lanceolata*, Bréb. ; Cleve, *op. cit.*, p. 191 ; Van Heurck, *op. cit.*, p. 131, Pl. XXVII, figs. 8-11.

Samples 41 and 43 (on Cyanophyceae); 52-55 (on *Tolypothrix* and *Oedogonium*).

Recorded from the Holle River, Calvinia Division, by G. S. West.

3. *Achnanthes coarctata*, Bréb. ; Cleve, *op. cit.*, p. 192 ; Van Heurck, *op. cit.*, p. 130, Pl. XXVI, figs. 17-20.

Samples 10 (on *Tribonema*), 43 (on *Phormidium*).

Long., 30-33  $\mu$  ; lat., 6-8  $\mu$ . Previously recorded from the Holle River, Calvinia Division, by G. S. West.

## (2) COCCONEIDACEAE.

### GENUS COCCONEIS EHRENBERG.

1. *Cocconeis pediculus*, Ehrenb. ; Cleve, *op. cit.*, p. 169 ; Van Heurck, *op. cit.*, p. 133, Pl. XXX, figs. 28-30.

Samples 45 (on *Cladophora*, abundant), 52-55 (on *Oedogonium*, *Lyngbya*).

2. *Cocconeis placentula*, Ehrenb. ; Cleve, *op. cit.*, p. 169 ; Van Heurck, *op. cit.*, p. 133, Pl. XXX, figs. 26, 27.

Samples 52-55 (together with *C. pediculus*).

## C. NAVICULOIDEAE.

### (1) NAVICULACEAE.

#### GENUS MASTOGLIOIA THWAITES.

1. *Mastogloia grevillei*, W. Smith, Brit. Diat., ii, 1856, p. 65, Pl. LXII, fig. 389 ; Cleve, *op. cit.*, p. 146.

Samples 6, 52.

Long., 51-57  $\mu$  ; lat., 12-13  $\mu$ .

2. *Mastogloia smithii*, Thwaites ; W. Smith, *op. cit.*, p. 65, Pl. LIV, fig. 341 ; Cleve, *op. cit.*, p. 152.

Samples 4, 6.

Long., 45-48  $\mu$  ; lat., 12-15  $\mu$ .

## GENUS NAVICULA BORY.

## SECTION DIPLONEIS EHRENBERG.

1. *Navicula (Diploneis) ovalis*, Hilse; Cleve, *op. cit.*, i, K. Sv. Vet.-Ak. Handl., xxvi, 1894, No. 2, p. 92.

Samples 4, 5, 6, 52, 54.

Long., 33-48  $\mu$ ; lat., 18-24  $\mu$ .

## SECTION NEIDIUM PFITZER.

1. *Navicula (Neidium) affinis*, Ehrenberg; Cleve, *op. cit.*, p. 68; Van Heurck, *op. cit.*, Pl. XIII, fig. 4.

Sample 4.

Long., 65-78  $\mu$ ; lat., 16-18  $\mu$ .

2. *Navicula (Neidium) iridis*, Ehrenberg; Cleve, *op. cit.*, p. 69; Van Heurck, *op. cit.*, p. 103, Pl. XIII, fig. 1.

Sample 4.

A very small form. Long., 54  $\mu$ ; lat., 15  $\mu$ .

3. *Navicula (Neidium) dubia*, Ehrenberg; Cleve, *op. cit.*, p. 70. (Syn.: *N. iridis*, Ehrenb., var. *dubia*, Van Heurck, *op. cit.*, p. 104, Suppl. Pl. B, fig. 32.)

Sample 5.

Small form. Long., 22  $\mu$ ; lat., 8.5  $\mu$ .

## SECTION NAVICULAE ORTHOSTICHAE CLEVE.

1. *Navicula cuspidata*, Kuetz.; Cleve, *op. cit.*, p. 109; Van Heurck, *op. cit.*, p. 100, Pl. XII, fig. 4.

Var. *ambigua*, Ehrenb.; Cleve, *op. cit.*, p. 110. (Syn.: *N. ambigua*, Ehrenb.; Van Heurck, *op. cit.*, p. 100, Pl. XII, fig. 5.)

Sample 26.

Long., 66  $\mu$ ; lat., 18  $\mu$ .

The type has been recorded from Little Namaqualand by G. S. West.

## SECTION FRUSTULIA AGARDH.

1. *Navicula (Frustulia) rhomboides*, Ehrenb.; Cleve, *op. cit.*, p. 122. (Syn.: *Vanheurckia rhomboides*, Bréb.; Van Heurck, *op. cit.*, p. 112, Pl. XVII, figs. 1, 2.)

Samples 2, 8, 9, 10, 19.



Var. *saxonica*, Rabenh. ; Cleve, *op. cit.*, p. 123. (Syn. : *N. saxonica*, Rabenh. ; *N. crassinervia*, Bréb.)

Samples 1, 7, 8, 9, 10, 43.

Long., 48-63  $\mu$  ; lat., 12-15  $\mu$ .

2. *Navicula (Frustulia) vulgaris*, Thw. ; Cleve, *op. cit.*, p. 122. (Syn. : *Vanheurckia vulgaris* (Thw.), Van Heurck, *op. cit.*, p. 112, Pl. XVII, fig. 6 ; *Colletonema vulgaris*, Thw.)

Sample 41.

#### SECTION NAVICULAE MESOLEIAE CLEVE.

1. *Navicula pupula*, Kuetz. ; Cleve, *op. cit.*, p. 131 ; Van Heurck, *op. cit.*, p. 106, Pl. XIII, figs. 15, 16.

Var. *subcapitata*, Hustedt ; v. Schoenfeldt, Bacillariales, in A. Pascher, Suesswasserflora Deutschlands, Osterreichs, etc., x, 1913, p. 79 (Fig. 40, e).

Samples 4, 6.

The type has been recorded from South Africa by G. S. West.

#### SECTION NAVICULAE MINUSCULAE CLEVE.

1. *Navicula muralis*, Grun. ; Cleve, *op. cit.*, ii, p. 3.

Sample 41 (very rare).

#### SECTION NAVICULAE LINEOLATAE CLEVE.

1. *Navicula cincta*, Ehrenb. ; Cleve, *op. cit.*, p. 16 ; Van Heurck, *op. cit.*, p. 82, Pl. VII, figs. 13, 14.

Samples 4, 5, 6, 25, 43.

A not uncommon form. Long., 27-36  $\mu$  ; lat., 6-7  $\mu$ .

2. *Navicula cryptocephala*, Kuetz. ; Cleve, *op. cit.*, p. 14 ; Van Heurck, *op. cit.*, p. 84, Pl. VIII, figs. 1, 5.

Samples 4, 25, 26, 31, 32, 33, 36, 43, 48.

Long., 22-35  $\mu$  ; lat., 5-7.5  $\mu$ .

Recorded from Holle River, Calvinia Division ; Gansfontein, Ceres Division ; and Little Namaqualand by G. S. West.

3. *Navicula rhynchocephala*, Kuetz. ; Cleve, *op. cit.*, p. 15 ; Van Heurck, *op. cit.*, p. 84, Pl. VII, fig. 31.

Samples 4, 6.

Previously recorded by Wille from South Africa.

4. *Navicula radiosa*, Kuetz. ; Cleve, *op. cit.*, p. 17 ; Van Heurck, *op. cit.*, p. 83, Pl. VII, fig. 20. (Syn. : *N. acuta*, W. Smith.)

Sample 25.

Long., 70  $\mu$ ; lat., 12  $\mu$ .

5. *Navicula anglica*, Ralfs; Cleve, *op. cit.*, p. 22; Van Heurck, *op. cit.*, p. 87, Pl. VIII, fig. 29. (Syn.: *N. tumida*, W. Smith.)

Samples 3, 4, 5, 6.

Long., 30–36  $\mu$ ; lat., 12–13  $\mu$ .

6. *Navicula muticopsis*, Van Heurck, Diatomées, Résult. d. voy. d. S. Y. Belgica, 1909, p. 12, Pl. II, fig. 181.

Samples 32, 43.

Long., 15–18  $\mu$ ; lat., 8–8.5  $\mu$ .

It is interesting to find this species, which, as far as I am aware, has hitherto only been recorded from the Antarctic. The specimens belonged mainly to forma *reducta*, W. & G. S. West (Freshw. Algae, Rep. Brit. Antaret. Exped., 1907–09, i, 1911, pp. 283, 284, Pl. XXVI, figs. 121–124).

7. *Navicula dicephala*, W. Smith, *op. cit.*, i, p. 53, Pl. XVII, fig. 157; Cleve, *op. cit.*, p. 21.

Samples 32, 43.

This is certainly very close to some forms of the previous species.

#### SECTION PINNULARIA EHRENBERG.

1. *Navicula (Pinnularia) molaris*, Grun.; Cleve, *op. cit.*, p. 74; Van Heurck, *op. cit.*, Pl. VI, fig. 19.

Samples 5, 32.

Long., 31  $\mu$ ; lat., 7  $\mu$ .

2. *Navicula (Pinnularia) interrupta*, W. Smith, *op. cit.*, i, p. 59, Pl. XIX, fig. 184; Cleve, *op. cit.*, p. 76 (Fig. 40, a–d).

Samples 2, 4, 5, 14, 36 (diverse forms, *cf.* below).

This is obviously an exceedingly variable species, merging on the one hand into *P. mesolepta*, Ehrenb., on the other into *P. braunii*, Grun., and *P. bicapitata*, Lagerstedt. In Lagerstedt's original figure of the latter species (Spetsb. Diat., Bih. Sv. Vet.-Ak. Handl., i, 1873, Tab. I, Fig. 5) the valves are shown with parallel, slightly retuse sides and small capitate ends, while the striae are not interrupted at the middle of the valve. Van Heurck's figure (Pl. VI, fig. 14), however, shows the sides as perfectly straight, although otherwise like that of Lagerstedt. Cleve (*op. cit.*, p. 76) places *P. bicapitata* under forma *biceps* of *P. interrupta*, this form corresponding to *P. interrupta*, var.  $\beta$ , W. Smith (*op. cit.*, ii, p. 96), which is synonymous with *P. biceps*, Gregory; to this form Cleve also refers the specimen figured by Van Heurck. The

forma *biceps* differs from *P. interrupta* proper in the fact that the striae are not interrupted at the centre of the valve. According to these different authorities, therefore, *P. interrupta* may have straight or slightly retuse sides, may or may not have the striae interrupted at the centre of the valve, and may apparently also vary somewhat in the dimensions and shape of the capitulate ends. More recently, G. S. West (Algae Yan Yean Reservoir, Journ. Linn. Soc., Bot., xxxix, 1909 pp. 78, 79, Pl. III, fig. 13) has referred still another form to *P. bicapi-*

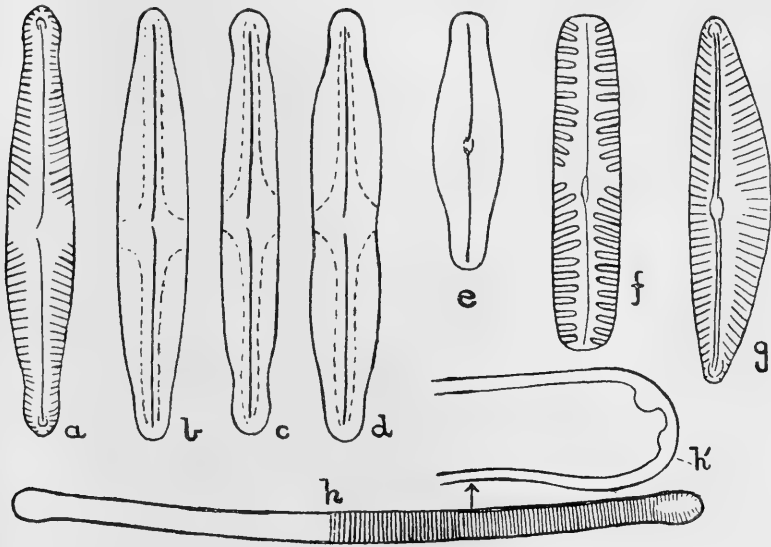


FIG. 40.—*a-d.* *Navicula interrupta*, W. Smith, diverse forms, cf. the text. *e.* *N. pupula*, Kuetz., var. *subcapitata*, Hustedt (the very fine and numerous radiating striae are not shown). *f.* *N. borealis*, Ehrenb., f. *rectangularis*, Carlson. *g.* *Cymbella pusilla*, Grun. *h.* *Eunotia bicapitata*, Grun. *h'*. End of valve of same, strongly enlarged. *a-f*  $\times 1000$ ; *g*  $\times 1800$ ; *h*  $\times 500$ ; *h'*  $\times 2700$ .

*tata*, in which the sides are slightly convex, the ends larger and not so clearly demarcated, and the striae appreciably shorter.

In the material from the Cape Peninsula the Diatom, above referred to *P. interrupta*, invariably had the striae interrupted at the centre of the valve (Fig. 40, *a-d*), but the shape of the latter was subject to very considerable variation. In many cases the valves were lanceolate, tapering gradually from the middle towards the ends, which were more or less markedly capitulate (Fig. 40, *a, b*); this form is certainly very like *P. braunii*, although not quite so tumid as Van Heurck (Pl. VI, fig. 21) figures it. From such a form all transitions are found to specimens in which the sides are almost absolutely straight and

parallel (Fig. 40, *c*), and from these again to specimens with slightly retuse sides (Fig. 40, *d*), which, in their turn, grade over to *P. mesolepta*. As the figures show the apices are also very variable, as regards their actual shape. In none of the individuals were such short striae encountered as West figures for his *P. bicapitata*.

It would seem most satisfactory to group these different forms as follows:

*Navicula (Pinnularia) interrupta*, W. Smith.\*

(1) Forma *genuina*.—Sides of valves straight and parallel; striae interrupted at the centre of the valve; apices markedly capitate. (Smith, Pl. XIX, fig. 184.)

(2) Forma *biceps*, Cleve.—Sides of valves straight and parallel; striae not interrupted at the centre of the valve; apices markedly capitate. (Van Heurck, Pl. VI, fig. 14.) (Syn.: *P. interrupta*, var.  $\beta$ , W. Smith; *P. biceps*, Gregory.)

(3) Forma *bicapitata*.—Sides of valves slightly retuse, but valve linear; striae not interrupted at the middle of the valve; apices markedly capitate. (Syn.: *P. bicapitata*, Lagerstedt, *op. cit.*, Pl. I, fig. 5.)

(4) Forma *sub-bicapitata*.—Sides of valves slightly retuse; striae interrupted at the middle of the valve; apices subcapitate. (Fig. nostr. 40, *d*.)

(5) Forma *subcapitata*.—Sides of valves straight and parallel; striae interrupted at the centre of the valve; ends not very markedly capitate (Fig. nostr. 40, *c*). (Syn.: *P. subcapitata*, Greg.; *P. gracillima*, Pritchard, var. *subcapitata*, Rabenh.)

(6) Forma *braunii*.—Sides of valves more or less markedly convex; striae interrupted at the middle; ends more or less capitate. (Syn.: *P. braunii*, Grun.) (Fig. nostr. 40, *a, b*.)

(7) Forma *westii*.—Sides of valves slightly convex; striae not interrupted at the middle, but short; ends slightly capitate. (G. S. West, *loc. cit.*, Pl. III, fig. 13.)

Perhaps one should also include *P. mesolepta* amongst these forms (*cf.* Cleve, p. 76), but for the present I prefer to keep it distinct. It should be added that all the specimens encountered in my material agreed with one another in the nature of the striation; the dimensions were: Long., 51–66  $\mu$ ; lat., 9–12  $\mu$ ; striae, 10–12 in 10  $\mu$ .

\* G. S. West (*loc. cit.*, p. 79) also includes *P. microstauron*, Ehrenb., in this group of similar species, but as I am not personally familiar with it, I have not dealt with it here.

3. *Navicula (Pinnularia) mesolepta*, Ehrenb.; Cleve, *op. cit.*, p. 76; Van Heurck, *op. cit.*, p. 79, Pl. VI, figs. 10, 11, Samples 6, 7, 41.  
Long., 57–64  $\mu$ ; lat., 10–11  $\mu$ .
4. *Navicula (Pinnularia) brebissonii*, Kuetz.; Cleve, *op. cit.*, p. 78; Van Heurck, *op. cit.*, p. 77, Pl. V, fig. 7.  
Sample 48.  
Long., 40  $\mu$ ; lat., 10  $\mu$ .  
Recorded from the Holle River, Calvinia Division, by G. S. West.
5. *Navicula (Pinnularia) legumen*, Ehrenb.; Cleve, *op. cit.*, p. 78; Van Heurck, *op. cit.*, p. 80, Pl. VI, fig. 16. (Syn.: *P. undulata*, Schum.)  
Sample 4.  
Long., 75  $\mu$ ; lat., 14  $\mu$ .
6. *Navicula (Pinnularia) borealis*, Ehrenb.; Cleve, *op. cit.*, p. 80; Van Heurck, *op. cit.*, p. 76, Pl. VI, fig. 3.  
Samples 1, 50, 51.  
Recorded from the Holle River, Calvinia Division, by G. S. West.  
Forma *rectangularis*, Carlson, *Suesswasseralg. a. d. Antarktis, etc.*, *Wiss. Ergebnisse d. schwed. Suedpolarexped., 1901–3*, iv, 1913, p. 21, Pl. III, Fig. 15. (Fig. 40, *f.*)  
Samples 43, 52.  
Long., 42  $\mu$ ; lat., 10  $\mu$ ; many of the specimens were even more markedly rectangular than Carlson figures them.
7. *Navicula (Pinnularia) stauroptera*, Grun.; Cleve, *op. cit.*, p. 82.  
Var. *interrupta*, Cleve, *op. cit.*, p. 83; Van Heurck, *op. cit.*, p. 77, Pl. VI, fig. 6.  
Sample 4.  
Long., 84  $\mu$ ; lat. med., 12  $\mu$ .
8. *Navicula (Pinnularia) major*, Kuetz.; Cleve, *op. cit.*, p. 89; Van Heurck, *op. cit.*, p. 73, Pl. V, figs. 3, 4.  
Samples 5 and 6.  
Long., 195–230  $\mu$ ; lat., 30–33  $\mu$ .
9. *Navicula (Pinnularia) viridis*, Ehrenb.; Cleve, *op. cit.*, p. 91; Van Heurck, *op. cit.*, p. 73, Pl. V, fig. 5.  
Var. *fallax*, Cleve, *op. cit.*, p. 91; Van Heurck, *op. cit.*, Pl. V, fig. 6; Smith, *op. cit.*, Pl. XVIII, fig. 163,  $\beta$ .  
Sample 4.  
Long., 66–93  $\mu$ ; lat., 14–15  $\mu$ .

10. *Navicula (Pinnularia) distinguenda*, Cleve, *op. cit.*, p. 92; Smith, *op. cit.*, Pl. XVIII, fig. 163a (sub. *P. viridis*).

Samples 5 and 6.

Long., 114–147  $\mu$ ; lat., 24–27  $\mu$ .

*N. madagascariensis*, F. E. Fritsch, is probably but a form of this species.

#### GENUS STAURONEIS EHRENBERG.

1. *Stauroneis phoenicenteron*, Ehrenb.; Cleve, *op. cit.*, i, p. 148; Van Heurck, *op. cit.*, p. 67, Pl. IV, fig. 2.

Sample 4.

A rather small form. Long., 81–87  $\mu$ ; lat., 20–21  $\mu$ .

#### GENUS GYROSIGMA HASSALL.

1. *Gyrosigma acuminatum*, Kuetz.; Cleve, *op. cit.*, p. 114; Van Heurck, *op. cit.*, p. 117, Pl. XXI, fig. 12. (Syn.: *Pleurosigma acuminatum*, Grun.)

Sample 32 (very rare).

### (2) GOMPHONEMACEAE.

#### GENUS GOMPHONEMA AGARDH.

1. *Gomphonema constrictum*, Ehrenb.; Cleve, *op. cit.*, p. 186; Van Heurck, *op. cit.*, p. 123, Pl. XXIII, fig. 6.

Samples 31 and 33 (on *Cladophora*).

Long., 48  $\mu$ ; lat., 11–12  $\mu$ .

2. *Gomphonema angustatum*, Kuetz.; Cleve, *op. cit.*, p. 181; Van Heurck, *op. cit.*, p. 126, Pl. XXIV, figs. 49, 50.

Samples 21 and 24 (on *Oedogonium*).

3. *Gomphonema gracile*, Ehrenb.; Cleve, *op. cit.*, p. 182.

Samples 14 and 15 (on *Oedogonium* and *Phormidium*).

Recorded from Gansfontein, Ceres Division; the Holle River, Calvinia Division, by G. S. West.

4. *Gomphonema lanceolatum*, Ehrenb.; Cleve, *op. cit.*, p. 183.

Samples 14 and 15 (on *Oedogonium* and *Phormidium*), 21 and 24 (on *Oedogonium*), 29 (on *Myriophyllum*), 52–54 (on *Oedogonium* and *Tolypothrix*).

Recorded from Little Namaqualand by G. S. West.

5. *Gomphonema parvulum*, Kuetz.; Cleve, *op. cit.*, p. 180; Van Heurck, *op. cit.*, p. 125, Pl. XXV, fig. 9.

Samples 5 (on *Vaucheria*), 41 (on Moss), 48 (on *Oedogonium*).

Recorded from Little Namaqualand by G. S. West.

(3) COCCONEMACEAE.

GENUS CYMBELLA AGARDH.

1. *Cymbella pusilla*, Grun.; Cleve, *op. cit.*, p. 162; Van Heurck, *op. cit.*, p. 62, Pl. III, fig. 5. (Fig. nostr. 40, *g.*)

Samples 52-54.

Long., 25  $\mu$ ; lat., 6  $\mu$ .

2. *Cymbella (Cocconema) cistula*, Hemprich; Cleve, *op. cit.*, p. 173; Van Heurck, p. 64, Pl. II, figs. 12, 13.

Var. *maculata*, Kuetz.; Cleve, *op. cit.*, p. 173; Van Heurck, *op. cit.*, p. 64, Pl. II, figs. 16, 17.

Sample 33 (on *Cladophora*).

Long., 57-60  $\mu$ ; lat., 18-20  $\mu$ .

3. *Cymbella (Cocconema) lanceolata*, Ehrenb.; Cleve, *op. cit.*, p. 174; Van Heurck, *op. cit.*, p. 63, Pl. II, fig. 7.

Sample 25.

4. *Cymbella (Encyonema) ventricosa*, Kuetz.; Cleve, *op. cit.*, p. 168; Van Heurck, *op. cit.*, p. 66, Pl. III, fig. 17.

Samples 25, 30a, 31.

GENUS AMPHORA EHRENBERG.

1. *Amphora ovalis*, Kuetz.; Cleve, *op. cit.*, ii, p. 104; Van Heurck, *op. cit.*, p. 59, Pl. I, fig. 1.

Samples 5, 31, 32, 34a, 35, 47, 48.

A small form. Long., 30-39  $\mu$ ; lat., 12-15  $\mu$ .

2. *Amphora lineolata*, Ehrenb.; Cleve, *op. cit.*, p. 126; Van Heurck, *op. cit.*, p. 57, Pl. I, fig. 23.

Sample 4.

GENUS EPITHEMIA BRÉBISSON.

1. *Epithemia sorex*, Kuetz.; Van Heurck, *op. cit.*, p. 139, Pl. XXXII, figs. 6-10.

Samples 25, 29, 29a, 30, 30a, 31, 32, 33.

2. *Epithemia gibba*, Kuetz.; Van Heurck, *op. cit.*, p. 139, Pl. XXXII, figs. 1, 2. (Syn.: *Rhopalodia gibba* (Kuetz.), O. Muell.)

Samples 25, 32.

Recorded from Little Namaqualand by G. S. West.

3. *Epithemia zebra* (Ehrenb.), Kuetz.; Van Heurck, *op. cit.*, p. 140, Pl. XXXI, figs. 9, 11-14.

Var. *proboscidea*, Grun.; Van Heurck, *op. cit.*, p. 140, Pl. XXXI, fig. 10.

Samples 29, 29a, 30a, 31.

Long., 57-60  $\mu$ ; lat., 11  $\mu$ .

4. *Epithemia gibberula*, Kuetz.; Van Heurck, *op. cit.*, p. 140. (Syn.: *Rhopalodia gibberula* (Kuetz.), O. Muell.)

Samples 4, 5, 6.

Recorded from the Karroo by G. S. West.

## D. NITZSCHIOIDEAE.

### GENUS NITZSCHIA HASSALL.

#### SECTION TRYBLIONELLA GRUNOW.

1. *Nitzschia tryblionella*, Hantzsch; Van Heurck, *op. cit.*, p. 171, Pl. LVII, figs. 9, 10. (*Tryblionella hantzschiana*, Grun.)

Var. *levidensis* (W. Sm.), Grun.; Van Heurck, *op. cit.*, p. 171, Pl. LVII, fig. 15. (Syn.: *Tryblionella levidensis*, W. Smith, *op. cit.*, ii, p. 89.) (Fig. 41, e.)

Samples 4, 6.

Long., 30-50  $\mu$ ; lat., 12-16  $\mu$ . Many of the individuals were slightly constricted in the middle. The markings on the surface of the valves are of a very irregular nature, appearing as short undulating lines extending from one edge a little more than half way across, the lines from opposite edges alternating in an irregular manner. (Fig. 41, e.)

The type has been recorded from the Halle River, Calvinia Division, by G. S. West.

#### SECTION APICULATAE GRUNOW.

1. *Nitzschia hungarica*, Grun.; Van Heurck, *op. cit.*, p. 173, Pl. LVIII, figs. 19-22. (Fig. 41, d.)

Samples 25, 32, 48.

Long., 57-93  $\mu$ ; lat., 8-9  $\mu$ . The characteristic interruption of the striae in the middle part of the valve, due to the presence of a fold, was very well marked (Fig. 41, d); in the region of interruption the striae are sometimes very faintly recognisable. In several of the specimens a few of the striae in the central part of the valve could be traced right across (Fig. 41, d). The carinal dots are very faint. The apices are slightly curved to one side.



2. *Nitzschia apiculata* (Greg.), Grun. ; Van Heurck, *op. cit.*, p. 173, Pl. LVIII, figs. 26, 27.

Sample 34a.

Long., 36  $\mu$ ; lat., 6  $\mu$ .

SECTION DUBIAE GRUNOW.

1 *Nitzschia stagnorum*, Rabenhorst; Van Heurck, *op. cit.*, Pl. LIX, fig. 24.

Sample 32.

Long., 45  $\mu$ ; lat., 6-8  $\mu$ .

Recorded from the Halle River, Calvinia Division, by G. S. West.

SECTION SIGMOIDEAE GRUNOW.

1. *Nitzschia sigmoidea* (Ehrenb.), W. Smith, *op. cit.*, i., p. 38, Pl. XIII, fig. 104; Van Heurck, *op. cit.*, p. 178, Pl. LXIII, figs. 5-7.

Samples 4, 5, 6, 25, 32.

SECTION SIGMATAE GRUNOW.

1. *Nitzschia sigma* (Kuetz.), W. Smith, *op. cit.*, i, p. 39, Pl. XIII, fig. 108; Van Heurck, *op. cit.*, p. 179, Pl. LXV, figs. 7, 8.

Samples 4, 52, 54.

Var. *subcapitata*, Rabenh. (*N. clausii*, Hantzsch; Van Heurck, *op. cit.*, Pl. LXVI, fig. 10). (Fig. 41, *f.*)

Samples 4, 6.

Long., 54-60  $\mu$ ; lat., 4-5  $\mu$ .

The specimens were often more markedly curved than shown in fig. 41, *f.*

Var. *sigmatella*, Grun.; Van Heurck, *op. cit.*, p. 179, Pl. LXVI, figs. 6, 7. (Fig. 41, *a.*)

Sample 6.

Long., 96-150  $\mu$ ; lat., 4-5.5  $\mu$ .

? Var. *rigidula*, Grun.; Van Heurck, *op. cit.*, p. 179, Pl. LXVI, fig. 8. (Fig. 41, *b.*)

Sample 5.

A form with slightly capitate ends, rather wide, and with well-marked carinal dots.

Long., 80-86  $\mu$ ; striae very fine.

SECTION LANCEOLATAE GRUNOW.

1. *Nitzschia subtilis*, Grun.; Van Heurck, *op. cit.*, p. 183, Pl. LXVIII, figs. 7, 8.

Var. *paleacea*, Grun.; Van Heurck, *op. cit.*, p. 183, Pl. LXVIII, figs. 9, 10.

Samples 14, 15.

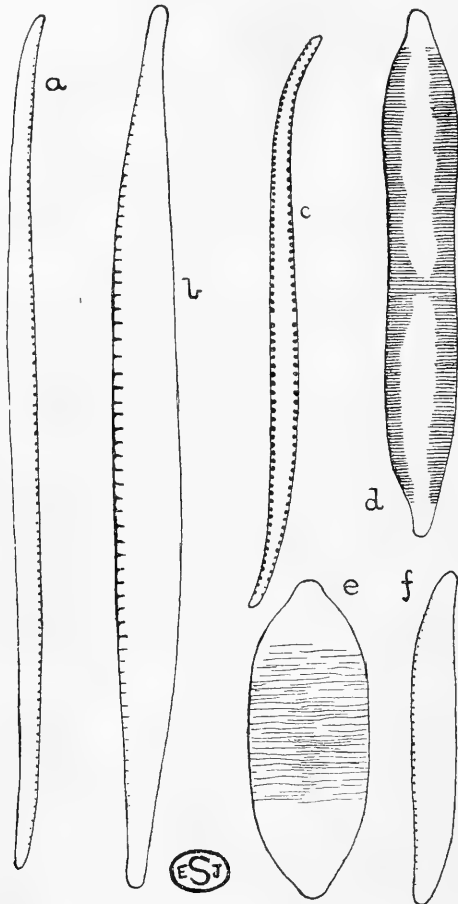


FIG. 41.—*a.* *Nitzschia sigma*, var. *sigmatella*, Grun. *b.* *N. sigma*, var. *rigidula*, Grun., forma (?). *c.* *Nitzschia lorenziana*, Grun. *d.* *N. hungarica*, Grun. *e.* *N. tryblionella*, var. *levidensis*, W. Sm. *f.* *N. sigma*, var. *subcapitata*, Rabenh. *a.*,  $\times 750$ ; *b.*, and *d-f.*,  $\times 1350$ ; *e.*,  $\times 600$ .

2. *Nitzschia amphibia*, Grun.; Van Heurck, *op. cit.*, p. 184, Pl. LXVIII, figs. 15-17.

Sample 32.

Long., 27-36  $\mu$ ; lat., 6  $\mu$ .

Recorded from Little Namaqualand by G. S. West.

3. *Nitzschia communis*, Rabenh.; Van Heurck, *op. cit.*, p. 184, Pl. LXIX, fig. 32.

Samples 5, 12, 26, 31.

4. *Nitzschia palea*, Kuetz.; Van Heurck, *op. cit.*, p. 183, Pl. LXIX, figs. 22*b*, *c*.

Samples 4, 5, 6, 25, 26, 27, 30*a*, 31, 32, 33, 36, 37, 41, 43.

Recorded by G. S. West from the Halle River, Calvinia Division, and Little Namaqualand.

5. *Nitzschia gracilis*, Hantzsch; Van Heurck, *op. cit.*, Pl. LXVIII, fig. 11.

Sample 26.

Long., 72  $\mu$ ; lat., 4.2  $\mu$ .

#### SECTION NITZSCHIELLA (RABENH.), GRUNOW.

1. *Nitzschia acicularis*, Kuetz.; Van Heurck, *op. cit.*, p. 185, Pl. LXX, fig. 6.

Samples 4, 32.

2. *Nitzschia lorenziana*, Grun.; Van Heurck, *op. cit.*, p. 185, Pl. LXX, fig. 12. (Fig. 41, *c*.)

Samples 4, 5, 6.

Long., 117–138  $\mu$ ; lat., 5.5–6  $\mu$ .

This is really a marine species, but Hustedt (Beitr. z. Algenfl. v. Bremen, ii, Abh. Nat. Ver. Bremen, xix, 1908, p. 448) has found var. *subtilis*, Grun., in fresh water. It is possible that the Cape specimens really belong to this variety.

#### GENUS HANTZSCHIA GRUNOW.

1. *Hantzschia amphioxys* (Ehrenb.), Grun.; Van Heurck, *op. cit.*, p. 168, Pl. LVI, figs. 1, 2.

Samples 6, 26, 27, 43.

Recorded from Little and Great Namaqualand by G. S. West.

### E. SURIRELLOIDEAE.

#### GENUS CYMATOPLEURA W. SMITH.

1. *Cymatopleura solea* (Br b.), W. Sm.; Van Heurck, *op. cit.*, p. 168, Pl. LV, fig. 1.

Samples 25, 32.

Long., 57–132  $\mu$ ; lat., 18–30  $\mu$ .

## GENUS SURIRELLA TURPIN.

1. *Surirella ovalis*, Bréb. ; Van Heurck, *op. cit.*, p. 188, Pl. LXXIII, fig. 2.

Sample 5.

Long., 72–81  $\mu$ ; lat., 37–43  $\mu$ .

Recorded from the Halle River, Calvinia Division, and Little Namaqualand, by G. S. West.

2. *Surirella linearis*, W. Smith, Brit. Diat., i, 1853, p. 31, Pl. VIII, fig. 58.

Sample 48.

Forma *minor*. Long., 36  $\mu$ ; lat., 8–9  $\mu$ .

## V. FLAGELLATA.

## D. EUGLENINAE.

## GENUS EUGLENA EHRENBERG.

1. *Euglena oxyuris*, Schmarda ; Lemmermann, in Suësswasserflora Deutschlands, Oesterreichs, u. d. Schweiz., Heft. 2, 1913, p. 130, fig. 207. (Fig. 42, A.)

Samples 3 and 4 (not uncommon).

Long., 180–195  $\mu$ ; lat., 21–27  $\mu$ . The dimensions are appreciably smaller than those given by Lemmermann, but otherwise the specimens agree well with the diagnosis. The cells are elongated and spirally twisted, often in a complicated manner. The periplast is provided with spiral striation, which, under higher powers, is seen to be composed of lines of closely arranged punctae. The oval nucleus (dark in Fig. 42, A) lies approximately in the middle of the cell, and there is a ring-shaped paramylon-grain in front and behind it.

2. *Euglena*, n. sp. (?). (Fig. 42, B.)

Samples 14 and 15 (not uncommon).

I think it probable that this is a new species, but that could only be certainly established by examination of fresh material. The cells are certainly highly metabolic, as the specimens show great diversity of shape; in general, however, the form of the cell is elongated, usually with the greatest breadth near one end. The anterior extremity appears produced as a blunt knob, and this feature is distinguishable in all the individuals, no matter how distorted their shape. At this point a slight orifice, from which no doubt the flagellum arises, can be

recognised. The posterior end is usually bluntly rounded. The periplast is provided with a very fine striation, which often runs almost transversely (cf. Fig. 42, *B*). The chloroplasts appear to be

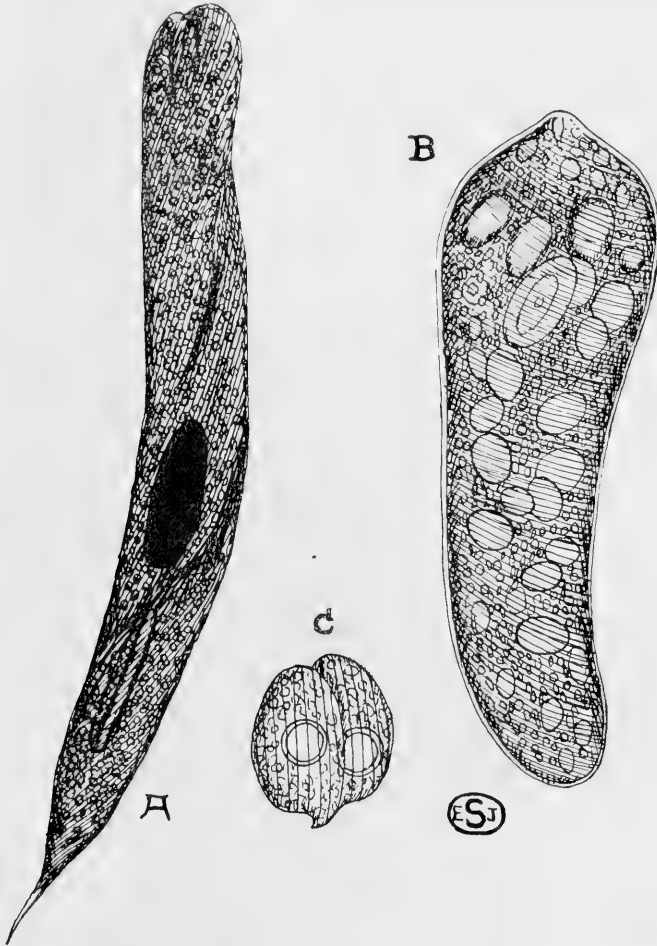


FIG. 42.—*A. Euglena oxyuris*, Schmarda. *B. Euglena*, n. sp. (?). *C. Phacus brevicaudata* (Klebs) Lemmerm. (?). All figs.  $\times 700$ .

numerous and disc-shaped, and there are a large number of oval paramylon-grains. The rather elongated nucleus is generally to be found near the middle of the cell, although sometimes (Fig. 42, *B*) it lies nearer the front end. The dimensions of two typical specimens were  $132 \times 39 \mu$  and  $153 \times 33 \mu$ .

(Note.—Indeterminable species of *Euglena* were encountered in occasional other samples, but never in large numbers.)

GENUS LEPOCINCLIS PERTY.

1. *Lepocinclis ovum* (Ehrenb.), Lemmermann, *op. cit.*, p. 134, fig. 216.

Samples 14, 15.

Long., 34  $\mu$ ; lat., 24–25  $\mu$ .

Many of the specimens had a brownish periplast. The spiral ribs in some of the individuals were not equally developed, but were alternately thin and thick.

Var. *globula* (Perty), Lemmermann, *op. cit.*, p. 134.

Samples 12, 13.

Long., 27  $\mu$ ; lat., 20  $\mu$ .

GENUS PHACUS DUJARDIN.

1. *Phacus longicauda* (Ehrenb.), Duj.; Lemmermann, *op. cit.*, p. 138, fig. 235.

Sample 14.

2. *Phacus pleuronectes* (O. F. M.), Duj.; Lemmermann, *op. cit.*, p. 138, fig. 236.

Sample 14.

3. *Phacus brevicaudata* (Klebs), Lemmermann, *op. cit.*, p. 139, fig. 232. (Fig. 42, C.)

Samples 12 and 13.

Long., 30–31  $\mu$ ; lat., 27  $\mu$ . All the individuals were broadest near the back end, the outline of which appears flattened or slightly concave. From its middle arises a very short spinous prolongation, which is bent towards one side. The dorsal fold can be traced right to the posterior end of the cell. The periplast exhibits rather faint longitudinal striation. In the vast majority of the individuals there are two paramylon-grains, lying one on either side of the dorsal fold, the one generally considerably larger than the other.

GENUS TRACHELOMONAS EHRENBERG.

1. *Trachelomonas volvocina*, Ehrenb.; Lemmermann, *op. cit.*, p. 145, fig. 246.

Forma *typica*.

Samples 12, 13, 14.

Long. et lat., 20  $\mu$ .

Forma *minuta* (Fig. 43, *F*).

Samples 14, 15.

Long. et lat., 5–6  $\mu$ .

These small individuals occurred in enormous numbers, especially in sample 14. Most of the testae of this form display a small pore situated at the end, opposite to that at which the usual aperture occurs (Fig. 43, *F*). It is very difficult to arrive at any conclusion as to the exact nature of this pore.

2. *Trachelomonas radiosa*, n. sp. (Fig. 43, *A–D*.)

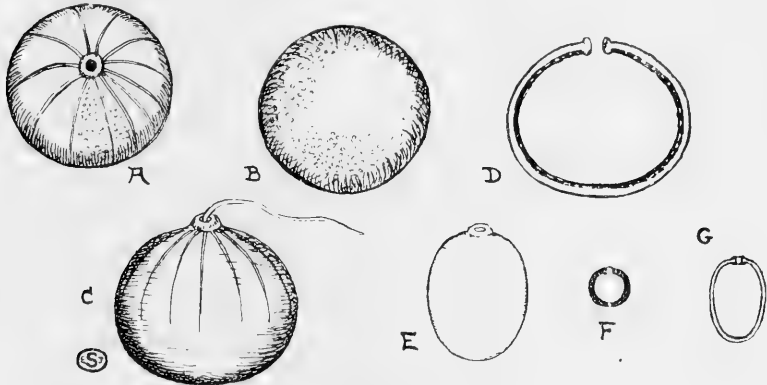


FIG. 43.—*A–D*. *Trachelomonas radiosa*, n. sp. *A*. Seen from the anterior end. *B*. Seen from the posterior end. *C* and *D*. Side views (*D*, optical section). *E*. *T. oblonga*, Lemm. *F*. *T. volvocina*, Ehrenb., f. *minuta*. *G*. *T. incerta*, Lemm., var. *minor*, nov. var. All figures  $\times 960$ .

Testa sphaerica polis deplanatis, rubiginosa, paullo latior quam longa; porus flagelli parvus, collari brevi extus vel intus paullo prominenti, 2–2.5  $\mu$  alto, circumdatus. Membrana incrassata, in partem anteriorem testae cum costis longitudinalibus ca. 12 subregulariter dispositis (prope mediam testam evanescentibus) et in totam superficiem punctis minutis numerosis praedita. Flagellum crassum, paullo longius quam testa. Contentus ignotus.

Long, 17–18  $\mu$ ; lat., 20  $\mu$ .

Sample 14.

This species at first sight bears a strong resemblance to a *T. volvocina*, with flattened poles, but its characteristic markings distinguish it at once on closer scrutiny. Viewed from either end the shape is circular (Fig. 43, *A*, *B*), but in a side-view the flattening of the poles is quite distinct (Fig. 43, *C*, *D*). Starting from the collar at the front

end are a number (about 12) of weak longitudinal ribs (Fig. 43, *A*); these ribs are not arranged quite symmetrically, being placed at slightly variable distances from one another. They do not extend for the whole length of the testa, but die out at about the middle of its length (Fig. 43, *C*), being therefore altogether invisible in an individual viewed from the posterior end (Fig. 43, *B*). Between the ribs, and over the whole of the rest of the surface of the testa, a very fine pitting can be made out with difficulty (Fig. 43, *A, B*). This appears to be due to the fact that the pitting is confined to the inner part of the wall of the testa, which presents a slightly interrupted appearance, like that of a pitted membrane, when seen in optical section (Fig. 43, *D*). The collar is a mere thickening of the edge of the flagellum, aperture and projects very slightly, both on the outer and the inner side (Fig. 43, *D*).

In one specimen (Fig. 43, *C*) a coarse flagellum, a little longer than the testa, was observed, but apart from that no details of cell-structure could be deciphered.

3. *Trachelomonas oblonga*, Lemmermann, *op. cit.*, p. 147, fig. 278. (Fig. 43, *E*.)

Samples 12, 14, 15.

Long., 14–16  $\mu$ ; lat., 11–14  $\mu$ . Some of the individuals were not nearly as oblong as others, and it seemed that there might be all transitions from this species to a typical *T. volvocina*. The tests also varied very much in colour, showing all shades from almost colourless, through light brown, to a very deep brown.

4. *Trachelomonas incerta*, Lemmermann, *op. cit.*, p. 151, fig. 284.

Var. *minor*, nov. var. (Fig. 43, *G*.)

Differt a typo testis multo minoribus, parte anteriore fere truncata, lateribus superne subparallelis, inferne convergentibus, polo posteriore rotundato.

Long., 11  $\mu$ ; lat. max., 7  $\mu$ .

Sample 14.

This comes very close to the var. *truncata* of *T. oblonga*, but the general shape of the testa, tapering as it does towards the back end, is more like that of *T. incerta*. Lemmermann has already described a small variety of *T. incerta*, but that is characterised by having a punctate testa.

5. *Trachelomonas hispida* (Perty), Stein; Lemmermann, *op. cit.*, p. 149, fig. 272.

Forma *typica*.

Samples 4, 14, 15, 24.



Var. *coronata*, Lemmerm.

Sample 14.

Var. *punctata*, Lemmerm.

Samples 5, 14.

## VI. PERIDINEAE (DINOFLAGELLATA).

Species of *Peridinium* were encountered in samples 24 and 39, but were too scanty for adequate determination.

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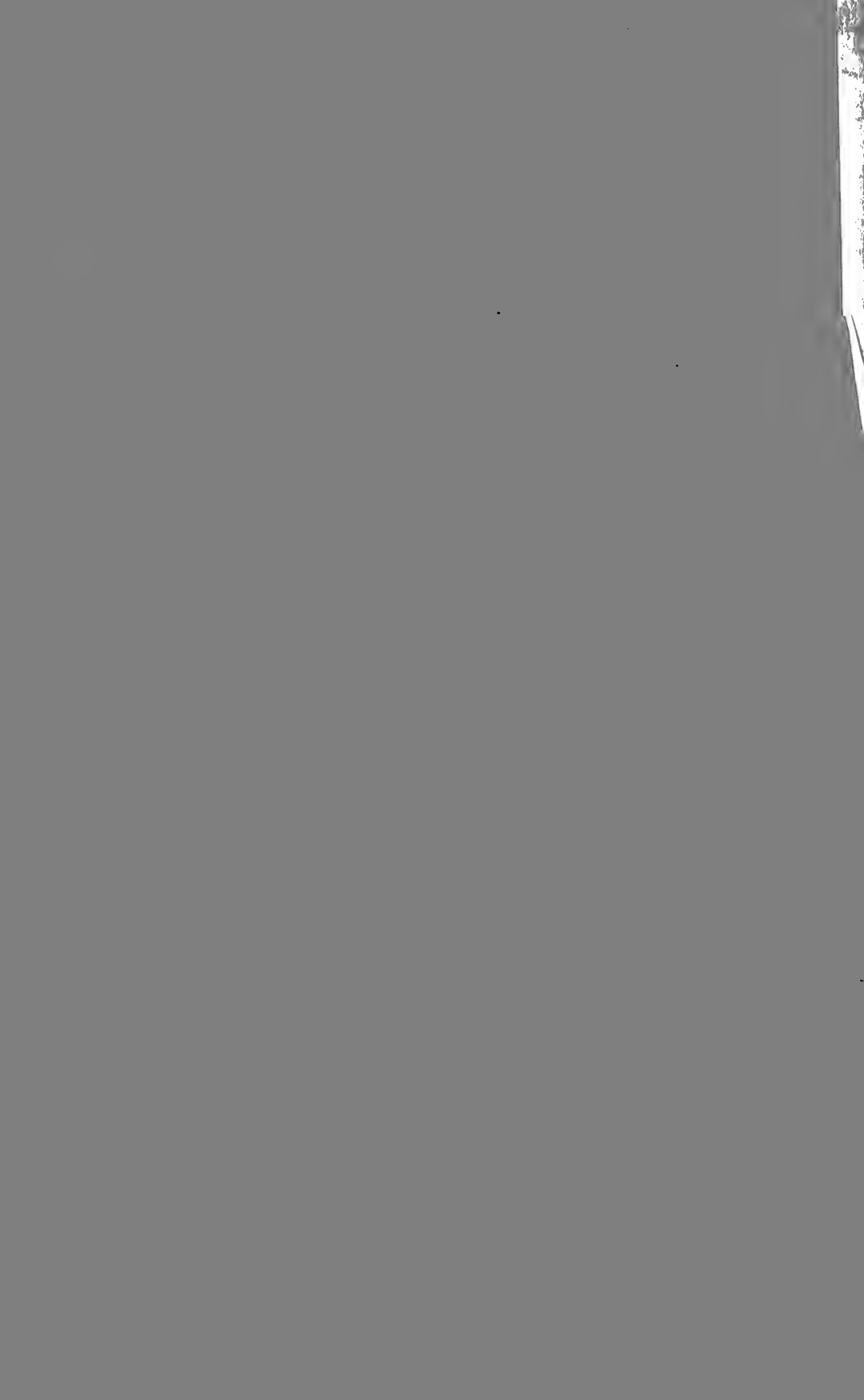
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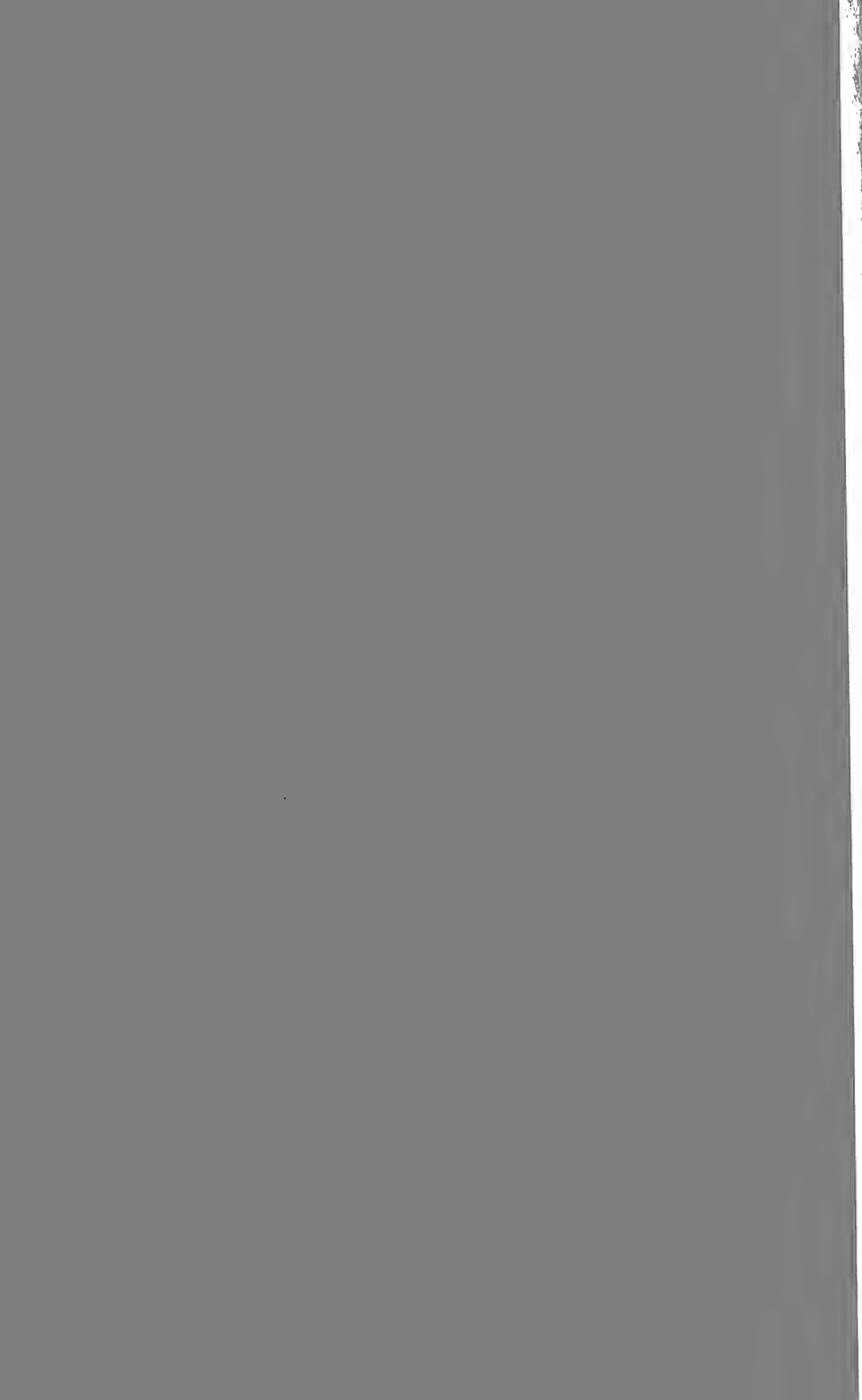
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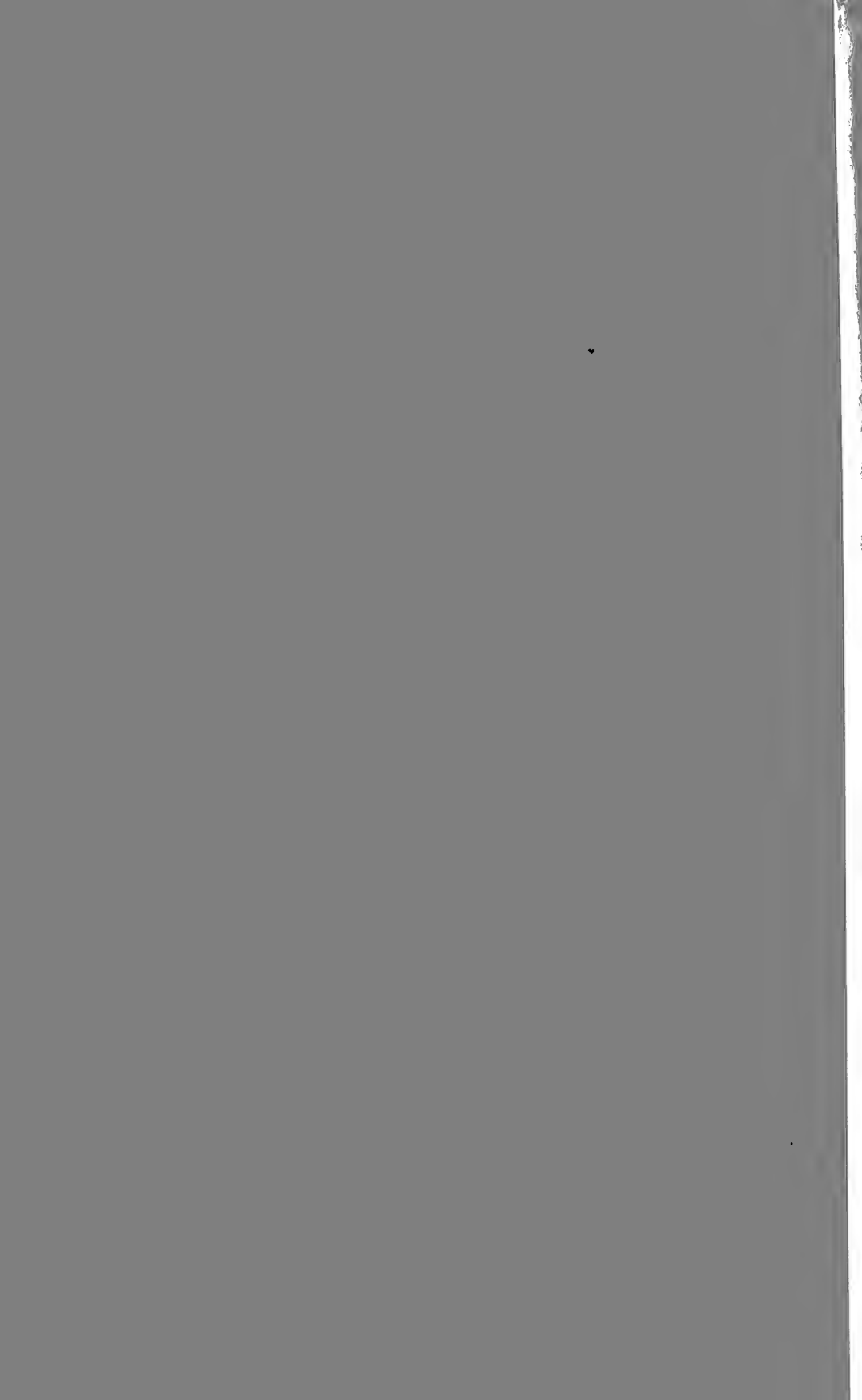
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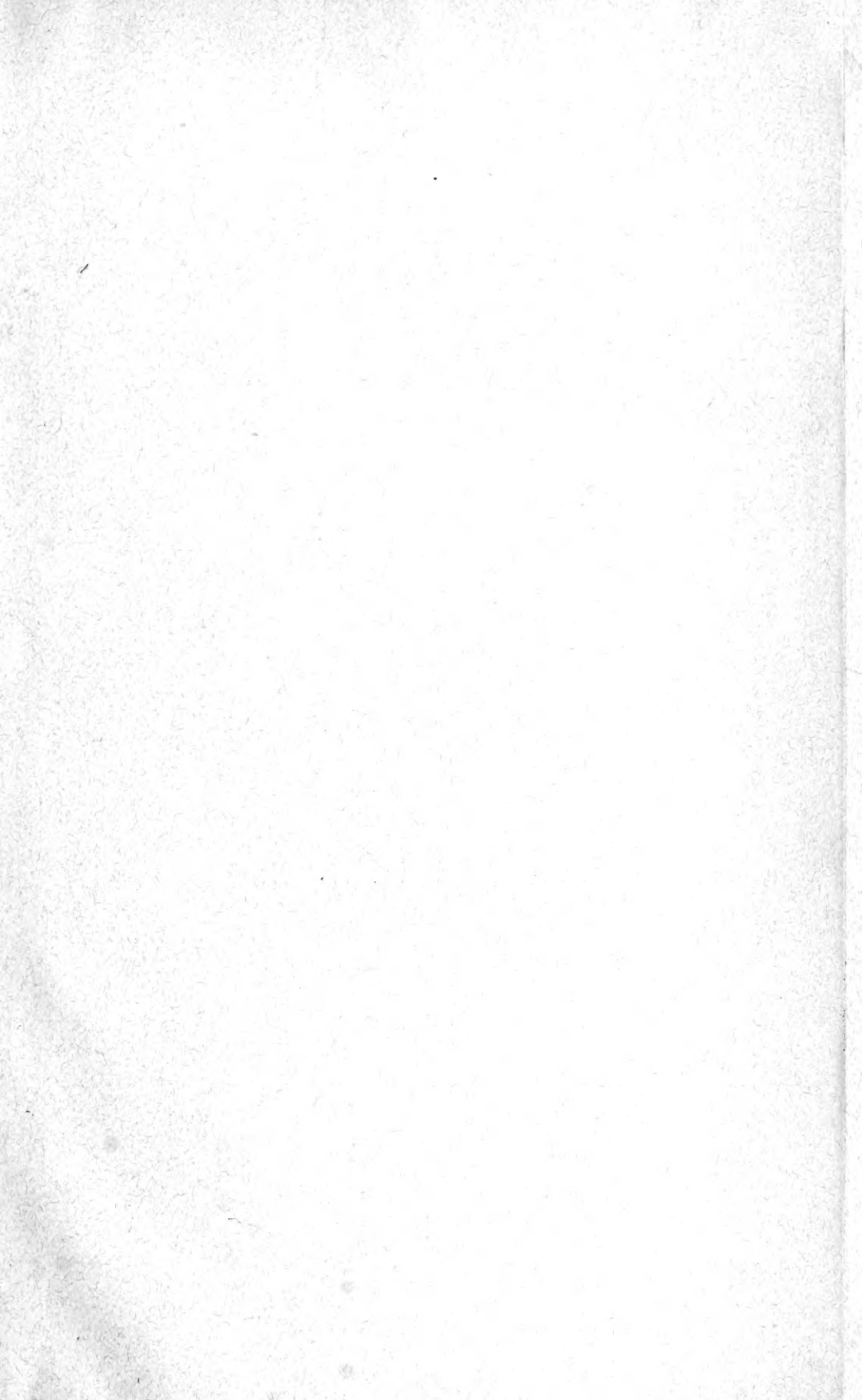
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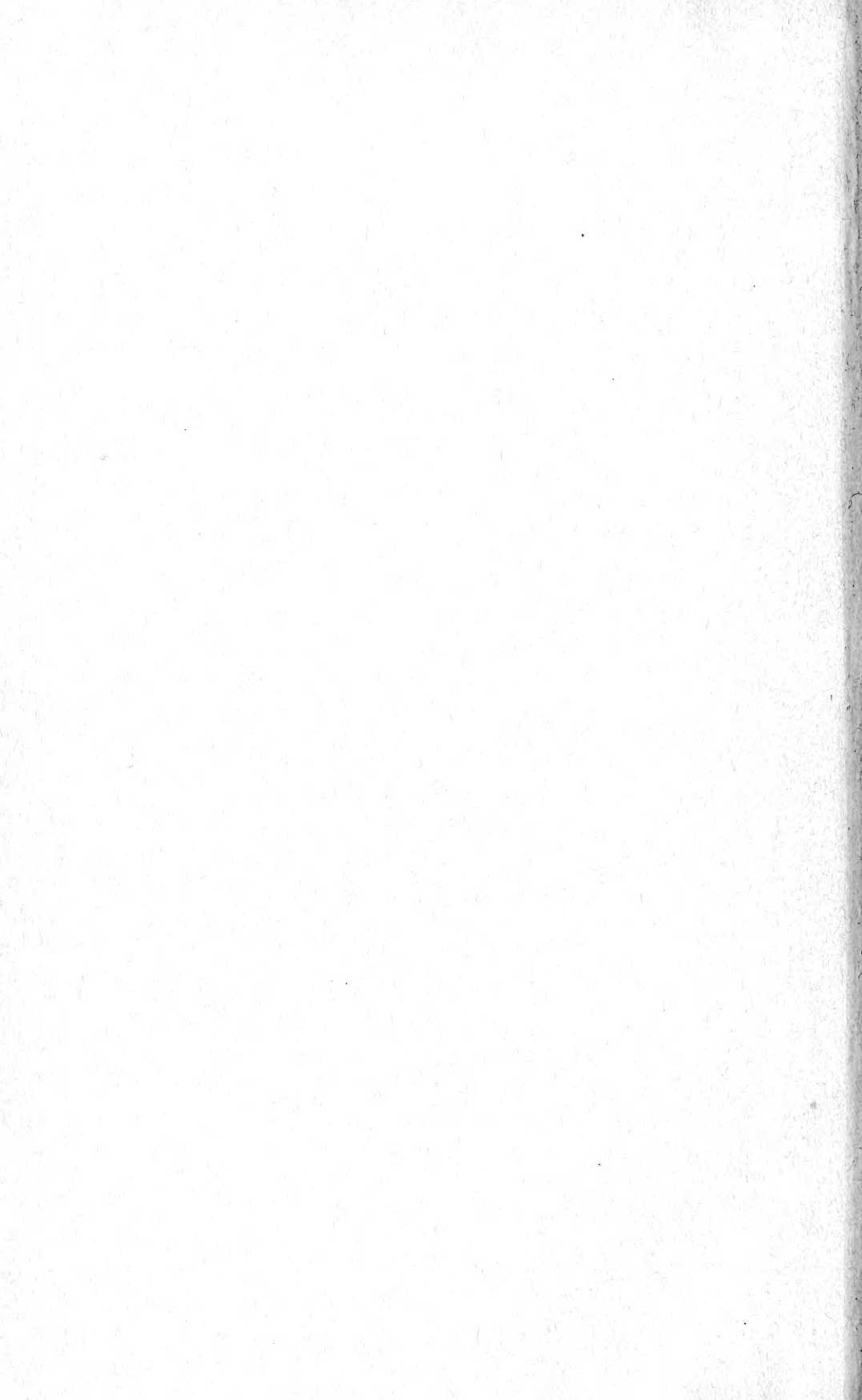
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