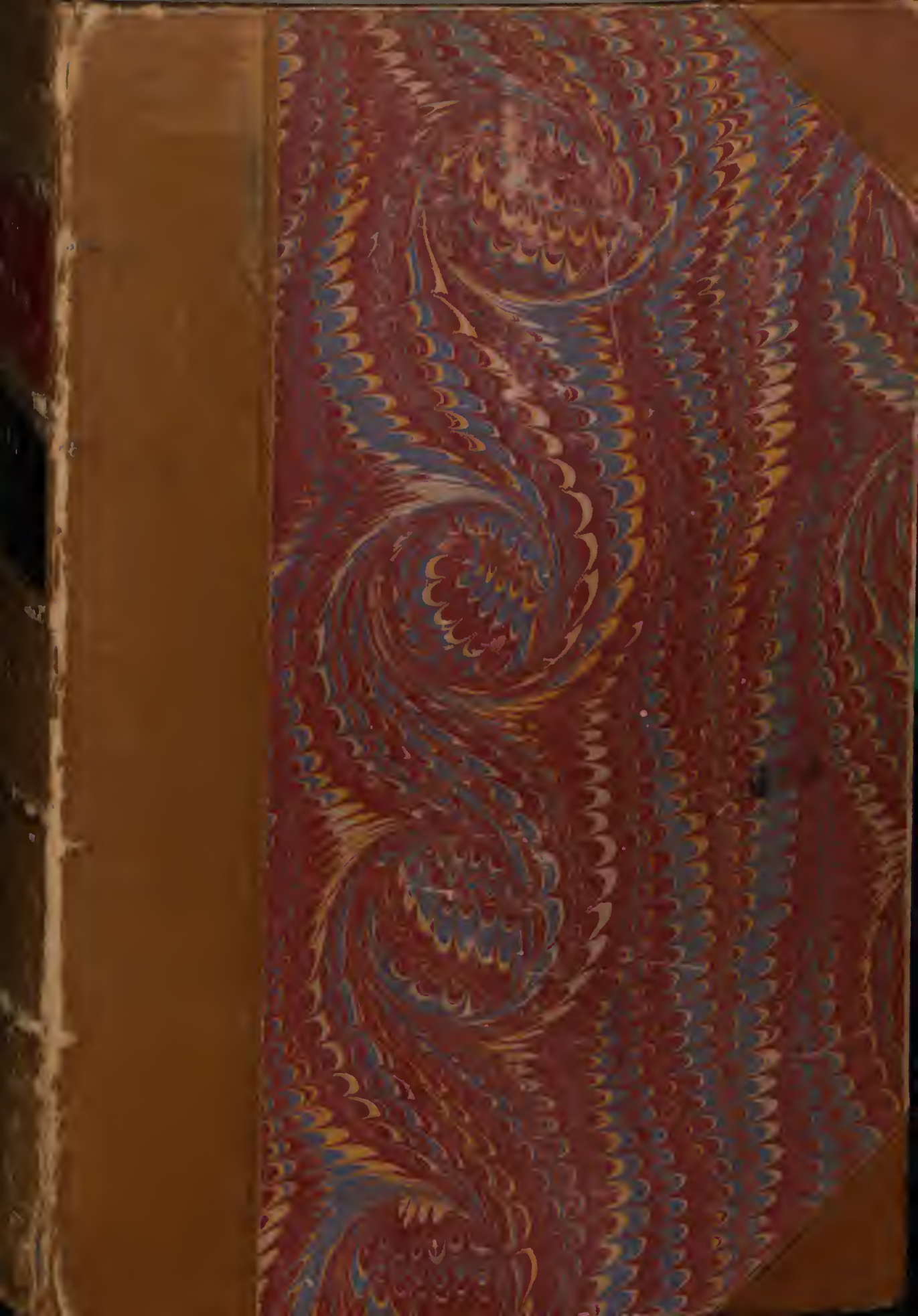

HOOKER'S

ICONES PLANTARUM

OR

FIGURES, WITH DESCRIPTIVE CHARACTERS AND REMARKS,
OF NEW AND RARE PLANTS

SELECTED FROM THE

KEW HERBARIUM

FIFTH SERIES

EDITED FOR THE BENTHAM TRUSTEES BY

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The names given in **clarendon** type are those of plants described or renamed in the work; an * is prefixed to the names of those not figured. Names in roman characters are those of plants discussed in the text. All synonyms are printed *in italics*; an * is prefixed to synonyms belonging to plants not figured.

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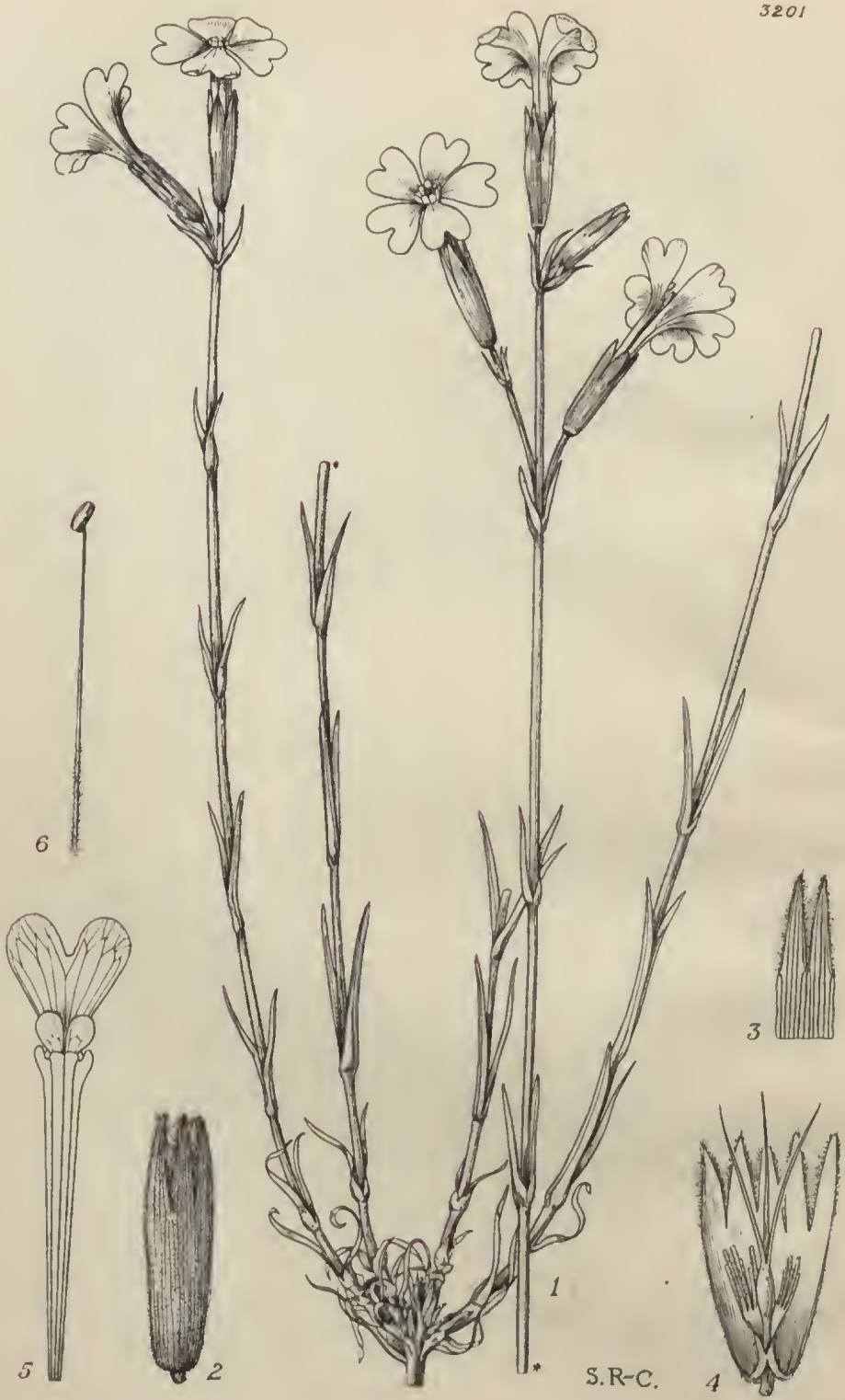
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Tabula 3201.

SILENE SUBCONICA *Friv.* var. GRISEBACHII *David.*

Caryophyllaceae. Tribus Sileneae.

S. subconica *Friv.* var. **Grisebachii** *David.* in Trud. na Blg. Prirod. Druž. viii. 53 (seorsum impr. 10) (1915); a planta Frivalskyana petalorum unguibus longe exsertis differt.

Herba annua, a basi ramosa, caulibus 2·4 dm. longis erectis vel suberectis inferne densissime albo-puberulis superne ut pedicelli glanduloso-puberulis. *Folia* linearia vel lanceolato-linearia, subacuta, inferiora 2–7 cm. longa et 1·5–2 mm. lata, superiora breviora utrinque dense puberula. *Inflorescentia* 2–7-flora; bracteae subherbaceae, glandulosae; pedicelli usque ad 1·3 cm. longi. *Calyx* cylindricus, 1·5–1·6 cm. longus, breviter glandulosus, dentibus lanceolatis leviter scarioso-marginatis ciliatis 7 mm. longis 1–1·25 mm. latis. *Petala* rosea, unguibus 2 cm. longis 6–7 mm. supra calycis dentes exsertis apice biauriculatis auriculis erectis 1 mm. longis, laminis 9 mm. longis 8 mm. latis 3·5 mm. lobatis; coronulae 2·25 mm. longae, ad basin bilobatae. *Filamenta* 1·8 cm. longa, inferne pubescentia. *Gynophorum* 2–2·5 mm. longum. *Ovarium* subcylindricum, 2·5 mm. longum, 1·25 mm. diametro; styli 3, 1·2 cm. longi.

Thrace. Porto Lagos, dry sandy places, 23 May 1930, *H. G. Tedd* 334.

An account of the synonymy and specific history of *Silene subconica* Friv. has been published in Kew Bull. 1933, 40. It is there shown that *S. juvenalis* Del. is a synonym of this species, which—apart from occurrences as an alien—has a distribution from S.E. Italy, through Greece, Thessaly, N. and S. Macedonia, Thrace, N. and S. Bulgaria, the Rodope Massif, Dobruja, Serbia, Hercegovina, and Asia Minor, east to Armenia. The supposed long dormancy of the seeds under the old scoriae from the silver mines at Laurion is also considered and refuted.

The plant figured is a somewhat striking and apparently well-defined, though rather local, variation from *S. subconica* which, as described by Frivaldszky, is found with a fairly general distribution in the countries round the north of the Aegean Sea and extending east, north

and west from there. Davidoff collected his material from near Dedcagach, Macri, and Porto-Lagos. He remarks that the variety flowers 10 to 15 days later than the typical kind, and is met with in small communities along the sands of the Aegean in western Thrace. It seems very probable that the variety arose mutationally in this area. Flower mutations involving petal size, recessive to the normal, so far as tested, are known for *S. maritima* and add to the polymorphism of that species. It is of interest to record that a variation very similar to that of *S. subconica* var. *Grisebachii* has appeared in one plant in a large generation of *S. vulgaris* s.l. (probably a segregate from *S. glareosa* × *S. vulgaris* s.s.), grown in the Herbarium Ground, Kew, from seed collected by the writer on 7 Aug. 1931, above St. Nizier, Hautes Alpes, France. Material is preserved at Kew under the number K.1099, Plant 4. The character will, it is hoped, be studied genetically, and its "parallel" occurrence in another species is alone noted here.

Davidoff's statement that his specimens are provided with "carpophoro longiore (vix 2 mm.)" needs further elucidation. In our material the true gynophore (carpophore) in the flowering condition is 2 to 2·5 mm. long, but the apparent gynophore, i.e. from the base of the calyx and thus including the calyx invagination and the very tightly fitting "corolla-tube," is quite 4 mm. long. It is probably the development of the internode, if such it be, between the calyx and corolla and the corresponding elongation of the true gynophore which causes the protrusion of the petals beyond the calyx teeth. Detailed investigation must await the receipt of material suitable for anatomical examination.—W. B. Turrill.

Fig. 1, whole plant, *natural size*; 2, calyx, × 2; 3, two calyx-teeth and upper portion of tube from inside, × 2; 4, calyx split open, showing invagination over top of pedicel, "corolla-tube" and lower parts of filaments, gynophore, and gynoecium, × 2; 5, petal, × 2; 6, stamen, × 2.


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Tabula 3202.

ASTRAGALUS SERICOPHYLLUS *Griseb.*

Leguminosae. Tribus Galegeae.

A. sericophyllus *Griseb.* Spic. Fl. rumel. et bithyn. i. 52 (1843); ab *A. apollinco* Boiss. et Heldr. caulibus foliisque dense adpresse sericeis differt.

Planta humilis, dense adpresse sericea, radice elongata lignosa, caulibus infernc suffrutieosis ramosis caespitosis vel subdiffusis. *Folia* usque ad 4·7 cm. longa, nitidissime argentea; foliola 2–6-juga, oblongo-linearia, linearia, vel fere oblonga, subobtusa vel acutiuscula, 6–18 mm. longa, 1–2 mm. lata, costa dorso prominula; stipulae ovato-triangulares vel ovato-oblongae rare oblongo-lineares, 1·5–2 mm. longae, intus glabrae et virides vel vetustae fuscae. *Inflorescentia* 1–10-flora; pedunculus 2·5–12 cm. longus; bracteae oblongo-ovatae, circiter 2 mm. longae pilis albis nigrisque obtectae; bracteolae plus minus obsoletae. *Calyx* cylindricus, dorso circiter 1·5 mm. fissus, 7–11 mm. longus, pilis albis nigrisque obtectus, dentibus anguste subulato-triangularibus vel fere subulatis 1·5 mm. longis (in fructu usque ad 2·5 mm. longis) marginibus anguste membranaceis hirsutis instructus. *Corolla* purpurascens; vexillum 1·9 cm. longum, parte superiore 1·1 cm. longa 6 mm. lata oblonga, deinde triangulari-auriculatum, parte inferiore gradatim cuncato-angustatum; alae 1·7 cm. longae, lamina 7 mm. longa 3 mm. lata; carina 1·4 cm. longa. *Gynoecium* 1·4 cm. longum; stylus complanatus; ovarium cylindricum, 5 mm. longum, 1·25 mm. diametro, dense adpresse hirsutum. *Fructus* immaturus, 1·8 cm. longus (stylo exeluso), 3 mm. latus, subadpresse villosus.

North Macedonia. "Seardus" *Grisebach*; Prilip, in saxosis m. Sivec, copiose, 22 June 1921, *Soška*.

South Macedonia. Near Gornichevo, west of Lake Ostrovo, 920 m., rocky limestone slopes by the Florina road, 15 June 1932, *Alston and Sandwith* 867; Krystallopegae (Smrdesh), 1540 m., limestone cliffs, summit of slopes on south side of valley, east of the village, 19 June 1932, *Alston and Sandwith* 909.

Greece. In m. Kythaerone supra Villia Atticae, in reg. abietina, 30 Maj. 1856, *J. Guicciardi*, in Heldr. Herb. Graec. norm. 510; Mt. Parnes, 1200 m., among fir woods, June 1932, *S. C. Atchley* 1600.

The attractive species figured here has an interesting distribution, still incompletely known, from the southern parts of North (Serbian) Macedonia, known also as South Serbia and as Vardar, through western South (Greek) Macedonia, to Greece proper in Attica. In addition to the records of specimens cited above, all in the Kew Herbarium, the following are important: "In regione montana *Macedoniae* occidentalis; in m. Nidgé, cum *Junipero Oxycedro*, alt. 2650′–3000′ (substr. marmor.)!; inter Trojaz-chan et Perlepe (substr. calc.) (Friedr.). Fl. Jun. E." (Griseb. l.c.); "In regione superiore mt. Ossa Thessaliae" (Hal. Consp. Flor. Graec. i. 431: 1900); Pletvar in M. (Vandas, Reliq. Formanek. 172: 1909). It may be noted that Perlepe is another name for Prilip, that Trojaci is a village 10½ miles to the east of Prilip, and Pletvar a place 5 miles to the east of Prilip. It is probable that Grisebach's specimen written up "Scardus" in the Kew Herbarium is not from Scardus proper, i.e. the Shar Planina, but is a type specimen from "m. Nidgé." In his Reise durch Rumelien, ii. 164 (1841), Grisebach lists his *Astragalus sericophyllus* as collected on 28 June 1839, between 2650 and 3000 ft., above Zejjen. In tracing Grisebach's route for this part of his journey it appears probable that he crossed the Malka Nidgé and not the higher range of the Nidgé proper to the north-east. It is evident that the species may be expected to occur on mountains between those of South Macedonia and Attica. The record for Mt. Ossa indicates an intermediate station, but no specimen from Thessaly has been seen.

A certain range of variation is apparent in the available material, more especially in the shape of the leaflets. These are relatively long and narrow in the specimens under *Alston and Sandwith* 909, and relatively short and broad in those under *Atchley* 1600. The remaining specimens are more or less intermediate in this respect. The proportion of white to black hairs on the calyces and the extent to which they are adpressed also show some variation. Alston and Sandwith describe the flowers of their No. 867 as "reddish-purple" and of their No. 909 as "standard mauve; keel and wings whitish."—W. B. Turrill.

Fig. 1, entire plant, *natural size*; 2, leaflet, × 4; 3, vexillum, × 2; 4, ala, × 2; 5, carina, × 2; 6, androecium, × 2; 7, gynoecium, × 2; 8, immature fruit, *natural size*.


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Tabula 3203.

MYRTUS COMMUNIS *L.* var. TARENTINA *L.*

Myrtaceae. Tribus Myrteae.

M. communis *L.* var. **tarentina** *L.* Sp. Pl. 471 (1753). *M. tarentina* Mill. Gard. Dict. ed. 8 (1768); Bertol. Fl. Ital. v. 120 (1842); Rouy et Fouc. Fl. de France, vii. 155 (1901), "une forme." *M. Borbonis* Sennen, Plantes d'Espagne, 3052 in Herb. Mus. Brit.—A planta vulgari foliis multo angustioribus leviter crassioribus paullo magis coriaceis differt.

Frutex ramosissimus, ramis junioribus densissime puberulis, internodiis 5–10 mm. longis. *Folia* opposita vel superne praecipue plus minusve spiralia, anguste lanecolato-elliptica, acuta vel leviter apiculata, 1·1–2·4 cm. longa, 4–7 mm. lata, subcoriacea, glabra, costa supra impressa, infra prominente, nervis lateralibus inconspicuis; petiolus 0·5–1·5 mm. longus, puberulus. *Flores* in foliorum superiorum axillis solitarii; pedicelli 5–8 (raro 10) mm. longi, minute puberuli; bracteolae 2, pedicelli apice sitae, angustissime lineari-lanceolatae, lineares vel fere subulatae, vix 0·75 mm. longae. *Receptaculum* obconicum, 4–4·5 mm. longum, 3 mm. diametro, glabrum. *Calyx* 5-lobus, lobis late triangularibus obtusis 1 mm. longis 2 mm. latis glabris ciliolatis. *Petala* 5–7, saepissime late ovato-elliptica vel fere orbicularia, 7 mm. longa, 6 mm. lata, interdum minora, ciliolata. *Stamina* 8 mm. longa, antheris vix 0·75 mm. longis. *Discus* minutissime hispidulus. *Stylus* 6·5 mm. longus, apice recurvus (an semper), ima basi leviter hispidulus. *Fructus* subellipsoideus, 7–8 mm. longus, 4·5–5 mm. diametro. *Semina* convoluta, circiter 2 mm. diametro.

Dalmatia. Island of Lacroma, near Dubrovnik (Ragusa), 6 Aug. 1925, *Turrill* 1062.

Myrtus communis L. has been recognized from ancient times to be a polymorphic species, and it is of interest that some of its variations, including that figured here, can be traced back in literature to a period nearly two thousand years ago.

The variety *tarentina* is primarily distinguished from other varieties by the smaller and narrower leaves. All specimens examined which have been definitely placed in this variety have also a fine thick indumentum on the young branches. This character, however, is not limited to var. *tarentina*, being seen in other specimens, preserved at

Kew, with leaves of or approximating to the average shape and size for the species. The pedicels are on the whole shorter and the flowers slightly smaller than in the more usual varieties, but no constant characters, limited to the variety, have been found in the shape of the calyx segments or fruits, although it should be noted that little fruiting material is available for study. Structures intermediate between sepals and petals, and between petals and stamens, have been observed in cultivated material. The internodes are frequently rather short, giving the leaves a crowded appearance. There is in some specimens a tendency for the leaves, especially in the flowering parts of the branches, to lose their definite opposite decussate arrangement. Plants seen by the writer in Dalmatia were somewhat smaller than most of those of the commoner kind.

It is difficult to speak with certainty of the natural distribution of the variety, partly because of the paucity of herbarium material and partly because it has been widely cultivated. It occurs here and there in the macchia on the Dalmatian coast, mixed with specimens of the broader-leaved variety, having been found, for example, near sea-level on the island of Lacroma, in 1925 (*Turrill* 1062). In Italy it is recorded from near Taranto and from the Naples district. For Sicily, Pojero, Fl. Sicula, i. pt. 2, 225 (1891), says "La var. *tarentina* la cito solo per farsene ricerca in Sicilia, ove non dovrebbe mancare." Moris, Fl. Sardoa, ii. 79 (1840), records the variety in Sardinia as growing "in aridis circa S. Rocco di Pula," but also says "Varietas *tarentina*, in hortis cultura persistens, alienam a vulgari stirpe faciem refert. Sed stipites ejus, in statu naturae folia ramea inferiora identidem promunt ut in varietate *vulgari*, praeterea occurrunt foliis baccisque minoribus majoribusve quibus ad typum accedent." Rouy and Foucaud (l.c.) record our plant from various localities in the Bouches-du-Rhône, Aude, and Corsica. It is doubtful if the variety occurs wild in Spain. Laguna, Fl. For. Espan. 153, t. 9 (1872), says it is cultivated at Granada and (probably) in Cataluña at S. Miguel del Fay.

In the herbarium of the British Museum (Natural History) there is a specimen from Cataluña (Monroig, garigues de Miramar, 1917—iv et vii, *F. Sennen*—Plantes d'Espagne 3052), under the name *Myrtus Borbonis* Sennen, which is indistinguishable from *M. communis* var. *tarentina*.

The var. *microphylla* Willk. et Lange, Prodr. Fl. Hisp. iii. 191 (1874), is most probably a different variety from var. *tarentina*. Lowe, Manual Fl. Madeira, 268 (1868), says that var. *tarentina* occurs frequently in gardens. A specimen in Herb. Kew. collected in Teneriffe (in rupibus siccis Metœca, Aug. 1845, *Bourgeau* 513) shows that the plant is known from the Canaries, but probably only as an escape from cultivation.

The varietal name "*tarentina*" was taken over by Linnaeus (Sp. Pl. 471: 1753) from C. Bauhin (Pinax 469: 1623), and by C. Bauhin from Mattioli (Comment. ed. Bauh. 196: 1598). Linnaeus's reference is simply "γ Myrtus minor vulgaris. Bauh. pin. 469." Fortunately in Mattioli, l.c. 195, under the title "II. Myrtus Tarentina," there is an excellent figure which enables the variety to be fixed without doubt. The text

comments on the plant are " Quod Dioscoridi Myrtidanum nominatur, vulgo notissimum est, ubi scilicet myrtus frequens nascitur. Sunt et alia veteribus Myrti genera, nobis quoque non ignota, nempe Tarentinum, et exoticum. TARENTINA a Tarento Apuliae civitate, ubi copiosa provenit ita vocata, folio est nostrate longe minutiore, robustioreque : fructu minore, copiosiore, et in summitate pluribus apicibus coronato, colore ex nigro purpurascente, minutis, crebris, albicantibusque intus ossiculis : floribus communi Myrto similibus."

This description is, in part, the same as that in Dalechamps, Hist. Gen. 237–38 (1587)—where (on p. 237) there is also a good figure of our plant under the name *Myrtus Tarentina*—and is evidently derived from Mattioli's Comment. ed. 1565, p. 232 (figure on p. 229). This figure is similar to, but not the same as, that in Bauhin's edition, but is a reproduction of that in Mattioli, New Kreüterbuch, 81 (1563). On p. 80 of this work the following words occur :

" Es sindt auch noch andere geschlecht bey den alten erfunden, nemlich bey dem Plinio lib. 15. cap. 29. der erzelet noch Myrtum Tarentinam, und Exoticam.

Myrtus Tarentina, allso genandt von der herrlichen stadt Apuliae, hat vil kleiner und steiffer Bletter dann der einheymische. Auch runder und kleiner früchte, die sindt am öberteil gekrönet, an der farb schwarz purpur, haben inwendig vil weisse kleine steinkernlen. Er blüet wie der gemeine Myrtenbaum."

This reference to the name *Myrtus Tarentina* most certainly, as indicated by the description, locality, and figure, refers to the plant here figured. The reference to Pliny, however, allows the variety to be traced back to near the beginning of the Christian era (Pliny: A.D. 23–79). Pliny's words are : " Sativarum genera topiarii faciunt : Tarentinam, folio minuto : nostratem, patulo : hexasticham densissimo, senis foliorum versibus," ed. Harduin. i. 753 (1723). It would seem that Pliny regarded the Tarentine myrtle as a cultivated plant. Be that as it may, it is a matter of considerable interest that the same variety is still in existence after nearly two thousand years. The Tarentine myrtle was also mentioned in Mattioli, Comm. 129 (1554), and the name may occur in other early herbals than those here quoted.

In Museum No. I at Kew, specimens of *Myrtus communis* are preserved from ancient, especially Egyptian, tombs. Material received from Prof. (now Sir) Flinders Petrie, from " animal burials of Roman age Lahun," has hairy shoots and leaves smaller than the average for the species, but, in the writer's opinion the leaf shape is not that of the var. *tarentina*.

The variety is said to be hardier under cultivation in the British Isles than other varieties (*see* Bean, Trees and Shrubs Hardy in the British Isles, ii. 91 : 1921).—W. B. TURRILL.

FIG. 1, flowering branch, *natural size* ; 2, flower bud, × 4 ; 3, petal, adaxial translucent view, × 4 ; 4, stamen, × 8 ; 5, gynoecium and calyx, × 4 ; 6, fruit, × 2 ; 7, seed, × 6.


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Tabula 3204.

AMARACUS AMANUS (*Post*) *Bornm.*

Labiatae. Tribus Saturejeae.

A. amanus (*Post*) *Bornm.* in Notizbl. Bot. Gart. Berlin, vii. 26 (1917). *Origanum amanum* Post in Bull. Herb. Boiss. iii. 161 (1895).—Ab *A. scabro* (Boiss. et Heldr.) Briq., foliis infra nervis hispidis, marginibus hispido-ciliatis, inflorescentiis saepissime simplicibus, corolla 3·2 cm. longa, staminibus in tubo inclusis facile distinguitur.

Planta perennis, inferne suffruticosa. *Radix* lignosa. *Caules* numerosi, e basi decumbente vel ascendente erecti, usque ad 1·6 dm. longi, juniores purpurei deinde brunnei, hispidi, inferne ramosi, internodiis 0·7–2 cm. longis. *Folia* ovata, acuta vel subacuta, basi cordata, sessilia, saepissime circiter 1·3 cm. (usque ad 1·7 cm.) longa et 1 cm. (usque ad 1·3 cm.) lata, supra glabra vel glabrescentia, infra in nervis hispida, utrinque glanduloso-punctata, nervis infra prominentibus supra subprominentibus, marginibus hispido-ciliatis. *Inflorescentia* simplex vel rarissime ramosa, compacta, 1·5–2·7 cm. longa, 1–1·7 cm. lata; bracteae inferiores foliis subsimiles sed minores et purpurascentes, florales imbricatae, anguste ovatae vel elliptico-ovatae, acutae, basi cuneatae vel truncatae, 0·5–1·5 cm. longae, 2·5–9 mm. latae, utrinque glabrae vel glabrescentes, supra glanduloso-punctatae, infra haud vel sparse glanduloso-punctatae, membranaceae, marginibus ciliatis, purpureae. *Calyx* anguste campanulatus, 9 mm. longus, tubo 1 mm. diametro extra sparsissime setoso intus fauce leviter piloso, labio superiore 2·5 mm. longo dentibus 3 subaequalibus triangularibus acutis 0·5 mm. longis saepe ciliatis instructo, inferiore dentibus 2 subaequalibus triangularibus acutis 2 mm. longis saepe ciliatis praedito. *Corolla* 3·2 cm. longa, tubo 2·8 cm. longo 1·5 mm. diametro hispidulo haud glanduloso-punctato, labio superiore transverse elliptico breviter bifido, 2 mm. diametro, labio inferiore lobis 3 subaequalibus (medio lateralibus leviter majore) orbicularibus 0·25 cm. diametro instructo, lobis omnibus vix crenulatis. *Stamina* in corollae tubo inclusa, 2·3 cm. et 2·45 cm. supra basin inserta, filamentis 0·5 mm. longis. *Stylus* juvenilis apice aequaliter bifidus.

Syria. Amanus: Gaiour Dagh, Aug.–Sept. 1892, *Post* 323; mont. de Drildril, 1500–2000 m., Aug. 1911, *Haradjian* 3884.

The very striking species here figured is especially remarkable for the elongated corolla-tube, which far exceeds in length that of any other known species of *Amaracus* or of the allied genera *Origanum* and *Majorana*. Apparently in correlation with the long corolla-tube, the stamens have very short filaments and are included in the tube.

The affinity of *A. amanus* is with *A. scaber* (Boiss. et Heldr.) originally described from Mt. Taygetos in the Peloponnese. Orphanides also collected it on Mt. Malevo, Laconia. *A. pulcher* (Boiss. et Heldr.) Briq., from Mt. Dirphys (Delphi) and Kandyli, Euboea, has usually been regarded as a distinct species. A careful examination of the material now available at Kew has, however, led to the conclusion that it is not specifically distinct from *A. scaber*. The earliest name for the species as thus accepted is *Origanum scabrum* Boiss. et Heldr. removed to *Amaracus* by Briquet in Pflanzenfam. iv. 3A, 306 (1896). Another species showing some morphological affinity with *Amaracus amanus* is *A. cordifolius* (Montbr. et Auch.) Benth. from Cyprus (probably the record from Syria is incorrect). This is a much taller plant with broader floral bracts and shorter corollas.

The plate and description have been prepared from Haradjian's material preserved at Kew. President Dodge, of the American University of Beirut, kindly lent the type specimen from Post's Herbarium, and there is no doubt that Haradjian's and Post's material represent the same species. The former has the vegetative parts slightly more hispid, the leaves and bracts less acute, the calyx-teeth slightly broader, and the corolla-tube less hairy than in the type. One of the three pieces of the type sheet has the bracts and calyx-teeth exceptionally narrow, the former being almost acuminate.

A. K. Jackson.

Fig. 1, plant, *natural size*; 2, portion of lower surface of leaf, × 4; 3, flower bud, × 2; 4, calyx, × 4; 5, upper portion of calyx opened out, × 4; 6, corolla opened out, × 2; 7, stamen, dorsal view, × 8; 8, gynoecium, × 4; 9, ovary, × 12.


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Tabula 3205

CYANANTHUS WARDII *Marquand.*

Campanulaceae. Tribus Campanuleae.

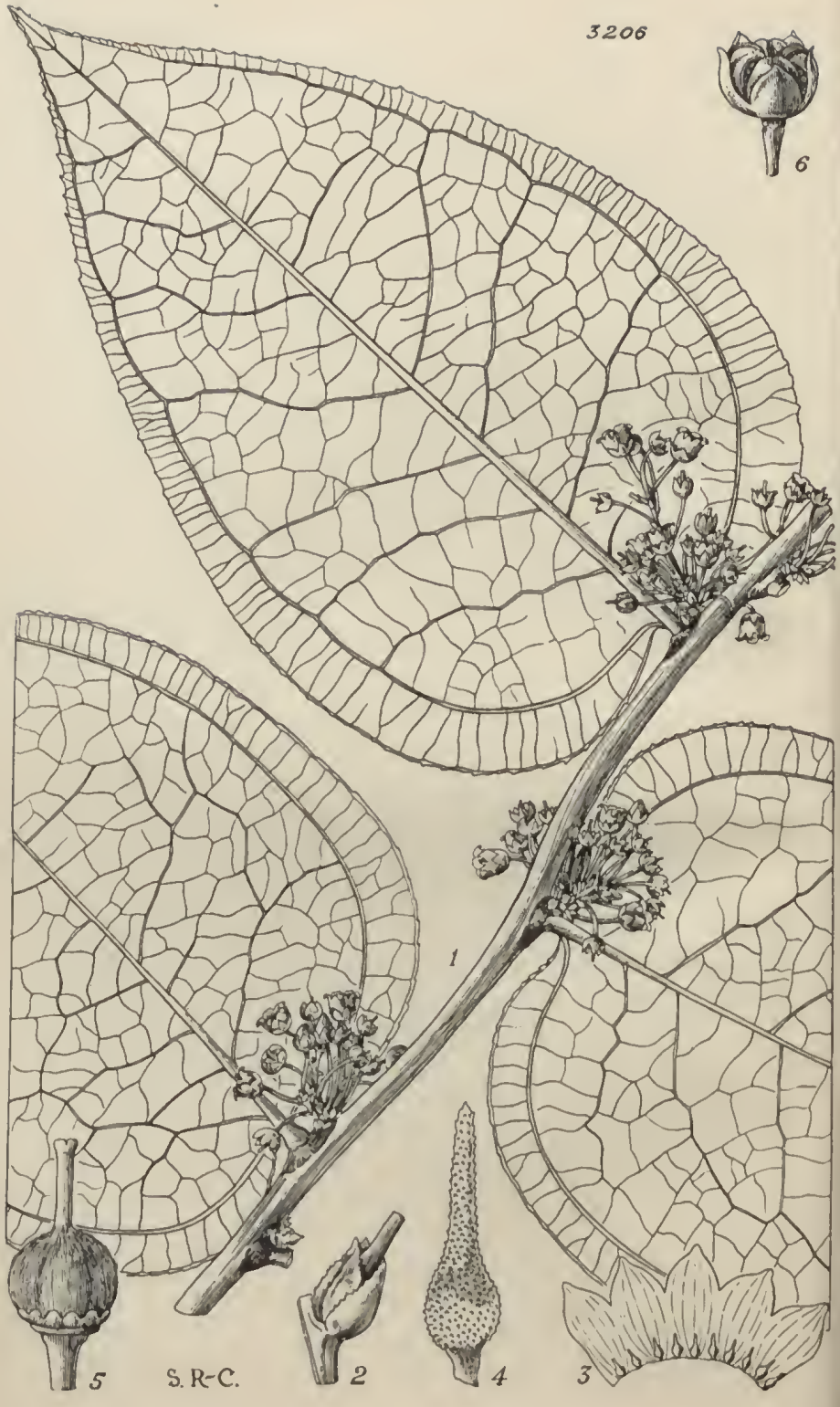
C. Wardii *Marquand* in Journ. Linn. Soc., Bot. xlviii. 196 (1929); *S. macrocalyci* Franch. var. *piloso* Marquand e provincia Yunnan affinis, a quo foliis sessilibus ellipticis dense et longe pilosis cataphyllis magnis subscariosis inter alia differt.

Planta perennis. *Caudex* ramosus cataphyllis obtusis spathulatis submembranaceis 1–1·5 cm. longis 3–3·5 mm. latis dense vestitus. *Caules* floriferi et steriles multi, graciles, adscendentes, sparse pilosi, circiter 8 cm. longi. *Folia caulina* infra minuta, sursum increscentia, oblanceolata, subobtusa, usque 11 mm. longa, 4 mm. lata, subsessilia, utrinque dense albo-pilosa. *Flores* solitarii, terminales, brevissime pedicellati. *Calyx* extra densissime pilosus; tubus circiter 7 mm. longus, 6–7 mm. diametro, intus glaber; lobi 5, 4–5 mm. longi, basi 3·5–4 mm. lati, apice subacuti, intus pilosi. *Corolla* caerulea, 3–4 cm. longa, usque ad tertiam partem in lobos 5 oblongos mucronulatos circiter 5 mm. latos divisa, fauce albido-tomentosa, extra apice pilosa. *Stamina* 5, filamentis gracillimis corollae tubo dimidio brevioribus; antherae ovoideae, 3–3·5 mm. longae. *Stylus* glaber, corollae tubum vix excedens. *Ovarium* ovoideo-oblongum, 1 cm. longum, glabrum.

S.E. Tibet. Nambu La, 3400–3600 m., 13 Aug. 1924, *Kingdon Ward* (with no. 6082).

This interesting species was found with specimens of *Microula sikkimensis* Hemsl. collected by Capt. F. Kingdon Ward, by whom it was also introduced into cultivation. It is the most densely hairy species known in this aberrant genus, which differs from all other genera of Campanulaceae in having the ovary wholly superior, and is confined to the interior of Asia. The rather striking habit of the plant is doubtless a response to the conditions under which it grows, where, at an altitude of 12,000 feet, it would be under deep snow in the winter and exposed to the high winds prevalent in Tibet during the comparatively short summer period.—C. V. B. Marquand.

Fig. 1, portion of a plant, showing the caudex with cataphylls, and the flowering stems, *natural size*; 2, flower in longitudinal section, × 1·5; 3, stamen, seen from without, × 3; 4, gynoecium, × 2.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Tabula 3206.

GAULTHERIA DUMICOLA
var. **PETANONEURON** *Airy-Shaw.*

Ericaceae. Tribus Gaultherieae.

G. dumicola *W. W. Smith* in Notes Roy. Bot. Gard. Edinb. ix. 106 (1916), var. **petanoneuron** *Airy-Shaw. G. dumicola* auctt. Edin. in Notes Roy. Bot. Gard. Edinb. xvii. 158, 286, 360 (1930).—Varietas nova, foliis latioribus cordatis, nervis lateralibus a costa angulo fere recto divergentibus margini (praecipue basali) subparallelis distincta.

Frutex 0·6–1·2 m. altus. *Ramuli* arcuati (teste Forrest), subteretes, subtiliter striati, glabri, usque 5 mm. diametro, levissime anfractuosi, internodiis 3–5·5 cm. longis. *Folia* late ovata, usque 14 cm. longa et 9 cm. lata, basi cordata, acuminata, margine minute denticulata denticulis setula caduca terminatis apicem folii versus in dentes manifestiores transeuntibus, valde coriacea, olivacea (infra pallidiora), utrinque glabra, nervis supra impressis infra prominulis costa valida valde prominente; nervi laterales utrinque solitarii, ab ipsa basi angulo fere recto exorti atque laminam margini fere paralleli percurrentes, a margine circiter 5–8 mm. (raro usque 11 mm.) distantes; nervi tertiarii inter hos et nervum tenuem stricte marginalem plus minus crebre scalariformes; nervi alii tertiarii a costa irregulariter adscendentes, saepe furcati, inter se anastomosantes; petioli robusti, circiter 2–4 mm. longi, 2–3 mm. crassi, basi distincte articulati, ex area ramuli elongato-elliptica laevi fusco-castanea orti. *Inflorescentiae* axillares, brevissime racemosae vel fere fasciculares, multiflorae, glabrae; rhachis usque 1·8 cm. longa; bracteae bracteolaeque parvae, deltoideo-subulatae, 0·5–1·5 mm. longae, dorso carinatae, plus minus scariosae et fimbriatae vel glanduloso-ciliatae; pedicelli patuli, usque 8 mm. longi. *Flores* officio feminei tantum noti. *Calyx* cupularis, 2–3 mm. longus et latus, basi in umbonem cum pedicello articulatum subito truncato-attenuatus, glaber, lobis triangulari-ovatis acutis. *Corolla* calyce paullo longior eique aequilata, late campanulata potius quam urceolata (ut in descriptione originali speciei), glabra, lobis triangularibus acutis leviter recurvis. *Stamina* minima, sterilia, circiter 1 mm. longa, subulata, supra basin dilatata, minutissime puberula, antheris minutissimis ovoideis exappendiculatis. *Ovarium* subglobosum, 1–2 mm. diametro, dense

adpresse albido-pilosum ; stylus paullo ultra 1 mm. longus, sat validus, stigmate inerassato subcapitato. *Capsula* depresso-globosa, 3–4 mm. diametro, sparse pilosa.

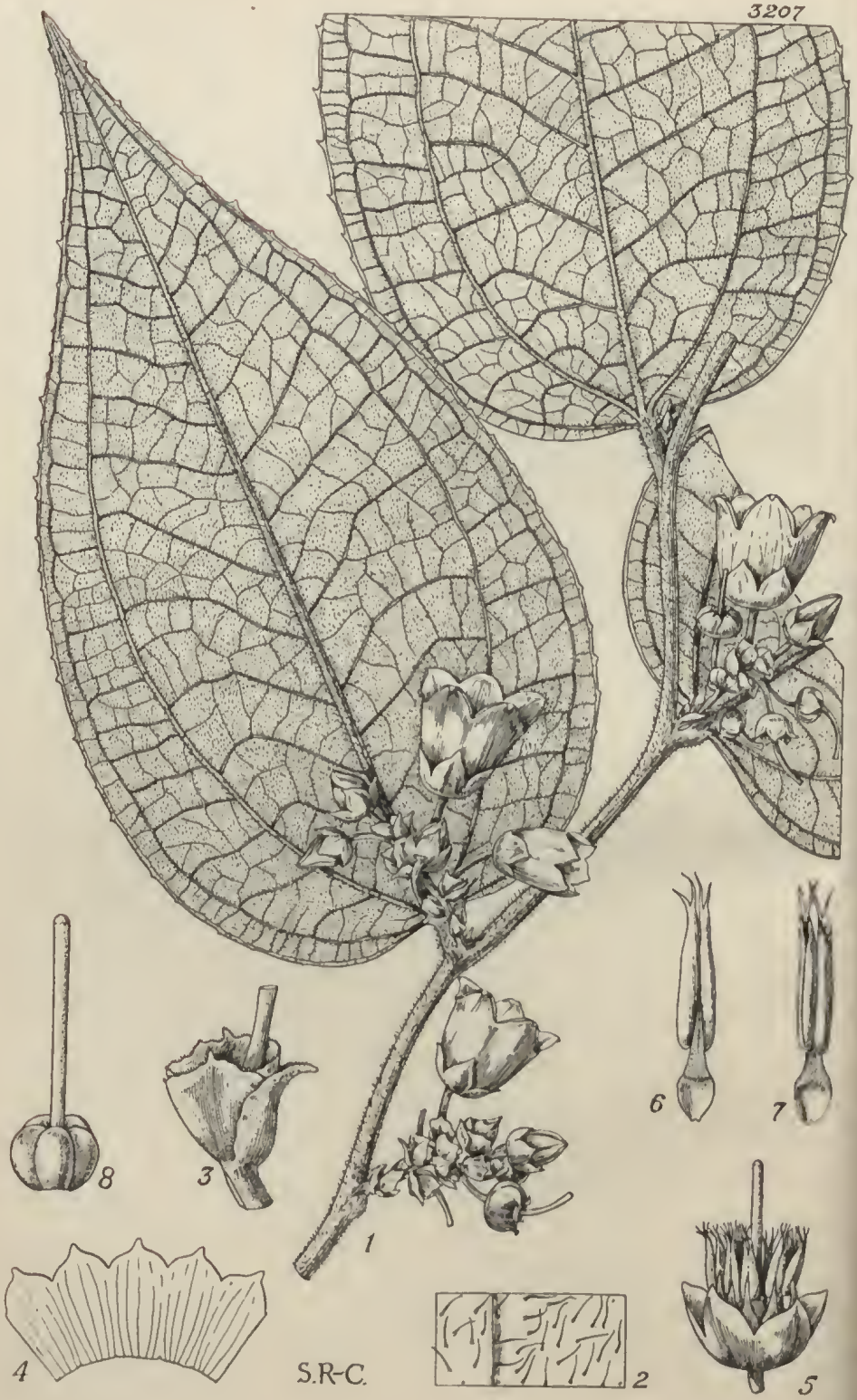
China : Yunnan. Without locality, July 1917, *Forrest* 15785 ; Shweli–Salwin divide, 25° 30′ N., 2700–3000 m., July 1918, *Forrest* 17773 ; amongst scrub and rocks in side valleys on the N'Maikha–Salwin divide, 26° N., 2400–2700 m., Nov. 1919, *Forrest* 18832 (type) :— " Shrub of 2–4 ft. Branches arched. In fruit, fruits black."

This variety is distinguishable by its broader, very definitely cordate leaves, the two lateral nerves of which leave the midrib at the extreme base at an angle of 80°–90° and follow a course practically parallel to the margin. In the type of the species the leaves are rounded-truncate to broadly cuneate at the base (though very slightly cordate in *Forrest* 9568), and the nerves diverge from the midrib, generally distinctly above the base, at an acute angle (40°–45°). Though inhabiting much the same geographical area as the type, the variety *petanoneuron* seems to favour higher altitudes : 2400–3000 m. as against 1800–2100 m.

The anthers of *G. dumicola* were originally described as biaristate, but in none of the material examined, either of the typical plant or of the variety, has any sign of appendages been observed ; indeed, in most cases the stamens consist of the minute filament only. Functionally unisexual flowers are of course known in other species of the genus, but in *G. dumicola* " female " flowers seem to be the rule.

H. K. Airy-Shaw.

Fig. 1, portion of flowering branch, *natural size* ; 2, bract and bracteoles, × 6 ; 3, corolla, opened out, showing abortive stamens, × 4 ; 4, abortive stamen, × 30 ; 5, gynoecium and disk, × 8 ; 6, capsule and persistent calyx, × 4.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Tabula 3207.

GAULTHERIA CODONANTHA *Airy-Shaw.*

Ericaceae. Tribus Gaultherieae.

G. codonantha *Airy-Shaw*; species nova insignis, *G. dumicolae* W. W. Sm. affinis, sed corolla latissime campanulata maxima, ramis foliisque saltem subtus hispido-pubescentibus distinctissima.

Dumus magnus, statura ignota. *Ramuli* (partibus superioribus tantum notis) modice graciles, subteretes, 1–2 vel vix 3 mm. diametro, leviter anfractuosi, sparse vel dense subtiliter vel valde patulo-ferrugineo-setosi, internodiis 2–5 cm. longis. *Folia* disticha, latissime ovata usque elliptico-ovata vel lanceolata (superiora raro fere elliptica), 6 cm. longa et 2·2 cm. lata usque 18 cm. longa et 15 cm. lata, basi leviter cordata usque truncato-rotundata (superiora raro cuneata), apice acuminata, acuta, margine levissime revoluta brevissime dissite abrupte dentata, dente majore cum minore saepe alternante, dentibus patentibus sub lente obtusis primum setula terminatis demum varie apiculatis, chartaceo-coriacea, pagina superiore siccitate surde grisco-viridia, setulis adpressis 1–1·5 mm. longis 1–2 mm. inter se distantibus vestita vel ima basi tantum setularum persistente glabrescentia, pagina inferiore colore lactiora, setulis ferrugineis suberectis quam pagina superiore densius vestita; nervi supra (foliorum superiorum fere bullatim) impressi, infra prominentes et dense setulosi, rete fere ut in *G. dumicola* efformantes; foliorum latiorum nervi laterales a basi orti utrinque 3, duo validiores totum folium usque ad apicem per-currentes, tertius tenuissimus, margini arete approximatus, juxta medium evanidus; nervi tertiarii praecipui inter costam et nervos laterales (et inter hos) in foliis latioribus laxe scalariformes, subparalleli, circiter 1 cm. distantes, in foliis minoribus adscendentes; petioli robusti, 2–6 mm. longi, plus minus dense ferrugineo-setosi. *Inflorescentiae* axillares, quaque sub folio suo subcelata, brevissime racemosae vel corymbosae, 4–7-florae, basi bracteis paucis parvis sterilibus instructae; rhachis 5–15 mm. longa, cum bracteis bracteolisque minutissime cinereo-velutino-tomentella; bracteae suffulcientes late deltoideae usque ovato-triangulares, usque 8 mm. longae et 5 mm. latae, basi inerassatae, apice breviter acute acuminatae, margine minute ciliolatae et sparse denticulatae, dorso obtusiuscule carinatae;

bracteolae binae, ima basi pedicelli affixae, suborbiculares, 3–4 mm. longae, 4–5 mm. latae, valde imbricatae, apice nonnunquam ut videtur breviter irregulariter 2–3-lobulatae, late membranaceo-marginatae, margine ciliolato et paucidenticulato, dorso carinatae, carina in cuspidem breviusculam terminalem excurrente; pedicelli patuli, robusti, usque 1·7 cm. longi, glaberrimi. *Calyx* sub anthesin breviter cupularis, usque 1·3 cm. diametro (explanatus), in lobos 5 deltoideo-ovatos 3–4 mm. longos et latos acuminatos apice minutissime cinereo-tomentellos ceterum glabros margine submembranaceos paullo ultra medium divisus. *Corolla* in genere maxima, siccitate ei *Zenobiae* persimilis, alabastro ovoideo-conica, sub anthesin late campanulata inde a basi ampliata, usque 1·8 cm. longa et lata, extra et intus glaberrima, alabastro (teste Ward) ochroleuca, sub anthesin saepe rubro-vittata; lobi late deltoidei, usque 8 mm. lati et fere aequilongi, dorso leviter carinati, apice inerassatuli brevissime recurvo-acuminati. *Staminum* filamenta subulata, 3–4 mm. longa (connectivo incluso), valde complanata, basi in dilatationem rhomboideo-orbicularem 1 mm. latam subito expansa, sub lente minutissime tomentella; antherae lanceolato-oblongae, 4–5 mm. longae, basi rotundatae 1 mm. latae, infra medium dorsifixae, siccitate laete aurantiacae, glabrae, sub lente minute punctulatae vel areolatae, thecis superius 2 mm. inter se liberis biaristatis aristis minute asperulis circiter 1·5 mm. longis fere angulo recto deflexis. *Ovarium* depresso-globosum, 5- vel nunc 6-loculare, circiter 2 mm. longum, 5 mm. diametro, glabrum, disco obsoleto; stylus columnaris, usque 9 mm. longus, stigmate truncato vix expanso; ovula numerosissima, angulosa, castanea, per totam placentam in quoque loculo densissime conferta. *Capsula* non visa.

Assam. Camp, Chibaon, Delei valley, 28° 10′ N., 96° 30′ E., in thickets on the steep slope of the hill, 1500 m., 6 Apr. 1928, *F. Kingdon Ward* 8024. "A large bushy shrub. Flowers cream in bud, banded with red (often) when fully open; very large."

An investigation into the relationships of the two species of *Gaultheria* figured in this and in the preceding plate has shown the necessity for considerable readjustments in the classification of the Asiatic species of the genus. It is hoped to publish elsewhere a paper on this subject. Here it may suffice to observe that the two species now figured, together with *G. notabilis* Anth. from Yunnan and an undescribed species from Sumatra, form a natural group which it is proposed to distinguish as follows:—

Series **Dumicolae** *Airy-Shaw*, ser. nov. *Pedicelli* ima basi (raro paullo supra basin) bibracteolati, bracteolis haud connatis. *Folia* infra medium latiora (plus minus ovata). *Flores* in racemis brevibus corymbosis dispositi. *Corolla* campanulata.—Typus: *G. dumicola* W. W. Sm.

It should be pointed out that none of the above characters (with the possible exception of the inflorescence) is actually confined to

this group. In combination, however, they clearly delimit the four constituent species from the remainder of the genus.

G. codonantha is readily distinguishable from the two Yunnan species by the very large size of the flowers. The specimens collected by Ward show some variation in indumentum : this may be due to differences of light-intensity in the habitat. *G. notabilis* Anth. differs from *G. dumicola* W. W. Sm. in its dwarf habit, slender branches, sparse ferrugineous indumentum, small leaves and few-flowered inflorescences.

H. K. Airy-Shaw.

Fig. 1, portion of flowering branch, *natural size* ; 2, upper surface of leaf, showing indumentum, × 2 ; 3, bract and bracteoles, × 4 ; 4, corolla, opened out, *natural size* ; 5, flower, with corolla removed, × 2 ; 6, anther, abaxial view, × 4 ; 7, the same, adaxial view, × 4 ; 8, gynoecium, × 3.


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Tabula 3208.

QUEENSLANDIELLA HYALINA (*Vahl*) *Ballard.*

Cyperaceae. Tribus Cypereae.

Q. hyalina (*Vahl*) *Ballard*, comb. nov. *Cyperus hyalinus* Vahl, Enum. ii. 329 (1806). *C. pumilus* Nees in Wight, Contrib. 74 (1834), excl. syn., non L. *Pycreus pumilus* Nees in Linnaea, ix. 283 (1834), quoad specim., excl. syn. *Queenslandiella mira* Domin in Bibl. Bot. lxxxv. 416 (1915). *Pycreus hyalinus* Domin, l.c. 417 (1915). *Mariscopsis suaveolens* Cherm. in Bull. Mus. Hist. Nat., Par. xxv. 60 (1919). *M. hyalinus* Ballard in Kew Bull. 1932, 457.—Species generis unica.

Planta annua, siccitate *Trigonellam Foenum-graecum* intense olens. *Culmi* caespitosi, erecti vel suberccti, usque 40 cm. alti, basi bulbosi, triquetri, striati, glabri. *Folia* numerosa, basalia, culmum fere aequantia, usque 6 mm. lata, flaccida, glabra, marginibus et costis plus minusve scabra. *Bracteae involucrales* 4–6, valde inaequales, usque 20 cm. longae, foliis similes, suberectae vel patulae. *Anthela* simplex, 4–8-radiata; radii paullum inaequales, patuli, usque 12 cm. longi, graciles. *Spicae* 8–18 mm. longae, 7–17 mm. latae, 8–15-spiculatae. *Spiculae* valde laxae, patulae, ovatae vel ovato-ellipticae, valde compressae, 4–9 mm. longae, 1·5–2·5 mm. latae, 3–9-florae; rhachilla late alata, supra squamas steriles articulata. *Squamae steriles* 2, usque 1·5 mm. longae, persistentes. *Squamae fertiles* imbricatae, 2·5–3·5 mm. longae, ambitu lanceolato-ovatae vel late ovatae, valde carinatae, lateribus laete luteis vel luteo-viridibus, prominenter 3–4-nervatis, marginibus scariosis. *Stamina* 2; antherae acutae. *Stylus* profunde bifidus, ramis elongatis exsertis. *Nux* dimidium squamae aequans vel paullo superans, asymmetrica, suborbicularis vel rotundo-quadrata, apice rotundato-truncata et leviter emarginata, compressa, biconvexa, angulis obtusis, dense et subtiliter punctulata, brunnea.

India. Bombay Presidency: Bombay, Sion suburb, *Woodrow* (fide *Clarke*); without locality, *Leith* 25; *T. Cooke* 25 (fide *Clarke*). Madras Presidency: Chingleput District, Nungambakam, Jan. 1900, ex *Herb. Madras*; Coimbatore District, Satiamangalam, March 1902, *A. W. Lushington*; Palni Hills, Shembaganur, 1800 m., *L. Anglade* 1097B.

Laccadive Islands, *Prain* (fide *Clarke*). Without precise locality, *Wight* 1808, 2864 pro parte; *Herb. Rottler*; *Wallich* 3336c, pro parte.

Ceylon. Anuradhapura, Dec. 1881, *Trimen*.

Mascarene Islands. Mauritius: near Mare Samson, growing in sand by track leading to Pt. aux Sables, sea level, April 1926, *R. E. Vaughan* B. 46; and June 1930, *R. E. Vaughan* B. 46a. Madagascar: damp meadows to the north of the Island, *Bernier* 33 (fide *Clarke* et *Chermezon*).

Tropical Africa. Zanzibar, *Last*, *Boivin* (fide *Chermezon*). Mozambique: sandy flat, April 1921, *Dummer* 4639; *O. Kuntze* 303 (fide *Clarke*); *Prelado* 5 (fide *Clarke*). Tanganyika Territory: Dares-Salaam, *Holst* 300 (fide *Clarke*).

Malay Islands. Dutch Borneo, *Motley* (fide *Merrill*). Java: in the flat country around Batavia, *Backer* (fide *Koorders*). Timor: Coepang, 1803, *R. Brown*; Soë, 1929, *M. E. Walsh* 168a; without locality, *Forbes* (fide *Clarke*).

Australia. North Queensland: Chillagoe, short grassy track on chalk, Feb. 1910, *Domin* (fide *Domin*).

Under the name *Mariscopsis hyalinus* the present plant formed the subject of an article by the writer in Kew Bull. 1932, 456. At that time, however, Domin's genus *Queenslandiella* had not been studied nor, indeed, could it have been surmised that a new genus of Australian *Cyperaceae* was identical with a long-established Indian species. Unfortunately, it has not been found possible to obtain on loan the type of *Queenslandiella mira* from Dr. Domin's herbarium at Prague, and no authenticated specimen of *Queenslandiella* exists in the Kew Herbarium. There can, however, be no doubt, from the drawing reproduced in Bibliotheca Botanica and the very full description therein, that Domin's plant is identical with *Mariscopsis hyalinus*.

The extension of the distribution of *Queenslandiella* to North Queensland is not surprising since it had already been recorded from Timor, while distributions similar to that of *Queenslandiella* are already known for certain grasses. Mr. C. E. Hubbard, who collected in Queensland during 1930–1931, found that in the neighbourhood of Chillagoe, the type locality of *Queenslandiella*, many species of grasses occur, of which the following have the same distribution as *Queenslandiella*: *Alloteropsis cimicina* (Retz.) Stapf (*Axonopus Maidenianus* Domin); *Eragrostis pilosa* Beauv.; *Imperata cylindrica* Beauv. var. *Koenigii* Dur. & Schinz; *Eriochloa procera* (Retz.) C. E. Hubbard. Of these, *Eragrostis pilosa* has been introduced to Chillagoe, but the others are probably native.

The introduction of an annual weed such as *Queenslandiella* is easily understandable when it is remembered that Chillagoe is a mining district where great quantities of materials of all kinds must have been imported in the past. C. E. Hubbard, when he visited the area twenty years after Domin's discovery, was unable to find a single plant, although he made a special search for it.

The systematic position of the genus has been discussed in Kew Bull. 1932, 457. There seems little doubt that it comes nearest to *Kyllinga*, which agrees in possessing a biconvex nut and a spikelet which disarticulates in one piece at maturity.

In accordance with the rule of priority, the genus must bear the name *Queenslandiella* in place of *Mariscopsis* Chermezon. This is somewhat unfortunate, since the plant is undoubtedly Indian in origin.

As mentioned in the previous paper, the plant possesses the strong and characteristic odour of *Trigonella Foenum-graecum*. The same smell occurs also in *Cyperus aristatus* Rottb., another annual member of the *Cyperaceae* found in India.—F. Ballard.

Fig. 1, entire plant, × 0·5; 2, a flowering culm, *natural size*; 3, portion of rhachis with persistent sterile squamae, × 10; 4, young floret, lateral view, × 6; 5, flower, × 10; 6, mature disarticulated spikelet, lateral view, × 6; 7, the same, abaxial view, × 6; 8, empty fertile squama showing inner surface, × 6; 9a and b, ripe nut, lateral and median views, × 10; 9c, transverse section, × 10.


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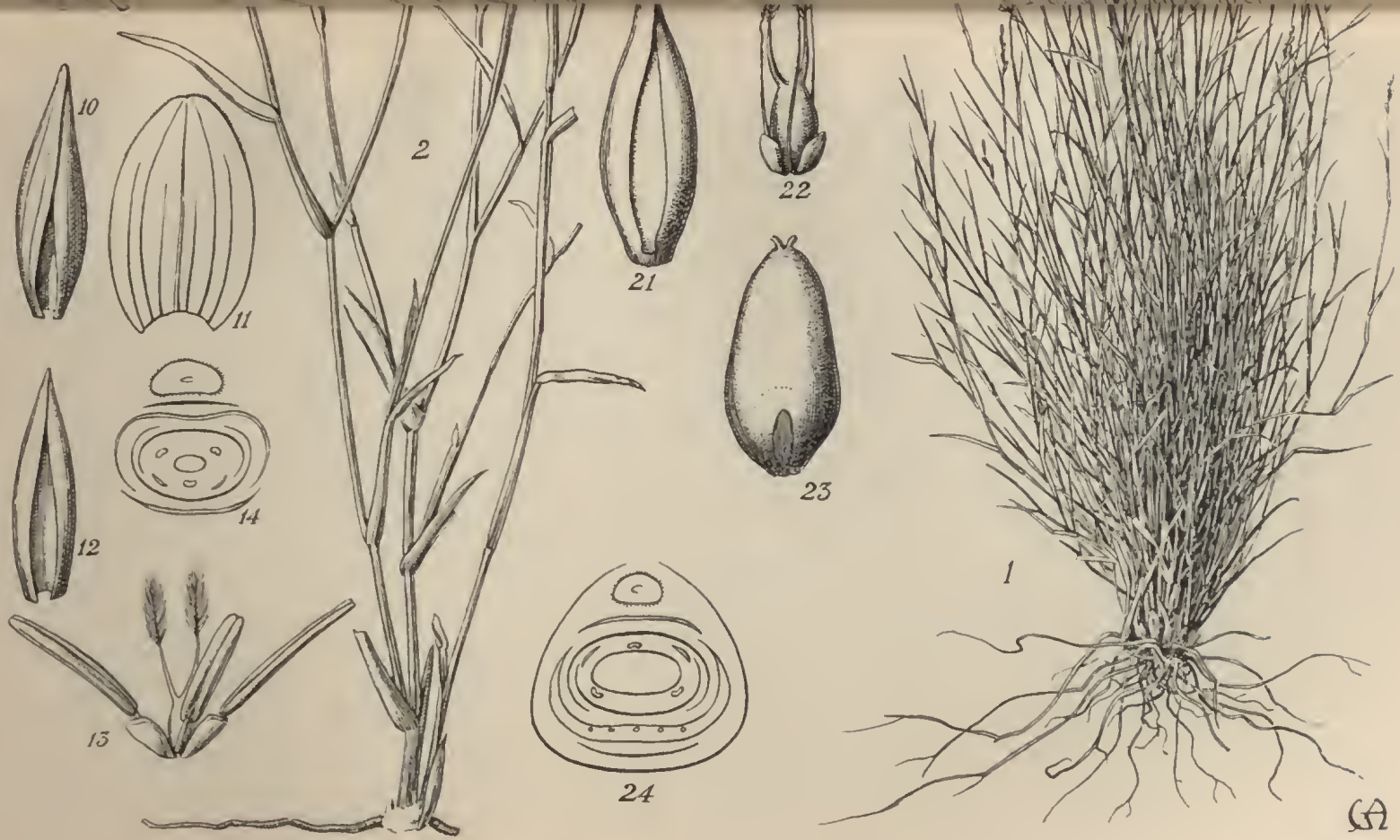
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Tabula 3209.

CLEISTOCHLOA SUBJUNCEA *C. E. Hubbard.*

Gramineae. Tribus Paniceae.

Cleistochloa *C. E. Hubbard.* Genus novum *Entolasiae* Stapf affine, sed spiculis cleistogamis in axillis vaginarum plurimarum et spiculis chasmogamis in rhachi racemi simplicis ortis, gluma superiore emarginata vel truncata vel obtusa, lemmate superiore fere glabro divergens.

Spiculae dimorphae, chasmogamae in rhachi gracili subtriquetra vel leviter compressa racemi spiciformis simplicis terminalis, cleistogamae abunde in axillis vaginarum ortae, omnes dorso compressae, muticae, demum totae a pedicellis persistentibus disarticulatae. *Anthoecia* duo: inferum ad lemma redactum; superum ♂. *Spiculae chasmogamae* brevissime pedicellatae, alternae, distichae, adaxiales. *Glumae* valde inaequales; inferior minuta, lata, membranacea, enervis; superior spiculae aequilonga vel paullo brevior, 5–7-nervis, nervis parallelis, firme membranacea. *Anthoecium inferum:* lemma spiculae aequilongum vel paullo brevius, 7-nerve, firme membranaceum. *Anthoecium superum:* lemma spiculae aequilongum vel paullo brevius, 5–7-nerve, tenuiter coriaceum, papillosum, apice et plerumque marginibus tenuibus planis ciliolatum; palea lemmati aequilonga, 2-nervis. *Lodiculae* duae. *Stamina* tria. *Ovarium* glabrum; styli distincti; stigmata plumosa, supra medium anthoecii exserta. *Caryopsis* ignota. *Spiculae cleistogamae* solitariae, breviter pedicellatae, abaxiales, fere glabrae. *Glumae* valde inaequales; inferior ad marginem latam brevissimam tenuem enervem redacta; superior spicula paullo brevior, conspicue 4–7-nervis, nervis parallelis, firme membranacea vel tenuiter coriacea. *Anthoecium inferum:* lemma spiculae subaequilongum et figura simile, inerassatum, obscure 5-nerve, apice breviter rostellatum et depressum, dorso primum convexum, siccitate dorso cicatriciformi, cartilagineum, obtuse bicarinatum, inter carinas depressum et medio leviter convexum vel inter nervum medium plerumque prominentem et carinas depressum, marginibus arcte inflexis. *Anthoecium superum:* lemma spiculae aequilongum, obscure 5–9-nerve, tenuiter coriaceum, papillosum, apice et plerumque marginibus tenuibus planis ciliolatum; palea lemmati subaequilonga, 2-nervis, tenuiter coriacea. *Lodiculae* duae. *Antherae* minutae. *Caryopsis* ovoidea, dorso compressa, inter

lemma et paleam arcte inclusa, scutellum circiter tertiam partem caryopsis aequans; hilum basale.—*Gramina* perennia ramosissima; innovationes plerumque intravaginales; culmi rigidi et duri, gracillimi; laminae breves, rigidae; ligulae ad seriem ciliorum redactae; racemi laxe pauci-spiculati, erecti.

Species duae, Queenslandiae incolae. Typus: *C. subjuncea* C. E. Hubbard.

Spiculae chasmogamae fere glabrae; gluma superior et lemma inferius emarginata vel truncata . . . . . 1. *C. subjuncea.*
Spiculae chasmogamae dense et breviter pubescentes; gluma superior et lemma inferius obtusa . . . . . 2. *C. Sclerachne.*

1. **Cleistochloa subjuncea** *C. E. Hubbard*, nom. nov. (t. 3209). *Panicum subjunceum* Domin in Biblioth. Bot. xx. Heft 85, 314, fig. 70 (1915), non Ekman (1911). *Entolasia subjuncea* C. E. Hubbard in Journ. Ecol. xxi. 223 (1933), nomen tantum.

Culmi 30–60 cm. alti, basi cataphyllis coriaceis glabris vel minute hirsutis obtecti, laxe vel dense caespitosi, erecti vel plerumque geniculati, teretes, multinodes, e nodis pluribus ramosi, ramis solitariis vel fasciculatis erectis vel plerumque patentibus, virides, striati, pilis rigidis brevibus ascendentibus e tuberculis ortis dense vel laxe hispidi vel glabri, scaberuli vel raro fere laeves. *Foliorum vaginae* internodiis plerumque multo breviores, 0·5–3·5 cm. longae, teretes, striatae, primum virides et arcte appressae, demum stramineae laxae et culmos detegentes, pilis albis ascendentibus vel patentibus saepe e tuberculis ortis laxe vel dense hirsutae vel glabrae; ligulae ad seriem ciliorum brevium redactae; laminae lineares vel lineari-lanceolatae, in apicem obtusum subcallosum attenuatae, 1–5 cm. longae, 1–2·8 mm. latae, planae vel plerumque convolutae, demum e vagina disarticulantes, virides, pilis rigidis brevibus e tuberculis ortis laxe hispidae, nonnunquam subtus puberulae vel glabrescentes, marginibus scaberulis cartilagineis. *Racemi* graciles, stricti, 0·7–2·5 cm. longi, 2–6-spiculati, virides; rhachis subtriquetra, scaberula; pedicelli 0·25–0·5 mm. longi, puberuli, apice subdiscoidei. *Spiculae chasmogamae* erectae, laxae, lanceolato- vel anguste elliptico-oblongae vel oblongae, subacutae vel obtusae, 3·5–4·5 mm. longae, fere glabrae. *Gluma* inferior oblata, emarginata vel truncata, 0·3–0·7 mm. longa; gluma superior (explanata) oblonga vel elliptico-oblonga, emarginata vel truncata, 3–3·8 mm. longa, 5-nervis, asperula, apice ciliolata. *Anthoecium inferum:* lemma (explanatum) ellipticum vel elliptico-oblongum, emarginatum, 3·5–4 mm. longum, asperulum, apice et plerumque marginibus apicem versus ciliolatum. *Anthoecium superum* ellipticum, subacuminatum, apice obtusum: lemma spiculae aequilongum, late ellipticum (explanatum), obtusum, 5–7-nerve; palea elliptico-lanceolata, subacuminata, apice et plerumque marginibus ciliolata. *Antherae* lineares, circiter 2·5 mm. longae. *Spiculae cleistogamae* ovatae,

oblongae, vel elliptico-oblongae, obtusae, plerumque apiculatae, 4–6 mm. longae; pedicelli 1·5–2 mm. longi, puberuli, apice discoidei. *Gluma* inferior usque ad 0·3 mm. longa; gluma superior (explanata) oblonga vel ovato-oblonga, truncata, 3–4·5 mm. longa, 4–6-nervis, apice glabra vel ciliolata. *Anthoecium inferum*: lemma dorso inter carinas primum flavido-fuscum, demum atrofuscum. *Anthoecium superum* anguste ellipticum vel lanceolato-ellipticum, subacuminatum, apice obtusum: lemma 5–7-nerve, marginibus ciliolatum; palea supra medium marginibus ciliolata. *Antherae* 0·5–1 mm. longae. *Caryopsis* circiter 2·8 mm. longa.

Queensland. North Kennedy District: near Gregory Springs Station, abundant on sandstone slopes of the Great Dividing Range, in open *Eucalyptus* forest, Feb. 1931, *Hubbard and Winders* 7702; on sandy slopes of the Great Dividing Range near Pentland, Feb. 1910, *Domin* (type); Warrigal, on Great Dividing Range, 420–450 m., in *Acacia* forest, on rocky conglomerate slopes, very common, Feb. 1931, *Hubbard and Winders* 7128. Burke District: Mt. Sturgeon Station, north of Hughenden, on quartzite hill slopes, in *Eucalyptus* forest, Feb. 1931, *Hubbard and Winders* 7746. Mitchell District: east of Jericho, on Great Dividing Range, 410 m., abundant in *Acacia* forest, on hard brown sandy soil, Feb. 1931, *Hubbard* 7853. Leichhardt District: Bluff, on rocky hill in *Eucalyptus* forest, 210 m., Feb. 1931, *Hubbard* 7991. Burnett District: Mundubbera, 1930, *Bloxsome* 94. Darling Downs District: near Gurulmundi, on Great Dividing Range, on stony soil in open *Eucalyptus* forest, 360 m., Nov. 1930, *Hubbard* 5058. Moreton District: Blackheath, near Ipswich, April 1908, *White*; near Moggill, on stony sandstone hills, 180 m., in open *Eucalyptus* forest, Nov. 1930, *Hubbard* 4904; April 1931, *White* 7598, *Hubbard* 8108.

2. **Cleistochloa Sclerachne** (*F. M. Bailey*) *C. E. Hubbard*, comb. nov. *Chionachne Sclerachne* F. M. Bailey in Queensl. Dept. Agric. Bull. no. 7 (Bot. Bull. no. 2), 21 (1891). *Polytoca Sclerachne* F. M. Bailey, Queensl. Fl. vi. 1849 (1902); Compr. Cat. Queensl. Pl. 616 (1913). *Panicum marginatum* var. *strictum* F. M. Bailey in Queensl. Agric. Journ. xxvii. 69 (1911), non Benth.

Culmi usque ad 70 cm. alti, basi cataphyllis coriaceis brevibus glabris vel plus minusve pubescentibus obtecti, erecti vel geniculati, teretes, multinodes, multiramosi, virides, glabri laevesque. *Foliorum vaginae* internodiis multo breviores, 1–4 cm. longae, demum laxae et culmos detegentes, teretes, latae, striatae, glabrae laevesque vel pilis patentibus e tuberculis ortis laxe hirsutae; ligulae ad seriem ciliorum minutorum redactae; laminae lineares, in apicem callosum attenuatae, 1·5–9·5 cm. longae, 1–4·5 mm. latae, planae vel convolutae, e vaginis disarticulantes, obscure puberulae vel glabrae, laeves vel marginibus cartilagineis plerumque minute scaberulae. *Racemi* graciles, stricti, 1–2·5 cm.

longi, 3–6-spiculati ; rhachis leviter compressa, scaberula ; pedicelli usque ad 0·3 mm. longi, minute puberuli. *Spiculae chasmogamae* anguste elliptico-oblongae, obtusae, 4–4·5 mm. longae, pubescentes. *Gluma* inferior ovata vel ovato-oblonga, obtusa, 1–2 mm. longa ; gluma superior (explanata) ovato-elliptica vel elliptico-oblonga, obtusa, spiculae aequilonga, minute tuberculata, dense et breviter pubescens, 5–7-nervis. *Anthoecium inferum :* lemma glumae superiori simile sed ellipticum et 7-nerve. *Anthoecium superum* oblongum vel ellipticum, acuminatum : lemma (explanatum) late ellipticum, 3·5 mm. longum, marginibus ciliolatis ; palea anguste elliptica, supra medium marginibus ciliolata. *Spiculae cleistogamae* ovato-oblongae vel oblongae, 5–7 mm. longae ; pedicelli usque ad 1·5 mm. longi. *Gluma* inferior 0·3 mm. longa ; gluma superior (explanata) ovato-oblonga, obtusa, 5–6 mm. longa, 5–7-nervis. *Anthoecium inferum :* lemma demum stramineum. *Anthoecium superum* ellipticum, acuminatum : lemma 5–9-nerve, apice ciliolatum. *Antherae* 1 mm. longae.

Queensland. Cook District : Badu Island, May 1911, *Bick* 96 ; Lloyd Bay, April 1886, *Gulliver* (type).

There is no doubt that *Cleistochloa* is most closely allied to *Entolasia* Stapf, a genus originally described from tropical Africa and to which Miss D. K. Hughes added two Australian species, *E. marginata* (R. Br.) Hughes and *E. stricta* (R. Br.) Hughes. Some Australian species of *Entolasia* are very similar in habit to *Cleistochloa subjuncea*, and in southern localities are found growing with it. No cleistogamous spikelets, however, have been found by me in any species of *Entolasia*.

Cleistochloa subjuncea probably occurs throughout the greater part of the Dividing Range, the adjacent ranges and their offshoots in Queensland. It is usually abundant in dry localities amongst sandstone or similar rocks and stones on the upper slopes or summits. In such situations the vegetation is open *Eucalyptus* forest with an undergrowth of scattered shrubs and isolated tufts of xeromorphic species of *Entolasia*, *Aristida*, *Eragrostis*, *Eriachne*, etc. It is well adapted to withstand the periods of drought which occur in the area of its distribution. The thick wiry roots, which penetrate deeply into the soil or rock-crevices, are covered with a layer of dense root-hairs ; these together with adhering particles of sand provide a protective sheath. The small leaf-blades readily disarticulate from the sheaths, and their work is apparently carried on by the dark green culms. Individual plants present a characteristic bushy appearance due to the much-branched rigid wiry culms.

The cleistogamous spikelets are abundantly produced in the axils of almost all the leaf-sheaths, and at maturity large numbers may be seen on the ground beneath the plants. They are not, however, usually developed in the axil of the terminal leaf-sheath immediately below the inflorescence, but a rudimentary pedicel has been found

there in the specimens examined. In the type specimen of *Panicum subjunceum*, kindly lent by Dr. Domin for examination, the cleistogamous spikelets have already fallen, but their pedicels are visible. Several special features are found in the cleistogamous spikelet. The lower gluma is reduced to an obscure rim at the base of the spikelet. The sterile lemma in the fresh condition is rather thick with a smooth convex back. At maturity it hardens, the soft tissues become depressed, leaving a more or less prominent midrib, two keels and an apical dorsal projection. A sear-like dorsal surface is thus produced which changes in colour from yellow to brown on maturity. This indurated sterile lemma closely embraces the fertile floret and serves to protect the grain. In the mature fertile floret the minute anthers are found entangled with the stigmatic hairs at the apex of the caryopsis, the whole being enclosed by the lemma and palea. As the cleistogamous spikelet develops it pushes out the leaf-sheath and causes the culm to assume a slightly bowed appearance, thus permitting the spikelet to fall to the ground at maturity.

In *Cleistochloa subjuncea* the cleistogamous spikelets are probably produced more or less continuously (except under very unfavourable conditions), and form the normal method of reproduction. When, however, there is a sufficient supply of water such as is received during the summer rains, then the chasmogamous terminal inflorescences are freely formed. In the chasmogamous spikelets examined no grains have been found, but it is very probable that they may be produced, as a well-developed ovary is present.

Cleistochloa Sclerachne was originally described as a species of *Chionachne* by F. M. Bailey from material collected by Gulliver at Lloyd Bay. The type specimen in the Brisbane Herbarium consists of a few small pieces of culm and some cleistogamous spikelets. This material proved insufficient to give Bailey a clear idea of the species. Later he transferred it to the genus *Polytoca*. Both *Chionachne* and *Polytoca* belong to the tribe *Maydeae* and are readily distinguished by their unisexual spikelets of quite a different structure. Still later Bailey referred complete plants of this species collected by Bick on Badu Island to *Panicum marginatum* var. *strictum* Benth. (= *Entolasia stricta* Hughes), failing to connect them with his *Chionachne Sclerachne*. In Bick's specimens both chasmogamous and cleistogamous spikelets are represented, the latter agreeing with those from Gulliver's plant. The amended description given above is mainly drawn up from Bick's specimens. According to Bailey (Compr. Cat. Queensl. Pl. 616), this species is a troublesome spear grass at Somerset, Cape York, but there are no specimens from this locality in the Brisbane Herbarium.

Henrard in Meded. Rijks Herb., Leiden, No. 67, 17 (1931), has identified with *Chionachne Sclerachne* Bailey a specimen collected at Sturts Creek in North-West Australia by Mueller. This, however, represents a new species of *Chionachne*.

In describing certain American cleistogamous grasses, Mrs. Chase states that most of the species so far found are plants of arid regions

or of dry places in humid regions. This is the case with all the cleistogamous grasses which have been observed in Australia. A somewhat similar type of cleistogamous spikelet to that described above is produced in the axils of the leaf-sheaths of *Microlaena polynoda* Hook. f.

C. E. Hubbard.

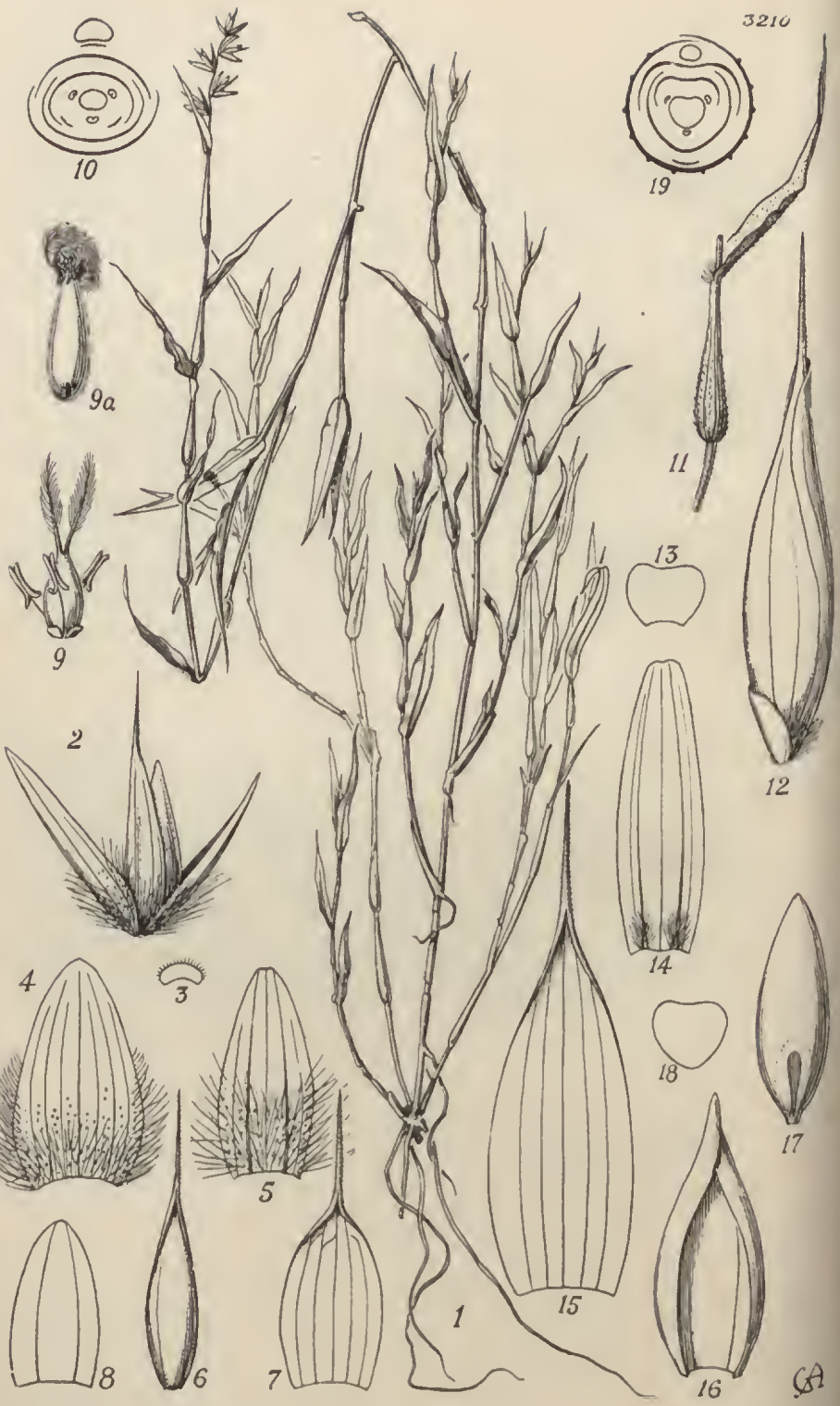
Addendum.

The following additional material of *Cleistochloa subjuncea* was received from Mr. C. T. White after the preceding text was in type :—

Mitchell District : Torrens Creek ; on rocky sandstone hills, March 1933, *White* 8749, 8754. These specimens show slight differences in the size and shapes of various parts, of which details are given here to supplement the specific description :—*Foliorum* laminae usque ad 7 cm. longae et 3·5 mm. latae. *Racemi* usque ad 5 cm. longi. *Spiculae chasmogamae* 3–4·5 mm. longae, gluma inferiore nonnumquam nulla vel minutissima. *Spiculae cleistogamae* late oblongo-elliptieae, usque ad 7 mm. longae et 3·8 mm. latae.—C. E. H.

Cleistochloa subjuncea.

Fig. 1, an entire plant, showing habit, × ½ ; 2, portion of plant, the minute pilosity omitted, *natural size* ; 3, terminal raceme, × 3 ; 4, leaf and portion of culm, showing cleistogamous spikelet in situ, × 3 ; 5, chasmogamous spikelet, ventral view, × 8 ; 6, chasmogamous spikelet, dorsal view, × 8 ; 7–14, details of chasmogamous spikelet :— 7, lower glume, × 8 ; 8, upper glume, × 8 ; 9, lower lemma, × 8 ; 10, upper lemma, × 8 ; 11, upper lemma (flattened), × 8 ; 12, palea, × 8 ; 13, flower, × 8 ; 14, diagram of chasmogamous spikelet ; 15, cleistogamous spikelet, dorsal view, × 8 ; 16, cleistogamous spikelet, ventral view, × 8 ; 17, cleistogamous spikelet, lateral view, × 8 ; 18–24, details of cleistogamous spikelet :— 18, lower glume, × 8 ; 19, upper glume, × 8 ; 20, transverse section of sterile lemma in fresh condition, × 8 ; 21, upper floret, × 8 ; 22, flower, × 8 ; 23, caryopsis, × 15 ; 24, diagram of cleistogamous spikelet enclosed by leaf-sheath.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Tabula 3210.

CALYPTOCHLOA GRACILLIMA *C. E. Hubbard.*

Gramineae. Tribus Paniceae.

Calyptochloa *C. E. Hubbard.* Genus novum e tribu *Panicearum*, ceterum sedis dubiae; distinguitur spiculis dimorphis, aliis adaxialibus in rhachi racemi spiciformis solitarii, aliis solitariis in axillis vaginarum superiorum, gluma inferiore minutissima vel nulla, anthoecio infero ad lemma redacto, lemmate anthoecii inferi cuspidato vel breviter aristato demum tenuiter coriaceo marginibus planis.

Spiculae dimorphae, chasmogamae vel cleistogamae in rhachi gracillima subangulata racemi spiciformis simplicis terminalis et cleistogamae singulae plerumque in axillis vaginarum superiorum ortae. *Anthoccia* duo: inferum ad lemma redactum; superum ♀. *Spiculae racemorum* solitariae, brevissime pedicellatae, adaxiales, demum totae a pedicellis persistentibus disarticulatae, ovatae vel ovato-ellipticae, demum hiantes, cuspidatae vel breviter aristatae. *Glumae* valde inaequales; inferior brevissima, hyalina, minute pilosa; superior (explanata) late ovata vel late elliptica, obtusa, spiculae subaequilonga, apice tenui excepto firme herbaceo-membranacea, 7-nervis, infra medium pilis albis appressis vel paullo patentibus e tubereulis ortis dense pilosa. *Anthoecium inferum:* lemma glumae superiori simile sed (explanatum) ovato-oblongum et 5–6-nerve. *Anthoecium superum* anguste ellipticum: lemma (explanatum) oblongo- vel ovato-ellipticum, apice cuspidatum vel breviter aristatum, spiculae aequilongum, demum tenuiter coriaceum, 5-nerve, glabrum; palea elliptica, marginibus inflexis acuta, lemmate paullo brevior, demum tenuiter coriacea, 2-nervis; lodiculae minutae; stamina tria; antherae parvae; ovarium glabrum; styli distineti, breves, terminales; stigmata plumosa; caryopsis anguste subovoidea vel ellipsoidea. *Spiculae axillares* subsessiles et solitariae in vagina folii arete inclusae, adaxiales, lanceolatae, cuspidatae vel breviter aristatae, fere glabrae. *Gluma* inferior nulla; superior oblata vel lanceolata, obtusa vel emarginata, minutissima vel usque ad medium spiculae attinens, raro deficiens, hyalina vel membranacea, enervis vel raro uninervis. *Anthoecium inferum:* lemma anguste oblongum vel lanceolato-oblongum, obtusum vel truncatum, spicula paullo brevius, dorso complanatum vel bicarinatum et inter

carinas subsulcatum, chartaceum, 3–5-nerve. *Anthoecium superum* lanceolatum: lemma lanceolatum, apice cuspidatum vel breviter aristatum, spiculae aequilongum, tenuiter coriaceum, 5-nerve, marginibus planis; palea oblongo-elliptica, acuta, lemmate paullo brevior, bicarinata et inter carinas sulcata, 4–6-nervis, nervis lateralibus anastomosantibus, tenuiter coriacea; lodiculae nullae; stamina tria; antherae minutae, inter plumas stigmaticas implicatae; caryopsis subovoidea, leviter lateraliter compressa, facie paullo sulcata, inter lemma et paleam arcte inclusa, hilo basali, scutello circiter tertiam partem caryopsis aequante.—*Gramen* perenne, ramosum, gracillimum, humile; culmi multinodes, infra nodos superiores tandem plerumque disarticulantes; foliorum vaginae inferae dilatatae et inerassatae; ligulae ad seriem ciliorum brevissimorum redactae; laminae lanceolatae vel lineari-lanceolatae, planae, demum disarticulantes; racemi solitarii, graciles, laxe pauci-spiculati; spiculae parvae.

Species unica, Queenslandiae incola.

C. gracillima *C. E. Hubbard*, species nova.

Culmi e basi prostrata geniculato-ascendentes, e nodis inferioribus radicantes, usque ad 30 cm. longi, gracillimi vel filiformes, teretes, rigidiusculi, flexuosi, laxe ramosi, ramis solitariis vel fasciculatis, internodiis usque ad 4 cm. longis, tenuiter striati, minute scaberuli, pilis mollibus appressis vel patentibus laxe vel dense pilosi vel glabrescentes. *Foliorum vaginae* demum internodiis breviores, arcte appressae, 0·7–1·6 cm. longae, striatae, inter costas pilis rigidiusculis vel mollibus e tuberculis ortis hirsutae, marginibus molliter ciliatis, inferiores teretes, superiores inferne durae et flavescentes, superne attenuatae tenuiores et glauco-virides; laminae basi abrupte contractae vel subrotundatae, apice subobtusae vel acutae, 1·5–3·5 cm. longae, 2–4·5 mm. latae, firmae, glaucae, prominenter nervatae, pilis brevibus rigidiusculis e tuberculis ortis laxe vel dense hirsutae vel glabrescentes, marginibus cartilagineis minute scaberulis. *Racemi* 1–1·5 cm. longi, 5–7-spiculati, albido-virides, e vagina summa breviter exserti vel basi inclusi; rhachis flexuosa, scaberula; pedicelli 0·2–0·3 mm. longi. *Spiculae racemorum* 3–3·5 mm. longae. *Gluma* inferior circiter 0·2 mm. longa; gluma superior 3 mm. longa. *Lemma anthoecii superi* 3–3·5 mm. longum, cuspide vel arista usque ad 2 mm. longa stricta vel flexuosa scaberula; palea circiter 2·5 mm. longa; antherae 0·5–1 mm. longae; caryopsis 1·6–1·8 mm. longa, pallide fusca. *Spiculae axillares* 4–5·5 mm. longae. *Gluma* superior 0·5–1·5 (raro 2·8) mm. longa. *Lemma anthoecii inferi* 4–5 mm. longum, basi carinarum minutissime pilosa. *Lemma anthoecii superi* 4–5·5 mm. longum, cuspide vel arista stricta scaberula usque ad 2 mm. longa; antherae usque ad 0·3 mm. longae; caryopsis 3–3·5 mm. longa.

Queensland. Burnett District: Mundubbera, April 1931, *Bloxsome* 9 (type). Darling Downs District: Chinchilla, in patches under Wilga (*Geijera parviflora*) trees, June 1931, *Beasley* 168A, 169.

The precise position of this genus in the *Paniceae* is somewhat doubtful. The flattened margins of the upper lemma recall the genera grouped around *Digitaria* Hall. Of these the only genus with which it shows affinity is *Allotcropsis* Presl; this also occurs in Australia. *Calyptochloa* differs from *Alloteropsis* in having solitary racemes, a minute nerveless lower glume, a 7-nerved ciliate upper glume, and a barren lower floret which is reduced to the lemma.

The spikelets of the terminal inflorescence are apparently either chasmogamous or cleistogamous. Unfortunately the material is insufficient to warrant an extensive examination of several spikelets at different stages of development. In the spikelets, however, which have been dissected, the anthers vary in size from 0·5 to 1 mm. Those spikelets with shorter anthers were definitely cleistogamous as the latter were enclosed in the mature floret and entangled among the hairs of the stigmas at the apex of the caryopsis. The lower glume of the terminal spikelets is a very minute hyaline rim hidden by hairs and at first examination is easily overlooked.

The axillary cleistogamous spikelets are tightly embraced by the leaf-sheaths. Their external structure is rather different from that of the terminal spikelets. The lower glume is suppressed, whilst the upper is small but somewhat variable in size. The lower lemma is dorsally flattened or two-keeled, no doubt owing to pressure from the culm, otherwise it is somewhat similar to the lower lemma of a terminal spikelet. As the axillary spikelet develops, the sheath becomes indurated and thickened downwards. The dispersal of the grain is effected by the joints of the culm disarticulating at the base of each leaf-sheath. Mrs. Chase has noted that in species of *Triplasis* which have axillary cleistogamous spikelets ("cleistogenes") the culms readily disarticulate at the lower nodes.—C. E. Hubbard.

Fig. 1, plant, *natural size*; 2, spikelet from terminal inflorescence; 3–9a, details of that spikelet:— 3, lower glume; 4, upper glume; 5, lower lemma; 6, upper floret; 7, upper lemma (flattened); 8, palea (opened out); 9, flower; 9a, immature caryopsis with shrivelled anthers at its apex; 10, diagram of spikelet from terminal inflorescence; 11, a single leaf, with its sheath enclosing an axillary spikelet; 12, axillary spikelet; 13–18, details of axillary spikelet:— 13, upper glume; 14, lower lemma; 15, upper lemma (flattened); 16, palea; 17, caryopsis; 18, transverse section of caryopsis; 19, diagram of axillary spikelet enclosed by sheath. *Figs.* 2–9a, 11–18, × 10.

S.R-C.

Tabula 3211.

HABENARIA LONGIROSTRIS *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

H. longirostris *Summerhayes* in Kew Bull. 1932, 192; species valde insignis, perianthii segmentis angustis elongatis linearibus vel lanceolatis acuminatis, petalis longiuscule ciliatis, rostelli lobo intermedio elongato truncato apice leviter 3-dentato supra antheram valde eminente, stigmatibus pro rata brevibus distinctissima.

Herba terrestris, usque 75 cm. alta. *Folia* 4–9, 2–3 infima ad vaginas redacta, intermedia lanceolato-ovata usque late ovata, acuta vel subacuminata, basi vaginantia, usque 16 cm. longa et 5 (rarius 8) cm. lata, versus inflorescentiam subito decrescentia, suprema bracteis similia. *Racemus* cylindricus, subdense vel dense multiflorus, 12–40 cm. longus, circiter 6 cm. diametro; bracteae late lanceolatae vel lanceolatae, valde acuminatae, 1·5–3·5 cm. longae, ovarium pedicellatum aequantes vel superantes. *Flores* adscendentes vel erecto-patentes, magni, petalis et sepalo intermedio albidis exceptis viridescentes, suaveolentes. *Sepalum* intermedium lanceolatum, acutum, concavum, 12–18 mm. longum, 2·5–3 mm. latum, trinervium; sepala lateralia oblique falcatim lanceolata, basi margine antico rotundato dilatata, acuminata, 16–20 mm. longa, 4–5 mm. lata. *Petala* supra trientem infimum biloba, dimidio inferiore cum sepalo intermedio conglutinata, marginibus praesertim superne dense longiuscule ciliata, in toto 13–18 mm. longa, basi 1·25–2 mm. lata; lobi lineares, acuti, posterior 9–12 mm. longus, 0·75 mm. latus, anterior 7–10 mm. longus, posteriore angustior. *Labellum* ex parte basali 4–5 mm. longa et 2 mm. lata tripartitum, partitionibus anguste linearibus acutis plus minusve incurvatis, intermedia 17–23 mm. longa, lateralibus 15–18 mm. longis; calcar basi tenue, superne modice ampliatum, subacutum, 15–20 mm. longum. *Anthera* erecta, 2·5–3 mm. alta, apice retusa apiculo interjecto, canalibus gracilibus leviter incurvatis 2·5–3 mm. longis, staminodiis oblongis brevibus circiter 0·7 mm. longis. *Brachia* stigmatifera crassiuscula, apice incrassata, 3–4 mm. longa; rostelli lobus intermedius basi triangularis, superne anguste oblongus, apice truncatus leviter 3-dentatus, 4–5 mm. longus, antheram valde superans, dense papillatus. *Ovarium* 10–16 mm. longum, saepius curvatum.

NORTHERN NIGERIA. Naraguta, July 1921, *Lely* 462 (type); Vom, Bauchi Plateau, 900–1350 m., *Dent Young*; Plains, August 1930, *Lely* P630; without locality, August 1912, *Nelson* 13.

UGANDA. Serere Teso, in cleared land among grass, 1080 m., July 1932, *Chandler* 819.

Habenaria longirostris seems to occupy a somewhat isolated position among the African representatives of the genus. The only species which appears to resemble it at all closely is *H. rhombocorys* Schltr., an inhabitant of Nyasaland and southern Tanganyika Territory. The latter has been placed in Sect. *Multipartitae* (*Taenianthera* Schltr.)—erroneously, in the writer's opinion. *H. longirostris* and *H. rhombocorys* agree in general habit and type of inflorescence, in the general features of the lip and of the sepals, and in the exceptional hairiness of the petals. In *H. longirostris*, however, these are bilobed in the upper two-thirds, whereas in *H. rhombocorys* they are simple. It is significant that the petals in the latter species have the anticous margin much dilated, forming what might be considered as the beginning of an anticous lobe. In column structure the two species show many points of resemblance, the stigmas are similar, and in each the rostellum is large and truncate, and projects above the anther loculi.

When first described, *H. longirostris* was known only from Northern Nigeria, but specimens have recently been received from Uganda and it can thus be numbered among the many species common to East Africa and Nigeria. A large number of East African species extend as far west as the Bauchi Plateau in Northern Nigeria, especially the Savannah types such as most of the African representatives of *Habenaria*. A few species are also found in the Gold Coast and it is possible that *H. longirostris* may be one of these.—V. S. SUMMERHAYES.

FIG. 1, flowering stem, lower leafless part and upper 2 inches of raceme omitted, *natural size*; 2, dorsal sepal and petals, × 3; 3, gynostegium, lateral view, × 6; 4, rostellum, spread out, × 6; 5, one pollinium, × 8:—A, anther; CV, caudicle and viscidium; Rm, median lobe of rostellum; Rl, lateral lobes of rostellum; S, staminode; St, stigmatic processes.


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Tabula 3212.

HABENARIA PRIONOCRASPEDON *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

H. prionocraspedon *Summerhayes* in Kew Bull. 1932, 342; *H. Englerianae* Kraenzl. affinis, a qua floribus minoribus, labelli lobis lateralibus semi-ovatis, calcari 5–6 cm. longo facile distinguitur.

Herba terrestris, erecta, ultra 35 cm. alta, basi non visa. *Caulis* teres, fere usque inflorescentiam foliatus. *Folia* 5, elliptico- vel oblongo-lanceolata, acuta, apice ipso breviter setaceo-acuminata, basi vaginantia, 12–18 cm. longa, 3·5–5·5 cm. lata. *Racemus* 13 cm. longus, 10 cm. diametro, dense multiflorus; bracteae inferiores foliosae, ceterae minores, lanceolatae, acuminatae, pedicello cum ovario saepius breviores. *Flores* subpatentes, ut videtur albi. *Sepalum* intermedium late lanceolatum, acutum, concavum, erectum, 16–17 mm. longum, 6 mm. latum; sepala lateralia deflexa, oblique semi-ovata, falcatim acuminata, 18 mm. longa, 7 mm. lata. *Petala* simplicia, linearilanceolata, leviter recurvata, acuta, 16 mm. longa, 3 mm. lata. *Labellum* ex ungue angusto trilobatum, in toto 3 cm. longum, 2·5 cm. latum; lobus intermedius ligulatus, acutus vel subacutus, 15 mm. longus, 3 mm. latus; lobi laterales late semi-ovati ex intermedio leviter divergentes, basi integri, superne serrato-pectinati, 16 mm. longi, infra medium 11 mm. lati; calcar inferne gracile, dimidio superiore sensim inflatum, clavatum, apice obtusum, satis incurvatum, 5–6 cm. longum. *Anthera* erecta, 5–6 mm. alta, canalibus crassiusculis leviter incurvatis 2·5 mm. longis; staminodia parva, rotundata, 1 mm. longa et lata. *Brachia stigmatifera* clavata, obtusa, apice interdum connata, circiter 7 mm. longa; rostelli lobus intermedius anguste triangularis, acutissimus, leviter concavus, 2·5 mm. longus.

Southern Nigeria. Ogoja District, Boshi, 1050 m., *Rosevear* 61/29.

The section *Plantagineae*, to which this species belongs, contains a number of very striking and beautiful species of which *H. militaris* Rchb. f. and *H. carnea* N. E. Br. are occasionally cultivated. The flowers are characterised by the usually pectinate or serrate but broad lateral lobes of the lip, while the leaves are generally radical and more or less rosulate and therefore somewhat resembling those of species of

Plantago. The section is distributed throughout the Indo-Malayan region and is represented in West Africa by a second species, namely, *H. Engleriana* Kraenzl., which possesses a spur about 15 cm. long. Up to the present, however, no *Habenaria* of this section has been recorded from East Africa, and the two West African species are therefore isolated geographically. The Indian representatives of section *Plantagineae* possess flowers of similar type, but much smaller, *H. geniculata* D. Don being a good example. The flowers of some of the Malayan and Indo-Chinese species, on the other hand, although as large as those of the African ones, tend to have a rather differently shaped lip with a bilobulate middle lobe. In both *H. Engleriana* and *H. prionoeraspedon* the leaves, instead of being in a basal rosette or cluster, extend up the stem to immediately below the inflorescence, in which respect they approach *H. genieulata*, which has the leaves scattered along the lower part of the stem.—V. S. Summerhayes.

Fig. 1, flowering plant, *natural size*; 2, dorsal sepal, × 1·5; 3, lateral sepal, × 1·5; 4, petal, × 1·5; 5, labellum, spur removed, × 1·5; 6, column, with perianth members removed, × 4; 7, rostellum, flattened out, × 4:—A, anther; S, staminode; St, stigmas; V, viscidia.


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Tabula 3213.

VIGNA NUDA *N. E. Br.*

Leguminosae. Tribus Phaseoleae.

V. nuda *N. E. Br.* in Kew Bull. 1901, 121; E. G. Baker, Leg. Trop. Afr. 415 (1929). *Liebrechtsia Ringoeti* De Wild. in Fedde, Rep. xiii. 113 (1914); De Wild. Notes Fl. Kat. iv. 27 (1914). *Vigna Ringoeti* (De Wild.) E. G. Baker, Leg. Trop. Afr. 415 (1929).— Habitu et magnitudine *V. esculentae* (De Wild.) De Wild. ex Th. et Hel. Durand similis, sed floribus asymmetricis carina et stylo per angulo 90° contorta facile distinguenda.

Herba perennis, praecox, caudice subterraneo lignoso repente. *Caules* maturi foliosi usque 1 m. longi, glabri vel puberuli. *Stipulae* ovatae vel deltoideae, acutae, haud auriculatae, parvae, circiter 4 mm. longae et 3 mm. latae, striatae, parce pubescentes. *Folia* trifoliolata; petioli circiter 5 cm. longi, puberuli; foliola oblongo-ovata vel subrhomboidea, usque 8 cm. longa, 3 cm. lata, minute puberula, hispidula, breviter petiolulata; rhachis circiter 1·2 cm. longa, ut petiolus valde sulcata; stipellae subulatae, 2 mm. longae. *Caules* floriferi e basi caulium maturorum (saepissime ustorum) orti, aphylli, erecti, basi ramosi, breviter pubescentes, usque 20 cm. longi sed saepe brevissimi. *Pedunculi* erecti, usque 20 cm. longi, minute et parce retrorsum pubescentes, praecipue apicem versus, vel inferne subglabri. *Flores* in verticillo 2–5-floro, rarius in verticillis duobus internodio brevi dispositi; pedicelli usque 3 mm. longi, pubescentes, apice bibracteolati. *Bracteolae* circiter 1 mm. longa, velutinae, caducae. *Calyx* late campanulatus, 8 mm. longus, parce pubescens, dentibus deltoideis subaequalibus acutis 2–3 mm. longis. *Vexillum* transverse ellipticum, breviter emarginatum, unguiculatum, usque 2 cm. altum, 3 cm. latum, dimidio altero majore. *Alae* rotundato-triangulatae, basi anguste unguiculatae, ungue usque 4 mm. longo, et breviter calcaratae, in toto usque 2·4 cm. longae, 1·1 cm. latae, subaequales. *Petala carinae* lunata, valde incurva, basi in unguem attenuata, superne lateraliter contorta, inaequalia, altero versus medium pustula 3 mm. diametro instructo, altero plano, circiter 2 cm. longa, 1 cm. diametro. *Stamina* circiter 3 cm. longa, cum carina contorta, antheris vix 1 mm. longis. *Ovarium* lineare, minute velutinum, circiter 1·5 cm. longum; stylus linearis, 2 cm. longus, fere glaber sed postice valde barbatus, lateraliter contortus; stigma leviter obliquum, pilis valde annulatum. *Legumen* immaturum lineare, breviter velutinum.

Southern Rhodesia. Mashonaland, without locality, abundant in dry pastures, May 1896, *Bryce* s.n. (type of *Vigna nuda*) :—Flowers purplish-blue and whitish. Mazoe, on burnt veld, 1350 m., Aug. 1905, *Eyles* 179 :—Flower-stalks in erect clusters ; no leaves ; flowers red-purple with a patch of yellow in throat of standard ; keel strongly curved upwards and sideways (always to the left) ; roots long, woody. Salisbury, 1440 m., Sept. 1927, *Eyles* 5059 :—Perennial with woody rootstock ; flowers red-purple ; keel twisted.

Northern Rhodesia. Chilanga District : Chilanga, on clay soil 1200 m., Aug. 1909, *Rogers* 8490. Ndola District : R. Kashitu and elsewhere on sand, 1200 m., July 1909, *Rogers* 8303 :—Flowers only springing up after the grass is burnt. Mwinilunga District : about 22 miles east of Mwinilunga, on burnt ground in open *Brachystegia* woodland, 10 Sept. 1930, *Milne-Redhead* 1077 :—Perennial with thick rootstock, flowers in clumps, rosy-mauve ; no leaves at time of flowering ; keel and style twisted. About 40 miles south of Mwinilunga and 12 miles west of R. Lunga, on burnt ground in *Brachystegia* woodland, 15 Aug. 1930, *Milne-Redhead* 911 :—Old unburnt shoots up to 1 m. long with dead leaves attached ; perennial with running rootstock ; flowers from base of dead shoots, large, dull mauve ; keel and style twisted.

Belgian Congo. Katanga. On sandy ground at Nieudorp, Aug. 1912, *Ringoet* 6 (type of *Vigna Ringoeti*). Elisabethville, Aug. 1911, *Rogers* 10017, pro parte. Elisabethville, June 1920, *Rogers* 26006.

This species is remarkable in the genus *Vigna* on account of its having the standard asymmetrical and the keel twisted through a right angle, characters which give the flower a most untidy and bizarre appearance. The style, however, is essentially that of *Vigna*, and not that of *Phaseolus* or *Physostigma*, genera to which this plant bears considerable superficial resemblance. The ripe fruits of *Vigna nuda* are unknown, but partly mature pods are similar to those of many species of *Vigna*.

In consequence of *V. nuda* producing its flowers before the leaves and of the prevalence of grass fires in the region where it grows, leaves of this species were unknown until the writer was fortunate enough to collect some dead ones still attached to the previous season's shoots which by chance had escaped the fire. They are now described for the first time.

The twisting of the keel is far from obvious in herbarium specimens, and has therefore escaped the notice of previous authors. The flowers seem always to twist towards the left, and the left-hand petal of the keel has a blister on its otherwise even surface, and is smaller than the right-hand one, which is outside it.—E. Milne-Redhead.

Fig. 1, flowering stem ; 2, leaf, from below ; 3, flower, with petals removed ; 4, vexillum ; 5, one of the alae ; 6, right-hand petal of carina, from outside ; 7, left-hand petal of carina, from outside ; 8, upper part of style, and stigma. Figs. 1–7, *natural size* fig. 8, × 4.


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Tabula 3214.

PHYSOSTIGMA MESOPONTICUM *Taub.*

Leguminosae. Tribus Phaseoleae.

P. mesoponticum *Taub.* in Ber. Deutsch. Bot. Ges. xii. 81 (1894); Engl. Pflanzenw. Ost.-Afr. C. 222 (1895); R. E. Fries in Wiss. Ergebn. Schwed. Rhod.-Kongo Exped. 1911–1912, i. 105 (1914); E. G. Baker, Leg. Trop. Afr. 386 (1929).—Ab affini *P. venenoso* Balf. praecipue habitu erecto herbaceo, floribus ante folia evolutis, nodis inflorescentiarum non conspicue inerassatis differt.

Herba erecta vel forsan subscandens, praecox, caudice subterraneo lignoso repente. *Caules* maturi foliosi non visi. *Stipulae* (ex descriptione Friesiorum) deltoideo-lanceolatae, circiter 1 cm. longae et 3 mm. latae, apice obtusae, valde striatae. *Folia* (ex descriptione Friesiorum) trifoliolata; petioli usque 5 cm. longi, pilis brevibus patentibus fulvis dense induti; foliola terminalia oblonga, circiter 5·5 cm. longa et 1 cm. lata, apice rotundata et valde emarginata, basi late cuneata vel rotundata, lobis basalibus duobus oblongis 1–1·5 cm. longis apice rotundatis instructa; foliola lateralia aliquanto similia sed minora et lobo unico 1·5 cm. longa et 1 cm. lato extrinsecus retrorsum spectante instructa; foliola breviter petiolulata, pilis brevibus albis induta; rhachis 1–1·5 cm. longa; stipellae ovatae, obtusae, 2–3 mm. longae, striatae. *Caules* floriferi e basi caulium maturorum (saepissime ustorum) et e caudice ipso orti, aphylli, erecti, ramosi, leviter compressi, obscure striati, pilis brevissimis patentibus vestiti, usque 45 cm. longi (racemo incluso). *Racemi* laxi, in panicalam amplam dispositi vel interdum simplices, usque 30-flori. *Flores* singuli vel bini ex axillis bracteārum vix inerassatis orti; pedicelli 2–10 mm. longi, densiuscule brevissime hirsuti. *Bracteolae* minutissimae, caducae. *Calyx* infundibuliformis, usque 8 mm. longus, dentibus triangularibus, acutiusculis, dense breviterque pubescens. *Vexillum* suborbiculatum, usque 2·5 cm. longum et 2·3 cm. latum, profunde emarginatum, basi cordatum, vix unguiculatum. *Alae* late falcatae, obovato-oblongae, usque 2·3 cm. longae, apice rotundatae, basi unguiculatae, ungue circiter 3 mm. longo, et inferne breviter calcaratae. *Carina* fere 90° curvata, 2·5 cm. longa (statu curvato), basin versus in calcar circiter 1 cm. longum et 3 mm. diametro producta, basi unguiculata ungue 3 mm. longo; petala carinae inaequalia. *Stamina* circiter 4·5 cm. longa, tubo circiter 3 cm. longo, cum carina

contorta ; antherae 1 mm. longae. *Ovarium* sessile, lineare, 1 cm. longum, dense pubescens, circiter 9-ovulatum ; stylus 4 cm. longus, apicem versus in circulum contortus, fere glaber sed postice apicem versus valde barbatus ; stigma terminale appendice retrorsa lineari acuta, 4 mm. longa, carinata, carina membranacea undulata instructa. *Legumen* ignotum.

Tanganyika Territory. Kigoma Province : in burnt grasslands near Itimbury in the Ugalla's country, *Boehm* 27a (type in Herb. Berlin). Kigoma District : Tongwe, Sept. 1926, *Grant* s.n. (Herb. Brit. Mus.). Tabora District : near Tabora, *Stuhlmann* 584a. Rungwe District : in stony bushland at Bulambya, 1200 m., Sept. 1912, *Stolz* 189. Lindi District : in wooded grassland fringing bush of Kindope stream, Tendaguru, 150 m., 16 Aug. 1930, *Migeod* 804 (Herb. Brit. Mus.) :—Leafless twiner in grass ; flowers brilliant pink.

Nyasaland. Zomba, 1901, *Sharp* 22.

Northern Rhodesia. Tanganyika Province : with no information, *Cameron* s.n. Mumbwa District : near Mumbwa, 1911, *Mrs. Macaulay* 1119 :—A tall herb ; flowers 25–35 in compound spikes ; calyx dark red ; standard and wings dark pink ; keel white or pink ; leaf trifoliolate, with rough hairs on the upper surface and prominent veins. Ndola District : Bwana Mkubwa, 1911, *Fries* 494 ; Ndola, 1911, *Fries* 494a ; Ndola, common all over the country, Oct. 1906, *Allen* 386. Solwezi District : on burnt ground in dambo and on termite hills at Solwezi, 20 Sept. 1930, *Milne-Redhead* 1159 :—Perennial with running rootstock forming clumps 60 cm. in diameter ; flowers light crimson, very conspicuous. Mwinilunga District : in degenerating *Cryptosepalum* woodland on burnt ground at Matonchi Farm, 31 Aug. 1930, *Milne-Redhead* 995 :—Perennial with running rootstock, flowering before its leaves ; flowers very conspicuous, deep pink.

Belgian Congo. Katanga : Kangenge, 12 Aug. 1931, *de Witte* 542 (Herb. Brit. Mus.) ; Elisabethville, Aug. 1911, *Rogers* 10017, pro parte ; Mushoshi, 1350 m., Oct. 1912, *Rogers* 10379.

Angola. On the left bank of R. Chitanda, 1108 m., in sandy places among quartz, flowering without leaves, Sept. 1899, *Baum* 133 (type of var. *Baumii* Harms). Abundant in open grassy woods of *Combretum* and *Caesalpineae* near the rivulet Songque at Soba Gumbe, Anha, 12 July 1905, *Gossweiler* 1745 :—A perennial with subterranean woody rootstock from which arise one or more 1–2 ft. high deciduous flowering stems, but without leaves ; flowers a brilliant reddish-purple colour.

Physostigma mesoponticum Taub. is a plant of very great morphological interest. The development of the peculiar spur along the fused part of the upper edge of the two keel petals at a point not far from the basal claw is dealt with by Taubert (l.c. 83). It is, however, of interest to draw a comparison between this plant and *Vigna nuda* N. E. Br., a species which, like *Physostigma mesoponticum*, possesses a twisted keel, and accordingly has the keel petals unequal. But *V. nuda* has,

in place of the long spur of *P. mesopontieum*, a much shorter outgrowth resembling a blister, situated on the surfaee of the inner keel petal, and not at the point of fusion of the two petals as in this species. The ovary of *P. mesoponticum* with the staminal tube wrapped round it frequently protrudes through the lower unfused portion of the keel. The shape and texture of the stigmatie appendage are somewhat variable, as is also the size of the flowers. The variety *Baumii* of Harms differs from the type only in possessing rather larger flowers.

The leaves of *Physostigma mesoponticum* were first described, as lobed, by R. E. Fries (l.c.), but apparently, as in many speeies of the tribe *Phaseoleae*, the degree of lobing of the leaflets is very variable. Leaves are not represented in the Kew Herbarium.

Physostigma mesopontieum has a more northerly distribution than *Vigna nuda*, being found as far north as Tabora in Tanganyika Territory, whilst it is not known to extend to Southern Rhodesia in the South. The two species have a similar life form, and are frequent on dry burnt ground at the end of the winter season. It is probable that *Physostigma mesopontieum* during the wet summer season develops twining leafy shoots which seramble about among the grass with whieh it grows, but it is not a subshrub, as was suggested by Taubert.

E. Milne-Redhead.

Fig. 1, plant in flowering stage; 2, vexillum; 3, ala, from within; 4, carina, lateral view; 5, 6, the two carina petals separated, from within; 7, androeeium, enclosing gynoeeium; 8, style and stigma. Figs. 1–7, *natural size*; fig. 8, × 2.


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Tabula 3215.

OXYGONUM PACHYBASIS *Milne-Redhead.*

Polygonaceae. Tribus Polygoneae.

O. pachybasis *Milne-Redhead*; species nova, ab affinibus *O. pubescente* C. H. Wright et *O. Dregeano* Meissn. ocreis majoribus longius setosis, pedicellis sub fructu longioribus distinguendum; ab illa etiam omnibus partibus pubescentibus differt.

Herba perennis, pubescens, caudice crasso lignoso brunneo plus minusve repente. *Caules annui* plures; caules primarii usque ad inflorescentiam redacti, efoliati, basin versus cataphyllis ocreiformibus circumdati, in toto 8–20 cm. longi, leviter curvati; caules secundarii ex axillis cataphyllorum superiorum caulium primariorum exorti, foliiferi, erecti, sub anthesin immaturi, circiter 15 cm. longi, breviter et parce pubescentes; cataphylla obconico-cylindrica, truncata, 6–8 mm. longa, leviter inflata, firme chartacea, apice breviter setoso-ciliata, brunnea, extra breviter et parce pubescentia. *Ocreae* foliorum herbaceae, cylindricae, truncatae, in toto 1–1·3 cm. longae, apice setoso-ciliatae ciliis brunneis usque 7 mm. longis, breviter pubescentes. *Folia* sessilia, lanceolata, apice valde acuta vel apiculata, in basin valde attenuata, usque 6 cm. longa et 9 mm. lata, utraque pagina breviter et parce pubescentia. *Spicae fasciculorum* terminales, usque 17 cm. longi; fasciculi cymosi, 10–14, usque 4-flori. *Bracteae generales* ocreis foliorum similes sed minores et plerumque haud setoso-ciliatae, et apice oblique truncatae, saepe apiculo terminatae, 5–8 mm. longae; bracteae propriae florum hyalinae, setis brevibus 1–2 instructae; pedicelli maturi circiter 4 mm. longi. *Flores longistyli* (♀):—*Perianthii tubus* circiter 2 mm. longus; lobi ovato-elliptici, circiter 4 mm. longi, apice plus minusve acuti. *Stamina* 8, quorum 5 exteriora 3 interiora; filamenta filiformia, omnia, praesertim interiora, basin versus expansa, 2–2·5 mm. longa; antherae circiter 1 mm. longae. *Ovarium* circiter 1 mm. longum, glabrum; styli pars inferior 2 mm. longa, ramis 3, circiter 4 mm. longis; stigmata minuta, capitata. *Flores brevistyli* (verosimiliter ♂):—*Perianthia* plus minusve perianthiis florum hermaphroditorum similia. *Stamina* circiter 5 mm. longa. *Styli* rami circiter 2 mm. longi. *Fructus* immaturus ampulliformis, nec trigonus nec spinosus, breviter pubescens, pedicellis recurvatis.

Northern Rhodesia. Solwezi District: in dambo, after burning, at Solwezi, 20 Sept. 1930, *Milne-Redhead* 1162:—Perennial herb with thick woody rootstock; flowers white, opening in sunshine.

Whilst most of the known species belonging to this genus are annuals, this plant, together with *O. tenerum* Milne-Redhead, is a perennial with a woody underground rootstock well suited to thrive in the conditions offered by the open grasslands, known as dambos, which occur throughout the savannah woodland areas of Northern Rhodesia. Were it not for the annual grass fires it is possible that both these species might develop into shrubs of similar habit to *O. fruticosum* Dammer ex Milne-Redhead, which grows in the evergreen *Cryptosepalum* woodlands of Angola and Northern Rhodesia, into which the grass fires never penetrate on account of the lack of a continuous ground vegetation on the loose sandy surface.

On examination of a number of flowers of *O. pachybasis* it was found that they were heterostylous, but inspection of the developing fruits showed that these had all come from flowers with long styles, the ovary of the short-styled flowers apparently being abortive. The species is therefore polygamous, although at first sight it does not appear so.

E. Milne-Redhead.

Fig. 1, plant, *natural size*; 2, flower, × 3; 3, long-styled flower, laid open, with gynoecium removed, × 3; 4, gynoecium of long-styled flower, × 3; 5, short-styled flower, laid open, with gynoecium removed, × 3; 6, gynoecium of short-styled flower, × 3; 7, unripe fruit, × 2.


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Tabula 3216.

OXYGONUM TENERUM *Milne-Redhead.*

Polygonaceae. Tribus Polygoneae.

O. tenerum *Milne-Redhead*; species nova, *O. pachybasi* Milne-Redhead habitu similis, sed foliis linearibus glabris, fructibus trigonis distinguenda; ab *O. delagoensi* O. Kuntze, quod fructus trigonos similes profert, habitu pumilo, foliis linearibus integris recedit.

Herba perennis, glabra, caudice crasso lignoso brunneo plus minusve repente. *Caules annui* plures; caules primarii inflorescentia terminati, paucifoliati, basin versus cataphyllis ocreiformibus circumdati, in toto circiter 6 cm. longi, plus minusve erecti; caules secundarii ex axillis cataphyllorum superiorum et folium caulium primariorum exorti, foliiferi, erecti, sub anthesin immaturi, circiter 4 cm. longi; cataphylla lato obconica vel subcylindrica, aliquantum inflata, firme chartacea, apice truncata, breviter setoso-ciliata, brunnea. *Ocreae* foliorum subherbaceae, cylindricae, truncatae, in toto usque 1·2 cm. longae, apice longe setoso-ciliatae ciliis brunneis usque 9 mm. longis. *Folia* sessilia, linearia, apice valde acuta vel apiculata, basi vix angustata, usque 4·5 cm. longa et 1 mm. lata. *Spicae fasciculorum* terminales, circiter 3 cm. longi; fasciculi 3–4-flori. *Bracteae generales* ocreis foliorum similes sed apice oblique truncatae, plerumque haud setoso-ciliatae, saepe apiculo terminatae, usque 6 mm. longae; bracteae propriae florum hyalinae, setis brevibus 1–2 instructae; pedicelli maturi circiter 7 mm. longi. *Flores* ♀:—*Perianthii tubus* circiter 4 mm. longus; lobi elliptico-oblongi, circiter 6 mm. longi. *Stamina* 8; filamenta filiformia, basin versus aliquantum expansa, hirsuta, 1·5–2·5 mm. longa; antherae brunneo-roseae, circiter 1 mm. longae. *Ovarium* circiter 1 mm. longum, glabrum; styli pars inferior 3 mm. longa, ramis 3 circiter 3·5 mm. longis; stigmata minuta, capitata. *Flores* ♂ non visi. *Fructus* ovoideus, conspicue trigonus, espinosus, circiter 7 mm. altus, 4 mm. diametro, pedicellis erectis.

Northern Rhodesia. Mwinilunga District: in sandy plain, after early burning, east of Mwinilunga and about 16 miles west of R. Kabompo, 11 Sept. 1930, *Milne-Redhead* 1115:—Perennial herb with woody rootstock creeping underground; shoots up to 8 cm. high; flowers white.

Although of exactly similar habit, this species is strikingly different from *O. pachybasis*. It was found growing on burnt ground on sandy soil in an open situation along with *Sapium Acctoscila* Milne-Redhead, *Ochna angustifolia* Engl. et Gilg, and *Ochna Hockii* De Wild., all plants of the same life form; but whereas the genera *Sapium* and *Ochna* are most commonly trees or large shrubs, the genus *Oxygonum* is largely composed of species which are annual herbs.

Only hermaphrodite flowers were discovered on the material collected, so the functionally male flowers have to remain undescribed until further material is available.—E. Milne-Redhead.

Fig. 1, plant, *natural size*; 2, ♀ flower, × 3; 3, ♀ flower laid open, with gynoecium removed, × 3; 4, gynoecium, × 3; 5, fruit, × 2.


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Tabula 3217.

ERLANGEA QUARREI *Hutch. et B. L. Burtt.*

Compositae. Tribus Vernonieae.

E. Quarrei *Hutch. et B. L. Burtt*; species nova, affinis *E. sengensi* S. Moore, sed foliis ovatis basi late rotundato-cordatis, involucri bracteis exterioribus latioribus ovatis distinguenda.

Caules e rhizomate duro lignosi, stricti, usque ad 7 dm. alti, obtuse costati, inferne laxe superne dense crispato-pubescentes, internodiis plerumque circiter 5 cm. longis. *Folia* opposita, sessilia, discoloria, ovata, basi late rotundato-cordata, apice obtusa supremis late lanceolatis exceptis, 5–10 cm. longa, 3–6 cm. lata, marginibus obscure crenatis leviter recurvis, plus minusve bullata, supra scabrida et tenuiter pubescentia, infra cinereo-tomentosa; nervi laterales patuli, supra obscuri, infra prominentes, utrinsecus circiter 12, flexuosi. *Capitula* solitaria vel subsolitaria, breviter pedunculata, late campanulata, 3–3·5 cm. diametro. *Involucri bracteae* circiter 6-seriatae, exteriores foliaceae, ovatae, marginibus crenatis, nervosae, mucronatae, interiores gradatim angustiores usque ad late lineares et apice pungentes marginibus hyalinis et glabris sed minute scabrido-denticulatis, omnes extra tomentosae. *Flores* pallide cremei, violacco-suffusi. *Corollae tubus* parce glanduloso-pubescens; lobi superne parce pilosi. *Achaenia* straminea, crasse 4-costata, glabra, 4 mm. longa, apice cupulata, pappo brevissimo setacco mox caduco.

Belgian Congo. Katanga: Kamina, on the Lovoi River, April 1932, *P. Quarré* 2998.

This very striking species was received in a general collection of *Compositae* from the Belgian Congo communicated by the Director of the Congo Museum, Tervueren, Belgium.

The genus *Erlangea* is distinguished from *Vernonia* by the scanty and early caducous pappus. The use of this character results in a somewhat artificial classification, as it brings together an assemblage of species some of which show very slight relationship. Following the classification adopted by Muschler,* *E. Quarrei* falls into the

* Engl. Bot. Jahrb. xlvi. 58 (1911).

section *Bothriocline* on account of its opposite leaves. It is, however, but distantly related to the typical members of this section, since it has large solitary or subsolitary capitula, whereas they have much smaller capitula arranged in corymbs.

J. Hutchinson and B. L. Burtt.

Fig. 1, flowering branch, *natural size*; 2, a pair of lower leaves, *natural size*; 3, portion of upper surface of leaf, × 20; 4, portion of lower surface of leaf, showing recurved margin, × 4; 5, flower, with ovary detached, × 4; 6, part of androecium, × 6; 7, achene, with two pappus bristles still persisting, × 6; 8, one of the pappus bristles, × 40.


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C. rivularis (Baker) Fedtsch. ex Bowes
in K.B. 1941: 56

Tabula 3218.

CRASSULA WRIGHTIANA *Bullock.*

Crassulaceae. Subfamilia Crassuloideae.

C. Wrightiana *Bullock* in Kew Bull. 1932, 487; affinis *C. natanti* Thunb., sed habitu robustiore, caulibus foliisque carnosioribus, sepalis longioribus pro rata angustioribus, petalis angustioribus oblongis vel oblongo-ellipticis, carpellis leviter bialatis majoribus distincta.

Herba erecta vel procumbens, omnino glabra, 6–30 cm. vel ultra alta, caulibus simplicibus vel parce ramosis, internodiis 1·5 mm.—3·5 cm. longis, radicibus adventitiis e nodis praecipue inferioribus ortis. *Folia* opposita, decussata, basi in vaginam usque 2 mm. longam connata, oblonga vel oblongo-spathulata, apice acuta usque rotundata, 5·5–18 mm. longa, 1·5–5 mm. lata. *Flores* axillares, solitarii vel in fasciculis pauciflori dispositi, minuti, tetrameri, pedicellis 5–10 mm. longis. *Sepala* basi connata, oblonga vel sursum leviter angustata, obtusa vel subacuta, usque 1 mm. longa. *Petala* oblongo-elliptica vel oblonga, apice obtusa vel rotundata, sepalis duplo longiora. *Filamenta* applanata, sursum angustata; antherae parvae, subglobosae. *Squamulae nectariferae* spathulatae, 0·5–0·6 mm. longae, ovariis singulis adpressae. *Carpella* ovoidea, leviter bialata, 1–1·2 mm. longa, stylo brevi leviter uncinato coronata, uniovulata. *Semina* oblonga, utrinque rotundata, dense minutissime tuberculata.

Kenya Colony. Nairobi, 1800 m., *Dowson* 476 (type). Aberdare Mts. and the base of Mt. Kenya, *Dowson* 73. Eldama Ravine, 2100–2250 m., Oct. 1898, *Whyte* s.n. Third day's march from Eldama Ravine, *Whyte* s.n. Between Nandi and Mumias, *Whyte* s.n. Limuru, 10 June 1918, *Snowden* 582. Mau, Nov. 1905, *Baker* 339. Mau Forest, *Mettam* 236. Mt. Elgon: 1950–2250 m., Oct. 1930, *Lugard* 215; 1920 m., 28 Feb. 1931, *Lugard* 538. Rumuruli District, 1800 m., July 1931, *Napier* 1229.

Uganda Protectorate. Bchungi Swamp, 2400 m., and common at this altitude throughout the Virunga Mts. area, 1 Dec. 1930, *B. D. Burtt* 2924. Kitakata, Shema County, Ankole, 24 Jan. 1929, *Snowden* 1288.

Tanganyika Territory. Arusha, 1500 m.: Dec. 1927, *Haarer* 916; Oct. 1925, *Haarer* 79b. Kamachuma Road, Bukoba District, 1200 m., Sept. 1931, *Haarer* 2296.

In the original publication of this species, *Crassula Wrightiana* was placed provisionally in the *Bulliarda* group of the section *Tillaea* (Linn.) Schönl. beside *C. aquatica* (Linn.) Schönl., which it closely resembles in habit. Further investigation shows, however, that, on account of its uniovulate carpels, it must be assigned to the *Helophytum* group of the same section, and is nearly related to *C. natans* Thunb., from which it differs as indicated in the diagnosis. Some specimens of *C. Wrightiana* and some of *C. natans* are strikingly similar in general appearance, but the differential characters appear to be constant. It seems not unlikely that Schönland's conception of *C. natans* included the plant figured here. There are no specimens of *C. natans* Thunb. from East Africa in the Kew Herbarium, and the "distinct robust variety which Engler mistook for a variety of *C. Vaillantii* (Willd.) Roth" * may have been *C. Wrightiana*.

C. Wrightiana is a more or less amphibious plant of the high swamps and watercourses of East Africa, and the great range of variation in habit corresponds with varying amounts of water in the habitat. When growing in comparatively deep water, the internodes elongate to bring the upper portions above the surface, whilst in drier situations the internodes remain very short. The plant evidently grows in dense masses, the individual stems providing mutual support, in addition to that given by the water to the aquatic form. It is assumed that the erect, unbranched habit is normal for the plant; the procumbent, slightly branched habit is apparently produced by the lowering of the water-level in seasonal ponds and streams, thus removing the support necessary for the weak, succulent stems.

The plant is named in honour of Mr. C. H. Wright, late of the Herbarium, Kew, whose notes on his dissection of Mr. Dowson's specimens are attached to the type sheet.—A. A. Bullock.

Fig. 1, a long unbranched stem (*Lugard* 215), *natural size*; 2, a stouter branched form (*Burtt* 2924), *natural size*; 3, a dwarf form (*Lugard* 538), *natural size*; 4, partially expanded flower, × 8; 5, expanded flower, with one petal bent back to show the androecium and gynoecium, × 8; 6, stamens, × 12; 7, gynoecium and squamae, × 12; 8, longitudinal section of a carpel, showing ovule, × 12; 9, seed, × 20.

* Schönland in Ann. Bolus Herb. ii. 49 (1916).


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Tabula 3219.

CEROPEGIA FILICALYX *Bullock.*

Asclepiadaceae. Tribus Ceropegieae.

C. filicalyx *Bullock* in Kew Bull. 1933, 145; *C. abyssinicae* Deene. affinis, sed calyce duplo longiore, corollae lobis minoribus, indumento densiore, habitu majore differt.

Herba erecta, usque 1 m. alta, caulibus simplicibus satis dense patenterque hirsutis. *Folia* angustissime oblonga vel anguste oblongo-oblanceolata, apice satis acuta, basin versus angustata, 6–12 cm. longa, circiter 1–1·5 (raro 2) cm. lata, supra subappresse pilosa, infra patenter pilosa, nervis lateralibus utrinseeus circiter 7, petiolis hirsutis 1 cm. longis. *Flores* 3–5 ex axillis foliorum fasciculati, pedicellis gracilibus usque 2 cm. longis patenter albido-villosis. *Calyx* fere ad basin divisus, segmentis 5 filiformibus circiter 1 cm. longis, cum glandulis triangulari-lanceolatis satis carnosis circiter 0·6–0·7 mm. longis alternantibus. *Corollae* lobi 5, oblongi, inflexo-apiculati, apiculis inter se cohaerentibus, 7·5–8 mm. longi, apicem versus extra leviter pubescentes, marginibus undulatis, extra ochroleuci, intus carinati, brunneo-purpurei; tubus oblongo-ovoideus, 1 cm. longus, medio 4 mm. diametro, glaber, brunneo-purpureus sed annulo ochroleuco notatus. *Corona* duplex, tubo staminco affixa; exterior ex saccis 5 minutis, antheris alternantibus; interior in lobos 5 caudiformes 1·1–1·2 mm. longos antheris oppositos supra gynostegium producta, apice inter se conniventes. *Antherae* supra gynostegium incurvae; pollinia minuta, e glandula valde adscendentes. *Fructus* ignotus.

Tanganyika Territory. Kikori, 1260 m., 14 May 1930, *B. D. Burtt* 2755 (type). Moshi, 900 m., June 1928, *A. E. Haarer* 1493.

Ceropegia filicalyx is one of the comparatively few erect species of the genus, and is interesting phytogeographically on account of its obvious relationship with *C. abyssinica* Deene., a native of Abyssinia, known only from Schimper's collections in 1843 and 1853. The root-stock of the latter species is a fleshy or half woody tuber, and it may be assumed that that of *C. filicalyx* is a similar structure. Morphologically, the large intersepaline glands (figures 2 and 6) form an interesting

feature: their function, if any, is unknown. The position of the glandular pollen-carriers on the rim of the peltate top of the gynostegium is well indicated in figure 3, showing that each bears a pollinium from adjacent pollen-sacs of different anthers, a fact which is not made clear in some of the published figures of plants in this family.

Mr. B. D. Burtt, who has collected so many undescribed species in Tanganyika Territory, describes this plant as a very local erect herb $2\frac{1}{2}$ ft. high, growing in woods of *Acacia usambarensis* Taub.

A. A. Bullock.

Fig. 1, upper part of flowering stem, *natural size*; 2, flower, × 3; 3, flower with perianth removed, showing outer and inner corona, anthers and pollinia, × 16; 4, the same, with an inner corona lobe and a stamen removed, showing the peltate stigmatic disk, × 16; 5, pair of pollinia, × 45; 6, gynoecium surrounded by intersepaline glands, × 16.


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after Miss F M Leighton

Tabula 3220.

ENCEPHALARTOS KOSIENSIS *Hutch.*

Cycadaceae. Tribus Encephalarteae.

E. kosiensis *Hutch.* in Kew Bull. 1932, 512, et in Hill Fl. Cap. v. sect. 2, Suppl. 34, fig. 5 (1933); species foliolis superne subaequaliter 3–5-lobatis, inferioribus ad aculeos sensim redactis, strobilis pro genere parvis ♀ ovoideis distinctissima.

Truncus usque ad 3·5 m. altus, ultra 30 cm. diametro. *Folia* apice caulis dense aggregata, 0·8–1 m. longa, petiolo 5–8 cm. longo; rhachis recta vel leviter recurva, apice leviter producta; foliola circiter 30-juga, erecto-patentia et leviter imbricata, superiora minora et subfalcata, inferiora ad aculeos sensim redacta, majora late oblonga, circiter 8 cm. longa et 2·5 cm. lata, basi circiter 8 mm. longa et supra rhachin longitudinaliter inserta, rigide coriacea, margine inferiore lobis spinosis rigidis breviter triangularibus 5–7, margine superiore lobis similibus minoribus 1–3 armata, nervatione parallela. *Strobilus* ♂ breviter pedunculatus, ellipsoideus, 10–13 cm. longus, 2·5–3 cm. diametro, rubro-salmoneus; axis circiter 6 mm. diametro; squamae paucis basalibus exceptis fertiles, cuneatae, superne rhomboideae, planae, inferne ubique microsporangiis (usque ad 200) 2–3–4-natis indutae, majores circiter 1·3 cm. longae et latae. *Strobilus* ♀ breviter pedunculatus, late ovoideus, maturus circiter 20 cm. longus et 15 cm. diametro, rubro-salmoneus; axis circiter 2·5 cm. diametro; squamae fertiles circiter 70, reliquis numerosis ad basin et apicem infertilibus, circiter 5·5 cm. longae et 4·5 cm. latae, stipite graeili usque ad 3 cm. longo, parte exteriore rhomboidea areola media depressa laevi excepta rugosa, firme carnosae. *Semina* oblonga, e basi ad apicem sensim angustata, leviter angulata, truncata, circiter 4 cm. longa et 2 cm. diametro, tegumenti parte exteriore carnosa et aurantiaco-rubra, intermedia oblonga utrinque rotundata circiter 2·5 cm. longa et 1·2 cm. diametro ossea venis superficialibus longitudinalibus notata, interiore membranacea.

South Africa. Northern Zululand, near Kosi Bay, in coastal sand-dunes and bush, *Aitken and Gale* 63 (type); *Col. Lugge* in Natal Herb.

16507. Cultivated by Col. G. Molyneux at the " Old Fort," Durban, and in the Kirstenbosch Botanic Garden, Newlands, Cape Province.

This remarkable Cycad was first recorded by Colonel Lugge at Kosi Bay, and a leaf specimen collected by him is preserved in the Natal Herbarium (16507). In 1920 R. D. Aitken and G. W. Gale made a journey to the Ingwavuma District of Zululand and collected further material, the record in their report (Bot. Survey S. Afr., Mem. 2, 18 : 1921) being " (63) Encephalartos sp. Right on coast and in sand-dune bush, E. Ingwavuma." In Fl. Cap. v. sect. 2, Suppl. 34 (1933), the locality is recorded as " behind sand-dune bush near Kosi Lake," and the collectors are quoted for the statement " stems at most a few inches high." The description of the species given by Hutchinson is founded on the leaf specimen mentioned above and on this statement by Aitken and Gale.

The existence of this species was brought to my notice by Brig.-General J. Wylie, and in 1932 Colonel G. Molyneux of Durban contributed five living specimens to the National Botanic Garden, Kirstenbosch, where they have established themselves satisfactorily and produced new leaves. One of these, with a trunk 16 inches high and a crown of 21 leaves, is figured in the accompanying plate. Two more large plants and several seedlings were received at Kirstenbosch during 1933 from General Wylie. Colonel Molyneux also gave me magnificent specimens of the male and female cones in July 1932, from which coloured drawings were made by Miss F. M. Leighton at the Bolus Herbarium. These form the basis of the present plate. Prior to the receipt of the plants now at Kirstenbosch, Colonel Molyneux had succeeded in establishing this species in cultivation in the garden of the Old Fort at Durban.

The material and information received from Colonel Molyneux enable the original description to be considerably amplified. The following statements are quoted from Colonel Molyneux' letters :—

" *Encephalartos kosiensis* grows on the sea-shore on the sand-dunes and in the coastal bush within 250 yards of the sea. . . . It is common in the coast sand-dunes in scattered groups for a matter of 15 miles, and a few specimens have been observed up to 10 miles inland within a few miles of the Portuguese border. . . . The coast belt of northern Zululand is unhealthy in the wet summer, and in the dry winter, prior to the introduction of motor-cars, was rather inaccessible, for there is 80 miles of sand to be got over which is soft when dry. These facts are sufficient to explain why this Cycad should have remained unknown for so long." Aitken and Gale (l.c.) also refer to the difficulties of transport through this region, so that " a day's journey rarely exceeds twelve miles." " . . . The tallest plant seen was 11 feet in height and about 3 feet 6 inches in girth. Plants from 6 to 9 feet are common. Seed brought to Durban has germinated freely. . . . Its foliage is distinctive enough, something like that of *E. latifrons*, but the leaves are longer and do not curve : but the really interesting point is that the

cones are a flaming scarlet, male and female. The nearest I know to this is *E. gratus* from British Central Africa of which the cones (in the Durban Botanic Garden) are a pale pink. . . . Apart from the red colour of its cones and its distinctly shaped pinnae, the very numerous leaves in its crown, which may even be described as crowded, and a more circinate arrangement of the young pinnae than is usual in the Cycads I know, may be worthy of remark."

The genus *Encephalartos* has been divided by Pilger (in Engler u. Prantl, Nat. Pflanzenfam. ed. 2, xiii. 80 : 1926) into three sections on the basis of the form of the exposed end of the female cone-scales. *E. kosiensis* would fall into Section B, along with the Central African species *E. gratus* Prain, *E. Hildebrandtii* A. Braun et Bouché, and *E. Barteri* Carruthers.

The information here given with regard to the stature of *E. kosiensis* necessitates the revision of the clavis in Fl. Cap. v. sect. 2, Suppl. 28, and also modifies the conjecture made in the addendum-slip inserted therein.—R. H. Compton (Kirstenbosch).

Since the receipt of Professor Compton's description and notes Mr. Cyrus R. Barrett, of Durban, has written to the Editor as follows : " I collected a dozen or so specimens [of *E. kosiensis*] at Kosi Bay last year. I also got three seed-cones from which I obtained 250 seeds ; these I planted last November [1932] and now have just over 200 seedlings, which are doing well.

I visited the area again early this month [July 1933], and examined the plants there. It appears to me that those plants growing within three miles of the Bay and five from the sea-shore are different from those growing twenty-two miles from the shore. Those found near the Bay were growing in the open on sandy grass-veld ; the stems ranged from 12 inches to 50 inches high ; leaves up to 3 ft. long. Those growing in bush about twenty-two miles inland have practically no stem showing above ground, the leaves are longer, running up to 5 ft., and the leaflets longer and narrower. The line of bush in which these were found runs parallel with the sea-shore, and no plants were seen farther than this from the coast, and no seed-cones were seen although a thorough search was made. In the space of a mile I counted roughly 250 plants, in some parts so close together that it was impossible to walk through the bush."

This information is particularly valuable because it confirms the original statement of Aitken and Gale, published in the Supplement to the Flora Capensis, that plants of this species have in some localities " stems at most a few inches high."

When this species was described for the Flora Capensis I had seen only the upper half of a leaf in the Natal Herbarium, and was unfortunately not aware that living specimens had been sent to the Kirstenbosch Botanic Garden. But the leaf material was sufficient to show that the species was distinct, and the bright red cones amply confirm this view.

E. kosiensis differs from all others in that the middle leaflets show no definite terminal lobe, but are equally lobed all round the top. The gradual reduction of the lower leaflets to prickles is a good diagnostic feature, other South African species showing the same character being *E. villosus* Lem., *E. Woodii* Sander, and *E. paucidentatus* Stapf et Burtt Davy.—J. HUTCHINSON.

FIG. 1, whole plant, showing habit, much reduced; 2, basal part of leaf, showing reduction of lower leaflets to prickles, × $\frac{2}{3}$; 3, upper leaflets, × $\frac{2}{3}$; 4, one leaflet from near the middle of the leaf, × $\frac{2}{3}$; 5, male cone, × $\frac{1}{3}$; 6, scale from male cone, *natural size*; 7, female cone, × $\frac{1}{3}$; 8, scale and seeds, × $\frac{2}{3}$.


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Tabula 3221.

FOCKEA CYLINDRICA *R. A. Dyer.*

Asclepiadaceae. Tribus Marsdenieae.

F. cylindrica *R. A. Dyer* in Kew Bull. 1933, 459; affinis *F. eduli* (Thunb.) K. Schum. et *F. crispae* (Jaeq.) K. Schum., ab illa foliis supra paullum glaucis, corollae segmentis linearibus 7–8 mm. longis, coronae tubo quam corollae tubo breviore, ab hac foliis glabris et paullum glaucis, ab ambabus corollae tubo cylindrico 4 mm. longo differt.

Herba perennis, radice tuberosa magna. *Caules* perennes, subligenosi, sparse ramosi; rami annui, graciles, herbacei, minutissime puberuli, usque ad 25 cm. longi vel verisimiliter longiores. *Folia* opposita, brevissime petiolata, ovata vel oblongo- vel elliptico-ovata, acuta vel acute apiculata, 1·6–2 cm. longa, 0·8–1 cm. lata, glabra, supra paullum glauca, marginibus plus minusve undulatis. *Flores* 2–4-ni, in fasciculis axillaribus dispositi; pedicelli 2 mm. longi, puberuli. *Calycis* segmenta lanceolata, 2–2·5 mm. longa. *Corolla* extra dense puberula, lobis intus glabris vel faucem versus puberulis; tubus cylindricus, 4 mm. longus; lobi linearcs, 7–8 mm. longi, in alabastro valde, flore aperto minus tortis, marginibus revoluto-plicatis. *Corona* tubulosa, tubo ejus quam corollae tubo breviore, basi circiter 1 mm. eum hoc conjuncta, intra appendicibus 5 filiformibus instructo; lobi 5, tridentati, 3 mm. longi, dentibus 5 parvis alternis. *Antherae* breves, erectae, membrana maxima elliptica hyalina terminatae.

South Africa. Albany Division: amongst karroid scrub on dry flats, near Committees in the Fish River Valley, 20 miles from Grahamstown, rare, Aug., *Dyer* 1635 (type).

The two species, *Fockea edulis* (Thunb.) K. Schum. and *F. crispa* (Jaeq.) K. Schum., to which *F. cylindrica* is most nearly allied, are recorded under the names *F. glabra* Deene. and *F. capensis* Endl. respectively in Dyer, Fl. Cap. iv. sect. i. 779–780. The former specific epithets have priority under the International Rules. Although *F. crispa* has been in cultivation in the Imperial Garden at Schönbrunn near Vienna for about 150 years, the native habitat was unknown until 1906, when the late Dr. R. Marloth rediscovered it in the Prince

Albert Division (Kew Bull. 1909, 349). Since then it has been collected in the same area by Miss Oosthuizen, who sent a large tuber to the Albany Museum, Grahamstown, where it is now growing in the Experimental Garden. A young plant presented to Kew by the Hon. Mrs. A. D. Ryder during 1932 will probably prove to be this species.

F. cylindrica is known only from the single collection recorded above. Duplicate material of the type is in the Albany Museum, Grahamstown.

R. A. Dyer.

Fig. 1, stem with leafy shoots, *natural size*; 2, flowering branch, *natural size*; 3, calyx, × 6; 4, corolla, × 4; 5, part of corona from within, × 6; 6, androecium, × 8; 7, stamen from within, with pollinia removed, × 8; 8, caudicle and pollinia, × 40; 9, gynoecium, × 8.


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Tabula 3222.

FOCKEA GRACILIS *R. A. Dyer.*

Asclepiadaceae. Tribus Marsdenieae.

F. gracilis *R. A. Dyer* in Kew Bull. 1933, 459; affinis *F. sinuatae* (E. Mey.) Druce, a qua caulibus superne tortuosis, marginibus foliorum minus undulato-sinuatis, coronae tubo lobis longiore differt.

Herba perennis, radice tuberosa. *Tuber* plus minusve oblongum, 15–20 cm. crassum, radicibus paucis tenuibus instructum; caudex perennis, subterraneus, sparse ramosus, usque ad 20 cm. longus, circiter 1 cm. crassus, succulentus vel sublignosus. *Caules* annui, graciles, superne tortuosi, 15–30 cm. longi, leviter carnosi, minute puberuli. *Folia* sessilia, linearia, 2–3 cm. longa, 1–2 mm. lata, supra minute puberula, infra glabra, apice incurvata, acuta, marginibus undulato-sinuatis reflexis vel revolutis. *Flores* axillares, 2–6-ni, in racemis brevissimis dispositi vel fasciculati; pedicelli 1–2·5 mm. longi, puberuli. *Calycis* segmenta anguste oblongo-lanceolata vel lineari-oblonga, 2 mm. longa, sinubus glandulis singulis minutissimis ima basi instructis. *Corolla* campanulata extra puberula; tubus 3–3·5 mm. longus; lobi lineares, 6–7 mm. longi, 1 mm. lati, obtusi, intus glabri vel sparse et minutissime puberuli, viridi-fusci. *Corona* tubulosa, 5 mm. longa, basi cum tubo corollae 1 mm. conjuncta; tubus 3·5 mm. longus, ex corollae tubo paullum exsertus, intra appendicibus 5 subulatis instructus; lobi 5, 1·5 mm. longi, tridentati, dente medio quam lateralibus multo longiore. *Antherae* breves, erectae, membrana maxima elliptica hyalina terminatae.

South Africa. Albany Division: amongst short Karroo bushes on Dikkop Flats, 22 miles from Grahamstown, rare, March, *R. A. Dyer* 1251 (type).

Up to the present time *Fockea gracilis* has been recorded only from the single locality cited above, an arid sandy plain in the Great Fish River valley, where the rainfall seldom exceeds 12 in. per annum and occasionally is as low as 5 in. As would be expected, the vegetation is decidedly karroid in habit, in fact the locality is at the south-eastern limit of typical Karroo vegetation. The flowering stems of *F. gracilis*, which twine on the small bushes 6–12 in. high, are produced annually from the underground perennial stock.

The species most closely allied to *F. gracilis* is *F. sinuata* (E. Mey.) Druce (= *F. undulata* N. E. Br.). As far as records go, the latter is known only from the Beaufort West and Prince Albert Divisions and was last collected over 100 years ago.

As a rule, species of *Fockea* seem to be represented by comparatively few individuals. All have tuberous rootstocks, which in some cases attain a size of about 2 ft. in thickness, and as has been recorded on more than one occasion previously, Bushmen, Hottentots and other natives of Southern Africa make use of the tubers of certain species as a source of food. No doubt certain animals such as baboons seek *Fockea* species for the same reason. It is probable, therefore, that this is an important factor in their distribution. Early colonists soon learnt the value of *Fockea* tubers, and even up to the present day they are sought and uprooted for the preparation of preserve ("confeit").

Duplicate material of *F. gracilis* is in the National Herbarium, Pretoria, and the Albany Museum Herbarium, Grahamstown.

R. A. Dyer.

Fig. 1, flowering shoot with upper part of caudex, *natural size*; 2, flower, × 3; 3, corona, from within, showing the tridentate lobes and the appendages, × 6; 4, androecium, × 8; 5, stamen, from within, with pollinia removed, × 8; 6, caudicle and pollinia, × 20; 7, gynoecium, × 8.


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Tabula 3223.

STRYCHNOS TABASCANA *Sprague et Sandwith.*

Loganiaceae. Tribus Strychneae.

S. (§ **Longiflorae**) **tabascana** *Sprague et Sandwith* in Kew Bull. 1927, 128; *S. triplinerviae* Mart. e Brasilia affinis, a qua foliis minus coriaceis longius acuminatis, corollis longioribus gracilioribus sparsius indutis, staminibus longius exsertis filamentis manifestis, fauce glabra differt; a *S. longissima* Loes. corollae indumento valde diversa.

Frutex verisimiliter scandens; ramuli annotini 2–3 mm. diametro, pubescentes; ramuli hornotini gracillimi, pubescentes; internodia 3–4·5 cm. longa. *Folia* ovata, ovato-lanceolata vel elliptico-lanceolata, acutissime acuminata, basi cuneata usque rotundata vel etiam leviter cordata, 5–11·5 cm. longa, 2·7–4·8 cm. lata, utrinque costa nervisque lateralibus breviter pilosa, mesophyllo marginibusque pilis raris induta, nitidula, supra minute granuloso-punctulata, quintuplinervia, nervis tertiariis conspicuis subparallelis; petioli dense pubescentes, 3–5 mm. longi. *Inflorescentiae* ramulos breves paria foliorum 1–3 gerentes terminantes, et terminales et in axillis foliorum summorum, corymboso-thyrsoideae; pedunculi pubescentes, cymarum terminalium 3–9 mm. longi, axillarium 8–12 mm. longi; cymulae ultimae triflorae, florc medio subsessili, lateralibus cum pedicellis dense pubescentibus 2–3·5 mm. longis; bracteae lineari-subulatae, dense pubescentes, 2–3·5 mm. longae. *Calycis segmenta* subulato-lanceolata, extra pilosa atque longe ciliata, circiter 3 mm. longa. *Corolla* gracilis, hypocrateriformis; tubus fulvo-pilosulus, praeterea serie pilorum longorum patente vel ascendente conspicua praeditus, intus basi ac apice exceptо albo-lanatus, 1·5–1·7 cm. longus, ad 1 mm. diametro; lobi demum reflexi, lineari-oblongi, obtusi, ad 4 mm. longi, extra indumento tubi praediti, intus cinereo-pulverulenti. *Stamina* summo tubo inserta, conspicue exserta; filamenta 1·5–2 mm. longa, glabra; antherae 1 mm. longae. *Ovarium* glabrum, 0·75 mm. diametro; stylus glaber, cum stigmate capitato 2–2·1 cm. longus, igitur fere ad 4 mm. e corollae fauce exsertus.

Mexico. Tabasco; San Sebastian, fl. Feb. 16, 1889, *Rovirosa* 361.

This species belongs to a rather distinct group in the section *Longiflorae*, the members of which are characterised by terminal

inflorescences, by ascending pubescence on the young branchlets and petioles, and by their leaves being more or less glabrous except for the main nerves and for scattered hairs on the margins, and verruculose-punctate above. Other members of this group, evidently allied to *S. tabascana*, are *S. panamensis* Seem., *S. cogens* Benth. of British Guiana (the flowers of which are still unknown), and *S. triplinervia* Mart.—N. Y. Sandwith.

Fig. 1, flowering branch, *natural size*; 2, calyx, × 4; 3, corolla, laid open, × 4; 4, gynoecium, × 4.


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Tabula 3224.

STRYCHNOS ASPERULA *Sprague et Sandwith.*

Loganiaceae. Tribus Strychneae.

S. (§ **Longiflorae**) **asperula** *Sprague et Sandwith* in Kew Bull. 1927, 131; *S. rondeletioidi* Spruce ex Benth. affinis, corollis haud pulverulentis fauce haud lanata, foliis minus coriaceis supra subtilissime tantum reticulatis, nervis tertiariis inconspicuis differt.

Frutex scandens; ramuli hornotini ascendentes, graciles, glabri; annotini obtuse quadrangulares, dense lenticellati, cortice cinereo. *Folia* ovata vel elliptica, acuminata, basi cuneata vel subrotundata, 8–10 cm. longa, 3·8–5 cm. lata, tenuiter coriacea, utrinque vix nitidula, glabra, quintuplinervia, nervis tertiariis inconspicuis, sed rete venularum elevato subtilissimo, supra punctis elevatis creberrimis asperula; petioli graciles, 4–8 mm. longi, 0·75–1 mm. lati. *Inflorescentiae* terminales, dense corymboso-thyrsoideae, floribus fere sessilibus; pedunculi 1·5–2·5 cm. longi, glabri; rhachis cum ramis suis acute angulata, pubescens; bracteae 1–2·5 mm. longae, connatae, ciliatae. *Calycis segmenta* rotundato-ovata, obtusa, 0·75 mm. longa, ciliata. *Corolla* ochroleuca, hypocrateriformis; tubus utrinque glaber, 8·5 mm. longus, 0·5–0·75 mm. diametro, fauce haud lanata; lobi patentes vel subreflexi, lineari-lanceolati, 2·5 mm. longi, obtusi, intus cinereo-pulverulenti, praesertim marginibus ac apicem versus. *Stamina* in fauce inserta, filamentis brevissimis; antherae e fauce exsertae, 1·75 mm. longae. *Ovarium* ovoideo-ellipsoideum, glabrum, 1 mm. longum, circiter 0·5 mm. diametro; stylus glaber, cum stigmate capitato 1 cm. longus.

Brazil. Amazons basin: Rio Acre; Seringal São Francisco, fl. Sept. 1911, *Ule* 9838.

A well-marked species, clearly allied to *S. rondeletioides* Spruce ex Benth., but easily distinguishable by the absence of wool at the throat of the corolla and the other characters indicated in the diagnosis.

The glabrous tube of the corolla is an important feature which is rare in tropical American species of the section *Longiflorae*. It is shared by two very interesting and distinct species recently described by Dr. Ducke (Bull. Mus. Hist. Nat. Par. sér. 2, iv. 745), from

the Amazons basin, which are represented in the Kew Herbarium. Of these, *S. trichostyla* Ducke is immediately distinguished from *S. asperula* by its axillary inflorescences and hairy style; while *S. ramentifera* Ducke differs in its leaves and its much longer stouter corollas. A third new species of this section, *S. divaricans* Ducke, with terminal inflorescences, is interesting since its tube is glabrous in the lower half, and minutely papillose-tomentellous in the upper half; this again differs widely from *S. asperula* in characters of the foliage and inflorescence.—N. Y. Sandwith.

Fig. 1, upper part of flowering branch, *natural size*; 2, portion of lower surface of leaf, × 3; 3, calyx and bracteoles, × 8; 4, corolla, laid open, × 4; 5, gynoecium, × 4.


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Tabula 3225.

STRYCHNOS PEDUNCULATA (*DC.*) *Benth.*

Loganiaceae. Tribus Strychneae.

S. (§ **Longiflorae**) **pedunculata** (*DC.*) *Benth.* in Journ. Linn. Soc., Bot. i. 105 (1857); Progel in Mart. Fl. Bras. vi. pars i. 275 (1868); Sandwith in Kew Bull. 1933, 397. *Rouhamon pedunculatum* DC. in DC. Prodr. ix. 561 (1845). *Strychnos Schomburgkiana* Klotzsch in Rich. Schomb. Reisen, iii. 1144 (1848), nomen. *S. trinitensis* Griseb. Fl. Brit. W. Ind. 407 (1861).—*S. Mitscherlichii* Rich. Schomb. (*S. smilacinae* Benth. pro majore parte) affinis, foliis plerumque minoribus firme chartaceis tantum vel vix coriaceis intricatius reticulatis, rhachi ramisque inflorescentiae conspicue pubescentibus nec glabris, calycis segmentis extra et pubescentibus et ciliatis differt.

Frutex scandens; ramuli hornotini pubescentes vel glabrescentes. *Folia* ovata usque elliptico-oblonga vel oblongo-lanceolata, breviter obtuse acuminata, basi abrupte cuneata, 4–12 cm. longa, 2–6 cm. lata, firme chartacea, vix subcoriacea, nitida, glabra, quintuplinervia, utrinque intricate reticulata, supra haud granuloso-punctata; petiolus minute pubescens, demum glabrescens, usque 7 mm. longus. *Inflorescentiae* axillares, usque 4·5 cm. longae, anguste thyrsoideae, ubique conspicue pubescentes; ramuli oppositi, horizontales vel ascendentes, breves, vulgo cymis simplicibus trifloris terminati; bracteae 1·5–4 mm. longae, pubescentes; pedicelli 1–3 mm. longi. *Calycis segmenta* inaequalia, ovata usque subanguste ovato-lanceolata, ad 1·3 mm. longa, 0·6–1 mm. lata, obtusa, extra pubescentia atque ciliata. *Corolla* alba, hypocrateriformis; tubus gracillimus, 3–6 mm. longus, extra minutissime papilloso-tomentellus, intus basi glabra excepta pilosiusculus; lobi vix 3 mm. longi, intus triente inferiore dense lanati ceterum papilloso-tomentelli. *Stamina* in fauce sub lana loborum inserta, subsessilia; antherae inclusae. *Ovarium* glabrum; stylus cum stigmate capitato glaber, sub anthesi breviusculus.

British Guiana. Roraima, fl. Nov., *Schomburgk* 482 (= 792B) in Herb. Kew., Mus. Brit., Cantab., Paris., isotypus speciei. Cotinga River, W. of Pirara, *Richard Schomburgk* sine numero in Herb. Kew., Cantab., sub numero 792 in Herb. Paris. Rupununi Savannahs,

Pirara, fl. Sept. 1931, *Davis* in *Forest Department* no. 2184, Herb. Kew., typus iconis; a bush-rope in savannah forest, with sweet-scented white flowers.

Trinidad. Caura, fl. Sept. 1849, *Crueger* in Herb. Kew., typus vel isotypus *S. trinitensis* Griseb.

Mr. Davis' material, from which the accompanying figure was drawn, is of value, not only as the rediscovery of a rare species, but also as proof that the corolla-tube may be much longer than described by Progel in the Flora Brasiliensis from the Schomburgk material at Berlin. The Kew specimens of *Schomburgk* 482 (= 792B) are equally short, being about $1\frac{1}{2}$ lines (3 mm.) long; but De Candolle originally described the tube as 3 lines (6 mm.) long from material of the same collection at Geneva. Even, however, with such short corollas before him, Progel was quite unjustified in placing *S. pedunculata* in his section *Rouhamon*, since its corolla-tube is always longer than the lobes, and its affinity is clearly with the species of the *Longiflorae* which bear axillary inflorescences. *S. pedunculata* was correctly placed in the *Longiflorae* by Solereder in Engl. Pflanzenfam. iv. 2. 39 (1895), and this writer also indicated the very close affinity of *S. trinitensis* Griseb. Careful comparison of *S. pedunculata* and *S. trinitensis* fails to show any characters by which they can be kept apart as distinct species.

N. Y. Sandwith.

Figs. 1, 2, flowering branchlets, *natural size*; 3, flower, × 4; 4, calyx, × 4; 5, corolla, laid open, × 4; 6, gynoecium, × 4.


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Tabula 3226.

SILENE ASTERIAS *Griseb.*

Caryophyllaceae. Tribus Sileneae.

S. Asterias *Griseb.* Spic. Fl. Rumel. et Bithyn. i. 168 (1843); Boiss. Fl. Or. i. 654 (1867); Rohrbach, Monogr. Silene, 150 (1868); Pančić, Fl. Princip. Serb. 166 (1874); Nyman, Consp. Fl. Eur. 89 (1878), et Suppl. 51 (1889); Velenovský, Fl. Bulg. 66 (1891); Rouy, Illustr. Pl. Eur. Rar. fasc. i. 2, t. 4 (1895); F. N. Williams in Journ. Linn. Soc., Bot. xxxii. 109 (1896); Gürke in Richter, Pl. Eur. ii. 304 (1899); Beck in Glasnik, xix. 20 (1907); Rev. Hortic. 1908, 111, fig. 35; Vandas, Reliq. Formánek. 61 (1909); Adamović in Engl. u. Drude, Veget. der Erde, xi. 82, 105, 367, 481, 500 (1909); Košanin in Pros. Glasnika, 1910, 28; Košanin, Elem. Vlasinske Flore, seorsim impr. 28 (1910); Degen ex Fritsch in Mitt. Naturw. Ver. Steiermark xlvi. 307 (1910); Košanin in Glas. Srp. Kralj Akad. Beograd, lxxxv. 234 (1911); Aschers. u. Graebn. Syn. Fl. Mittel-Eur. v. 2, 156 (1921); Velenovský, Reliq. Mrkvičk. 7 (1922); Stoyanoff et Stefanoff, Flor. Bulg. 378 (1924); Hayek, Prodr. Fl. Penins. Balcan. i. 272 (1924); Bornmüller in Engl. Bot. Jahrb. lix. 409 (1924).—*Saponaria Asterias* Griseb. Reise durch Rumelien und nach Brussa, ii. 110 (1841).—Ab *S. compacto* Friv. duratione perenni, inflorescentia minore floribus paucioribus praedita, pedunculo multo longiore facile distinguitur.

Herba perennis, glaber. *Rhizoma* repens, breviter stoloniferum, sureulis sterilibus praeditum. *Caules* erecti, simplices, 5·4–6·2 dm. alti, basi 6–8 mm. superne 1–4 mm. diametro, internodiis sursum longioribus 4·5–20 cm. longis (pedunculo excepto) teretibus longitudinaliter striatis sub nodis viscosis. *Folia* oblanceolata, vel suprema elliptico-lanceolata, acuta vel ima obtusa, suprema breviter acuminata, inferne gradatim angustata, basi in vaginam 5–12 mm. longam internodii basin libere ampleetentem connata, ima 6 cm. longa et 2 cm. lata, media usque ad 16·4 cm. longa et 3 cm. lata, suprema 6 cm. longa et 1·8 cm. lata vel minora, laete virentia, integra vel parce minute denticulata, costa nervisque supra inconspicuis infra subprominentibus, nervis lateralibus e costa angulo valde acuto excurrentibus. *Cyma* terminalis, multi- (20–40-) flora, 3–3·5 cm. diametro, capituliformis, floribus fere sessilibus; bracteae exteriores involucrantes, ovato-lanceolatae vel lanceolatae, plus minusve scarioso-

membranaceae, apice attenuato- vel cuspidato-acuminatae, circiter 2 cm. longae et 0·8 cm. latae; interiores lineari-lanceolatae, 4–5 mm. longae vel breviores; pedunculus 2–2·7 dm. longus. *Calyx* clavatus, 1·4 cm. longus, superne rubens, dentibus ovato-lanceolatis apice subulato-attenuatis 3–4 mm. longis. *Petala* oblanceolato- vel oblongo-spathulata, apice fere truncata vel crenulato-truncata, inferne in unguem sensim attenuata, 1·2 cm. longa, 1·75 mm. lata, squamis coronae 2 brevissimis praedita. *Stamina* subinaequalia; filamenta alterna petalis basi adnata, 8 et 10 mm. longa; antherae 1·5 mm. longae. *Ovarium* cylindricum, 4·5 mm. longum, 1·75 mm. diametro; styli 6·5 mm. longi; carpophorum circiter 6 mm. longum. *Capsula* inferior clavato-cylindrica, 6 mm. longa, dentibus 6 ovatis exsiccando superne valde recurvis 1·5 mm. longis instructa; carpophorum 5 mm. longum.

South Macedonia. Malka Nidjé, west of Lake Ostrovo, 1350–1500 m., *Grisebach*; Pisoderion, 12 June 1932, 1230 m., swampy spots in upland meadows in valley, very handsome deep crimson flowers, *Alston and Sandwith* 811.

This very distinct species is endemic in the central parts of the Balkan Peninsula. It appears to be fairly widespread in Bulgaria, having been recorded from the Rila Dagh, Stara Planina, Sredna gora, Osogovo, and Plana Planina. In Serbia it is known from Vlasina, Ostrozub, and Kopaonik. In Northern Macedonia, Bornmüller found it on the Golešnica and Dudica Planinas and on Peristeri, while Košanin lists it from Jakupica. Alston and Sandwith's specimens, quoted above, are from the southern limit of the species, so far as known at present. The records from Albania, Montenegro, and Hercegovina are doubtful.

Grisebach, in his Spicilegium, gives the habitat and locality as "in regione alpina Macedoniae: socialis in pratis humidis juxta rivulos m. Nidgé alt. 4400′–4870′ (substr. marmor.) (unde descendit cum aquis nonnunquam in regionem Pinus)! Fl. Jun." In his Reise, ii. 166, the plant is listed, in a footnote, as *Saponaria Asterias* nov. sp. Reading pp. 163–174 of this most interesting book, it becomes clear that Grisebach never crossed or climbed the Nidjé (Nidže or Nidgé) Planina proper, as the name is now applied, and which rises in Mt. Kaymakchalan to 2549 m. (8284 ft.). He crossed the Malka Nidjé, to the west of Lake Ostrovo, from Zejjen (Chegan) to Cruscherat (probably Krushograd). Grisebach's specimen at Kew is written up "Scardus," but this is certainly erroneous if, as is generally held, the name Scardus should be accepted as synonymous with that of the Shar Planina.

S. Asterias appears to be limited to the zones from the damp upland to the subalpine meadows, most often at between 1200 and 1700 m. altitude, though Bornmüller records it from 1000 m. on the Dudica Planina. No close relationship can be traced for the species except that with *S. compacta* Fisch., which has a much wider distribution than *S. Asterias* and is a commoner plant. The geographical ranges of the two species overlap in Bulgaria and Macedonia, but that of *S. Asterias*

is on the whole the more north-western in the Balkan Peninsula. *S. compacta* extends widely outside the Peninsula to Syria, Asia Minor, and the Caucasus as well as northwards to the Banat and Transsilvania, and within the Peninsula occurs generally at lower altitudes. Since the perennial habit of *S. Asterias* is an important (i.e. a constant) taxonomic character and is undoubtedly correlated with the habitat conditions under which the plant grows, one may postulate an ecotypical segregation of *S. Asterias* from the more widely spread *S. compacta*.

W. B. Turrill.

Fig. 1, entire plant, × ½; 2, lower part of plant, *natural size*; 3, peduncle and inflorescence, *natural size*; 4, flower, × 2; 5, section of flower (calyx removed), × 2; 6, petal and stamen, × 4; 7, gynoecium, × 6; 8, soaked capsule (calyx opened), × 2; 9, seeds, × 12.

S.R-C.

Tabula 3227.

SILENE VENTRICOSA *Adamović*.

Caryophyllaceae. Tribus Sileneae.

S. ventricosa *Adamović* in Oesterr. Bot. Zeitschr. lv. 180 (1905); Hayek, Prodr. Fl. Penins. Balcan. i. 278 (1924); a *S. Roemeri* Friv. caulibus basi sublignescentibus, surculis foliiferis numerosis, calyce pruinoso-puberulo distinguitur.

Herba perennis, basi caespitosa, multicaulis, caulibus inferne sublignescentibus ramulos steriles dense foliatos subrepentes edentibus, floriferis erectis (15–)23–30 cm. altis simplicibus tenuibus dense puberulis. *Folia* radicalia fere rosulata, elongato- vel spathulato-obovata, obtusa vel leviter apiculata, in petiolum attenuata, 2–4·5 cm. longa, 0·4–1·5 cm. lata, utrinque dense puberula; caulina diminuta, remota, lineari-lanceolata vel fere linearia, acuta vel suprema attenuata, basi 1·5 mm. connato-amplexicaulia, inferne longe ciliata, suprema et albo-marginata et ciliata, 1–3·7 cm. longa, 1–5 mm. lata. *Cyma* ovata, fere capitata, compacta vel imo tantum verticillastro remotiusculo, 2·3–3·6 cm. longa, 1·5 cm. diametro; bracteae ovatae vel lanceolato-ovatae, in apicem attenuatae, 5–8 mm. longae, 1·5–3 mm. latae, puberulae, inferne praecipue ciliatae. *Calyx* ovatus, ventricoso-inflatus, pruinoso-puberulus, 10-nervius, usque ad 7 mm. longus, 4·5–6 mm. diametro, dentibus obtusis vel subobtusis fere 2 mm. longis et 2·5 mm. latis late membranaceis ciliatis. *Petala* alba, oblanceolato-cuneata, 8–9·5 mm. longa, 2·25 mm. lata, unguibus valde ciliato-barbatis, lamina biloba lobis 1–1·5 mm. longis. *Stamina* (in floribus ♂) filamentis 2·5–7 mm. longis hirsutis (inferne praecipue) antheris 1·5 mm. longis praedita. *Ovarium* (in floribus ♀) oblongum, circiter 3 mm. longum, 1·5 mm. diametro, glabrum; stigmata tria, 4–5 mm. longa. *Capsula* (ex *Adamović*) ovata, 4 mm. longa, 3 mm. diametro, carpophoro incrassato circiter 1 mm. longo suffulta.

South Macedonia. Mountains above Pisoderion, 1850 m., 2 July 1932, on granite rocks and in turf on summit ridges between Kibanitsa and the Jugoslavian frontier, *Alston and Sandwith* 1096; in alpinis m. Baba Planina (loc. cl.), July 1904, *O. Bierbach* (Herb. Mus. Brit.).

Albania. Grainos Mts., bushy slope (sandstone), 1380 m., 27 June 1933, *Alston and Sandwith* 1937; Ostrovicë Range, on grassy sandstone slopes, 2000 m., 4 July 1933, *Alston and Sandwith* 2079.

Adamović collected the type material of this species "in graminosis praealpinis et subalpinis montis Baba Planina Macedoniae australis." Alston and Sandwith collected their first (1932) excellent flowering material in what is essentially the southern part of the Baba Planina. Later material, collected by them in 1933, came from farther west in southern Albania. The 1932 material has only female flowers, whilst both the 1933 numbers consist of plants with male flowers, that is to say, the flowers have fully developed stamens but a reduced and probably non-functional gynoecium.

Some of Adamović's measurements do not tally with those obtained from Alston and Sandwith's material—notably the calyx, which is given by him as "4–5 mm. longus, 3·5–4 mm. latus," and the petals as "5–6 mm. × 2 mm." The new specimens show a greater range in leaf shape and size, especially in maximum dimensions, than is indicated in the original description. Adamović contrasts the species with *S. olympica* Boiss., a species from Asia Minor and not known from the Balkan Peninsula. This belongs to the same group of the *Otites* section as *S. ventricosa*, which appears to be at least as close morphologically to *S. Roemeri* Friv., a species widely spread through the central parts of the Balkan Peninsula. Typical *S. Sendtneri* Boiss. has entire petals ("petalis . . . ovato-oblongis obtusis") but Beck (Glasnik xviii. 21 : 1906) describes a var. (vel forma) *emarginata* with emarginate petals from Bosnia, and similar material has been collected in northern Albania. Indeed, I suspect that *S. Roemeri*, *S. Sendtneri*, *S. ventricosa*, and perhaps other members of the *Otites* group in the Balkan Peninsula are not sharply distinguishable one from another, although most specimens can be definitely placed. It is not possible to determine the significance of this from a study of herbarium material only. With regard to Thessalian material I am inclined to regard *Sintenis*, Iter thessalicum 1896, No. 817b, from Mt. Zygos, as *S. ventricosa* Adamović and *Haussknecht*, Iter Graecum 1885, from Mt. Zygos, above Metzovo, as either the same or as intermediate between *S. ventricosa* and *S. Roemeri*.

It should also be noted that Alston and Sandwith describe the calyx-teeth as "purple." In their dried material from all three localities the calyx-teeth and the upper parts of the calyx-tube, especially on the adaxial sides, are of a deep reddish purple. Adamović in the original description of *S. ventricosa* says "calyce . . . albido," and again "calycis fabrica toto coelo abhorret," and Bierbach's material in the British Museum (Natural History) herbarium agrees with these statements.—W. B. Turrill.

Fig. 1, part of a plant, *natural size*; 2, part of lower surface of leaf, × 8; 3, male flower, × 4; 4, petal and stamen of male flower, × 4; 5, androecium and abortive gynoecium of male flower, with one stamen removed, × 4; 6, female flower, × 4; 7, petal and staminode of female flower, × 4; 8, abortive androecium, and gynoecium of female flower, × 4.


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Tabula 3228.

LYCHNIS SUBINTEGRA (*Hayek*) *Turrill*.

Caryophyllaceae. Tribus Sileneae.

L. subintegra (*Hayek*) *Turrill*, status novus. *Lychnis Cyrilli* Degen et Dörfl. in Denkschr. Akad. Wiss. Wien, Math.-Naturwiss. Cl. lxiv. 13 (1897); Stoyanoff in God. Sofij. Univ. xv.–xvi. 88 (1918–1920); Velen. Reliq. Mrkvičk. 7 (Prague, 1922); non Richt. ex Reichb. Icon. vi. 55 (1844). *L. Flos-cuculi* L. subsp. *Cyrilli* Velen. Fl. Bulg. 57 (1891); Vandas, Reliq. Formánek. 58 (1909). *L. Flos-cuculi* L. var. *Cyrilli* Polak in Oesterr. Bot. Zeitschr. xliii. 379 (1893); Stoyanoff et Stefanoff, Fl. Bulg. 383 (1924). *L. Flos-cuculi* L. subsp. *subintegra* Hayek in Oesterr. Bot. Zeitschr. lxx. 14 (1921), in Denkschr. Akad. Wiss. Wien, Math.-Naturwiss. Cl. xcix. 120 (1924), et in Prodr. Fl. Penins. Balcan. i. 288 (1924). *L. Cyrilli* Richt. ex Reichb. subsp. *subintegra* Bornm. in Engl. Bot. Jahrb. lix. 411 (1924). *L. Flos-cuculi* Hal. Consp. Fl. Graec. i. 151 (1900) pro parte, non L.—A *L. Flos-cuculi* L. petalis albis vel pallide roseo-lilacino-suffusis multo brevioribus subintegris leviter quadrilobatis recedit.

Herba perennis, erecta, usque ad 6·7 dm. alta, fere glabra. *Caules* 1–4, longitudinaliter sulcati, angulis leviter retrorso-hispidis praecipue infra nodos. *Folia* caulina basi in vaginam 0·5–3 mm. longam connata, lineari-lanceolata vel lineari-oblanceolata, superne saepissime angustata, apice subobtusa, basi abrupte leviter angustata, sessilia, inferiora 3–6·5 cm. longa et 0·5–1·2 cm. lata, superiora gradatim breviora angustioraque et in bracteas transeuntia, costa prominente nervis lateralibus indistinctis. *Inflorescentia* 3-multiflora; pedicelli usque ad 4·6 cm. longi, plerumque multo breviores; bracteae inferiores anguste lineares, superiores lanceolatae, acutae, margine ciliatae et plus minusve membranaceae. *Calyx* anguste campanulatus, 0·9 cm. longus, apice 0·6 cm. diametro, dentibus ovato-triangularibus 3 mm. longis et usque ad 2·75 mm. latis margine membranaceis glanduloso-ciliatis. *Petala* alba, squamis coronae pallide lilacinis exceptis, vel pallide roseo-lilacino-suffusa, circiter 1·2–1·6 cm. longa, lamina 3·5–6 mm. lata leviter quadrilobata; squamae coronae lanceolatae, valde acutae vel acuminatae, 2–3 mm. longae, plus minusve dentatae. *Stamina* 9 (an semper ?), filamentis 5–7 mm. longis, antheris 1·75 mm. longis. *Ovarium* elongato-ellipsoideum, 4 mm. longum, 2·5 mm.

diametro; styli 5, 4·5 mm. longi; gynophorum 1 mm. longum. *Capsula* anguste ellipsoideo-ovoidea, 9 mm. longa, 4 mm. diametro, dentibus 5 anguste triangularibus 1·5 mm. longis instructa; carpophorum 1·5 mm. longum. *Semina* complanata, reniformia vel suborbicularia, tuberculata.

Thessaly. Pindus tymphaeus, Said Pascha, in prat. humidis, 9 July 1896, *Sintenis* 814.

Albania. District of Moskopolë, west of Korçe: Moskopolë, 1170 m., wet meadow, July 1933, *Alston and Sandwith* 2019.

North Macedonia. In locis paludosis prope Allchar, 16 June 1893, *Dörfler* 78.

South Macedonia. Armensko, in meadows and hayfields in the bottom of the valley, 1000 m., 2 June 1932, *Alston and Sandwith* 621.

Bulgaria. In pratis ad Dragalevtzi non procul a Sofia, 24 May 1915, *Stoyanoff*.

Lychnis Cyrilli Richt. ex Reichb. was named (p. 55) and figured (t. ccevi. fig. 5129b) in Reichenbach's Icones in 1844 and described (in synonymy) by Rohrbach in Linnaea xxxvi. 182 (1869). It is said in these publications to grow near Tergestum (Trieste), in Sicily, near Idria, and near Belgrade. Specimens at Kew are from "near Rome," "Napoli (nella valle di S. Rocco)," and Corsica. It is characterized chiefly by its slender pedicels, and Briquet (Prodr. Fl. Corse, i. 565: 1910) will not sustain it even as a variety of *L. Flos-cuculi* L. Degen and Dörfler were apparently the first authors to associate, wrongly, the plant here figured and described with *L. Cyrilli* Richt. ex Reichb. Under one or another combination the epithet *Cyrilli* has been used by many authors writing on the flora of the Balkan Peninsula, even since Hayek pointed out its inaccuracy in 1921.

Some justification must be given for raising Hayek's subspecies to full specific rank. In addition to the specimens quoted above, all of which are in the Herbarium at Kew, the following records may be accepted as most probably representing our plant: Nidže-Gebirge: zwischen Alšar und dem Tribor, auf feuchten Wiesen, 800–1000 m. (25 Juni 1918; *Scheer*), and Peristeri-Gebiet: bei Dolenci, auf Wiesen häufig, 800 m. (Juni 1918; *Gross* n. 225), recorded by Bornmüller in Engl. Bot. Jahrb. lix. 411 (1924). Albania: in pratis montanis inter Trektani et Kruma, ca 600–700 m. s.m., leg. *Dörfler*, recorded by Hayek in Oesterr. Bot. Zeitschr. lxx. 14 (1921). Bulgaria: Wiesen bei Knezewo, recorded by Polak in Oesterr. Bot. Zeitschr. xliii. 379 (1893); Kamenicki Alcek in mt. Rh. Bg. (xi. 95), recorded by Vandas, Reliq. Formánek. 58 (1909); and Belasitza Planina, in a damp meadow, near the village of Gabrovo, with flowers 23·7·1917, recorded by Stoyanoff in God. Sofij. Univ. xv.–xvi. 88 (1918–1920). It will be noticed that the plant is limited, so far as is known, to the Balkan Peninsula, where it occupies a fairly extensive but relatively continuous area in the central parts including Thessaly, Albania, North and South

Macedonia, and western Bulgaria (with the Rodopes). *Lychnis Flos-cuculi* L. has, of course, a much wider general distribution, but one which probably overlaps that of *L. subintegra* in the Balkan Peninsula. It is agreed that the morphological characters distinguishing *L. subintegra* from *L. Flos-cuculi* are few, and might, indeed, be correlated with a single gene difference or at most a few gene differences. On the other hand Sandwith and Alston have informed the writer in very definite terms that *L. subintegra* forms an entity most distinct in the field, in southern Albania and South Macedonia, from *L. Flos-cuculi*, with which they never found it associated. In addition to the characters noted in the differential diagnosis, it seems, from dried material, that the texture of the petals may be thicker in *L. subintegra* than in *L. Flos-cuculi*. Alston and Sandwith also noted that the petal laminae lie in a markedly flat plane in the living flowers. It is uncertain from available material if the short gynophore, slightly extended as a carpophore in the fruit, has any real diagnostic value. The known distribution and the field evidence suggest that a status higher than that of variety should be given to our plant. This is not the place to enter upon a discussion of the ambiguous term " subspecies " and it must suffice to point out that those who wish to retain *L. subintegra* within the species *L. Flos-cuculi* can use Hayek's combination.

W. B. Turrill.

Fig. 1, plant, *natural size*; 2, calyx, × 3; 3, petal, × 3; 4, androecium and gynoecium, × 3; 5, calyx and capsule, × 2; 6, seed, × 16.


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Tabula 3229.

STACHYS SERBICA *Panč.*

Labiatae. Tribus Stachydeae.

S. serbica *Panč.* Fl. Princip. Serb. 563–4 (1874); Nyman Consp. Fl. Eur. 579 (1881); Hausskn. in Mitt. Thür. Bot. Ver. N. F. xi. 43 (1897); Hal. Consp. Fl. Graec. ii. 531 (1902); Podpěra in Verh. Zool.-Bot. Ges. Wien, lii. 672 (1902); Degen in Math. u. Naturw. Ber. Ungarn, xix. 369 (1904); Stoyanoff et Stefanoff, Flor. Bulg. 949 (1925); Hayek, Prodr. Fl. Penins. Balcan. ii. 301 (1929); a *S. hirta* L. et *S. arvensi* L. floribus capitatis vel inflorescentia verticillastris perpaucis praedita differt; a priore corolla purpurea, a posteriore calycis dentibus longioribus angustioribus facile distinguitur.

Herba annua, 7–30 cm. alta. *Caulis* erectus, simplex vel inferne ramosus, tetragonus, subpatule reflexo-hirsutus, praecipue infra nodos. *Folia* oblongo-ovata vel raro ovata, obtusiuscula, parum cordata, 1·3–3·5 cm. longa, 0·8–2 cm. lata, manifeste crenato-dentata, dentibus obtusiusculis in foliis floralibus paullo acutioribus, utrinque adpresse vel subadpresse hirta, nervis in pagina superiore inconspicuis, in pagina inferiore prominentibus, inferiora petiolo usque ad 2·8 cm. longo patule hirsuto, superiora petiolo gradatim breviore, folia verticillastros subtendentia petiolo 1–3 mm. longo instructa. *Verticillastra* terminalia 2–10-flora, capitulum subglobosum formantia, verticillastris inferioribus saepe nullis interdum 5–7-floris; bracteae lanceolatae vel anguste lanceolatae, acute attenuatae, demum spinulosae vel subspinulosae, 8–9·5 mm. longae, 1·75–3 mm. longae, longe pilosae. *Calyx* tubuloso-campanulatus, extra pilosus, 1·3 cm. longus, dentibus oblongo-lanceolatis superne sensim angustatis apice spinuloso-acuminatis 6 mm. longis basi 1·75–2 mm. latis utrinque pilosis, fructifer accretus, rigidulus, campanulatus, crebre nervulosus, dentibus rigidis subpatentibus leviter recurvis spinescentibus. *Corolla* purpurea, 1·7 cm. longa, tubo anguste cylindrico 1·1 cm. longo fauce leviter ampliato breviter pubescente, labiis extra pubescentibus; labium superius ellipticum, 4 mm. latum, interdum leviter emarginatum; labium inferius trilobatum lobo medio fere 3 mm. lato lobis lateralibus fere 2 mm. latis. *Filamenta* adaxialia 2 mm., abaxialia 3 mm. longa, glabra vel fere glabra. *Stylus* 1·4 cm. longus, superne praecipue latere abaxiali pubescens, inferne glaber. *Nuculae* compresso-trigono-ovatae, 3·75 mm. longae, 2·5 mm. diametro, castaneo-fuscae.

Thessaly. Agrapha (Dolopia veterum): in reg. infer. m. Pindi circa monasterium Korona, in nemorosis quercinis alt. 1080–1140 m. substratu schistoso, Junio 1885, *Haussknecht*.

Albania. District of Gjinokastrë, above Gjinokastrë, June 1933, 770 m., open stony slopes of Mali Gjer, usually around low bushes, *Alston and Sandwith* 1544; Çajup (Mali Lunxheriës), June 1933, 1230 m., stony bush ground by the meadow, *Alston and Sandwith* 1576; Nemerçka Range, above Biovishdë, 1400 m., June 1933, *Alston and Sandwith* 1849; above Leskovik, June 1933, 1230 m., bare rocky limestone slopes of Melesin, *Alston and Sandwith* 2250; Moskopolë, west of Korçë, 1400 m., June 1933, stony sandstone bush slopes near the Hagios Prodromos Monastery, *Alston and Sandwith* 2007.

North Macedonia. Troïaci, near Prilep, May 1917, *T. Nikoloff*.

South Macedonia. Pisoderion, stony slopes in open beech-woods near Hagia Trias Monastery, very local, 1230 m., *Alston and Sandwith* 584.

Bulgaria. In aridis calcareis ad Karaseli, Maio 1926, *N. Stoyanoff*.

Serbia. Alexinatz, wachst auf Aeckern, April 1870, *Pančić*.

Stachys serbica is a very distinct species endemic in a fairly well-marked area practically in the centre of the Balkan Peninsula. In addition to the localities given above, Podpěra records the species from a light oak-wood on dry forest soil northwards of Haskovo, in South Bulgaria. Although it is morphologically nearest to *S. arvensis* L. (*Glecoma arvensis* L.) it is certainly not a mere doubtful segregate from this. Rather it appears to be a relict type of natural open woodlands whose widespread destruction by man in the Balkan Peninsula may well have reduced and restricted the area of distribution of *S. serbica* in an artificial manner, and may certainly be a cause of its relative rarity within the known contours of its present territory. It may be noted that while Pančić records the plant "auf Aeckern" (label in Herb. Kew.), most other collectors whose labels or records have been traced describe the habitat as forest of oak or beech.

W. B. Turrill.

Fig. 1, plant, *natural size*; 2, part of leaf, lower surface, × 4; 3, bract, × 3; 4, calyx, × 3; 5, anterior half of corolla, × 3; 6, posterior half of corolla, with stamens, × 3; 7, gynoecium, × 3; 8, ovary, × 12; 9, nutlet, × 4.

S.R-C.

Tabula 3230.

MICROMERIA FORMOSANA *Marquand.*

Labiatae. Tribus Saturejeae.

M. formosana *Marquand* ; species nova inter asiaticas distinctissima, a *M. Wardii* Marquand et Airy-Shaw habitu multo breviore ramoso, foliis minoribus, calyce corollaque multo minoribus, bracteolarum absentia recedens.

Herba perennis, usque 12 cm. alta. *Caules* erecti vel adscendentes, ramosi, teretes, rubro-purpurascentes, sparse crispule pubescentes. *Rosula basalis* nulla. *Folia caulina* petiolata, ovata, subobtusa, basi subcuneata, usque 7 mm. longa et 5 mm. lata, supra scaberula, utrinque glandulis depressis punctata ; petioli 2–3 mm. longi, scaberuli. *Inflorescentiae* pauciflorae, caulem et ramulos laterales terminantes ; bracteae foliiformes ; bracteolae nullae ; pedicelli graciles, puberuli, vix 1 mm. longi. *Calyx* cylindrico-infundibularis, purpurascens, puberulus, 2·5–3 mm. longus, faucc 1 mm. diametro, glandulis numerosis minutis sessilibus aureo-nitentibus obsitus, faucc pilis longis albis praeditus ; dentes quinque, ovato-deltoidei, subacuti, usque 1 mm. longi. *Corolla* pallide violacea, 5–7 mm. longa, extra pubescens, glandulis paucis minutis sessilibus aureo-nitentibus vel hyalinis obsita, labio superiore ovato bilobato circiter 2·5 mm. diametro, labio inferioro trilobato lobis subrotundatis circiter 1·5 mm. diametro. *Stamina* didynama, anteriora labio superiore subbreviora, posteriora faucem tubi vix superantia ; filamenta glabra ; antherarum lobi divaricati. *Discus* aequalis. *Ovarium* breviter quadrilobatum. *Nuculi* ellipsoideo-oblongi, laeves, vix 0·5 mm. longi. *Stylus* filiformis, 8 mm. longus.

Formosa. Described from a living plant grown in the Royal Botanic Gardens, Kew, from seed received from Mr. K. Yashiroda (No. 31).

This is the only species of *Micromeria* known from the island of Formosa.—C. V. B. Marquand.

Fig. 1, part of plant, *natural size* ; 2, upper surface of leaf, showing glands and hairs, × 6 ; 3, flower with subtending bract, lateral view, × 4 ; 4, flower, front view, × 4 ; 5, calyx, × 8 ; 6, interior of calyx, and gynoecium, × 8 ; 7, anterior part of corolla (flattened out), showing insertion of stamens, × 8 ; 8, posterior part of corolla, × 8 ; 9, anther, ventral view, × 16 ; 10, anther, dorsal view, × 16 ; 11, lower part of gynoecium and disk, × 16.


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Tabula 3231.

HOMOPHOLIS BELSONII *C. E. Hubbard.*

Gramineae. Tribus Paniceae.

Homopholis *C. E. Hubbard* in Kew Bulletin, 1934, 126; genus *Leptolomati* Chase affine, sed gluma inferiore spiculae aequilonga vel paullo breviore arcte 7-nervi, anthoecio supero infero multo breviore, lemmate superiore apice calloso differt.

Spiculae omnes similes, dorso anguste lanceolatae vel lineari-lanceolatae, acutae, muticae, dorso compressae, abaxiales, solitariae, longe pedicellatae, demum totae a pedicellis persistentibus disarticulatae, in ramis longis gracillimis paniculae ortae. *Anthoccia* duo; inferum sterile, ad lemma et paleam minutam redactum; superum ♂, infero multo brevius. *Glumae* similes, spiculae aequilongae vel inferior vel ambae paullo breviores, lineari- vel anguste oblongo-lanceolatae et obtusae (explanatae), crebre et prominenter 7-nerves, herbaceae, marginibus angustis hyalinis; gluma inferior dorso plana, superior dorso leviter convexa. *Anthoecium inferum:* lemma spiculae aequilongum vel paullo brevius, ambitu anguste lanceolatum, subacuminatum, marginibus superne involutis, apice obtusum, dorso planum, explanatum glumae superiori simile; palea minuta, biloba vel emarginata, hyalina. *Anthoecium superum* anguste elliptico-oblongum, subapiculatum: lemma late ellipticum (explanatum), apice callosum, tenuiter 5–7-nerve, laeve, chartaceum, marginibus latis tenuibus planis; palea lemmati aequilonga, acuta, dorso plana, 2-nervis, marginibus late inflexis. *Lodiculae* duae, minutissimae. *Stamina* tria; antherae lineares. *Ovarium* glabrum; styli distincti, terminales; stigmata plumosa, ex apice anthoecii exserta. *Caryopsis* anguste ellipsoidea, inter lemma et paleam arcte inclusa; scutellum circiter dimidiam partem caryopsis aequans; hilum basale.—*Gramen* perenne, laxe caespitosum; culmi multinodes; laminae lineares, planae; ligulae tenuiter membranaceae; panicula laxissima; rami longi, plerumque applanati, superne 3–1-spiculati; pedicelli solitarii; spiculae fere glabrae.

Species unica, Queenslandiae incola.

H. Belsonii *C. E. Hubbard*, l.c. 127. *Culmi* erecti vel plerumque genieulato-ascendentes, nonnunquam e basi prostrata nodis inferioribus

radicantibus, usque ad 40 cm. alti, gracillimi, teretes, basin versus laxe ramosi, rigidiusculi, usque ad 9-nodes, straminei, glabri laevesque. *Folia* glabra ; vaginae plerumque internodiis longiores, teretes, arcte appressae vel demum laxae, laeves ; ligulae truncatae, usque ad 1·5 mm. longae ; laminae basi leviter contractae, acutae, usque ad 8 cm. longae, plerumque 2–2·5 mm. latae, subglaucae, minute scaberulae. *Panicula* valde effusa, ambitu latissime obovata vel demum latissime elliptica, tandem a culmo disarticulata, usque ad 25 cm. longa et 20 cm. lata ; axis primarius gracillimus, strictus, angulatus et leviter sulcatus, minute scaberulus ; rami numerosi, stricti, rigidiusculi, oblique patentes, demum horizontaliter patentes vel leviter deflexi, solitarii vel 2–3 approximati, applanati vel subtriquetri, marginibus scabridis, basi in axillis minute pubescentes, inferiores usque ad 15 cm. longi, superiores gradatim breviores ; pedicelli ramis similes, 1·3–6 cm. longi, apice subdiscoidei. *Spiculae* 4·5–6 mm. longae, atro-virides. *Gluma* inferior basi serie pilorum minutissimorum praedita, nervis superne scaberulis ; gluma superior inter nervos pilis minutissimis rigidis instructa ; internodium rhachillae inter glumas usque ad 0·5 mm. longum. *Lemma anthoecii inferi* glumae superiori simile vel fere glabrum ; palea circiter 0·5 mm. longa. *Lemma anthoecii superi* usque ad 3 mm. longum. *Antherae* 1·5 mm. longae. *Caryopsis* 2 mm. longa.

Queensland. Darling Downs District : head of Dogwood Creek, east of Gurulmundi, November 1930, *Belson*.

Homopholis is most closely allied to *Leptoloma* Chase, a genus represented in North America by *L. cognatum* (Schult.) Chase and in Northern Australia by *L. papposum* (R.Br.) Hughes. *Leptoloma cognatum* and *Homopholis Belsonii* are indeed very similar in general appearance, but the well-developed lower glume and comparatively small fertile floret of the latter readily distinguish it. The same characters and in addition the paniculate inflorescence serve to separate *Homopholis* from *Digitaria* Hall. In both *Leptoloma* and *Digitaria* the lower glume is very small or suppressed.

This species commemorates Mr. E. H. Belson, who, whilst engaged on a land-survey, rendered considerable assistance to the writer in collecting grasses in the Leichhardt District of Queensland. The name *Homopholis* was given in allusion to the three similar scales of the spikelet.

C. E. Hubbard.

Fig. 1, plant, *natural size* ; 2 and 3, spikelet, front and back views respectively, × 8 ; 4, upper glume, × 8 ; 5, lower lemma, × 8 ; 6, palea of lower floret, × 16 ; 7, upper floret, × 8 ; 8, flower, × 16 ; 9, caryopsis, × 10.


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Tabula 3232.

ORYZA AUSTRALIENSIS *Domin.*

Gramineae. Tribus Oryzeae.

O. australiensis *Domin* in Biblioth. Bot. xx. Heft 85, 333 (1915); Roshev. in Bull. Appl. Bot. Genet. & Pl.-Breed. xxvii. pt. 4, 45, 125, figs. 17b, 32, 33 (1931); Chevalier in Rev. Bot. Appl. et Agric. Trop. xii. 1016 (1932). *O. sativa* F. Muell. Fragm. Phyt. Austral. viii. 115 (1873), et *l.c.* xi. 130 (1882); Benth. Fl. Austral. vii. 550 (1878); Maiden, Usef. Nat. Pl. Austral. 49 (1889); F. M. Bailey, Queensl. Fl. vi. 1844 (1902), et Comprch. Cat. Queensl. Pl. 612 (1913); Ewart & Davies, Fl. North. Territ. 41 (1917); omnes partim, non Linn.—Species affinis *O. sativae* Linn. var. *fatuae* Prain, sed perennis, ligulis brevioribus, paniculae ramis et pediccllis scabrido-ciliolatis, glumis majoribus, lemmatis arista graciliore subcapillari, palea apice cuspidata differt. Descriptio hic emendata.

Gramen perenne, usque ad 1·6 m. altum; rhizomata repentia, gracilia, usque ad 3 mm. diametro, multinodia, glabra, cataphyllis brevibus papyraceis glabris obtecta. *Culmi* fasciculati, erecti vel ascendentes, validi, teretes, simplices, 4–5-nodes, glabri laevesque. *Foliorum vaginae* internodiis longiores, usque ad 45 cm. longae, laeves, glabrae vel ore pilis paucis rigidiusculis pilosae; ligulae 3–6 mm. longae, apice rotundatae demum lacceratae; laminae lineares, in acumen tenue attenuatae, usque ad 65 cm. longae et 1·7 cm. latae, planae vel conduplicatae, firmae, glabrae vel ligulam versus pilis brevibus sparsis pilosae, supra scaberulae, subtus laeves, marginibus cartilagineis scaberrimae. *Panicula* laxa, oblonga, e vagina summa demum exserta, 20–45 cm. longa, multiramosa; rhachis basin versus laevis vel leviter scaberula, superne angulata et scaberrima; rami graciles, in axillis pubescentes, angulati, valde scabrido-ciliolati, inferne ramulis brevibus vel simplices, laxe vel dense spiculati, usque ad 25 cm. longi, inferiores subverticillati; pedicelli inaequales, 1–8 mm. longi, scabrido-ciliolati. *Spiculae* oblongae, oblique acuminatae, 6–7·5 mm. longae, albidae, stramineae vel demum fuscae. *Glumae* suborbiculares, circiter 0·5–0·8 mm. longae, tenuiter membranaceae, enerves. *Lemmata sterilia* lanceolata vel anguste ovata (explanata), acuta, 1·5–2·5 mm. longa, coriacea, laevia. *Lemma fertile* oblongum, in aristam flexuosam capillarem usque ad 4·5 cm. longam oblique attenuatum, cartilagineum,

prominenter 5-nerve, inter nervos depressum, subtiliter granuloso-striatum, leviter rugulosum, nervis et carinis pilis rigidis minutis erectis praeditum. *Palea* lineari-lanceolata, cuspidata (cuspide usque ad 2·5 mm. longa), carina pilis rigidis minutis scabrido-ciliolata. *Antherae* 3·5–4·5 mm. longae. *Caryopsis* oblonga, 4–5 mm. longa.

Northern Australia. Sturt's Creek, *Mueller* (type).

Queensland. Burke District: Normanton, *Wildash*. Cook District: Georgetown, May 1914, *Green*; Gilbert River, Feb. 1922, *White* 1473; Forest Home Station, Gilbert River, 1931, *Brass* 1885; without precise locality, *Pollock*.

Domin, when describing *Oryza australiensis*, stated that his description was based on specimens collected by Mueller at Sturt's Creek. This type material is in the Kew Herbarium. It consists of four specimens, each without the base. Three of the four represent the same species and are taken as the type of *O. australiensis* Domin; the fourth specimen, however, is a wild variety of the cultivated rice (= *O. sativa* L. var. *fatua* Prain). The measurements of the ligule of the latter were unfortunately included in the original description of *O. australiensis*. This accounts for the length of that organ being given as 5 to 20 mm., whereas it is only 3 to 6 mm. long. The presence of two wild rices at Sturt's and Hooker's Creeks was noted by Mueller (Fragm. Phyt. Austral. viii. 115), who stated that there were two varieties, one with larger spikelets and stouter awns and the other with almost capillary awns and a long-cuspidate palea. These are some of the characters which distinguish *O. sativa* L. var. *fatua* Prain from *O. australiensis* Domin.

The perennial habit of *O. australiensis* was unknown until Mr. L. J. Brass collected an excellent series of specimens at Forest Home Station on the Gilbert River. These show a well-developed system of rhizomes.

There seems no doubt that Stapf's interpretation of the structure of the spikelet of *Oryza* is correct, at least so far as the glumes and sterile lemmas are concerned (see Hook. f. in Trimen, Fl. Ceyl. v. 182: 1900, and A. Arber, The Gramineae, 184: 1934). The glumes in *O. australiensis*, although very small, are larger and more distinct than in any other species of *Oryza*. They are free from each other, the lower glume being usually slightly larger, whilst its margins at the base overlap those of the upper. The internode of the rhachilla is slightly produced above the glumes and can be readily seen between them.

Rosheviez (Bull. Appl. Bot. Genet. & Pl.-Breed. xxvii. pt. 4, 125: 1931) points out that none of the diagnostic characters seen in *Oryza australiensis* Domin are met with in any of the cultivated rices, and on this account he supposes that it has played no part in the formation of any varieties or groups of cultivated rice.

Oryza australiensis probably occurs along rivers and creeks and in swamps throughout northern Australia. In Australian literature it is usually referred to as a wild form of *O. sativa* L. or placed under that

species. Mueller (Fragm. Phyt. Austral. viii. 115) records it from Sturt's and Hooker's Creeks ; later (*l.c.* xi. 130) he states that it is spontaneous and abundant in the Einasleigh and Herbert Rivers, where it was collected by Armit. Cowley (Queensl. Agric. Journ. i. 236 : 1897) writes that he has seen the native wild rice of Queensland and that enormous flocks of wild geese indigenous in Northern Queensland build their nests in places adjacent to the depressions where the rice grows, choosing the time when the grain will be ready as food for their offspring. F. M. Bailey first refers to the wild rice in a list of Queensland grasses published in 1877. He mentions that his only specimen is from Mr. Gulliver, Normanton. In the Queensland Flora, vi. 1844, Bailey points out that it is common in the Gulf Country swamps and that the stockholders there consider it an excellent fodder. Later (Compreh. Cat. Queensl. Pl. 612) he notes that two forms of wild rice are met with in the tropical swamps of Queensland, one having dark- and the other light-coloured inflorescences. The latter is without doubt *O. australiensis*, whilst the former may be more mature specimens of that species or specimens of *O. sativa* L. var. *fatua* Prain.—C. E. Hubbard.

Fig. 1, entire plant, excluding 6 cm. of culm, × $\frac{2}{3}$; 2, ligule, × 3 ; 3, spikelet, with portion of awn removed, × 6 ; 4, 5 and 6, glumes, × 12 ; 7 and 8, sterile lemmas, × 6 ; 9, stamens, × 6 ; 10, gynoecium, × 16 ; 11, caryopsis, × 6.


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Tabula 3233.

LEPTURUS GEMINATUS *C. E. Hubbard.*

Gramineae. Tribus Lepturеae.

L. geminatus *C. E. Hubbard* ; species nova, affinis *L. repenti* (Forst.) R.Br., sed foliis plerumque pilosis, spicis submoniliformibus brevioribus, spiculis per paria oppositis oblongis vel lanceolato-oblongis, gluma superiore longiaristata dorso convexa minute pubescente differt.

Gramen perenne, usque ad 60 cm. altum. *Culmi* e basi longa procumbente ascendentes vel suberecti et laxe caespitosi, compressi, rigidiusculi, ramosi, 4–6-nodes, glabri vel internodio supremo pilosi, laeves vel nodos versus minute scaberuli. *Folia* pilis debilibus e tuberculis minutis ortis laxe vel sparse pilosa vel fere glabra ; vaginae laxae, tenues, internodiis breviores, compressae et carinatae, minute scaberulae ; ligulae truncatae, brevissimae ; laminae lineares, tenuiter acutae, usque ad 18 cm. longae et 5 mm. latae, planae vel siccitate convolutae, tenues, subglaucae, leviter scaberulae. *Spica* submoniliformis, gracilis, 2–4·5 cm. longa (aristis inclusis), viridis ; rhachis articulata, internodiis valde compressis 5–6·5 mm. longis circiter 2 mm. latis et 0·75 mm. crassis, lateribus canaliculatis minute pubescentibus. *Spiculae* per paria oppositae (spicula terminali excepta), uniflorae ; callus minute et dense pubescens. *Gluma* inferior in spicula terminali glumae superiori similis, in spiculis lateralibus nulla ; gluma superior oblonga vel lanceolato-oblonga, acuminata, 5–6 mm. longa, apice in aristam 1–1·7 cm. longam scaberulam producta, dorso leviter convexa, minute et dense pubescens, coriacea, arcte multinervis. *Anthoecium* ellipticum : rhachilla producta, anthoecium rudimentarium gerens : lemma ovato-ellipticum et obtusum vel minute truncatum (explanatum), 4–4·3 mm. longum, 3-nerve, membranaceum, inter nervos laterales et margines et apicem versus minute pubescens ; palea oblonga, obtusa, lemma subaequans, 2-nervis, carinis superne ciliolatis ; antherae 2 mm. longae.

Queensland. Cook District : Thursday Island, April 1931, *Hockings*.

Four species of *Lepturus* are now recorded from Australia. They are the following : 1. *Lepturus geminatus* C. E. Hubbard ; 2. *L. repens*

(Forst.) R.Br. (Northern Australia, Queensland, Polynesia, Malaya, Ceylon, Mascarene Islands and East Africa ; on sea-shores) ; 3. *L. xerophilus* Domin (Queensland ; Cook District) ; 4. *L. cylindricus* (Willd.) Trin. (Mediterranean Region ; introduced into Australia, South Africa, North America, etc.). *Lepturus incurvatus* (L.) Trin. (Benth. Fl. Austral. vii. 668) is now referred to the genus *Pholiurus*. The following key is given to assist in identifying the Australian species :—

Spikelets paired and opposite on each internode of the rhachis ; spikes constricted between the pairs of spikelets ; upper glume long-awned (awn 10–17 mm. long), minutely pubescent . . . . . 1. *L. geminatus*.

Spikelets usually solitary or most of them solitary on each internode of the rhachis ; spikes more or less cylindrical ; upper glume tapering into an awn up to 8 mm. long, or awnless, scaberulous or smooth :

Perennial ; upper glume lanceolate, acuminate, usually awned :

Spikelets usually 1-flowered ; upper glume 6–14 mm. long ; lemma 4·5–5 mm. long ; leaf-blades up to 20 cm. long and 4–10 mm. wide ; spikes 5–15 cm. long, very stiff and rigid . . . 2. *L. repens*.

Spikelets 2-flowered ; upper glume 4–6 mm. long ; lemmas 2·8–3 mm. long ; leaf-blades 2·5–5 cm. long and 3·5–5 mm. wide ; spikes 5–7 cm. long, becoming flexuous . . . . . 3. *L. xerophilus*.

Annual ; upper glume lanceolate-oblong, acute, awnless, 4–7 mm. long ; spikelets 1-flowered . . . . . 4. *L. cylindricus*.

The most interesting morphological feature of *L. geminatus* is the presence of two spikelets on each internode of the rhachis. In the other species of *Lepturus* the spikelets are usually solitary, but examples with two spikelets to each internode are occasionally seen in specimens of *L. cylindricus* and *L. repens*. In such cases the paired spikelets usually occur in the lower or middle portion of the larger spikes, whilst in the upper part of the spike, and on smaller spikes, the spikelets are solitary. The presence of paired spikelets in these species appears to be unusual, whereas in *L. geminatus* it is quite normal.

C. E. Hubbard.

Fig. 1, plant, *natural size* ; 2, pair of spikelets and internode of rhachis, × 4 ; 3, internode of rhachis, × 6 ; 4, terminal spikelet, × 6 ; 5, upper glume from inside, × 6 ; 6, floret, × 6 ; 7, lemma, opened out, × 6 ; 8, palea, × 6 ; 9, lodicules, × 18.


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Tabula 3234.

SORGHUM DIMIDIATUM *Stapf.*

Gramineae. Tribus Andropogoneae.

S. dimidiatum *Stapf* in Prain, Fl. Trop. Afr. ix. 140 (1917); Massey, Sudan Grasses, 16 (1926); Broun et Massey, Fl. Sudan, 446 (1929); affine *S. purpureo-sericeo* (Hochst.) Aschers. et Schweinf., a quo spiculis plerumque paullo minoribus, gluma inferiore spiculae sessilis infra medium demum incrassata et cartilaginea supra medium abrupte multo tenuiore et plus minusve chartacea differt.

Gramen annuum, fasciculatum vel solitarium, usque ad 1·5 m. altum. *Culmi* erecti vel basi geniculati et e nodo infimo radicantes, graciles vel validi, teretes, simplices vel ramosi, 3–7-nodes, " nodis vaginarum " pilis albidis patulis usque ad 6 mm. longis dense barbatis, ceterum glabri laevesque. *Foliorum vaginae* internodiis demum breviores, teretes, ore barbatae, marginibus ciliatae, ceterum glabrae vel inferiores plerumque superne pilis e tubereulis ortis pilosae; ligulae brevissimae, membranaceae, glabrae; laminae lineares, in apicem tenuissimum longe attenuatae, usque ad 40 cm. (vel ultra) longae et 1 cm. latae, planae, virides, pone ligulam pilis longis pilosae, ceterum pubescentes, marginibus scaberulis, costa media supra lata et albida. *Panicula* anguste lanceolata vel anguste lanceolato-oblonga, 6–25 cm. longa, contracta; rhachis gracilis, laevis vel scabrida, nodis plerumque pilosis exceptis glabra; rami filiformes, verticillati, simplices, erecti, glabri, fere laeves vel scaberuli, inferiores usque ad 7·5 cm. longi. *Racemi* usque ad 5-nodes; internodia (" articuli ") usque ad 5 mm. longa, pilis rubellis vel pallidis dense ciliata; pedicelli internodiis similes. *Spiculae sessiles* lanceolatae vel anguste elliptico-lanceolatae, subacuminatae, 7–9 mm. longae; callus dense barbatus. *Gluma* inferior 8–14-nervis, infra medium primum carnosa et pallide viridis, demum incrassata et cartilaginea, nitens, glabra, rubro-fusca vel atro-fusca, supra medium valde abrupte et conspicue tenuior, plus minusve chartacea, pallide viridis, dorso glabra, carinis rigide ciliata, ad margines pilis erectis pilosa; gluma superior inferiori subsimilis et subaequilonga sed paullo angustior et supra medium (saepius gradatim) tenuior et pubescens, 5–7-nervis. *Lemma anthocarpii inferi* (explanatum) ovatum, minute truncatum, 6–7·5 mm. longum, tenuiter membranaceum, marginibus hyalinis supra basin molliter ciliatis, 2-nerve. *Lemma anthocarpii superi* (explanatum) late ellipticum, bilobum, usque ad 3 mm.

longum, hyalinum, supra medium ciliatum, 3-nerve; arista gracilis, genieulata, usque ad 4 cm. longa, columna atrofusca, seta pallida; palea hyalina, usque ad 1·5 mm. longa, vel nulla; lodiculae truncatae, apice dense ciliatae; antherae usque ad 4 mm. longae; caryopsis anguste ovoidea, dorso compressa, 4·5–5 mm. longa. *Spiculae pedicellatae* ♂ vel steriles, anguste lanceolatae vel anguste ellipticae, acutae, 6–8 mm. longae, pallide virides vel purpureae; callus barbatus. *Glumae* firme membranaceae, minute pubescentes; inferior 7–11-nervis; superior 5–7-nervis. *Lemmata* (explanata) lanceolata, tenuiter membranacea, ciliolata; inferum obtusum, 2-nerve; superum minute bilobum vel integrum et acuminatum, 1-nerve; palea nulla.

Sudan. Fung Province, *Punter*; without precise locality, *Broun* (type); cultivated at Isleworth, Middlesex, from seed communicated by the *Director of Agriculture and Forests, Khartoum* (type of t. 3234, fig. 1).

When describing this species, Stapf suggested that it was perhaps a hybrid between *Sorghum versicolor* Anderss. and some cultivated *Sorghum*, but as *S. versicolor* has not been found in the Sudan, it is very probable that he intended to write *Sorghum purpureo-sericeum* Aschers. et Schweinf. The latter is a closely allied species which has been recorded from the Sudan, and which, according to Massey (Sudan Grasses, 16), has been collected in the same locality as *Sorghum dimidiatum* Stapf (Fung Province; Jongol's Port). Mr. A. W. Punter, however, who has had considerable experience with Sudanese Sorghums, informs us that *S. dimidiatum* does not grow in association with any other wild or cultivated *Sorghum*. In a note on these grasses he states that *S. purpureo-sericeum* is found over a wide area east of the Blue Nile up to the Abyssinian frontier, but that he has not seen it west of the Blue Nile. On the other hand, he has only found *S. dimidiatum* west of the Blue Nile and between the Blue and White Niles, where it occurs as far north as lat. 13° 30′ N. in the Jebel Moya District of the Blue Nile Province and as far south as lat. 10° N. In this area it is fairly common on the open cotton-soil plains.

An opportunity to grow *S. dimidiatum* occurred when seed of that species was communicated to Kew in October 1932 by the Department of Agriculture and Forests, Khartoum. A small quantity sown in the open in 1933 germinated readily and during the warm summer months produced plants about 3 ft. high, but only a few developed exserted panicles before being killed by cold weather. These plants had all the characters exhibited in the type-specimen and showed no signs of hybridization with any other species. This confirmed the results obtained by Punter at the Gezira Research Station in 1930, where he raised plants from seed which grew true to type.

Prof. C. L. Huskins has kindly supplied the following note on the chromosome numbers of *S. dimidiatum* and allied species. "*Sorghum dimidiatum* in common with *S. versicolor* and *S. purpureo-sericeum* has $2n = 10$ chromosomes. All the species of grain sorghums so far

examined have 20 chromosomes, as have the grass sorghums *S. virgatum*, *S. verticilliflorum*, *S. Vogelianum*, *S. lanceolatum*, *S. arundinaceum* and *S. sudanense* (see Huskins and Smith in Journ. Genetics, xxv. 241–249 : 1932, et *l.c.* xxviii. 387–395 : 1934), while *S. halepense* has 40 chromosomes. Longley (Journ. Agric. Res. xliv. 317–321 : 1932) reports 20 chromosomes in *S. Drummondii* and *S. Hewisonii*, and 40 in *S. purpureo-sericeum*. The origin of his material is not stated. Dr. L. J. Stadler in a recent personal communication states that young plants of Longley's 40-chromosome *S. purpureo-sericeum* look quite different from those of the 10-chromosome *S. purpureo-sericeum* obtained from Kew. The chromosomes of the 10-chromosome species are much larger than those of the 20-chromosome group and of very different shapes. Further detailed studies are necessary, but it appears highly improbable that the relationship of these two groups is a simple polyploid one, as it apparently is between the 20- and 40-chromosome grass sorghums. The 10-chromosome sorghums appear to constitute a closely inter-related group very distinct cytologically from the remainder of the genus." It should be noted that the seeds from which Prof. Huskins raised his plants of *S. dimidiatum* and *S. purpureo-sericeum* were compared at Kew with type-material of these species and found to be correctly named. The plants of *S. dimidiatum* referred to in the preceding paragraph were raised from the same sample of seed.

Thus there is no evidence to support the suggestion, made by Stapf, of a hybrid origin for *S. dimidiatum*.

The differentiation of the lower glume of the sessile spikelets into a thick dark-coloured lower half and then abruptly into a thin pale upper half is most striking and gives the inflorescence a variegated appearance. The reason for this peculiar modification is not obvious. There is no doubt that it affords considerable protection to the grain during its development and also at maturity, but less than is the case with many other species of *Sorghum* in which the lower glume is wholly coriaceous.

Sorghum dimidiatum belongs to a group of about 8 to 10 annual and perennial species, of which the area of distribution extends from Northern Transvaal to Sudan, through India to China, the Malayan Region and Australia. This group is distinguished from the remainder of the section *Eu-Sorghum* (*sensu* Stapf) by the bearded nodes, the simple branches of the panicle and the brownish spikelets. The three species hitherto examined cytologically have 10 chromosomes (see above). C. E. Hubbard.

Fig. 1, an entire plant, *natural size* ; 2, a pair of spikelets, × 4 ; 3, pedicel, × 4 ; 4–14, details of sessile spikelet :—4, lower glume, from inside, × 4 ; 5, transverse section of lower half of same, × 8 ; 6, longitudinal section of same, × 8 ; 7, upper glume, × 4 ; 8, lower lemma, × 5 ; 9, upper palea, × 7 ; 10, upper lemma, × 7 ; 11, lodicules, × 12 ; 12, flower, without the lodicules, × 8 ; 13, caryopsis, × 4 ; 14, transverse section of caryopsis, × 4 ; 15–21, details of pedicelled spikelet :—15, lower glume, from outside, × 4 ; 16, the same from inside, × 4 ; 17, transverse section of same, × 4 ; 18, upper glume (flattened), × 4 ; 19, lower lemma, × 4 ; 20, upper lemma, × 4 ; 21, apex of same, × 12.


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Tabula 3235.

BOTRYCHIUM CHAMAECONIUM *Bitt. et Hieron.*

Ophioglossaceae.

B. chamaeconium *Bitt. et Hieron. ex Bitter* in Engl. u. Prantl, Nat. Pflanzenfam. i. Abt. 4, 471 (1900); F. K. Butters in Rhodora xix. 216 (1917); arcte affine *B. lanuginosae* Hk. et Grev., sed minus, gracilius, folio fertili sterilem superante, stipite fertili e basi laminae sterilis orto.

Filix 8–28 cm. alta. *Radices* numerosae, validae, funiformes, statu vivo verisimiliter carnosae. *Petiolus* communis 5–12 cm. longus, praecipue basin versus pilis paucis albidis debilibus conspersus. *Vagina stipularis* demum castanea, plus minusve persistens. *Gemma* in petioli basi stipulari vaginante omnino inclusa, dense albido-sericeo-pilosa. *Lamina sterilis* herbacea, ambitu late subdeltoidea vel pentagona, usque ad 18 cm. lata, bipinnata, pinnulis pinnatifidis, demum basi tripinnata, rhachibus anguste alatis; segmenta ultima ambitu late elliptica usque ovata, valde lobata, lobis oblongis vel suboblongis, apice dentatis, dentibus ovatis vel ovato-lanceolatis acutis. *Folium fertile* e basi vel prope basin folii sterilis ortum, bi- vel tripinnatum, usque ad 15 cm. longum, stipite usque ad 5 cm. longo. *Sporangia* sphaerica, pallide brunnea, usque ad 1·5 mm. diametro maturitate ad medium fissa, dimidiis late hiantibus subreflexis. *Sporae* pallide luteae, superficie leviter undulata, 35–40 μ diametro.

British Cameroons. Cameroons Mountain, Buea, 2200 m., in a gorge, in fissures of very steep rock slope, *Preuss* 1037.

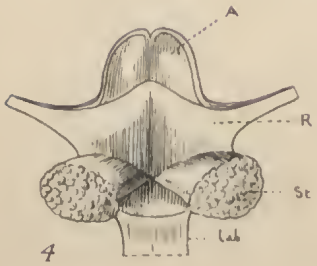
Uganda. Bulago District, Mount Elgon, Bugishu, 1970 m., moist soil over rocks, also seen at Butandiga, Aug. 1932, *A. S. Thomas* 350.

Botrychium chamaeconium was originally described in 1900 from somewhat poor material collected on Cameroons Mountain by Preuss. The species was unrepresented in the Kew Herbarium until quite recently, when specimens were received from Mr. A. S. Thomas, a botanist in the Department of Agriculture, Uganda, who collected them on the slopes of Mount Elgon at an altitude of 6500 feet. The Uganda plants are much larger than those of the type-collection, probably as the result of more favourable environmental conditions, though in other respects they are similar.

A member of the *B. virginianum* group, *B. chamaeconium* finds its nearest ally in the Indian *B. lanuginosum* Hk. et Grev., to which it bears a strong resemblance. It may be readily distinguished by the characters given in the differential diagnosis. F. K. Butters has pointed out that *B. virginianum* and its allies have a typical boreal distribution, the tropical members having travelled down from the north. There is no evidence, however, that such has been the case in *B. chamacconium*.

It seems unlikely that the species is restricted to these two localities in tropical Africa. Only in the mature fruiting condition can it be said to be at all conspicuous, while in the early stages it might readily be taken for the leaf of a young umbellifer. Its presence on other mountain masses in tropical Africa will no doubt be demonstrated in course of time.—F. Ballard.

Fig. 1, upper part of plant, *natural size*; 2, lower part of plant, *natural size*; 2a, sheathing base opened to show the enclosed bud, × 2; 3, portion of the sporangiophore from the front, × 4; 4, portion of sporangiophore from the back, × 4; 5, group of dehisced sporangia, × 4; 6, 6a, spores from the Uganda plant, and 7, 7a, spores from the Cameroons plant, × 400.



S.R-C.

Tabula 3236.

CYNORCHIS PARVA *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

C. parva *Summerhayes* in Kew Bull. 1932, 338; statura parva, racemis 1–2-floris, labelli forma, calcari quam labellum circiter duplo longiore valde distincta.

Herba terrestris, parva, usque 15 cm. alta. *Tubera* cylindrico-ellipsoidea, circiter 1 cm. longa. *Folia* radicalia, 3–5, late linearia vel anguste lanceolata, acuta, plus minusve recurvata, 1–2·5 cm. longa, 2–4 mm. lata. *Scapus* erectus, gracilis, apice 1–2-florus, saepissime infra medium cataphyllo singulo lanceolato acuminato instructus; bracteae lanceolatae, acuminatae, 4–8 mm. longae, ovario pedicellato multo breviores. *Flores* erecti, partim virides, partim albi; pedicellus cum ovario 1·3–2·7 cm. longus. *Sepalum* intermedium erectum, ovatum, acutum, 4–5·5 mm. longum, 2·75–4·5 mm. latum; sepala lateralia patentia, oblique lanceolato-ovata, acuta, 5–6·5 mm. longa, 2·5–3·5 mm. lata. *Petala* lineari-ligulata, acuta, leviter incurvata, 3·5–5 mm. longa, 0·7–1 mm. lata. *Labellum* album, trilobum, ambitu obtriangulare; pars basalis indivisa, 1·6–2·5 mm. longa; lobus intermedius e basi angusta plus minusve subito dilatatus, fere flabellatus, apice obcordatus apiculo interjecto, 4–6 mm. longus, 4–5 mm. latus; lobi laterales lineari-oblongi vel ligulati, obtusi vel subacuti, basi a lobo intermedio angulo 45° divergentes, 4·5–6·5 mm. longi, 1–1·6 mm. lati; calcar dependens, cylindricum, dimidio inferiore paullo inflatum, subacutum, 11–16 mm. longum. *Anthera* erecta, apice rotundata, 1·6–2·5 mm. alta, canalibus leviter incurvatis 1–1·5 mm. longis. *Stigmata* crassa, apice clavato-truncata, 1·5–1·8 mm. longa, latere superiore per duos trientes inferiores rostelli lobis lateralibus adnata; rostelli lobus intermedius triangulari-dentiformis, brevis vel brevissimus.

French Guinea. Timbo, July 1907, *Pobéguin* 1692.

Northern Nigeria. Vom, Bauchi Plateau, 900–1350 m., *Dent Young*; plains between Hepham and Ropp, 1380 m., July 1921, *Lely* 361; Bauchi Plateau, grass plains, June 1930, *Lely* P337 (type); no exact locality, *Nelson* 9.

British Cameroons. Bamenda District, Bum, in grassland among boulders, 1200 m., May and June 1931, *Maitland* 1398, 1669.

This species has the distinction of being the most westerly member of the genus, only two others occurring in West Africa, namely, *C. debilis* Summerhayes, which is found on the Cameroons Mountain, and *C. Barlaeae* Schlechter, a native of Angola. The other Tropical African representatives of *Cynorchis* occur in East Africa, particularly Tanganyika Territory, while the majority of the species inhabit Madagascar. It is interesting to find that a species so far from the centre of distribution of the genus possesses such a striking combination of characters as does *C. parva*. These consist of the dwarf habit, the few-flowered inflorescences, the labellum with its large cuneate-flabellate central lobe and ligulate side-lobes, and the long spur. I have not yet been able to find any other *Cynorchis* which seems at all closely allied to *C. parva*, although different species approach it in single characters.

V. S. Summerhayes.

Figs. 1 and 1a, flowering plants (tubers missing in 1a), *natural size*; 2, flower, × 2; 3, column, side view, × 6; 4, column, rostellum arms spread out, front view, × 6:—A, anther; Lab, base of labellum; R, rostellum; St, stigma.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Tabula 3237.

HABENARIA TWEEDIEAE *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

H. Tweedieae *Summerhayes* in Kew Bull. 1933, 248 ; affinis *H. cultriformi* Kraenzl. et *H. incomptae* Kraenzl., a quibus sepalis lateralibus semi-ovatis vel semi-orbicularibus subacutis nec lateraliter apiculatis, sepalo intermedio longiore, petali partitione postica haud fimbriata, partitione antica basi haud subito dilatata, rostelli lobo intermedio antheram bene superante differt.

Herba terrestris, robusta, erecta, 45–70 cm. alta ; tuber elongato-ovoideum, 4 cm. longum, ultra 1 cm. diametro. *Caulis* teres, basi cataphyllis paucis instructus, 6–8-foliatus. *Folia* lanceolata, acuminata, basi vaginantia, intermedia usque 27 cm. longa et 7 cm. lata, sursum sensim decrescentia in bracteas abeuntia. *Racemus* 15–30 cm. longus, circiter 5 cm. diametro, subdense multiflorus ; bracteae lanceolatae, acuminatae, ovarium pedicellatum subaequantes vel paullo superantes, extra et praesertim marginibus glanduloso-ciliatae et pubescentes. *Flores* suberecti, partim virides partim albi ; ovarium pedicellatum, 2·5–4 cm. longum. *Sepalum* intermedium ovatum, acutum, carinato-concavum, 5·5–7 mm. longum, 2·5–4 mm. latum, extra sparse pubescens, carina et nervis praesertim basi scabridulis ; sepala lateralia semi-ovata vel semi-orbicularia, margine anteriore valde dilatata, oblique obtuse acuminata vel cuspidata, 8–10 mm. longa, 5–6·5 mm. lata, extra sparse pubescentia. *Petala* bipartita ; partitio posterior ligulata, subacuta, 6–6·5 mm. longa, 0·7–1·5 mm. lata, papilloso-puberula ; partitio anterior multo major, subfalcatim lanceolato-cultriformis, obtusa, 10–11 mm. longa, basin versus 1·8–2·5 mm. lata, papilloso-puberula. *Labellum* ex ungue circiter 1 mm. longo tripartitum ; partitio intermedia linearis, obtusa, 10–12 mm. longa, 0·8–1·4 mm. lata, subcarnosa ; partitiones laterales anguste lineares, 5–6·5 mm. longae, 0·3–0·5 mm. latae ; calcar dependens, dimidio inferiore cylindricum, apice clavato-inflatum, obtusum, circiter 2·5 cm. longum. *Anthera* subdeclinata, 2·5–3 mm. alta, obtusa, canalibus apice leviter incurvatis 2·7–3 mm. longis ; staminodia biloba. *Brachia stigmatifera* crassa, clavata, 3·5–5 mm. longa, antherae canales aequantia vel paullo excedentia. *Rostelli* lobus intermedius ligulatus, apice triangulari-acutus, 2·5–3·2 mm. longus, antheram bene superans ; lobi laterales ab intermedio angulo recto divergentes.

KENYA COLONY. Mt. Elgon, 2010 m., Nov. 1931, *Mrs. Tweedie* 25 (type). Nandi District, 1800 m., Nov. 1898, *Whyte*.

UGANDA. Mt. Elgon, Butandiga, on rocky knoll, 2100 m., in fruit, Jan. 1918, *Dummer* 3646. Ruwenzori, 2100 m., *Dawe* 670a. Toro, Ibonde, 2250 m., Oct. 1932, *Thomas* 774.

The section *Cultratae* Kraenzl., which seems to be entirely African, remains rather ill-defined. On the whole the species show a close resemblance to many of those belonging to section *Bilabrellae* Kraenzl., but usually have somewhat larger flowers. Perhaps the most characteristic feature of the group is the hairiness of the inflorescence, particularly the bracts, sepals and petals, but in this as in other respects there is great variability, certain of the species being little more hairy than some members of *Bilabrellae*. In *H. Tweedieae* and its immediate allies (*H. cultrata* A. Rich. and *H. cultriformis* Kraenzl.) the bracts have a more or less irregularly denticulate or almost spinulose margin as well as being hairy on the surface. In *H. Tweedieae* these hairs (both marginal and superficial) are mostly gland-tipped, a feature which recalls many species of *Cynorchis* but is decidedly uncommon in *Habenaria*.

Another important characteristic of the section is the relatively long middle lobe of the rostellum which in several species projects above the apex of the anther and is strongly developed in *H. Tweedieae* (fig. 4). This feature is also found in *H. longirostris* Summerhayes (t. 3211), which, however, differs considerably in other respects.

So far as can be ascertained, *H. Tweedieae* is the first member of the *Cultratae* to be discovered in Kenya or Uganda, the great majority of the species being inhabitants of Abyssinia, while one or two others (perhaps rather doubtfully referable to the section) have been recorded from Central Africa. From the data available it appears that *H. Tweedieae* occurs on most of the mountains of Uganda and Western Kenya at altitudes of about 2000 m., but more records are required to enable us to state its detailed distribution.—V. S. SUMMERHAYES.

FIG. 1, lower part of a plant (*Dawe* 670a), × ⅔; 2, inflorescence from another plant (*Tweedie* 25), × ⅔; 3, portion of bract, to show margin, × 6; 4, a single flower with one anterior petal-lobe turned down, × 2; 5, rostellum (spread out), × 3.


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Tabula 3238.

PLATYCORYNE MEGALORRHYNCHA *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

P. megalorrhyncha *Summerhayes* in Kew Bull. 1933, 250; affinis *P. tenuicauli* Rolfe, a qua caule magis foliato, floribus minoribus, anthera obtusa nec longe apiculata canalibus brevioribus, brachiis stigmatiferis apice ovato-dilatatis antherae canales exeedentibus, rostelli lobo intermedio antheram bene superante differt.

Herba terrestris, gracilis, omnino glabra, 20–30 cm. alta. *Caulis* foliatus, erectus, teres, basi cataphyllis paucis acutis vaginantibus instructus. *Folia* lanceolata vel lineari-lanceolata, acutissima, basi caulem amplectentia, usque 5 cm. longa et 9 mm. lata, superiora minora. *Racemus* 3–4 cm. longus, circiter 2 cm. diametro, dense 6–7-florus; bracteae lanceolatae, subaristato-acuminatae, ovario pedicellato saepius breviores, usque 2 cm. longae. *Flores* suberecti, ovario pedicellato circiter 1·7 cm. longo. *Sepalum* intermedium ovatum, acutum, carinato-concavum, 7 mm. longum, 4·5 mm. latum; sepala lateralia oblique oblongo-lanceolata, subacuta, 7·5 mm. longa, 2·5 mm. lata. *Petala* e basi latiore falcatim ligulata, acuta, 6·5 mm. longa, 1 mm. lata. *Labellum* simplex, anguste linguiforme, carnosum, marginibus recurvatis, 6·5 mm. longum, 1·3 mm. latum (explanatum); calcar dependens, cylindricum, dimidio superiore clavato-inflatum, obtusum, 1·4 cm. longum. *Anthera* erecta, obtusa, 3·5 mm. alta, canalibus porrectis crassiusculis 2·5 mm. longis. *Brachia stigmatifera* crassa, apice ovata vel spathulato-ovata dilatata, 2·5 mm. longa, antherae canales paullo excedentia. *Rostelli* lobus intermedius e basi latiore oblongo-lanceolatus, acutus, 2·4 mm. longus, 1·2 mm. latus; lobi laterales basi latissimi, ab intermedio sinu lato rotundato sejuncti.

Southern Nigeria. Bamenda District, Fougom, in boggy ground, 1050 m., April 1931, *Maitland* 1509 (type).

In habit and general floral structure this species is a very ordinary member of the genus. It is unique, on the other hand, in possessing an enormous middle lobe of the rostellum, overtopping the column, and making the latter appear quite insignificant. In this and some other species with a relatively large rostellum placed in front of and more or

less separated from the anther, the same evolutionary trend is seen as in the genus *Bonatea* where, however, the rostellum is more or less cucullate. Both *Platycoryne* and *Bonatea* are considered by some taxonomists to be merely sections of the large and polymorphic genus *Habenaria*; each may be separated generically because the species referred to it exhibit, to varying degrees, correlated modifications in particular directions resulting in a readily recognized assemblage of characters. In *Platycoryne* the species show considerable diversity in certain features, some of which are paralleled in various sections of *Habenaria*. There is, nevertheless, no doubt as to whether any given species should be referred to *Platycoryne* or *Habenaria* in spite of the paucity of exact differential characters.—V. S. SUMMERHAYES.

FIG. 1, flowering plant, *natural size*; 2, flower, lateral view, × 3; 3, petal, × 4; 4, column, lateral view, × 6; 5, stigma, from inside, × 12; 6, rostellum, spread out, × 6:—A, anther; R, rostellum; S, staminode; St, stigmata; V, viscidia.


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Tabula 3239.

PLATYCORYNE AMBIGUA (*Kraenzl.*) *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

P. ambigua (*Kraenzl.*) *Summerhayes*, comb. nov. *Habenaria ambigua* Kraenzl. in Engl. Jahrb. xxviii. 175 (1900). Affinis *P. tenuicauli* Rolfe, a qua sepalo intermedio longiore angustiore subfalcato-ineurvato, sepalis lateralibus angustioribus, labello longiore, anthera mutica, rostelli lobis latioribus differt.

Herba perennis, paludicola, usque ad 40 cm. alta ; tubera ellipsoidea, circiter 1 cm. longa. *Caulis* erectus, gracilis, leviter flexuosus, basi cataphyllis vaginantibus 1 vel 2 instructus, trientibus duobus inferioribus 4–5-foliatus. *Folia* linearia vel lineari-lanceolata, basi dilatata vaginantia, apice acuminata, usque ad 14 cm. longa et 9 mm. lata, suberecta vel adscendentia. *Inflorescentiae* simpliciter racemosae, subdense 3–8-florae, 5–10 cm. longae ; bracteae foliaceae, lanceolatae, acuminatae, infima usque ad 4 cm. longa, ceteris minoribus ovario pedicellato saepius brevioribus. *Flores* suberecti, flavidi, ovario pedicellato 1·5–2·5 cm. longo. *Sepalum* intermedium lanceolatum vel lanceolato-ovatum, acuminatum, valde concavum, subfalcato-ineurvatum, circiter 15 mm. longum, 6–7 mm. latum ; sepala lateralia deflexa, oblique oblongo-lanceolata, acuta, apice leviter carinata, 14 mm. longa, circiter 2·5 mm. lata. *Petala* linearia vel lineari-lanceolata, acuta, 13–15 mm. longa, 1·3 mm. lata, ad sepalum intermedium agglutinata. *Labellum* simplex, lineare, obtusum, saepius ineurvatum, 13–14 mm. longum, 1·5 mm. latum, marginibus recurvatis ; calcar dependens, apice clavato-inflatum, 15 mm. longum. *Anthera* circiter 6 mm. alta, mutica, loculis parallelis, canalibus leviter ineurvatis, 4·5 mm. longis. *Brachia stigmatifera* apice dilatata, ovata, convexa, 3 mm. longa, 2 mm. lata (explanata) ; rostelli lobus intermedius oblongo-lanceolatus, acutus, apice ineurvatus, 3 mm. longus, lobi laterales oblique triangulares, truncati.

Tanganyika Territory. Uhehe, Wem, in open Bush, in damp depression, 1600 m., Feb. 1899, *Goetze* 700 (type). Msalala, *Hannington*. Manyoni District, Kazikazi, in seasonally-wet bog in drainage valley, 1260 m., March 1933, *Burtt* 4621.

A striking member of the genus, easily recognized by the long narrow leaves and the long narrow perianth members, of which the dorsal sepal somewhat resembles a scimitar in lateral view. The species is probably allied to *P. tenuicaulis* Rolfe, which comes from the same region but has smaller flowers with broader parts and a long apiculus to the column. In *P. ambigua* the rostellum is in front of and quite separated from the anther, but it is relatively much smaller than in *P. megalorrhyncha* Summerhayes, figured in tab. 3238.

V. S. Summerhayes.

Fig. 1, flowering plant, *natural size*; 2, flower, lateral view, × 2; 3, column, lateral view, × 4; 4, rostellum, spread out, × 4:—A, anther; Rm, rostellum, median lobe; Rl, rostellum, lateral lobe; St, stigma; V, viscidium.


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Tabula 3240.

SATYRIUM FIMBRIATUM *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

S. fimbriatum *Summerhayes* in Kew Bull. 1932, 348; affinis *S. membranaceo* Sw. et *S. principi* Bolus, ab illo rostelli lobo intermedio triangulari acuto nec ampliatim semiorbiculari, ab hoc statura, foliis floribusque minoribus, colore florum, stigmate integro differt.

Herba terrestris, usque 40 cm. alta; tubera ovoidea, circiter 1 cm. longa. *Folia* 2, radicalia, humistrata, ovata vel suborbicularia, subacuta vel obtusa, 3–7 cm. longa, 2·5–7 cm. lata, ut videtur subcarnosa. *Scapus* erectus, teres, glaber, vaginis 3–5 lanceolatis acuminatis membranaceis subdistantibus instructus. *Racemus* cylindricus, 6–13 cm. longus, circiter 2·5 cm. diametro, subdense 5–18-florus; bracteae lanceolatae vel elliptico-lanceolatae, acutae vel acuminatae, ovarium pedicellatum superantes, sub anthesi dimidio superiore recurvatae. *Sepalum* intermedium ligulato-oblanceolatum, obtusum, 8–10 mm. longum, 2–2·5 mm. latum; sepala lateralia curvatim oblongo-lanceolata, subacuta, 8–11·5 mm. longa, 2·5–3 mm. lata; sepala omnia basi petalis adnata. *Petala* elliptico-oblanceolata, subacuta, superne marginibus lacerato-fimbriata, 8–10·5 mm. longa, 2·5–3·5 mm. lata. *Labellum* late ellipsoideum, leviter cucullatum, totum 9·5–12 mm. longum, inferne 6–7 mm. latum, in apicem suborbicularem ± reflexum marginibus lacerato-fimbriatis 3·5–4 mm. longum productum; calcaria gracilia, ovario ± parallela, cylindrica, circiter 3 cm. longa. *Columna* incurvata, 3–5 mm. longa; labium stigmatiferum transverse oblongo-ellipticum, 1·5–2 mm. altum, 3–4 mm. latum; rostellum basi quadratum, lobis lateralibus brevissimis dentiformibus, lobo intermedio triangulari acuto, totum rostellum 1·5–2 mm. longum, basi 1·25–2 mm. latum.

Kenya Colony. Kinangop Plateau, Aberdare Mts., lower slopes of Kipipiri, in open grassland close to forest edge, 2490 m., *Honoré* 1877 (type). Kinangop, open land on grassy hillside, 2520 m., May 1932, *Harvey* 168. Tinderet, *Mrs. Mainwaring* 1287. Cherangani, 1800–2100 m., June 1932, *Tweedie* 36, *Jex-Blake* 2129. Londiani, in grasslands, 2340 m., July 1932, *Graham* 2879.

The section *Eusatyrium* of *Satyrium* is characterized by the possession of one or two orbicular or broadly ovate radical leaves which are adpressed

closely to the ground rather in the manner of *Plantago major* L. on a lawn. These leaves are often fleshy and act as organs for water storage, being frequently exhausted by the rapid elongation of the spike before flowering and therefore either withered or partially so when the flowers are expanded. There are about a dozen species in the tropical parts of Africa and perhaps another twenty in South Africa. There is a considerable amount of variation in the size of the flowers and other characters, but on the whole the section is a fairly natural one. The species here figured is of especial interest because although it is restricted, so far as is known, to Kenya Colony, it possesses certain features in common with two species (*S. membranaceum* Sw. and *S. princeps* Bolus) which are natives of the Cape Province and are not known to occur in either Natal or the Transvaal. The chief feature is the finely fimbriate or almost lacerate margins of the petals and of the flattened apex of the lip, this being restricted to these three species. The Kenya species is a much smaller and more slender plant than its two relatives but in general respects resembles them very closely. The important differences are given in the differential diagnosis.

S. fimbriatum is an inhabitant of grassland at and above 2000 m. in western Kenya Colony. It possesses rather pretty pink unscented flowers.—V. S. Summerhayes.

Fig. 1, flowering plant, large leaf drawn upright to show shape, *natural size*; 2, a single flower, × 2; 3, 4 and 5, gynostegium in front, three-quarter front, and back views, × 6; 6, a pollinium with gland, × 8.

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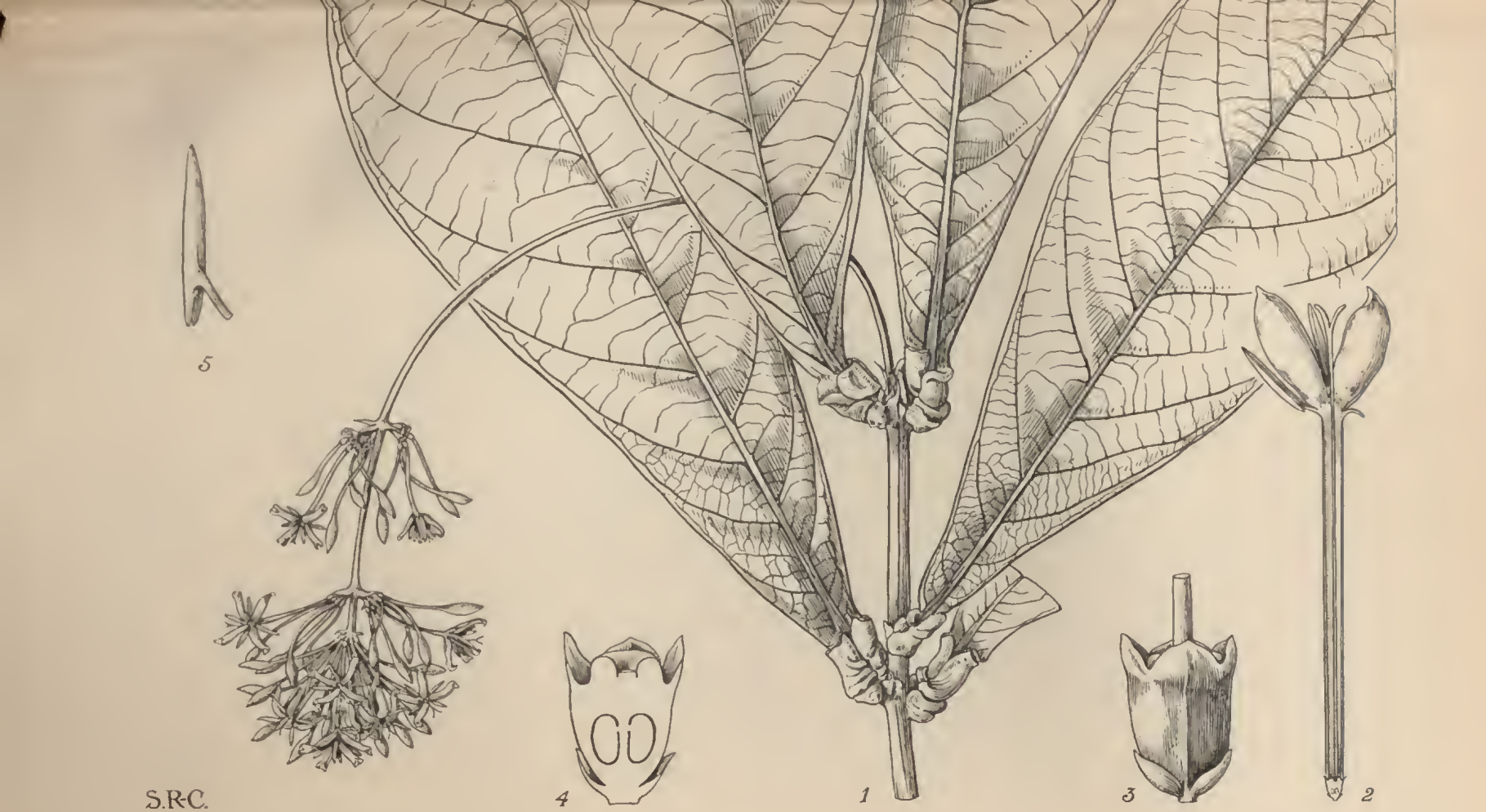

S.R.C.

Tabula 3241.

IXORA HIPPOPERIFERA *Bremekamp.*

Rubiaceae. Tribus Ixoreae.

I. hippoperifera *Bremekamp*; species nova, affinis *I. laxiflorae* Sm., *I. anemodesmati* K. Schum., *I. viridiflorae* K. Schum., *I. nematopodae* K. Schum., *I. roseae* K. Schum., *I. longepedunculatae* De Wild., *I. divaricatae* Hutch. et Dalz., sed panicula angusta, floribus sessilibus ad apicem ramulorum brevium congestis ab his speciebus facile distinguenda, parte basali foliorum sessilium in sacculos binos utroque latere costae hippoperarum instar dispositos mutata ab omnibus congeneribus hactenus cognitis conspicue diversa.

Frutex glaber, ramis novellis praesertim parte superiore internodiorum bisulcatis. *Folia* sessilia, membranacea, oblanceolato-obovata, 20–28 cm. longa, 7·5–10 cm. lata, apice acuminata, dimidio inferiore cuneata, ad basin tamen dilatata et utroque latere costam versus reduplicata, hoc modo pagina superiore sacculos binos formantia, supra nitidula, subtus opaca, nervis utroque latere costae 10–12 subtus prominentibus, venulis sparsis; stipulae late ovatae, arista longitudine partem basalem paullo superante munitae. *Inflorescentia* terminalis, longe pedunculata, anguste paniculata; pedunculus basi jugo foliorum parvorum 0·5–0·8 cm. longorum munitus, 10–16 cm. longus; ramuli paniculae breves, inferiores ab aliis 4 cm. remoti, superiores ad apicem agglomerati; ramuli secundarii brevissimi; bracteae parvae, lineares; bracteolae minutae, ovario multo breviores. *Flores* sessiles, ad apicem ramulorum fasciculati. Receptaculum ambitu cupulare, 0·8 mm. altum. *Calyx* 1 mm. longus, lobis late triangularibus tubo subaequilongis. *Corollae tubus* gracilis, 2 cm. longus, 0·5 mm. diametro, intus glaber; lobi oblongi, 6 mm. longi, 2·5 mm. lati, acuti. *Filamenta* 1·5 mm. longa; antherae 4 mm. longae, apiculatae, flore aperto contortae. *Stylus* glaber, usque ad 5·5 mm. exsertus, parte terminali incrassata 2·5 mm. longa, in lobis recurvaturos profunde bifida. *Drupa* bisulcata, dipyrena, 8 mm. alta, 11 mm. lata.

Cameroons. Bipinde, *Zenker* 4124 (flowering), 4841 (fruiting).

The "saddlebags" at the base of the leaf show a close resemblance to the small bags found at the base of the leaves of *Duroia saccifera*

(Mart.) Hook. f. and *Remijia physophora* Benth., where the entrance, however, is at the lower side of the leaf. They suggest myrmecophily, but I must add that I have not found the ants.

The presence of a pair of reduced leaves at the base of the peduncle is a peculiarity found in a large number of species; it is doubtless of taxonomic importance, and is shown by all the species to which I have referred above. These plants resemble one another moreover in the considerable length of the peduncle of the more or less pendulous inflorescence and usually also in the colour of the flowers: these are white or greenish, except in *I. rosea*, where they are pink. The inflorescences are corymbose or panieulate, and their branchlets and pedicels are long and slender: in the new species, however, the branchlets are short, and the flowers sessile. They are all West-African.—C. E. B. Bremekamp.

Fig. 1, upper part of branch, with inflorescence, × ⅔; 2, longitudinal section of flower, × 3; 3, flower with corolla removed, × 12; 4, longitudinal section of same, × 12; 5, stamen, × 6; 6, upper part of style, × 12; 7, infructescence, *natural size*.


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Tabula 3242.

PYGMAEOTHAMNUS CONCRESCENS *Bullock.*

Rubiaceae. Tribus Vanguerieae.

P. concrescens *Bullock* in Kew Bull. 1933, 471 ; a *P. Zeyheri* (Sond.) Robyns foliis oppositis, floribus multo majoribus facile distinguitur.

Suffrutex nanus, erectus, 15–25 cm. altus ; caules annui, simplices, lignosi, glabri, e rhizomate subterraneo orti, internodiis 2–5(–7) cm. longis. *Stipulae* intus villosae, ceterum glabrae, longe subulatae, inferne in vaginam intrapetiolarem truncatam connatae, caudis acutis erectis usque 6·5 mm. longis. *Folia* opposita, glaberrima, leviter discoloria (subtus ut videtur glaucea), elliptica vel anguste obovata, apice acute cuspidata, basi in petiolum circiter 1 cm. longum sensim angustata, 8–10 cm. longa, 3–5 cm. lata, inferne cataphyllaria, costa et nervis lateralibus (utrinque circiter 5) satis prominentibus, rete venularum conspicuo. *Flores* albi, 5- vel saepe 6-meri, in cymas dichasiales axillares pedunculatas circiter 10–15-floras dispositi ; pedunculi sub anthesin 2 cm. longi, satis crassi, statu fructifero usque 5 cm. longi et basin versus cum caule coaliti ; pedicelli crassi, 3–6 mm. longi ; bracteae et bracteolae lineares. *Calyx* glaber, campanulatus ; tubus (receptaculo incluso) 4·5 mm. longus, apice 3 mm. diametro, basin versus leviter puberulus ; lobi anguste triangulares, 4 mm. longi, basi 2 mm. lati, apice acuti. *Corollae tubus* subconico-cylindricus, 5 mm. longus, usque 3·5 mm. diametro, intus circa medium pilis villosis reflexis annulatus ; *lobi* oblongi, subacuti, 5 mm. longi, 2 mm. lati, glabri, sub anthesin reflexi. *Filamenta* brevissima, basin versus ampliata ; antherae alabastro circa stigma cohaerentes, sub anthesin liberae, lanceolatae, apice acutae, basi subsagittatae, 2 mm. longae, 1 mm. latae, margine hyalinae. *Ovarium* 2-loculare ; ovula in loculis solitaria, pendula ; stylus 7 mm. longus, apicem versus leviter angustatus ; stigma capitatum, 2 mm. longum, circa medium 2 mm. diametro, apice bifidum. *Fructus* drupacei, carnosi, plerumque abortu uniloculares, subglobosi, usque 2 cm. diametro.

Tanganyika Territory. Iringa Province : Njombe, a small shrub, very common, especially where the grass has not been burnt, fl. Dec. 1931, *Rear-Admiral H. Lynes* " D.p. 108 " (type) ; Njombe, 1800 m., a woody herb 1 ft. high, with leathery leaves, common in patches in grassland, fr. Aug. 1931, *Mr. and Mrs. H. E. Hornby* 65.

The genus *Pygmaeothamnus* was established by Dr. Robyns (Bull. Jard. Bot. Brux. xi. 29 : 1928) to accommodate four South African species, three of which had been previously described by various authors under the generic names *Canthium*, *Plectronia*, *Vangueria*, *Fadogia* and *Pachystigma*. Robyns admitted three varieties of *P. Zeyheri* (Sond.) Robyns, a species occurring in Angola, Belgian Congo and Rhodesia, as well as in South Africa, and one variety of *P. Chamaedendrum* (O. Kuntze) Robyns. Some of the varieties had previously held specific rank.

The chief difference between *Pygmaeothamnus* Robyns and *Canthium* Lam. (= *Plectronia* Auett., non Linn.) given in Dr. Robyns' "Conspectus generum" (*l.c.* 21), is in the inflorescence :—

"Flores solitarii vel in inflorescentias simplices haud ramosas dispositi . . . . . *Pygmaeothamnus* etc.
"Flores in umbellas vel plerumque in inflorescentias conspicuas ramosasque dispositi . . . . . *Canthium* etc."

A detailed examination of the African species of *Canthium* (Bullock in Kew Bull. 1932, 353–389) shows that the inflorescence is even more variable than Dr. Robyns' key suggests, and it is equally so in *Pygmaeothamnus*, which makes the separation of the two genera very difficult. It is nevertheless convenient to retain *Pygmaeothamnus* as a genus distinct from *Canthium*, the points of difference being briefly summarized as follows :—

Arbores vel frutices erecti vel scandentes ; flores 4–5-meri ; drupae plus minusve globosae, lignosae vel rarius carnosae, saepe didymae . . . . . *Canthium*
Suffrutices nani, erecti ; flores 5–6-meri ; drupae plus minusve obovoideae vel globosae, valde carnosae, haud didymae . *Pygmaeothamnus*

The most striking feature of *Pygmaeothamnus* is the subherbaceous habit, which at once separates it from the climbing and erect shrubs and trees included in *Canthium*. Herbarium specimens of *Pygmaeothamnus concrescens* show a striking resemblance to those of *Canthium crassum* Hiern, which is a tree with fire-resisting bark, widely distributed in the grasslands and deciduous forests of Tropical Africa (Bullock, *l.c.* 379). In texture, shape and venation the leaves are remarkably alike in the two species, whilst the inflorescence and flowers approximate very closely.

The specific name *concrescens* refers to the union of the peduncle and main stem which becomes more marked in the fruiting stage.

A. A. Bullock.

Fig. 1, part of a plant, in the flowering stage, *natural size* ; 2, hexamerous flower, × 4 ; 3, part of corolla, from within, × 4 ; 4 and 5, longitudinal and transverse sections of ovary, × 3 ; 6, stamen, abaxial view, × 8 ; 7, part of infructescence, *natural size*.


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Tabula 3243.

CROTALARIA ANNUA *Milne-Redhead.*

Leguminosae. Tribus Genisteae.

C. (Sphaerocarpae) annua *Milne-Redhead*; species nova *C. phyllostachyi* Baker habitu et floribus similis sed fructu majore polyspermo recedens.

Herba annua, scopiformis, caule erecto usque 1 m. alto. *Rami* erecto-adscendentes, simplices, 25–50 cm. longi, virgati, ut caulis striati, dense crispule pilosi. *Folia* petiolata, trifoliolata, circiter 2 cm. longa, secundum caules dispersa, stipulata, stipulis minutissimis tomentosis caducis; petioli adscendentes, 5–8 mm. longi, supra plani, parce tomentosi; foliola sessilia, oblanceolata, apice acuta et longe mucronata, basi cuneata, usque 1·5 cm. longa et 4 mm. lata (lateralia minora), supra parcissime pilosa, subtus longe adpresse pilosa, costa et mucrone densius; costa supra sulcata, subtus prominens; nervi laterales utrinque inconspicui. *Inflorescentiae* longe racemosae, caulem et ramos terminantes, floribus solitariis vel paucis ex axillis foliorum superiorum exortis, circiter 25 cm. longae, erectae, virgatae, rhachibus dense crispule pilosis; bracteae subulatae, 2·5 mm. longae, adpresse pilosae; pedicelli erecti, circiter 5 mm. longi, densius induti. *Calyx* 5-dentatus, extra parce tomentosus, intus glaber; tubus 3 mm. longus; dentes lanceolati, acuti, 6 mm. longi, basi 1·5 mm. lati. *Vexillum* suborbiculare, 12 mm. diametro, luteum, extra nervis rubris ornatum; alae obovato-oblongae, 12 mm. longae, apicem versus 4·5 mm. latae, luteae; carina infra medium rectangulata, apicem versus in rostrum rectum tortilem 10 mm. longum prolata, basin versus rotundata, 12 mm. longa, 5 mm. lata, lutea. *Stamina* fertilia antheris ultra 1 mm. longis praedita; stamina abortiva fertilibus 3 mm. longiora, antheris valde redactis. *Ovarium* circiter 4 mm. longum, villosum, ovulis 15–20; stylus circiter 10 mm. longus, basin versus angulatus, apicem versus utrinque pilosus, stigmate glabro. *Legumen* oblongo-globosum, 7 mm. longum, 5 mm. diametro, extra densiuscule pilosum, intus glabrum; semina 10–16, parva, 1·5 mm. diametro.

Northern Rhodesia. Solwezi District: on bared ground in *Brachystegia* woodland at Solwezi, 5 June 1930, *Milne-Redhead* 422:— Virgate woody annual up to 1 m. high; flowers yellow and red.

The available material of *Crotalaria phyllostachys* Baker is unfortunately lacking in the basal part of the stems and in the rootstock, but the upper portions so strongly resemble those of *C. annua* that one is led to expect that the former species is really an annual and not an undershrub as stated by Baker. In the flowering condition it is hard to distinguish these two species, but when in fruit they are easily separable, the legumes of *C. phyllostachys* being subglobose, about 4 mm. in length, and usually only 2-seeded, whilst *C. annua* has pods 7 mm. long, slightly less in diameter and containing up to 16 seeds. The pods of *C. annua* are almost identical with those of *C. argyrolobioides* Baker, a species which, in the writer's opinion, should be placed in the section *Sphaerocarpae*.

Crotalaria annua was found growing on very hard dry ground in *Brachystegia* woodland, the turf of which had been removed a year or so previously. Associated with it were *Crotalaria filicaulis* Welw. ex Baker, *C. Bequaertii* E. G. Baker, *Aster Eylesii* (S. Moore) Milne-Redhead,* *Eragrostis Chapelieri* Nees, *Melinis macrochaeta* Stapf et Hubbard, and *Rhynchelytrum repens* (Willd.) C. E. Hubbard (syn. *R. roseum* (Nees) Stapf et Hubbard).—E. Milne-Redhead.

Fig. 1, upper part of plant, *natural size*; 2, terminal leaflet showing upper surface, × 2; 3, terminal leaflet showing lower surface, × 2; 4, vexillum, anterior view, × 2; 5, ala, from outside, × 2; 6, carina, lateral view, × 2; 7, portion of androecium, seen from within, × 4; 8, gynoecium with calyx × 2; 9, upper part of style, × 4; 10, legume, *natural size*; 11, longitudinal section of legume showing placentation, *natural size*; 12, seed, × 6.

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* **Aster Eylesii** (*S. Moore*) *Milne-Redhead*, comb. nov.: *Felicia Eylesii* S. Moore in Journ. Bot. lxiv. 304 (1926).


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Tabula 3244.

CROTALARIA PRAECOX *Milne-Redhead.*

Leguminosae. Tribus Genisteae.

C. (Sphaerocarpae) praecox *Milne-Redhead*; species nova, peraffinis *C. bicolori* I. M. Johnston, a qua rhizomate repente, foliolis latioribus et brevioribus differt.

Herba perennis, rhizomate repente erasso. *Caules* valde numerosi, erecti vel decumbentes, subsimplices, circiter 15 cm. longi, vetustiores longiores, minute sulcato-striati, puberuli vel parce canescenti-pubescentes, internodiis 5–15 mm. longis. *Folia* petiolata, trifoliolata, stipulata, stipulis minutissimis caducis; petioli adscendentes, 2–6 mm. longi, supra late excavati, parce adpresse pubescentes; foliola obovata vel oblanceolata, apice subacuta vel obtusa vel truncata, vix mucronulata, basin versus in petiolulum minutissimum tomentosum cuneata, 3–10 mm. longa, 1·5–3·5 mm. lata, supra glabra, subtus adpresse pubescentes; costa supra sulcata, subtus prominula; nervi laterales utrinque inconspicui. *Racemi* terminales, densiusculi vel laxi, 1–9 cm. longi; rhaches plus minusve angulati, pubescentes; bracteae lineares, vix 2 mm. longae, pubescentes; pedicelli adscendentes, 1–4 mm. longi, parce adpresse pubescentes. *Calyx* 5-dentatus, 3 mm. longus, extra parce pubescens, intus glaber; dentes anguste triangulares, acuti, tubum excedentes. *Vexillum* late obovatum, basi cuneatum, usque 7 mm. longum et 6 mm. latum, extra parce pubescens, intus glabrum, luteum, purpureo-lineatum; alae obovato-oblongae, 6 mm. longae, 2·5 mm. latae, luteae, purpureo-lineatae; carina infra medium rotundato-angulata, in rostrum leviter curvatum prolata, 6 mm. longa, 2·5 mm. lata, lutea, purpureo-lineata. *Stamina* fertilia antheris ultra 1 mm. longis; stamina abortiva circiter 2 mm. longiora, antheris valde redactis. *Ovarium* circiter 2 mm. longum, parce pubescens, 2–3-ovulatum; stylus 6 mm. longus, apicem versus utrinque ciliatus. *Legumen* sessile, ellipsoideum, postice applanatum, 3·5 mm. longum, 2·5 mm. latum, 1–2-spermum.

Northern Rhodesia. Mwinilunga District: in open space in *Brachystegia* woodland, after grass fire, near Matonchi Farm, 1 Sept. 1930, *Milne-Redhead* 1010:—Perennial herb with running habit and thick rhizome; flowers yellow with purple veinings; old unburnt shoots much longer than young flowering shoots.

C. praecox is one of the few perennial species belonging to the section *Sphaerocarpae*, and is very closely allied to the Angolan *C. bicolor* Johnston. It differs from *C. bicolor*, however, in possessing underground horizontal stems, from buds on which new plants develop, resulting in the production of colonies of the species by vegetative means. The plant figured was collected early in the season, when it flowers profusely. At a later date, probably during the rains, it produces shoots considerably longer than those shown in the figure, but whether it bears flowers on these or whether they are just sterile leafy shoots is not known. The fruits develop and ripen very quickly, the plants being in fruit before the later flowers have opened.

E. Milne-Redhead.

Fig. 1, plant in flowering stage, *natural size*; 2, vexillum, × 4; 3, ala, from without, × 4; 4, carina, × 4; 5, androecium opened out, posterior view, × 4; 6, calyx and gynoecium, × 4; 7, gynoecium, × 4; 8, upper part of style with stigma, × 6; 9, portion of fruiting branch, × 2; 10, legume, opened showing seeds, × 4; 11, seed, × 8.


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Tabula 3245.

CROTALARIA STREPTORRHYNCHA *Milne-Redhead.*

Leguminosae. Tribus Genisteae.

C. (Sphaerocarpae) streptorrhyncha *Milne-Redhead*; species nova, a ceteris speciebus africanis hujus sectionis inflorescentiis densis subfasciculatis vel brevissime racemosis ex axillis petiolorum persistentium exortis differt.

Herba annua, caule erecto simplici circiter 5 dm. alto plus minusve striato adpresse albo-pubescente basin versus puberulo vel glabro, internodiis 1–2 cm. longis. *Stipulae* minutissimae, adpresse albo-pubescentes. *Folia* petiolata, trifoliolata, 5–5·5 cm. longa; petioli adscendentes, 1·5–2·5 cm. longi, supra profunde sulcati, parce adpresse albo-pubescentes; foliola oblongo-obovata, apice rotundata vel subtruncata, basin versus in petiolulum minutissimum attenuata, 2–3 cm. longa, 9–11 mm. lata, supra glabra, subtus adpresse albo-pubescentes; costa supra leviter sulcata, inconspicua, subtus prominula; nervi laterales supra valde inconspicui, subtus vix prominuli. *Inflorescentiae* densae, brevissime racemosae vel subfasciculatae, ex axillis petiolorum persistentium exortae; rhaches 2–3 mm. longae, albo-pubescentes, floribus 4–6 instructae; bracteae lineares, acutae, circiter 4 mm. longae, albo-pubescentes; pedicelli vix 2 mm. longi, albo-pubescentes; bracteolae infra calycem subulatae, 3 mm. longae. *Calyx* 5-dentatus, extra parce adpresse albo-pubescens, intus glaber; tubus 2–3 mm. longus; dentes lanceolati vel ovato-lanceolati, acuminati, 5 mm. longi, 2·5 mm. lati, plus minusve imbricati, anticus ceteris angustior. *Vexillum* obovatum, apicem versus truncato-rotundatum, basin versus late cuneatum, 9 mm. longum, 7 mm. latum, luteum, superne postice medium versus pubescens; alae obovato-oblongae, 9 mm. longae, 3·5 mm. latae, luteae, purpureo-lineatae; carina infra medium rectangulari-angulata, apicem versus in rostrum rectum tortilem prolata, 8 mm. longa, 3·5 mm. lata, pallide lutea. *Stamina* fertilia 5(–6), antheris 1 mm. longis instructa; stamina abortiva 5, primum fertilibus breviora, demum iis 2 mm. longiora, antheris valde redactis minutissimis penicillatis. *Ovarium* circiter 4 mm. longum, subglabrum vel postice sparse hirsutum; stylus circiter 6 mm. longus, apicem versus utrinque breviter pubescens. *Legumen* maturum ignotum, immaturum sphaericum, ovulis 2.

Northern Rhodesia. Solwezi District: by path through *Brachystegia* woodland at Mutanda Bridge, 21 June 1930, *Milne-Redhead* 569:—Erect annual with trifoliolate leaves and yellow flowers in axillary clusters. Only one specimen seen.

Although fruits of this species are unknown, it seems safe to place it in the section *Sphaerocarpae* on account of its biovulate ovary. Within this section, however, it is not easy to find an affinity for it, as, on account of the fasciculate inflorescence in the axils of the old leaves, *C. streptorrhyncha* does not fit into any of the eight subdivisions of the section used by E. G. Baker in his account of the African species of *Crotalaria* (Journ. Linn. Soc. xlii. 273). Amongst African *Crotalariae*, *C. axillaris* Dryand. alone has a somewhat similar habit, but it is a member of the section *Eucrotalaria*, and is not nearly related to *C. streptorrhyncha*.

A feature well shown in this *Crotalaria* is that the filaments of the small-anthered stamens continue to lengthen after those bearing the large anthers have reached their full length. If a bud or young flower is examined, the former set will be found to be shorter than those bearing the larger anthers, whilst in an old flower they will have grown out to nearly double their length. The small anthers are penicillate-hairy, and it is possible that they help to brush the pollen up towards the stigma and out at the end of the keel when they grow up past the dehiscing fertile anthers, which are situated considerably below the stigma within the beak of the keel. In one of the flowers examined six fertile stamens were present (fig. 6). The twisting of the beak of the keel is very noticeable in this species, a character which is not infrequent in certain sections of the genus, but which is seldom mentioned in descriptions.

Crotalaria streptorrhyncha is another of the numerous annuals which are endemic in the great plateau area of southern tropical Africa, the flora of which is, at the present moment, very incompletely known. In this area the distribution of many of the annual species is remarkably local. In the course of covering about 300 miles on foot in the Solwezi and Mwinilunga Districts of Northern Rhodesia, the writer found this plant only once, although one would expect it, as a weed of waste places, to be of frequent occurrence.—E. Milne-Redhead.

Fig. 1, plant, *natural size*; 2, calyx, × 2; 3, vexillum, from within, × 4; 4, ala, × 4; 5, carina, × 4; 6, staminal sheath from within, first stage, with one additional perfect stamen, × 4; 7, part of staminal sheath, later stage, with the filaments of the staminodes elongated, × 4; 8, antherode, × 16; 9, gynoecium, × 4


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Tabula 3246.

BOLUSIA RESUPINATA *Milne-Redhead.*

Leguminosae. Tribus Genisteae.

B. resupinata *Milne-Redhead*; species nova, a *B. amboënsi* (Schinz) Harms floribus resupinatis, carina basin versus incurva, caulibus et foliis albo-pilosis valde distincta.

Herba perennis, usque 9 dm. alta. *Caules* erecti vel adscendentes, plus minusve ramosi, teretes, inconspicue striati, breviter albo-pilosi, demum glabrescentes, foliosi: internodia 1·5–3 cm. longa. *Stipulae* a petiolo liberae, conspicuae, foliosae, oblique ovatae, postice gibbosae, acute apiculatae, basi rotundatae vel subcordatae, usque 13 mm. longae et 8 mm. latae, albo-pilosae. *Folia* digitatim 3-foliolata, albo-pilosa; petioli usque 9 mm. longi, teretes; foliola oblanceolata, apice rotundata et conspicue apiculata, basi in petiolulum brevissimum attenuata, usque 3 cm. longa et 13 mm. lata, lateralia aliquanto minora; costa utrinque prominula; nervi laterales circiter 5, inconspicui, exsiccando prominuli. *Racemi* axillares, abortu uniflori; pedunculi 1–2·5 cm. longi, albo-pilosi; bracteae lanceolatae, acutae, circiter 5 mm. longae et 1 mm. latae; pedicellus 3–4 mm. longus, valde recurvatus flore itaque inverso, basin versus bibracteolatus, parce albo-pilosus; bracteolae lanceolatae, acutae, circiter 4 mm. longae. *Calyx* infundibuliformis, circiter 9 mm. longus; lobi liberi, lanceolati, acuti, circiter 5 mm. longi, postici vexillo expanso valde recurvati; calyx extra albo-pilosus, intus glaber. *Vexillum* alte cucullatum, apice profunde bifidum, basi unguiculatum, ungue 4 mm. longo valde (per 180°) recurvato et in basin concavam vexilli valde adpresso, circiter 1 cm. altum et 7 mm. diametro, postice extra medium versus albo-pilosum, ceterum glabrum. *Alae* obovatae, basi in unguem valde angustatae, basin versus auriculatae, auricula 2 mm. longa valde reflexa, circiter 11 mm. longae et 6 mm. latae. *Carina* basin versus incurva, superne in cyclos tres spiraliter contorta, angustissima, circiter 5 cm. longa et 1·5 mm. lata. *Stamen* vexillare a basi liberum, cetera connata; staminum longiorum antherae ovatae, minutae, filamenta circiter 7·5 cm. longa, breviorum antherae lineari-lanceolatae, 1·5 mm. longae, basifixae, filamenta usque 3 cm. longa; vagina medium versus circiter 1 cm. longa; stamen vexillare anthera minuta ovata instructum. *Ovarium* sessile, circiter 5 mm. longum, multiovulatum; stylus circiter

4·5 cm. longus, ut carina ter spiraliter contortus, glaber; stigma oblique terminale, dense barbatum. *Legumen* ut flos inversum, oblongum, apice styli basi persistente rostratum, turgidum, 2-valve, intus continuum. *Semina* rotundata, compressa, vix 4 mm. diametro, basi valde cordata, estrophiolata, funiculis filiformibus circiter 2 mm. longis.

Northern Rhodesia. Mpika District: on poor white soil derived from quartzites and sandstones near the top of a rocky ridge, Musha Hills near Kanona on the Mpika–Broken Hill road, about 1700 m., 8 April 1932, *St. Clair Thompson* 1283:—Erect herb up to 9 dm., but usually 6 dm. high; petals yellow; stamens and style enclosed in a spirally twisted envelope; fairly frequent on ground incompletely colonized by herbs and grasses, growing with *Anthephora acuminata* Robyns, *Cyperus* sp. and *Xyris* sp.

In the absence of flowers, this plant appears to be practically indistinguishable from the subsection *Stipulosae* of *Crotalaria*, section *Eucrotalaria*, for the legumes and seeds, although not quite mature in the available material, are remarkably similar to those of the latter genus, and their inversion might be thought to be accidental. However, on examination of the flowers, one finds a number of very striking and taxonomically important distinctions. The keel petals are very long and narrow, and form a tube which is at first sharply bent upwards and backwards, as in *Crotalaria*, but is then coiled spirally into three complete turns. At the first bend of the keel there are two small outwardly projecting prominences on to which the reflexed auricles of the two wing petals are hooked. The vexillary stamen is free, and apparently bears a small anther, although one was not actually seen attached to the filament in the flowers examined. The five long anthers are on short filaments, and the small anthers are on long filaments and reach to the end of the keel tube. The style follows the keel exactly, and is quite glabrous, the stigma alone being hairy. The deeply hooded standard, with a strongly reflexed claw which fits into the groove above it, has no parallel in *Crotalaria*. The inversion of the flowers—brought about by the bending backwards of the pedicel, so that the subtending bract appears above and behind the flower—is probably connected with the pollination mechanism.

It was at first thought that this plant represented a new genus in the *Genisteae*, but investigation shows that it belongs to the small and little known genus *Bolusia* Benth., endemic in southern Africa, and hitherto placed in the *Galegeae*. *Bolusia* was based on *B. capensis* Benth. in Hook. Ic. Pl. t. 1163 (1873). Two additional species have since been described, but it is probable that *B. rhodesiana* Corbishley will have to be reduced to *B. amboënsis* (Schinz) Harms. Although in many respects *B. resupinata* strongly resembles the other species, it differs from them in having its flowers inverted. However, the possession of an additional bend towards the base of the keel in *B. resupinata*

results in the spiral mechanism being in the same position relatively to the ground in all the species. The inflorescence is, by reduction, one-flowered, which makes it possible for the pedicels to bend backwards.

After careful consideration I feel satisfied that the most natural position for *Bolusia* is in the *Genisteae* near *Crotalaria*, and not, as was suggested by Bentham, next to *Sylitra* in the *Galegeae*.* In the *Genisteae* it is exceptional in having the vexillary stamen free, but it agrees in the unifoliolate or digitately trifoliolate leaves and in the dimorphic anthers.—E. Milne-Redhead.

Fig. 1, flowering stem, *natural size*; 2, portion of fruiting branch, *natural size*; 3, 4, vexillum, anterior and lateral views, × 2; 5, ala, from within, × 2; 6, carina, lateral view, × 2; 7, androecium, *natural size*; 8, gynoecium, lateral view, × 2; 9, stigma, × 12.

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* In his key to Leguminosae in "The Flowering Plants of Africa" Thonner placed *Bolusia* in the *Genisteae*.


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Tabula 3247.

RHADAMANTHUS URANTHERUS *R. A. Dyer.*

Liliaceae. Tribus Scilleae.

R. urantherus *R. A. Dyer*; species nova, affinis *R. convallarioidi* Salisb., a quo floribus multo minoribus, antheris basi plus minusve caudatis, stylo brevissimo differt.

Bulbus tunicatus, subglobosus, 1·5–3 cm. diametro, collo 0·5–1 cm. longo, nonnunquam in duos bulbos divisus. *Folia* 2–8, filiformia, teretia, acuta, recta vel superne eurvata, 4–6 cm. longa, 0·5–0·75 mm. diametro, glabra. *Scapus* gracilis, simplex vel subsimplex, 12–30 cm. altus, minutissime puberulus, statu aphyllo editus. *Flores* 12–20, in racemum terminalem 3–12 cm. longum dispositi; bracteae inferiores 1–1·75 mm. longae, glabrae, basi infra insertionem in calear 1–1·5 mm. longum productae, superiores minores; pedicelli gracillimi, 0·75–1·5 cm. longi. *Perianthium* in alabastro globosum; tubus basalis circiter 1 mm. longus; lobi subcampanulato-conniventes vel patentes, subaequales vel exteriores paullo angustiores, suborbiculati vel late oblongi, apice rotundati, circiter 3·5 mm. longi, 3 mm. lati, dilute fusci, medio colore intensiore vittati, 1-nervii. *Stamina* basi loborum affixa; filamenta 1 mm. longa, basi paullum dilatata; antherae oblongae, basi sagittatae et in caudas breves vel brevissimas productae, circa stylum conniventes, superne per poros obliquos introrsum dehiscentes. *Ovarium* sessile, subtriquetrum, minutissime puberulum; stylus brevissimus, subtruncatus, leviter trisulcatus.

South Africa. Cape Province: Oudtshoorn Division; bulbs growing amongst stones one mile east of Oudtshoorn, *Miss W. Barker* (type). Specimens cultivated at Kew under the number 933/32.

The most important diagnostic character of the genus *Rhadamanthus* is the mode of dehiscence of the anthers by means of oblique pores, instead of by slits as in the related genera of *Scilleae*. This character was mentioned by Salisbury (Gen. 37: 1866) in the original description of the genus: "antherae filamento confluentes superne foramine obcuneato ut in *Kalmia* dehiscentes." Bentham and Hooker (Gen. Pl. iii. 808: 1883) and Baker (Dyer, Fl. Cap. vi. 444: 1897) merely stated that the dehiscence was introrse, and some difficulty was therefore experienced in assigning the present species to the right genus. *Rhadamanthus* was founded on *Hyacinthus convallarioides* L.f., which was

based on specimens collected by Thunberg south of the Roggeveld in the Cape Province. The type was kindly sent on loan from the Natural History Museum, Uppsala, and it is now possible to confirm the statement that the anthers open by oblique pores about half their length.

An examination of *Bolus* 7567 in the Kew Herbarium, cited by Baker, *l.c.*, under *R. convallarioides*, shows that the anthers open by longitudinal slits, an essential character which excludes it from the genus and suggests that it should be placed in *Urgincopsis* Compton. There has since been received, however, a specimen, *Bolus* 13210, collected " in declivibus lapidosis in convalle flum. Hex " which agrees in detail with Thunberg's plant from the same region. Masson's specimen in the British Museum (Natural History), also cited by Baker, *l.c.*, consists of two inflorescences : the right-hand one is definitely *R. convallarioides*, and was probably collected at the same time as Thunberg's, when he and Masson were travelling together. The left-hand specimen on Masson's sheet looks somewhat different but the material is insufficient for determination.

Rhadamanthus urantherus is distinguished from *R. convallarioides* by the anther thecae being shortly tailed at the base. In the type specimen the length of the tails is not constant and in some flowers is very short, but in no case are the tails entirely absent. The species was introduced to the Royal Botanic Gardens, Kew, in a consignment of bulbs forwarded from South Africa by Miss Winsome Barker during 1932. The bulbs flowered in March of the following year in the leafless condition, a feature common to certain species of the closely allied genus *Urginea*. Two to eight filiform leaves were produced from each bulb during November 1933, and it is noteworthy that whereas the peduncles are very minutely puberulous, the leaves are glabrous.

The allied genus *Urgineopsis* was founded on the single species *U. Salteri* from the Cape Peninsula (Journ. Bot. 1930, 107) and " differs from *Urginea* chiefly in the markedly gamophyllous perianth " and " from *Rhadamanthus* in the erect flowers and non-connivent stamens." Prior to the publication of this, Miss A. Duthie in Ann. Univ. Stellenbosch, vi. sect. A, no. 2 (Feb. 1928), gave an account of the species of *Urginea* of the Stellenbosch Flats. In this paper Miss Duthie described five new species, three of them, *U. pygmaea*, *U. minor* and *U. gracilis*, with perianth-lobes united at the base. At the same time she drew attention to the fact that *U. Dregei* Baker (1897) also had the perianth-lobes united at the base, and proposed a section *Pseudo-urginea* for the four species distinguished by this character.

R. A. Dyer.

Fig. 1, bulb with two peduncles, *natural size* ; 2, leaves produced later in the year and withering prior to the next flowering period, *natural size* ; 3, transverse section of leaf, × 8 ; 4, peduncle, pedicel and spurred bract, × 8 ; 5, adaxial view of spurred bract, × 8 ; 6, open flower showing slightly united perianth-lobes, tailed anthers and short style, × 4 ; 7, adaxial view of stamens, showing basal tails and apical pores, × 12 ; 8, abaxial view, × 12 ; 9, gynoecium, × 8 ; 10, transverse section of ovary, × 8.


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Tabula 3248.

NISSOLIA HINTONI *Sandwith.*

Leguminosae. Tribus Hedysareae.

N. Hintoni *Sandwith*; species nova, *N. laxiori* (Robinson) Rose atque *N. montanae* Rose affinis, ramulis (setis exceptis) foliis foliolisque ab initio omnino glabris nec pubescentibus, inflorescentiis dense setosis ceterum glabris, bracteis conspicue setoso-ciliatis, racemis elongatis saepius speciose panieulatis nunquam ad pseudoverticillos redactis differt; praeterea a *N. laxiore* calyce setis exceptis glabro, a *N. montana* dentibus calycinis multo longioribus distinguitur.

Frutex scandens; ramuli setis exceptis glaberrimi, conspicue haud dense flavescenti-setosi, setis vulgo 1·5 mm. longis. *Stipulae* lanceolatae, sparse setoso-ciliatae, 5–9 mm. longae, basi 1·2–2 mm. latae. *Folia* glabra sed petiolis praecipue dimidio inferiore setosis; petioli 3–7 cm. longi; internodium rhacheos inferius 1–2·2 cm. longum, terminale pro rata brevius; petioluli 1–2·2 mm. longi; foliola 5, forma atque magnitudine valde variabilia, suborbiculari-oblonga vel oblonga, foliolum terminale nonnunquam obovato-oblongum, utrinque rotundata, obtusissima, apice 1·5–3·5 mm. mucronata, basi rotundata vel saepe levissime cordata, 1–6 cm. longa, 0·7–3·5 cm. lata, juniora tenuiter adulta firme chartacea, ab initio omnino glabra, nervis lateralibus utroque costae latere circiter 7–8, his venuliscum in foliolis vetustioribus tantum utrinque prominulis. *Racemi* multiflori, axillares, solitarii vel superne saepius seeus axin longum ita dispositi ut panieulam speciosam floriferam praebeant; racemi solitarii, 4–8 cm. longi; panicûlae saepe usque ad 27 cm. longi, anguste pyramidales, racemis 1·5–6 cm. longis nunquam ad pseudo-verticillos redactis; rhachis paniculae racemorumque dense conspieue setosa ceterum glaberrima; bracteae anguste lanceolato-subulatae, conspicue setoso-ciliatae, valde variabiles, 4–8 mm. longae, 0·5–2 mm. latae; pedicelli esetosi vel sparsissime setosi, necnon puberuli, 0·6–1·1 cm. longi. *Flores* siccitate 1·2–1·5 cm. longi. *Calyx* turbinato-campanulatus, truncatus, 4 mm. longus, fere 5 mm. latus, in pedicellum 1 mm. supra articulum abrupte angustatus, glaber sed sparse conspicue flavescenti-setosus; dentes subulati ac apice seta circiter 0·5 mm. longa terminati, seta inclusa superiores fere 4 mm. inferiores 3 mm. longi. *Petala* siccitate viridescenti-flava; vexillum cum ungue ad 1·4 cm. longum, ungue circiter

3·2 mm. longo extra dimidio superiore dense pubescente, lamina applanata suborbiculari 1 cm. lata extra praecipue dimidio inferiore dense pubescente; alae unguc 5 mm. longo prope apicem ciliato, lamina oblonga 9·5 mm. longa 3·2 mm. lata prope basin ciliata; carinae petala laminis dorso cohaerentibus, ungne 5 mm. longo dimidio superiore ciliato, lamina 9·5 mm. longa 4·2 mm. lata prope basin ciliata. *Stamina* ad 1·3 cm. longa, vagina filamentisque glabris. *Ovarium* cylindricum, 5 mm. longum, 1 mm. diametro, dense flavescenti-pubescens, stipite fere 1·5 mm. longo; stylus inferne sparsissime pilosus, fere 8 mm. longus; ovula 2–3. *Fructus* totus 4·3–5·3 cm. longus, stipite 4–7 mm. longo, articulis 1–2, inter articulos constrictus, conspicue venosus, praesertim inferne satis dense pilosulus, stipite articuloque inferiore sparse flavescenti-setosis, ala articuli superioris 1·1–1·4 cm. lata apice acuto vel obtuso.

Mexico. District of Temascaltepec, State of Mexico: Carboneras, 2020 m., fl. Nov. 1932, *Hinton* 2334 (type); edge of crater, Volcán, 1520 m., fl. Oct. 1932, *Hinton* 2213; Bejucos, 610 m., fl. Nov. 1932, *Hinton* 2520; barranca, Ixtapan, 1000 m., fl. Dec. 1932, *Hinton* 2922; hill, San Lucas del Maiz, fr. Feb. 1933, *Hinton* 3335; "stone fence," Rincon, 1930 m., fl. Nov. 1933, *Hinton* 5075. All these collections were described as a vine.

The species of the scandent genus *Nissolia* are somewhat difficult to separate owing to evident variability in certain characters such as the size of the leaflets, the presence or absence of scattered bristles on the branchlets, calyx and fruit, and the development of the axillary inflorescence. The present species is clearly well marked by its combination of the following features: completely non-pubescent branchlets, leaves and inflorescence; copious setose development on the branchlets, and particularly on the inflorescence and the margins of the conspicuous bracts; remarkably well-developed and elongate racemes and panicles; large flowers with setose, but otherwise glabrous calyx and long calyx-teeth; and large sparsely setose fruit. The fact that Mr. G. B. Hinton has made as many as six collections of a vine presenting these peculiar characteristics is a fair guarantee of its specific status even in a genus whose members have frequently been regarded as ill-defined.—N. Y. Sandwith.

Fig. 1, part of branch with a single leaf and axillary panicle, *natural size*; 2, calyx, × 2; 3, vexillum, × 2; 4, ala, × 2; 5, carina, × 2; 6, androecium, opened out, × 2; 7, gynoecium, × 4; 8, fruit, with persistent calyx, *natural size*; 9, longitudinal section of basal joint of fruit, *natural size*.


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Tabula 3249.

PLATYMISCIUM LASIOCARPUM *Sandwith.*

Leguminosae. Tribus Dalbergieae.

P. lasiocarpum *Sandwith*; species nova, *P. hebestachyo* Benth. affinis, foliolis semper 5 basi saepius cuneatis vel saltem obtusis subtus pilosulis, lobis calycinis margine fere glabris, ovario villoso atque fructu tomentoso differt; *P. pubescens* Micheli, species austro-brasiliensis, foliolis multo angustioribus subtus adpresse pubescentibus, calyce tomentoso differt; *P. fragrans* Rusby, species boliviensis quae fructu puberulo gaudet, foliolis angustioribus subtus adpresse pubescentibus, stipite fructus multo breviore, fructu valde reticulato-venoso e descriptione differt.

Arbor satis magna, ramulis summis teretibus sulcatis, annotinis satis crebre lenticellatis pubescentibus vel glabrescentibus, hornotinis griseo-fulvo-tomentosis. *Folia* verticillata, imparipinnata, usque 33 cm. longa, petiolo rhachique crispule pilosulo-pubescentibus; petiolus 5–8·5 cm. longus; internodium rhacheos inferius 3·7–7 cm. longum, superius 2–4·5 cm. longum; petioluli internodiis crassiores, indumento simili, 4–7 mm. longi; foliola 5, elliptica, rarius ovata vel obovato-elliptica, apice breviter obtuse acuminata vel cuspidata, basi cuneata vel obtusa, raro rotundata, 7–14 cm. longa, 4–9·5 cm. lata (foliolum terminale lateralibus oppositis semper majus), firme chartacea, supra nitida glabra, subtus opaca conspicue sed nervis exceptis haud dense crispule pilosula, nervis lateralibus utrinque circiter 8–12 supra prominulis subtus elevatis marginem versus arcuato-anastomosantibus, rete venularum utrinque prominulo. *Stipulae* delapsae. *Racemi* axillares, 3–5 apice ramulorum congregati itaque pseudo-terminales, 4–11 cm. longi, apice nonnunquam bifurcati, densiflori, statu florifero usque ad 2 cm. lati, densissime griseo-pilosuli; pedicelli brevissimi, indumento conspicuo simili, 1·5 mm. longi; bracteae bracteolaeque haud cito caducae, obovatae vel obovato-oblongae, rotundato-obtusae, 2–2·3 mm. longae, 1·2–1·5 mm. latae, extra dense griseo-tomentosae. *Calyx* anguste campanulatus, oculo nudo glaber, siccitate nigro-purpurascens, sub lente forti extra minute granulato-verruculosus ac albo-lepidotus; tubus 3·2 mm. longus, 3 mm. latus; labium superius 1·5 mm. longum, ad medium in lobos duos parvos obtusos fissum; labium inferius e lobis tribus subaequalibus (intermedio majore)

deltoideo-triangularibus obtusis 1·5 mm. longis ad 1·6 mm. latis constans ; lobi omnes sub lente satis sparse ciliati. *Petala* ut videtur flava, glabra ; vexillum unguc 1·5 mm. longo, lamina late orbiculari-elliptica apice rotundata brevissime emarginata basi rotundata haud obliqua 8·5 mm. longa 6·5–7 mm. lata ; alae ungue 2–2·2 mm. longo, lamina anguste ovato-oblonga basi valde obliqua 7·2–7·5 mm. longa 3–3·5 mm. lata ; carinae petala dorso cohaerentia, ungue 2 mm. longo, lamina ei alarum simili, basi valde obliqua, latere superiore auriculato-cordato, inferiore in unguem attenuato, 7·5 mm. longa, 2·8 mm. lata. *Stamina* 10, monadelpha, glabra, ad 6 mm. longa. *Ovarium* dense pallide fulvo-villosum, circiter 2 mm. longum, stipite 2–2·5 mm. longo pilosulo vel inferne glabrescente ; stylus glaber, 2 mm. longus ; ovulum 1. *Fructus* oblongus, vix maturus ad 5·5 cm. longus ad 1·8 cm. latus, chartaceus, dense molliter griseo-velutino-tomentosus, haud reticulato-venosus ; stipes sub maturitate ad 1·5 cm. longus ; stamina persistentia e calyce exserta.

Mexico. District of Temascaltepec, State of Mexico : tree 15 m. high in field, Acatitlán, fl. 19 Jan. 1933, *Hinton* 3174 (type) ; large tree in barranca, Bejucos, 610 m., fr. 14 Feb. 1933, *Hinton* 3389 ; tree 15 m. high, frequent in the Luvianos valley near the base of Nanchititla, 1450 m., foliage only, 25 Dec. 1933, *Hinton* 5396. Vernacular name " Granadillo."

This very distinct species is clearly related to *P. hebestachyum* Benth. which it resembles in the facies of its leaflets and inflorescence, but is remarkable for the indumentum of the leaflets, ovary and fruit. The remaining species assigned to the genus *Platymiscium* are glabrous in these parts with the exception of the South Brazilian *P. pubescens* Micheli, the Bolivian *P. fragrans* Rusby, and the Bolivian *P. ellipticum* Rusby. Of these the first two are easily distinguished from *P. lasiocarpum* by the characters given in the diagnostic description ; no material of *P. pubescens* has been seen, and only fragmentary foliage of *P. fragrans*. The third, *P. elliptieum*, which has fulvous-sericeous fruits, has alternate leaves, small alternate leaflets, and a pod with the upper suture slightly winged, characters which obviously remove it from the genus *Platymiscium*.—N. Y. Sandwith.

Fig. 1, flowering branch, *natural size* ; 2, upper part of leaf, detached, *natural size* ; 3, lower surface of leaf, × 4 ; 4, calyx, showing one bracteole, × 4 ; 5, vexillum, × 4 ; 6, ala, × 4 ; 7, carina, × 4 ; 8, androecium, opened out, × 4 ; 9, gynoecium, × 4 ; 10, fruit, *natural size*.


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Tabula 3250.

RHYNCHOSPORA CONFUSA *Ballard.*

Cyperaceae. Tribus Rhynchosporeae.

R. confusa *Ballard*, nom. nov. *Syntrinema brasiliense* Radlk. et Pfeiff. ex H. Pfeiff. in Fedde, Rep. xxi. 238, t. 21A, fig. a (1925), quoad specim., excl. char. nonnull.—Affinis *R. minarum* Steud. a qua inflorescentia congestiore semper monocephala, bracteis involucralibus brevioribus et foliorum basibus vaginiformibus latissimis differt.

Planta perennis. *Rhizoma* breviter repens, validum, lignosum, nodosum, foliorum vetustiorum basibus dense vestitum. *Folia* numerosissima, basalia, imbricata, usque ad 16 cm. longa vel ultra, basibus vaginiformibus chartaceis fere usque ad 4 cm. longis et 2 cm. latis, apice abrupte contractis, marginibus saepe subhyalinis; laminae subcarinatae, superne attenuatae, usque ad 5 mm. latae, coriaceae, rigidiusculae, inferne marginibus ciliatae superne scabridulae, ceterum glabrae laevesque. *Culmi* usque ad 10 cm. longi vel ultra, leviter complanati, haud triquetri, striati, glabri, monocephali. *Inflorescentia* composita, late obconica, usque ad 2 cm. diametro, pallide rubro-brunnea; bracteae involucrales numerosae, imbricatae, lanceolatae, acutae vel acuminatae, usque ad 1·8 cm. longae, 4 mm. latae, spiculis raro longiores, striatae, tenuiter pubescentes vel apicem versus laxe pilosae vel glabrescentes. *Spiculae* dense congestae, elliptico-lanceolatae, 7–10·5 mm. longae, 2–3 mm. latae, lateraliter complanatae, 3–6-florae, flores 2 inferiores ♀, ceteri ♂. *Squamae* carinatae, lateraliter compressae, usque ad 9 mm. longae, acutae vel obtusae, plerumque mucronatae; squamae steriles 3. *Nux* immatura atro-brunnea, apice minute rugulosa; stylus simplex, apice truncatus; setae 6, ferrugineae, antrorse scabridae; florum juniorum ♂ filamenta plus minusve connata.

Brazil. Goyaz, Aug. 1912, *Ph. von Lützelburg* 1223, 15483; West Bahia: campinas Boa Esperança, 1912, *Ph. von Lützelburg* 15484.

The present plant was first described by H. Pfeiffer in 1925 under the name *Syntrinema brasiliense* Radlk. et Pfeiff. This name had actually been suggested by Radlkofer ten years previously, as is shown by a note written on a sheet of *von Lützelburg* 1223 in the herbarium at Munich. The preparation of the description and accompanying notes,

however, was the work of the junior author, Radlkofer being 95 years of age at the time it was written.

The description is accompanied firstly by a habit figure (fig. a) of the plant originally seen by Radlkofer. Secondly, there are six figures (figs. c–h) purporting to be dissections of the spikelet of *Syntrinema*, but which, quite obviously, belong to a very different plant. Lastly, a ground plan of the spikelet (fig. b) is given which also does not refer to *Syntrinema*. In fact, the last two sets of drawings illustrate the genus *Chorisandra*—a genus only very distantly related to the present one. They appear to be adaptations from N. E. Brown's drawings of that genus in C. B. Clarke's " Illustrations of Cyperaceae " (t. 119).

The description itself is also a mixture combining the gross morphological features of Radlkofer's *Syntrinema* with the floral details of one or more species of *Chorisandra*. Curiously enough, the particular character which served Radlkofer as a basis for his generic name is entirely ignored. In 1915 Radlkofer wrote as follows on a sheet at Munich : " Genus Cyperacearum novum, ut videtur, cujus stamina in flor. ♂ connata nomen *Syntrinema* (*S. brasiliense*) suppeditant."

One is forced to conclude that the published description was partly based on figures illustrating dissections of *Chorisandra*, which had in some way become associated with the specimens of *Syntrinema*.

Pfeiffer must have had some misgivings, however, regarding Radlkofer's note about the connate stamens, since, in his remarks following the description, he mentions that neighbouring male flowers have their stamens connate at the base. This interpretation, although quite incorrect, was the only way of reconciling Radlkofer's observation with the assumption that the male flowers were monandrous as in *Chorisandra*.

The expression in the specific description, " ovarium 2-lobum, 2-loculare (an semper ?)," calls for explanation. It probably arose from the fact that in N. E. Brown's drawing of the ground plan of the *Chorisandra* spikelet two small round objects are shown within the ovary wall. To the uninitiated these might seem to indicate the presence of two loculi or two ovules, whereas in reality they represent the number of styles.

It should be mentioned that in 1933 Dr. Pfeiffer placed a note on the sheet of *von Lützelburg* 1223 in the Munich herbarium to the effect that the original description required emending. Since then he has written saying that it had been his intention to publish another paper and a rectified description, but that he would refrain from doing so in view of the present investigation.

The stamens in *Rhynchospora confusa* are interesting. In the early stages of the male flower, and possibly also in the hermaphrodite flower, the filaments cohere, to what extent it is difficult to judge from dried material. In this condition the stamens reach maturity. A definite articulation is present between filament and anther, while the anther itself is peculiar in possessing a short sterile portion above this articulation. When the anther is quite mature and conditions

favour dehiscence, the filament apparently lengthens suddenly, possibly by rapid elongation of individual cells, the anther emerges from the squamae and dehiscence takes place. After this, the anther disarticulates from the filament and drops away.

Exactly the same arrangement is seen in *Rhynchospora hirta* Boeck. (*R. monadelpha* C. B. Clarke), and a good figure showing the connate stamens was published by Lindman in Bih. Svenska Vet.-Akad. Handl. xxvi. Afd. 3, No. 9, t. 5 (1900).

The disarticulating type of stamen is found also in *R. globosa* Britton and *R. minarum* C. B. Clarke, although connate filaments were not observed. Nees also draws attention to this type in Nov. Act. Nat. Cur. xix. Suppl. 1, 99 (1843), where, in a description of *Sphaeroschoenus Walliehii* (*Rhynchospora Wallichiana* Kunth), he says, "antherae . . . basi veluti in stipitem sterilem filiformem attenuatae eiusque opera filamento, strictura arguta intercedente, impositae, ita ut primo attactu defluant."

All the specimens seen of *Rhynchospora confusa* had obviously been badly burned, so that our illustration may not be altogether typical. Uninjured plants probably attain much larger dimensions, the inflorescences, without doubt, being borne on considerably longer culms.

F. Ballard.

Fig. 1, entire plant, *natural size*; 2, a spikelet, lateral view, × 6; 3, a young ♀ flower, × 8; 4, young stamens from ♂ flower, with connate filaments, × 6; 5, an old ♀ flower, with anthers shed, × 3; 6, very young nut, × 32.


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Tabula 3251.

HYPERICUM THASIUM *Griseb.*

Hypericaceae. Tribus Hypericeae.

H. thasium *Griseb.* Spic. Fl. Rumel. et Bithyn. i. 227 (1843); Boiss. Fl. Or. i. 789 (1867), et Suppl. 130 (1888); Halácsy in Oesterr. Bot. Zeitschr. xlii. 414 (1892); Velenovský in Sitz. Böhm. Ges. Wiss. 1902, xxvii. 4; Podpěra in Verh. Zool.-Bot. Ges. Wien, lii. 643 (1902); Davidoff in Spis. Bulg. Akad. Nauk. xii. 74 (1915); Stefanoff in God. Sof. Univ. 1918–20, xv.-xvi. 81 (1921); Hayek, Prodr. Fl. Penins. Balcan. i. 531 (1925); Stoyanoff et Stefanoff, Fl. Bulg. 750 (1925), et ed. 2, 708 (1933); Stefanoff in God. Agr.-lesov. Fak. Univ. Sofia, xi. 160 (1933); herba perennis sepalis aequilongis bracteisque longissime fimbriato-setaceis, setis (ciliis) haud glandulosis, staminibus pentadelphis, ovario quinqueloculari, stylis 5, a congeneribus facile distinguenda.

Herba perennis, glabra. *Radix* lignosa, radices secundarias numerosas emittens. *Rhizoma* horizontaliter curvatum. *Caules* numerosi, ascendentes, fere teretes, usque ad 5·5 dm. alti, internodiis 0·5–4 cm. longis cavis costis longitudinalibus duabus praeditis. *Folia* linearia, infima anguste oblonga vel elliptico-oblonga, obtusa, basi haud vel vix angustata, interdum leviter cordato-amplexicaulia, basi haud articulata, sessilia, plerumque 1–2 cm. longa et 1–4 mm. lata, pellucido-punctata, margine plus minusve revoluta (in siccitate) et remote nigro-punctata. *Inflorescentia* 3–15-flora, ramosa, laxa vel subcompacta, cymis 3–9-floris; bracteae superiores lineares vel lineari-lanceolatae, acuminatae, circiter 8 mm. longae et 1 mm. latae, longe fimbriato-setaceae, glandulis flavidis pellucido-punctatae, plus minusve nigro-punctatae. *Calyx* profunde 5-partitus, segmentis ellipticis aequilongis 1·1 cm. longis 2·5–3·5 mm. latis (setis eglandulosis exclusis) 3–5-nerviis margine longe barbato-setaceis flavido-pellucido-punctatis superne margineque nigro-punctatis. *Petala* obovato-oblonga, usque ad 2 cm. longa et 9 mm. lata, flava, punctis subremotis fere rotundis nigris juxta marginem una serie dispositis, punctis flavidis elongatis numerosis in parenchymate subsparse inspersis, venarum reticulo laxo. *Stamina* numerosissima, brevissime pentadelpha, 8–10 mm. longa; antherae subrotundae, 0·75 mm. longae, connectivo tenui glandula nigra superne instructo. *Ovarium* elliptico-ovoideum, 5 mm. longum, 3·5 mm.

diametro, longitudinaliter 5-vittatum et striatum, carpellis dorso carinato-convexis in stigmata 5 (rarissime 6) aequilonga primo erecta deinde patentia attenuatis.

Thasos. "Frequens inter frutices pr. Panajia alt. 0–200′ locis aprieioribus, ubi consociatum viget cum *H. perfoliato* et *perforato* (substr. calcar.)" sec. Griseb ach, l.c.; Limenas, copiose, 4 Jun. 1891, in prat. arenos., *Bornmüller et Sintenis* 316.

Thrace. Phanar, edge of cornfield, sandy soil near lagoon, 25 May 1930, *H. G. Tedd* 348A; Bouloustra, 19 June 1931, sandy fields near sea behind dunes, *H. G. Tedd* 348B.

South Bulgaria. In colle Sevri Kaja ad Harmanli, Jun. 1901, *Stříbrný*.

Hypericum thasium is the sole known representative of the section *Thasia* Boiss. (Fl. Or. i. 785: 1867), a section distinguished by the herbaceous habit, subpentadelphous stamens, 5 styles, 5-locular ovary, 5-valved capsule, and equal calyx segments which do not enlarge in fruit. It is one of the very many morphologically and taxonomically distinct endemics of the Balkan Peninsula. Originally described by Grisebach from Thasos it has since been recorded from the South Bulgarian plain near Harmanli and from lowland localities in both eastern and western Thrace. Grisebach (l.c.) quotes as a synonym *Hypericum foliis linearibus, margine revolutis*, Forskål, Fl. Aeg. (Flor. Constant. etc.) p. xxx. (1775). This identification is very doubtful and must remain so till material collected by Forskål and so determined by him has been examined.

Grisebach refers to the flowers as bibracteolate. In the material dissected two bracteoles have never been found associated with one flower. In the flowers of lateral cymes a single bract-like structure was sometimes (not invariably) found at the base of the pedicel placed laterally to the subtending bract. An examination of abundant living material is necessary before it can be definitely stated whether this is a true bracteole or (as the writer suspects) a bract whose axillary flower is not produced beyond a very rudimentary stage.

Another interesting morphological feature is the transition from foliage leaves to bracts and sepals. The foliage leaves range from narrowly to broadly linear, are obtuse at the apex, and more or less cordate-amplexicaul to truncate at the base. The lowest leaves, those first produced on the chamaephytic perennating shoots, are usually broader and may even be elliptic-oblong. The transition from the uppermost foliage leaves to the first bracts subtending inflorescence branches is sometimes abrupt, but in some specimens a shortening and relative broadening of the leaf and the development of some marginal bristles occur on one only or on both of the first "bract" pair. In specimens with luxuriant inflorescences the leaves subtending the lower inflorescence branches are developed as ordinary foliage leaves. The bracts of the ultimate cymes show some range in size but frequently

both in this and in other characters they closely resemble the narrower sepals so that it is possible to arrange a series of transitions showing no real break from typical foliage leaves to sepals.—W. B. Turrill.

Fig. 1, upper part of flowering plant, *natural size*; 2, lower part of flowering plant, *natural size*; 3, portion of leaf showing lower surface, × 8; 4, bract, × 4; 5, two sepals, showing upper surface, × 4; 6, petal, × 3; 7, portion of stamen bundle, × 3; 8, gynoecium, × 6; 9, transverse section of ovary, × 6.


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Tabula 3252.

ASTRAGALUS GLYCYPHYLLOIDES *DC.*

Leguminosae. Tribus Galegeae.

A. glycyphylloides *DC.* in DC. Prodr. ii. 292 (1825); Ledebour, Fl. Ross. i. 621 (1842); Boiss. Fl. Or. ii. 267 (1872); Panč. Fl. Princ. Serb. 246 (1874); Schmalhausen, Fl. Sredn. i Yuzhn. Ross. 273 (1895); Halácsy, Consp. Fl. Graec. i. 438 (1900), et Suppl. 2 in Mag. Bot. Lap. xi. 142 (1912); Velenovský in Sitz. Böhm. Ges. Wiss. 1903, xxviii. 4; Aschers. u. Graebn. Syn. Mitteleur. Fl. vi. 2. 761 (1909); Fedtschenko, Fl. Evrop. Ross. 571 (1910); Stoyanoff et Stefanoff, Fl. Bulg. 663 (1925), et ed. 2, 623 (1933); Hayek, Prodr. Fl. Penins. Balcan. i. 775 (1926). *A. serbicus* Panč. ex Boiss. l.c. 268 in syn., nomen solum; Beck in Reichb. Ic. Fl. Germ. xxii. 102 (1903), et Flora Bosne, 278 (1927); non Wettstein. *A. glycyphylloides* var. *serbicus* Beck in Ann. Nat. Hofmus. Wien, xi. 75 (1896); Aschers. u. Graebn. l.c.; Hayek l.c. *A. galegiformis* Panč. in Verh. Zool.-Bot. Ges. Wien, vi. 482 (1856), non L., fide Janka in Oesterr. Bot. Zeitschr. xix. 117 (1869). *A. Petrovicii* Vel. l.c., sec. Hayek l.c.—Ab *A. glycyphyllo* L. caulibus pilosis, calycibus adpresse nigro-hirtis, leguminibus brevioribus 6–12-ovulatis praecipue differt.

Caulis suberectus, subrigidus, leviter plus minusve patule pilosus, usque ad 1 m. altus (in planta culta). *Folia* 7–22 cm. longa, 7–17-juga; foliola elliptica vel ovato-elliptica, breviter apiculata, basi rotundata, 2–5·5 cm. longa, 0·8–2·2 cm. lata, supra glabra, subtus patule pilosa, margine piloso-ciliata, costa nervisque subtus subprominentibus, supra inconspicuis; petioluli 1–2 mm. longi, dense patule pilosi; stipulae e basi triangulari longe subulato-lineares, integrae, nigro-pilosae, membranaceae. *Racemi* floriferi 6–14 cm. longi (pedunculo 4·5–11·5 cm. longo pilis nigris albisque instructo incluso), fructiferi vix elongati, dense 8–17-flori; pedicelli 1–1·5 mm. longi; bracteae anguste lineares vel lineari-lanceolatae, acuminatae, 3–4 mm. longae, circiter 0·5 mm. latae; bracteolae bracteis similes sed minores. *Calycis* tubus extra, dentes utrinque, sicut bracteae, bracteolae, pedicelli, racemi rhachis, pilis nigris adpressis copiosis praediti; tubus 4·5 mm. longus, 3·5 mm. diametro; dentes anguste lineari-subulati, adaxiales 2·5 cm. longi, abaxiales 3·5 cm. longi. *Vexillum* 1·4 cm. longum, 7 mm. latum; alae 1·25 cm. longae; carina 1·15 cm. longa. *Tubus staminalis* 1 cm.

longus. *Ovarium* usque ad carvamen 1 cm. longum (stipite 2 mm. longo incluso), glabrum. *Legumen* oblongum, 2·2–2·5 cm. longum (stipite circiter 6 mm. longo et stylo persistente 2 mm. longo inclusis), 4–5 mm. diametro, adaxialiter valde sulcatum, junius breviter pilosum, maturum fere glabrum. *Semina* 6–12, inaequaliter reniformia, 3–3·5 mm. × 2–2·5 mm.

SERBIA. In sylvestribus m. Ozren, Mai.-Jul. 1873, *Pančič*.

BOSNIA. In silvis montis Trebević, c. 1200 m., 4 Jul. 1906 et 5 Aug. 1906, *Maly*; Trebević, 21 June 1931, *Gilliat-Smith* 2821; cult. in Herb. Ground, Kew, 1934, from seeds communicated by Maly.

CRIMEA. Sine loco, *Steven*; in silvis supra pagum Molbai, 21 Jun. 1900, *Callier* 683.

BITHYNIA. Olympus, *Aucher-Eloy* 1298; Mt. Ida, in marmor. prop. Kareikos, Jul. 1883, *Sintenis* 627; in regione silvatica montis Olympi, supra Brussa, 1000–1200 m., 31 Mai. 1899, *Bornmüller* 4385.

CAUCASUS. Iberia, *Steven*.

In addition to the records given above, which are from specimens in the Kew Herbarium, the species, in the sense in which it is accepted here, is recorded from Greece, Thessaly, North Macedonia, Montenegro, and Hercegovina, as well as from additional localities in the areas named.

The chief taxonomic problem which has had to be elucidated is the relationship of *A. serbicus* Panč. with *A. glycyphylloides* DC. The latter was based on Steven's material from Iberia (Caucasus). Accepting as authentic the Kew material (in fruit) thus written up, no structural differences can be found between Steven's plant, Crimean specimens, and those from the Balkan Peninsula, apart from minor fluctuations. Beck's note that the description of De Candolle cannot apply to material from the Balkan Peninsula, is true so far as the phrase "stipulis oblongis substipitatis foliaceis" is concerned. Equally, this phrase cannot apply to any other species of the group to which *A. glycyphyllus* and *A. glycyphylloides* belong. It is suggested here that De Candolle mistook a pair of leaflets for stipules either through their being misplaced in mounted material or by not correctly interpreting the reduced leaves which sometimes subtend inflorescences and which have a pair of leaflets very low down. The leaflets of the pinnate leaf are normally opposite, except for the odd terminal leaflet, but occasionally a subopposite arrangement appears.—W. B. TURRILL.

FIG. 1, small portion of upper part of plant, *natural size*; 2, portion of lower surface of leaflet, × 4; 3, calyx, × 3; 4, vexillum, × 3; 5, ala, adaxial side, × 3; 6, ala, abaxial side, × 3; 7, carina, × 3; 8, androecium, × 3; 9, gynoecium, × 3; 10 and 11, legumes, × 1·5; 12, seed, × 4.

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Tabula 3253.

VERBASCUM GRACILE *Turrill.*

Scrophulariaceae. Tribus Verbasceae.

V. gracile *Turrill*; species nova, ab affini *V. nobili* Vel. caule plus minusve stellato-tomentoso viridi, foliis basalibus fere ad costam profunde pinnatipartitis praecipue recedens.

Planta biennis (raro perennans). *Radix primaria* verticalis, basi 1·3 cm. diametro. *Caulis* stricte erectus, rigidus, foliosus, teres, basi adpresse stellato-tomentosus, canescens, ceterum viridis, parce stellato-tomentosus, superne valde ramosus, usque ad 15–21 dm. altus (in cultis). *Folia basalia* rosulam formantia, usque ad 3·85 dm. longa (petiolo canaliculato 1·25 dm. longo incluso) et 1 dm. lata, lamina ambitu anguste oblonga apice rotundata obtusa vel subacuta, matura inaequaliter pinnatipartita, segmentis oblongis vel anguste oblongis patentibus usque ad 5 cm. longis et 3·5 cm. latis, superioribus plus minusve confluentibus acutis vel obtusis, inferioribus liberis acutis vel subacutis, omnibus irregulariter dentatis vel sublobatis, juniora angustiora grosse dentata haud vel vix pinnatipartita, omnia supra parce subtus sat dense cano- vel albo-tomentosa, pilis stellatis praedita; folia caulina inferiora basalibus subsimilia sed petiolo breviore, media gradatim minus pinnatipartita minoraque, elliptica vel ovato-elliptica, breviter acuminata, 1·9–0·9 dm. longa, 7·5–3·5 cm. lata, sessilia, superiora ovata, multo minora, longe sensim acuminata, in bracteas gradatim transeuntia. *Inflorescentia* laxe paniculato-ramosa (in planta culta ramis numerosissimis instructa), ramis tenuibus rigidiusculis teretibus glabris vel junioribus plus minusve stellato-tomentellis. *Fasciculi* jam sub anthesi remoti, 2- (rarissime 3-)flori, interdum ramorum apicem versus flore uno abortivo praediti; pedicelli 3–7 mm. longi, graciles, ebracteolati; bracteae ultimae squamiformes, ovato-lanceolatae, acutae, 2–2·5 mm. longae, 1–1·5 mm. latae, virides, glabrae. *Calyx* 2–3 mm. longus, fere ad basin in lacinias oblongo-lanceolatas acutas margine glandulis minutissimis breviter stipitatis vel subsessilibus obsitas partitus, ceterum glaber. *Corolla* lutea, 15–23 mm. diametro, leviter (postice praecipue) pellucide punctata, extra intusque glabra, lobis late obovatis fere (inferioribus praecipue) orbicularibus 6–8 mm. longis latisque. *Stamina* circiter 7 mm. longa, filamentis abaxialibus apice nudis ceterum ut adaxialibus pilis longissimis flavido-albidis plus minusve clavatis superne densissime villoso-

lanatis, antheris omnibus reniformibus medifixis. *Stylus* 6–7·5 mm. longus, glaber, superne subincrassatus, stigmate oblongo-spathulato terminatus; ovarium ellipsoideo-ovoideum, 1·5–2 mm. longum, 1–1·25 mm. diametro, densissime adpresseque albido-stellato-tomentellum. *Capsula* late ellipsoidea vel ellipsoideo-obovata, leviter complanata, truncata et leviter emarginata, 3·5 mm. longa, 3 mm. diametro, matura glabrescens, plus minusve irregulariter verrueulosa. *Semina* breviter obconico-prismatica, 0·6–0·75 mm. longa, 0·4–0·5 mm. diametro, subseriatim vel interdum irregulariter foveolato-corrugata.

Thrace. Near Xanthie, Soune Mahalla, 92 m., 4 June 1930, rocky places etc. on hill slopes, height about three feet, *H. G. Tedd* 385; grown from seed, collected, in the same locality, 31 July 1931, in the Herbarium Ground, Kew, 1933, as K. 1019 and K. 1020.

The genus *Verbascum* has recently been monographed by Prof. S. Murbeck (Monographie der Gattung Verbascum, Lund, 1933), and on his classification the species here described must be placed in Sect. I. *Bothrosperma*, Subsect. 1. *Fasciculata*, B. *Isandra*, b. *Ebracteolata*, β *Leiantha*. Within the group *Leiantha* it is morphologically allied to *V. nobile* Vel. and *V. Nikolovii* Stoy., showing some characters of one, some of the other. It is with the former that the closest comparison can be drawn: indeed, it is specifically separated from *V. nobile* with considerable hesitation.

Velenovský in his original description of *V. nobile* (Fl. Bulg. Suppl. 209: 1898) noted the absence of leaves in the upper part of the stem, which is purple. Murbeck (l.c.) describes the stem as "atrorubens." The specimens in the Kew Herbarium show this character conspicuously, while the material of *V. gracile* has green stems and stem-branches. Again, the basal leaves of *V. nobile* are described as "eleganter multi-lobatis" (Vel.) or with the lamina "obovato- v. lanceolato-oblonga, obtusa, margine nunc subintegerrima v. leviter sinuato-undulata, nunc sinuato-lobata ± plicata, lobis late rotundatis integris v. infimis rotundato-triangularibus crenatis" (Murb.). This agrees with the material at Kew of *V. nobile*, but *V. gracile* has pinnatipartite basal leaves (in both wild and cultivated material). *V. gracile* is on the whole more hairy (stellate-tomentose) than is *V. nobile*—especially on the stem. Lastly *V. nobile* is so far known only from Bulgaria (near Tatar-Pazardjik, Ali Kočovo, Plovdir, Peštera, Trigrad), considerably to the north of Xanthie.

V. Nikolovii was described by Stoyanoff (Bull. Soc. Bot. Bulg. i. 75: 1926) from material collected "ad vias prope Kavala." In the description of its basal leaves as "fere ad medium profunde pinnatipartita" it seems to resemble *V. gracile*. It is, however, described as a much smaller plant (Murb.), with an aphyllous glabrous stem (Stoy.). The size of the corolla (3–3·5 cm. diam.) is greater than that of *V. gracile*—or any other species of the group.

In addition to the species referred to above, two others can be

advantageously compared with *V. gracile*. Mattfeld and Stefanoff described (in Bull. Soc. Bot. Bulg. i. 101, t. 1 : 1926) *V. Dingleri* from "Kalkfelsen bei Derwent (Derbent), unweit Dedeagatsch." The material had been collected by H. Dingler fifty years previously. The species, while belonging to the same group as *V. gracile*, is distinguished from it (and from other allied species) by the bipinnatilobed (better bipinnatipartite or bipinnatifid—according to the plate) basal leaves. *V. pseudonobile* Stoy. et Stef. (in Jahrb. xx. Univ. Sofia, Agronom. Fak. II. 69 : 1924) is distinguished from the species mentioned above especially by the presence of bracteoles a little above the base of the primary flower of every fascicle. While it is thus placed by Murbeck in another group "a. Bracteolata," its affinity in other characters with *V. gracile*, *V. nobile*, etc. is easily recognized. The type was originally described from specimens collected "in rupibus calcareis ad montem Ali-Botus, prope vic. Petrovo et Gaitaninovo," and a specimen at Kew shows that it is distinct from *V. gracile*. Stoyanoff and Stefanoff, however, describe (l.c.) a "var. *acutiloba*" in the following terms : "lobis foliorum rosularum acutis subintegris. Supra urbem Xanti (Thracia mer.)." It is possible that *V. pseudonobile* var. *acutiloba* is the same as *V. gracile*. The variety is apparently ignored by Murbeck in his monograph.

Some stress is laid by authors upon the height to which the species of this group grow. The following are the maximum recorded heights for the species mentioned above : *V. gracile*, 21 dm. ; *V. nobile*, 15 dm. ; *V. Nikolovii*, 4 dm. ; *V. Dingleri*, 6 dm. ; *V. pseudonobile*, 8 dm.—W. B. Turrill.

Fig. 1, entire flowering plant, × $\frac{1}{6}$; 2, leaf of first year rosette, *natural size* ; 3, lateral flowering branch, *natural size* ; 4, flower with corolla and androecium removed, × 6 ; 5, three lobes of corolla, × 3 ; 6, adaxial stamen, × 6 ; 7, ovary and lower part of style, × 12 ; 8, portion of fruiting branch, *natural size* ; 9, capsule, × 4 ; 10, seed, × 20.

S.R-C.

Tabula 3254.

POLYGONUM ICARICUM *K. H. Rechinger.*

Polygonaceae. Tribus Eupolygoneae.

P. icaricum *K. H. Rechinger* in Magyar Bot. Lap. xxxiii. 8, t. 3, fig. 3 (1934); a *P. setoso* Jacq. habitu dense suffruticoso-caespitoso, foliis acutis brevioribus latioribusque, floribus minoribus facile distinguendum.

Suffrutex inferne valde lignosus et identidem ramosus, usque ad 1·6 dm. altus, dense multicaulis. *Caules* erecti vel ascendentes, glabri, inferne aphylli, internodiis superioribus novellis herbaceis viridibus 5–10 mm. longis tenuibus longitudinaliter tenuiter sed profunde sulcatis. *Folia* linearia vel anguste elliptico-lincaria, 8–12 mm. longa, 1·5–2 mm. lata, acuta, haud vel vix mucronata, inferne angustata sed vix vel breviter petiolata, pulvillo 0·5–0·75 mm. longo nervoso, marginibus leviter revolutis, glabra, viridia, costa supra subprominente infra prominente, nervis lateralibus inconspicuis vel 1–2 infra praecipue subprominentibus; ochreae hyalinae, tubuloso-amplectentes vel plus minusve fimbriato-lacerae, 3–7 mm. longae, multinerviae. *Flores* 1–2 in foliorum superiorum minorum axillis orti; inflorescentia 1·2–2·5 cm. longa, internodiis 2–5 mm. longis; pedicelli infra articulationem 1·5 mm. longi, supra articulationem ampliati 0·75 mm. longi. *Perigonium* corollinum, rubicundo-album; tepala 5, uninervia, obsolete venulosa, apice rotundata, externa ovato-oblonga, 1·75 mm. longa, 1 mm. lata, interna oblonga, 2 mm. longa, 1·3 mm. lata. *Stamina* 0·75–1·25 mm. longa, 3 leviter majora; filamenta basi ampliata, superne subulata. *Gynoecium* immaturum 1·25 mm. longum; ovarium triquetrum, stylis brevibus.

Ikaria (Nikaria). In summo jugo supra pagum Hag. Kyrikos, in fissuris rup. gneiss., ca. 950 m., 24–25 Jun. 1932, *K. H. Rechinger* 2220.

Samothrace. Mt. Fengari, 1480 m., in crevices of vertical rock, in flower 28 June 1934, *H. G. Tedd* 1472 :—A dwarf bushy shrub with pink-white flowers.

The species of *Polygonum* Sect. *Aviculuria* are generally recognized as forming a group difficult to classify in a clear and satisfactory manner. This applies more especially to the annual species (§ *Annua*

Boiss.). In the Mediterranean Region perennial herbaceous (§ *Perennia* Boiss.) and suffruticose (§ *Fruticulosa* Boiss.) species occur in increasing numbers from west to east, reaching a maximum in the area from Syria and Asia Minor to Persia. *Polygonum equisetiforme* S. et S. and *P. maritimum* L. are the best-known species of the *Perennia* subsection and both are widespread in the Mediterranean Basin, the former also extending east to Afghanistan. *P. longipes* Hal. et Charr. (Oesterr. Bot. Zeitschr. xl. 164 : 1890) is compared, *inter alia*, with *P. equisetiforme* and, judging from the description, must be a member of the same subsection. It was discovered "in locis siccis ad litora maris Aegaei prope Thessalonicam usque ad altitudinem 206 mt., nec non ad vias urbis," and is retained by Hayek (Prod. Fl. Penins. Balcan. i. 110 : 1924) as a valid species, but his reference to *P. creticum* var. *graecum* Meisn. has not been traced. *P. icaricum* must be placed in the subsection *Fruticulosa*, and appears to be most closely related to *P. setosum* Jacq. No species of this subsection had been recorded previously from the Aegean Islands.

P. setosum was described and very crudely figured by Jacquin (Obs. iii. 8, t. 57 : 1768), who quotes Tournefort's *Polygonum Orientale Caryophylli folio, flore magno, albo* (Cor. 39 : 1719) in synonymy. Jacquin records a specimen in the Gronovian herbarium, communicated by Vaillant and bearing the Tournefortian phrase-name. Jaubert and Spach (Ill. ii. t. 125 : 1844–46) give an excellent figure and description of *P. setosum*. Quoting from Herb. Tournefort they give the original locality as Armenia and add *Aucher-Eloy* 2588, also (according to Boissier) from Armenia. A specimen of the latter number is at Kew. Boissier (Fl. Or. iv. 1039 : 1879) includes specimens from Lydia (supra Bozdagh, *Bal.*) and near Baibut (*Bourg.*) in the species and makes a new variety (var. *restionoides*) for specimens from prov. Musch, Armenia, and from the Cataonian Taurus. Armenian specimens collected by Sintenis are in Herb. Kew., as are also more recently collected sheets from the Amanus and Akher Dagh. Thus, apart from Balansa's Lydian material, which has not been seen by the writer, *P. setosum* is known only from Armenia, Cataonia, and S.E. Anatolia—more than 1000 km. from Samothrace and hardly less from Ikaria.

An account of the botany of Samothrace has been given by Degen (Oesterr. Bot. Zeitschr. xli. 301, 329 : 1891). The only species of *Polygonum* recorded from the island was *P. equisetiforme* S. et S., but the specimen was so poor that the identification remains doubtful (l.c. 337).

Both Rechinger's and Tedd's specimens are in flower only and the flowers are not old enough to give any clear indication of fruit characters. The older inflorescences show more or less zigzag bending, but it is uncertain whether this is natural or due to treatment on drying.

The plate and description published here have been based on Tedd's material from Samothrace. In this the ochreas are on the whole somewhat more lacerated than in the type ; the perigone is pink-white,

not purely white in the upper part and green in the lower. Rechinger's description of the stems as simple—" caules . . . simplices," " immer unverzweigte Stengel "—applies only to the young green branches, not to the lower older brown branches, which increase in woodiness with age, branch repeatedly, and are apparently all included in the rhizome system by Rechinger. The young stems of the Samothracian specimens are apparently darker green than those of the Ikarian plants, which are described by Rechinger as " pallide virides, in vivo subglaucescentes." None of the above characters are considered to indicate more than very minor fluctuations within the one species.

Ikaria (also known as Nikaria and Kariot) is about 315 km. to the south (slightly south by east) of Samothrace, and is from its position better regarded as belonging to Asia Minor than to the Cyclades and Greece. The discontinuity of known distribution of *P. icaricum* may be partly due to our still meagre knowledge of the flora of many of the islands in and land masses bordering the Aegean Sea. On the other hand there is obviously a considerable real discontinuity since both Ikaria and Samothrace are now islands. It may well be postulated that the discontinuity in distribution of *P. icaricum* (as of many other species) had its origin in the break-up of the Aegean continent in geologically recent times.—W. B. Turrill.

Fig. 1, portion of a plant, *natural size*; 2, portion of stem with two nodes and foliage leaf, × 6; 3, portion of stem with one node, showing ochrea in the abaxial view, × 6; 4, flower, × 12; 5, perianth and androecium, split and flattened out, × 10; 6, gynoecium, × 20.


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Tabula 3255.

AGAPETES LINEARIFOLIA *C. B. Clarke.*

Ericaceae. Tribus Thibaudieae.

A. linearifolia *C. B. Clarke* in Hook. f. Fl. Brit. Ind. iii. 449 (1882); Airy-Shaw in Kew Bull. 1935, 41; ab *A. nutante* Dunn inflorescentia multo brevius pedunculata, pedicellis apice conspicue cupulatim expansis, calyce majore vix ad medium usque fisso, corolla subduplo breviore discedit; ab etiam affini *A. neriifolia* (King et Prain) Airy-Shaw foliis angustioribus, calyce 5-lobo nec subintegro, corolla multo minore, ab *A. angustifolia* (Knagg) Airy-Shaw pedicellis carnosis nec filiformibus, corolla breviter subconica, praecipue differt.

Suffrutex epiphyticus, radicibus scandens, glaberrimus, basi bulbosa vel tumida (teste F. K. Ward), radices tuberosas anguste napiformes hinc inde emittens. *Caules* humiles, parce ramosi, 30–40 cm. alti, 1–2 mm. crassi, teretes, lenticellis parvis sparsis praediti, cortice cinereo-brunneo. *Folia* alterna, subdistiche disposita, lanceolato-linearia, 10–15 cm. longa, 0·7–1·3 cm. lata, in apicem acutissimum sensim attenuata, basi in petiolum robustum 2–4 mm. longum supra canaliculatum rotundato-contracta, margine valde revoluta, pagina superiore siccitate plumbeo-viridi costa impressa, pagina inferiore pallidiore et laetiore vel rufescente costa valde prominente, nervis lateralibus obscuris. *Racemi* axillares, pendentes, corymbosi, foliis breviores, usque 8 cm. longi; axis 1·5–4·5 cm. longa, apicem versus inerassata, striata; bracteae et bracteolae minutissimae, deltoideae, ima basi pedicellorum sitae. *Pedicelli* apicem axis versus conferti, ex foveolis velut excavationibus illius orti, ima basi subito valde contracti, apicem versus inerassati, usque 2·2 cm. longi, apice articulati et in cupulam 2–5 mm. diametro ovarium (receptaculum) sub anthesin semi-amplectentem expansi. *Receptaculum* subglobosum, sub anthesin 2–3 mm. longum et latum, sed post fecundationem mox valde auctum, usque 1 cm. diametro, scarlatinum. *Calyx* breviter ellipsoideo-cylindricus, 5–6 mm. diametro, tubo 3–6 mm. longo membranaceo 5-nervi, lobis anguste triangularibus circiter 3 mm. longis basi 1–3 mm. latis acutissimis. *Corolla* cylindrico-conica, 1·3–1·4 cm. longa, basi circiter 4 mm., ore circiter 2 mm. diametro, lobis brevissimis deltoideis acutis vix recurvis, glabra, viridis, glaucescens, basi siccitate pallidiore. *Filamenta* circiter 5 mm. longa, glabra, nonnunquam abnormaliter in tubum plus

minus perfecte connata. *Antherae* anguste lanceolatae, 9–10 mm. longae, ad sinus corollae attingentes, thecis densissime scabro-papillosis circiter 4 mm. longis basi obscure appendiculatis, rostris siccitate pallidis laevibus 5–6 mm. longis inferne connatis dorso ecalcaratis. *Stylus* filiformis, 1·4 cm. longus, stigmate inconspicuo. *Fructus* ignotus.

Assam. Mishmi Hills: Thumath Summit, 1836, *Griffith* (Kew distrib. no.) 3480 (type) :—" Frutex epiphytic. Pedunc. pedicell. calyc. rosacco-carneis, alab. livido-caeruleis." Camp, Chibaon, Delei Valley, 28° 10′ N., 96° 30′ E., 1800 m., 6 Apr. 1928, *F. K. Ward* 8021 :—" An epiphytic root climber. Base bulbous. Corolla green ; pedicel, calyx and ovary scarlet. Flowers passing over. A somewhat straggling and lolling plant of the temperate rain forest."

Originally collected by Griffith nearly a century ago, *A. linearifolia* was described from Griffith's sterile specimens by C. B. Clarke in the *Flora of British India* and relegated to the *species non satis notae.* Capt. Kingdon Ward's excellent material now enables *A. linearifolia* to be assigned its proper place in the genus. From *A. nutans* Dunn it is readily distinguished by the glabrous peduncle, by the conspicuous cupular apical expansion of the pedicels, and by the calyx segments being connate halfway or more. From *A. angustifolia* (Knagg) Airy-Shaw, which agrees with the present plant in the points just mentioned, *A. linearifolia* differs in its thickened, almost fleshy peduncle and pedicels, and in its short, subconical corolla.

The occasional occurrence of flowers in which the filaments are connate into a tube (fig. 8) affords an interesting parallel to some American genera of *Thibaudieae*, such as *Satyria* Klotzsch, in which united filaments are a constant feature.—H. K. Airy-Shaw.

Fig. 1, flowering branch, *natural size* ; 2, leaf, lower surface, *natural size* ; 3, apex of pedicel, receptacle and calyx, × 3 ; 4, the same, with part of calyx cut away to show disk and style, × 3 ; 5, part of corolla from within, × 3 ; 6, stamen, lateral view, × 6 ; 7, the same, abaxial view, × 6 ; 8, three stamens, abaxial view, showing occasional abnormal union of filaments, × 3.


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Tabula 3256.

AGAPETES PENSILIS *Airy-Shaw.*

Ericaceae. Tribus Thibaudieae.

A. pensilis *Airy-Shaw* in Kew. Bull. 1935, 52 ; ex affinitate remotiore *A. Hosseanae* Diels, *A. yunnanensis* Franch., *A. Mannii* Hemsl. (omnium pariter filamentis longis pubescentibus gaudentium) ; caulibus dense pilosis, foliis parvis ovatis coriaceis, et praecipue florum subsessilium subsolitariorum receptaculo cum corolla hirsuto facile recognoscenda.

Suffrutex epiphyticus, scandens, a ramis arborum longe pendulus, ramosissimus. *Caules* graciles, 1–2 mm. (vetustiores usque 3 mm.) crassi, dense et longiuscule bruunco-pilosi, e parte basali radices napelliformes usque 3·5 cm. longas emittentes. *Folia* parva, ovata usque elliptico-oblonga, 1–1·6 cm. longa, 0·5–1·1 cm. lata, basi angustato-rotundata, apice obtusa usque subacuta, apiculata, margine integerrimo leviter revoluto pauciciliato vel fere eciliato, utraque pagina pilis paucis brevibus aegre visibilibus conspersa (sed folia innovationum plus minus dense pubescentia), supra siccitate surde viridia, rugulosa, subtus pallidiora, plana, coriacea, costa et nervis supra impressis subtus obscurissimis ; petiolus vix 1 mm. longus vel subnullus. *Flores* solitarii vel bini, ut videtur parcissime editi, subsessiles, pedicello 1–2 mm. longo. *Receptaculum* turbinatum, circiter 2 mm. diametro et aequilongum, totum longe ac dense setoso-pilosum. *Calycis* segmenta sublibera, ovato-deltoidea, circiter 2 mm. longa et basi subaequilata, subacuminata, acuta, dorso longe pilosa sed minus dense ac receptaculum. *Corolla* cylindrica, sursum levissime augustata, tubo 1·7 cm. longo 5–7 mm. diametro albo- et roseo-vittato, segmentis deltoideis viridibus circiter 1·5 mm. longis et basi aequilatis acutis recurvis apice ipso iterum recurvo, extra longiuscule et densiuscule glanduloso-pilosa, pilis albis 1–1·5 mm. longis glandulis fuscis oblongis, fauce breviter et sparsius eglanduloso-piloso. *Filamenta* libera, lineari-subulata, basi leviter dilatata, plana, circiter 12 mm. longa et 0·5 mm. lata, pilosa. *Antherae* leviter cohaerentes, anguste lanceolatae, 6 mm. longae, filamentis subaequilatae, circiter 1 mm. supra basin rotundatam dorsifixae, rostris liberis apicem versus subattenuatis rigidis parte pollinifera paullo longioribus subobtusis poro oblongo dehiscentibus, medio dorso calcaribus duobus papilloso-scabridis angulo recto porrectis

angulo recto iterum sursum refractis totis circiter 1·5 mm. longis instructae, antherarum alternarum calcaribus porrectioribus. *Stylus* filiformis, 1·7 cm. longus, glaber, stigmate truncato obscure dentieulato vix expanso. *Fructus* ignotus.

Upper Burma. Valley of the Seinghku, 28° 5′ N., 97° 30′ E., 2400–2700 m., 25 Sept. 1926, *F. K. Ward* 7458 (type) :—" A pendent epiphyte in the upper rain forest, hanging from the boughs of large trees by the yard, or curtaining their trunks. Flowers striped pink and white with a green toothed rim. Small carrot-like water-storing tubers occur at the base, but these are very small compared with the large globular structures found on other species which grow in parts of Burma where there is a long dry season."

N.W. Yunnan. Prope fines Tibeto-Birmanicas inter fluvios Lu-djiang (Salween) et Djiou-djiang (Irrawadi or. sup.), in jugi Tsehiangsehel, 27° 52′, lateris occid. pluviisilva mixta temperata, substr. granitico, circiter 2800–3450 m., 5 Jul. 1916, *Handel-Mazzetti* 9352 (Herb. Kew.) :—" Frutex epiphyticus pendulus bulbos lignosos edens."

Closely related to *A. spissa* and *A. brachypoda*, especially the latter, with which it agrees in the indumentum of the receptacle. The leaves, however, are considerably smaller than those of *A. brachypoda*, and the rather stiff pubescence of the undersurface distinguishes it from both the species mentioned.—H. K. Airy-Shaw.

Fig. 1, flowering branch, showing pendent habit, *natural size*; 2, leaf, lower surface, × 2; 3, receptacle and calyx, × 3; 4, the same, two sepals removed to show disk and style, × 3; 5, part of corolla from within, × 3; 6, stamen (filament in adaxial view, anther in lateral view), × 3; 7, upper part of filament with anther, abaxial view, × 6; 8, the same, lateral view, × 6.


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Tabula 3257.

AGAPETES BRACHYPODA *Airy-Shaw.*

Ericaceae. Tribus Thibaudieae.

A. brachypoda *Airy-Shaw* in Kew Bull. 1935, 51 ; *A. pensili* Airy-Shaw affinis, ramis robustis parum ramosis, foliis duplo majoribus crassius coriaceis glaberrimis distincta.

Suffrutex parvus, patulus, interdum epiphyticus. *Rami* robusti, recti, subsimplices, usque 5 mm. diametro, dense patenti-hirsuti, innovationibus ferrugineo-hirtis. *Folia* breviter ovata usque elliptica, 1·5–2·1 cm. longa, 1–1·5 cm. lata, basi subcuneata usque rotundata, apice rotundata, apiculata, margine revoluto integerrimo vel hinc inde cilio vel vestigio denticuli minuti interrupto, crasse rigide coriacea, glaberrima, siccitate pagina superiore rugulosa, cinereo-viridia, pagina inferiore laevia laete brunnescentia ; costa et nervi supra impressi, subtus prominuli ; petiolus brevissimus, 1–2 mm. longus, transverse rugosus, basi perulis lineari-subulatis setiformibus usque 3 mm. longis quasi stipulis laciniatis circumdatus ; folia innovationum coccinea (teste Ward), siccitate surde rosea, margine revoluto remote ciliata. *Flores* axillares, solitarii vel bini, penduli, brevissime pedicellati ; pedicelli breviter albo-pubescentes et longe subferrugineo-glandulosо-setosi, 2–4 mm. longi, paullulum supra basin bracteolis binis ovatis acutis ciliolatis et ipsa basi perulis paucis parvis brunneis membranaceis ciliolatis suffulti. *Receptaculum* obconicum, eodem modo ac pedicellus dense vestitum, 2–4 mm. diametro. *Calycis* segmenta ovato-lanceolata, 4–6 mm. longa, basi circiter 2 mm. lata, breviter acuminata, acuta, submembranacea, nervosa, indumento dupliei parce vestita. *Corolla* fere stricte cylindrica, inferne levissime ampliata, alba, tenuiter rosco-vittata, tubo 1·6–1·7 cm. longo 5–6 mm. lato extra indumento dupliei breviter pubescente intus basin versus parce breviter et subtiliter pubescente, segmentis triangularibus reflexis 1–2 mm. longis acutis intus minute papillosis marginibus glabrescentibus. *Filamenta* linearia, applanata, 1·3 cm. longa, 0·5 mm. lata, copiose pubescentia, basi vel paullo supra basin in dilatationem oblongam 2 mm. longam 1 mm. latam glabram abruptiuscule ampliata. *Antherae* leviter cohaerentes, anguste oblongo-lanceolatae, filamento dorsaliter basifixae eique 2–3 mm. adnatae, 6 mm. longae, vix 1 mm. latae, rostris liberis apicem versus attenuatis rigidis parte pollinifera brevioribus (2·5 : 3·5 mm.),

dorso supra medium ealearibus duobus papilloso-seabridis iis *A. pensilis* simillimis instruetae. *Stylus* filiformis, 1·7 em. longus, glaber, stigmate minuto vix expanso. *Fructus* ignotus.

Upper Burma. Mountains east of Fort Hertz, 27° 30′ N., 97° 50′ E., 1800 m., 5 Sept. 1926, *F. K. Ward* 7369 :—" Small spreading undershrub on rocks or trees ; young foliage searlet. Flowers white, with thin pale pink stripes."

Allied to *A. spissa*, but quite distinct in its sparse branching and rounded-ovate leaves. The searlet young foliage reealls the similar phenomenon in another member of the *Ericaceae*, namely *Pieris formosa* (Wall.) D. Don.—H. K. Airy-Shaw.

Fig. 1, flowering branch, *natural size* ; 2, leaf, lower surface, × 2 ; 3, receptacle and calyx, × 3 ; 4, the same, two scpals removed to show disk and style, × 3 ; 5, part of corolla from within, × 3 ; 6, stamen, lateral view, × 3 ; 7, upper part of filament with anther, abaxial view, × 6 ; 8, the same, lateral view, × 6.


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Tabula 3258.

AGAPETES SPISSA *Airy-Shaw.*

Ericaceae. Tribus Thibaudieae.

A. spissa *Airy-Shaw* in Kew Bull. 1935, 49; ex affinitate *A. pensilis* Airy-Shaw et *A. brachypodae* Airy-Shaw, a quibus differt caulibus rigidis creberrime verticillato-ramificatis, foliis obovatis crenulato-denticulatis basi cuneatis nervis utrinque pulchre prominenter reticulatis; habitu atque foliorum figura *A. Wardii* W. W. Sm. accedens, a qua tamen calycis hirsuti segmentis brevibus, corolla pubescente et foliis denticulatis (nec integerrimis) recedit.

Suffrutex parvus, epiphyticus. *Caules* robusti, rigidi, dense ramosi, usque 5 mm. crassi, cortice fusco-brunneo longitudinaliter striato lenticellis parvis pallidis rotundis vel lateraliter elongatis parce notato; rami miro modo verticillati vel subverticillati, usque 10 ex eodem loco ut videtur nascentes, rigidi, recti, patuli, foliosissimi, dense patenti-hirsuti, perulis linear-lanceolatis 5–10 cm. longis membranaceis brunneis vel eorum vestigiis emarcidis etiam crebre vestiti; innovationes longe ferrugineo-hirsuti. *Folia* obovata, rarius subelliptica, 2–2·5 cm. longa, 7–10 mm. lata, in petiolum brevissimum cuneato-angustata, apice subacuta usque subobtusa, margine subrevoluta crenulato-denticulata denticulis minute apiculatis, basin versus subintegra, glaberrima, supra nitida siccitate surde fusco-viridia, subtus obscuriora pallidiora (innovationum subpurpurascentia); costa et nervi utrinque pulchre prominenter reticulati, intra marginem anastomosantes; petiolus subnullus. *Flores* solitarii, axillares, pedicello circiter 2 mm. longo basi perulis vel bracteolis paucis minutis instructo. *Receptaculum* obconicum, pedicello distincte articulatum, 2–3 mm. diametro, subtiliter pubescens. *Calycis segmenta* breviter connata, ovato-triangularia, subacuminata, acuta, 2–3 mm. longa, 1·5 mm. lata, extra parce breviter pubescentia. *Corolla* subcylindrica, apicem versus leviter angustata, 5-angulata, tenera, alba, tubo 1 cm. longo 3–4 mm. lato extra minutissime puberulo et insuper sicus angulos breviter glandulosо-pubescente, intus (maxime superne) minute pubescente, segmentis deltoideis acutis patenti-recurvis 1 mm. longis glabrescentibus. *Filamenta* angustissime linearia, applanata, 3–4 mm. longa, vix 0·3 mm. lata, crispule pubescentia, basi in dilatationem rotundato-quadratam circiter 0·6 mm. diametro subito expansa. *Antherae* leviter cohaerentes,

anguste lanceolatae, 5 mm. longae, filamento dorsaliter basifixae eique 1 mm. adnatae, thecis basi rotundatis et brevissime cornutis, rostris tenerrimis flexibilibus ut videtur planis dorso calcaratis, antherarum alternarum calcaribus adscendentibus et deflexis minutissime vel vix papilloso-scaberulis. *Stylus* filiformis, 9–10 mm. longus, glaber, stigmate parvo subdisciformi pallido medio depresso. *Fructus* ignotus.

Assam. Delei Valley, 28° 20′ N., 96° 35′ E., 1500–1800 m., 24 July 1928, *F. K. Ward* 8479 :—" A small epiphytic undershrub in the forest. Flowers white. Calyx, corolla and filaments pubescent or downy."

A species remarkable for its rigid, verticillate, densely leafy branches. *A. Wardii* is the only species of the group showing an approach to this habit, but, in addition to obvious floral differences, it has neither the crenulate-denticulate leaves nor the beautifully reticulate venation of *A. spissa*.—H. K. Airy-Shaw.

Fig. 1, flowering branch, *natural size* ; 2, leaf, upper surface, × 1·5 ; 3, flower, with corolla and style removed, × 4 ; 4, gynoecium, × 6 ; 5, part of corolla from within, × 4 ; 6, stamen, abaxial view, × 6 ; 7, the same, lateral view, × 6.


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Tabula 3259.

AGAPETES KANJILALI *A. Das.*

Ericaceae. Tribus Thibaudieae.

A. Kanjilali *A. Das* in Assam Forest Records (Botany), i. 13, t. 6 (1934); Airy-Shaw in Kew Bull. 1935, 49; ex affinitate *A. yunnanensis* Franch. et *A. Hosseanae* Diels, a quibus foliis anguste ellipticooblanceolatis retusis, receptaculo dense cinereo-puberulo, corolla subduplo longiore, filamentis glabris bene distinguitur.

Frutex epiphyticus, ramis strictis usque 4 mm. diametro, cortice fuseo obscure striato glabrescente, ramorum iuniorum minute puberulo. *Folia* anguste elliptico-oblanceolata, 2·5–3 cm. longa, 7–9 mm. lata, basi in petiolum 1–2 mm. longum transverse minute rugosum cuneato-angustata, apicem versus leviter angustata, retusa, margine revoluta, integerrima, coriacea, glaberrima, siccitate supra fusca subtus subcastanea, nervis obscuris. *Flores* solitarii, ex axillis 2–3 subterminalibus valde approximatis orti, suberecti vel patentes; pedicelli 5–6 mm. longi, subtiliter striati, cinereo-puberuli, basi bracteis perulisque paucis parvis subulatis brunneo-membranaceis ciliolatis suffulti. *Receptaculum* oblongo-obovoideum, circiter 2·5 mm. longum, 1–2 mm. diametro, dense cinereo-tomentellum. *Calyx* cupularis, in receptaculum abrupte contractus, circiter 4 mm. longus, cinereo-puberulus, segmentis anguste deltoideis acuminatis acutissimis usque ad tertiam partem connatis. *Corolla* anguste subcylindrica, circiter 3·8 cm. longa (inclusis lobis deltoideis acuminatis acutis 3–4 mm. longis), 7–8 mm. diametro, basin versus leviter attenuata, extra sparse subtiliter puberula, haud transverse notata. *Filamenta* inordinaliter elongata, circiter 2·8 cm. longa, lineari-filiformia, glaberrima. *Antherae* pro rata breves, 1–1·2 cm. longae, angustissime lanceolatae, dorso circiter medio bicalcaratae, calcaribus usque ad medium connatis alternatim sursum et deorsum spectantibus, rostris ut videtur in unum coalitis. *Stylus* circiter 4 cm. longus, glaber, stigmate vix expanso. *Fructus* ignotus.

Assam. Lakhimpur District: Makum Range, 105 m., April 1914, *Upendranath Kanjilal* 4090:—"Epiphytic. Corolla not transversely marked."

Vernacular name (Assam): "Horu Gumani."

The present species was recognized as new, and the accompanying plate and description were prepared for publication, several months before the first number of *Assam Forest Records*, in which *A. Kanjilali* appeared, was received at Kew (Dec. 1934). It is thought advisable to publish them, since the original description of the species is somewhat brief, and certain floral details on the plate are not quite accurate. Instances of the latter are the curiously *Fuchsia*-like corolla, stated to be "more or less diagrammatic" but quite unlike anything in *Agapetes* with which the present writer is acquainted; the anther-thecae apparently dehiscing by slits and represented as quite distinct from their beaks, which have the appearance of a prolongation of the connective; the spurs, in one case, arising from the front instead of from the back of the beaks; and the barrel-shaped rather than subdiscoid stigma. As the specimen figured in *Assam Forest Records* is part of the same collection (*Kanjilal* 4090) as that from which our plate was drawn, it seems probable that the artist, in attempting to give the dissections a life-like appearance, drew rather more freely upon his imagination than the condition of the dried material warranted. His habit-figure, on the other hand, gives a good idea of the plant.

Das gives *A. buxifolia* Nutt. as the nearest ally of *A. Kanjilali*, but, beyond the fact that both species are referable to the Series *Longifiles*, there is no very close affinity between them. In foliage, *A. Kanjilali* is similar to *A. Hosseana* Diels, but the much larger flowers, densely tomentellous calyx-tube (receptacle) and unusually elongate glabrous filaments readily distinguish it from that species and its immediate allies.—H. K. Airy-Shaw.

Fig. 1, flowering branch, *natural size*; 2, receptacle and calyx, × 4; 3, the same, with part of calyx cut away to expose disk and base of style, × 4; 4, apex of style, with stigma, × 4; 5, part of corolla from within, × 1·5; 6, stamen, adaxial view, × 1·5; 7, apex of filament, with anther, lateral view, × 4; 8, the same, abaxial view, × 4.


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Tabula 3260.

MARISCUS BOWMANNI (*F. Muell.*) *C. B. Clarke.*

Cyperaceae. Tribus Cypereae.

M. Bowmanni (*F. Muell.*) *C. B. Clarke* in Kew Bull., Add. Ser. viii. 20 (1908). *Cyperus Bowmanni* F. Muell. ex Benth. Fl. Austral. vii. 287 (1878); F. M. Bailey, Syn. Queensl. Fl. 592 (1883); Queensl. Fl. vi. 1749 (1902); Compreh. Cat. Queensl. Pl. 591 (1913). *M. Dietrichiae* subsp. *Bowmannii* Domin in Bibl. Bot. xx. Heft 85, 436 (1915).—Affinis *M. Dietrichiae* C. B. Clarke, a qua statura minore, culmis gracillimis debilibus, foliis angustioribus, infloreseentia simplici distinguitur.

Planta annua, gracilis, glabra. *Rhizoma* breve, nodulosum. *Culmi* laxe caespitosi, graciles, subereeti vel patentes, usque 45 cm. alti. *Folia* gracilia, culmo fere aequilonga, 2–4 mm. lata, in acumen tenue attenuata, marginibus apicem versus antrorse scabridis. *Bracteae involucrales* 3–4, patentes, foliis similes, valde inaequales, usque 40 cm. longae. *Anthela* simplex, 1–6-radiata; radii patentes, valde inaequales, gracillimi, usque 5·5 cm. longi. *Spicae* 15–35 mm. longae, 18–45 mm. latae, 7–15-spiculatae. *Spiculae* laxissime dispositae, patulae, infimae saepe valde reflexae, 10–24 mm. longae, fere 1 mm. latae, anguste lineares, subteretes, 5–9-florae; rhachilla alis latis hyalinis praedita. *Squamae steriles* 2, inaequales, usque 1·5 mm. longae, persistentes. *Squamae fertiles* usque 2 mm. inter se distantes, 2·5–3 mm. longae, 9–11-nerviae, ellipticae et obtusae (explanatae), carina latiuscula viridi, ceterum flavidae, marginibus rhachillam arete amplectentibus. *Stamina* 3. *Stylus* profunde trifidus, ramis elongatis exsertis. *Nux* triquetra, ambitu oblonga, leviter curvata, latitudine sua circiter triplo longior, brunnea, alis rhachillae arete comprehensa atque hac invicem squama amplectente comprehensa.

Queensland. Leichhardt District: Herbert's Creek, *Bowman*. Moreton District: near Moggill, on roadside in open *Eucalyptus* forest, on sandstone and conglomerate ridges, 9 Nov. 1930, *C. E. Hubbard* 4883; near Mt. Gravatt and Sunnybank Cemetery Reserve, on roadside through open *Eucalyptus* forest, 30 March 1931, *C. E. Hubbard* 8072; Taylor Range: Mt. Coot-tha, near Brisbane, in depression where water had been standing, in open *Eucalyptus* forest, 150 m., 6 April 1930, *C. E. Hubbard* 2044; Brisbane River, *Bailey*; Moreton Bay, *Leichhardt*.

Mariscus Bowmanni belongs to that group of species considered by Schrader to represent a distinct genus, *Diclidium*. The main features upon which this genus was based were the terete or subterete many-flowered spikelets and the keel-less squamae. In essentials, *Diclidium* was identical with *Mariscus*, and subsequent workers have failed to maintain it, although Bentham retained *Diclidium* as a sectional name under his all-embracing *Cyperus*.

The localities cited above are all in Southern Queensland, the most northerly record being that of the type specimen, which was collected by Bowman at Herbert's Creek, a few miles south of the tropic of Capricorn. The species appears to be definitely coastal and is restricted apparently to open *Eucalyptus* forest where it is generally found in damp situations. *M. Bowmanni* has also been recorded for New South Wales; Moore (Handb. Fl. N.S. Wales, 450: 1893) states that it is found in the "northern parts of the colony," while Turner (Proc. Linn. Soc. N.S. Wales, xxx. 84: 1905) records it from the north-western area. The latter statement seems doubtful and may have been based on an incorrect determination. There are no specimens of it from New South Wales in the Kew collections.

Domin in Bibl. Bot. xx. 430 (1915) reduced *M. Bowmanni* to a subspecies of *M. Dietrichiae*. The latter species, which occurs further north in Queensland, has a very robust habit, much wider leaves and a compound inflorescence. The two species, although obviously related, differ in so many respects that specific segregation seems unavoidable.

Also included by Domin as a subspecies of *M. Dietrichiae* is a plant collected on Mt. Remarkable near Pentland, which bears a distinct resemblance to *M. Bowmanni*. It was described by him as subsp. *brevibracteatus* and was accompanied by a figure reproduced from a photograph.

There is no specimen of this "subspecies" at Kew, the type presumably being at Prague, but from the description and figure it seems to be closely related to *M. Bowmanni*.— F. Ballard.

Fig. 1, entire plant, × ½; 2, a flowering culm, *natural size*; 3a, 3b, 3c, a floret in back, three-quarter front and side view, × 15; 4, a floret, somewhat advanced, × 20; 5, a ripe nut, × 20; 6, diagram to show ripe nut with enveloping squama and rhachilla wings.


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Tabula 3261.

ECHINOPOGON INTERMEDIUS *C. E. Hubbard.*

Gramineae. Tribus Festuceae.

E. intermedius *C. E. Hubbard*; species nova, ab *E. ovato* (G. Forst.) Beauv., spiculis majoribus, glumarum carinis rigide ciliatis, aristis longioribus, ovario plerumque glabro distinguenda.

Gramen perenne, laxe caespitosum, 25–90 cm. altum, e rhizomate gracili ortum. *Culmi* erecti vel basi geniculati, rigidi, graciles, simplices, 3–4-nodes, striati, retrorse scaberrimi. *Foliorum vaginae* internodiis breviores, glabrae, plerumque retrorse scabrae; ligulae truncatae, usque ad 1 mm. longae; laminae lineares vel lanceolato-lineares, acutae, 2·5–13 cm. longae, 3–7 mm. latae, planae, firmae, glabrae, scabrae. *Panicula* erecta, densissima, ovata, ovato-oblonga vel oblonga, 3–6 cm. longa, 2–4 cm. lata (aristis inclusis). *Spiculae* lineari-oblongae, 5–7 mm. longae, pallide virides, inferiores tandem horizontaliter patentes. *Glumae* ambitu anguste lanceolatae, acuminatae, tenuiter acutae, carina supra basin laxe et rigide ciliata. *Lemma* ambitu lineari-lanceolatum, 4–5 mm. longum, 5–7-nerve, bilobum, lobis seta rigida scabrida 2–2·5 mm. longa terminatis; callus obtusus, minutus, pilis usque ad 2 mm. longis dense barbatus; arista rigida, 10–25 mm. longa, inferne minutissime hispidula, superne scabra. *Palea* lanceolata, carinis apicem versus scabrido-ciliolata. *Antherae* 1·5–2 mm. longae. *Ovarium* apice plerumque glabrum vel raro pilis paucis praeditum. *Caryopsis* anguste ellipsoidea, 3–3·5 mm. longa.

Queensland. Darling Downs District: Dalveen, March 1916, *Clark* 41; Warwick, March 1911, *Boorman*; Inglewood, Dec. 1933, *Wicks* 5; Wyberba, creek banks, 830–900 m., Jan. 1933, *Blake* 4630; Bald Mountain, shady places along creek bank, 900 m., Jan. 1933, *Blake* 4477.

New South Wales. Liverpool Plains, *Moore* 112. Gough County: Glen Innes, in cleared *Eucalyptus* forest country, on hill slope, March 1930, *Hubbard* 8217. Hardinge County: Howell, Jan. 1906, *Boorman*. Inglis County: Walcha Road, Dec. 1912, *Boorman* (type). Harden County: Burrinjuck, Feb. 1911, *Boorman*.

The main diagnostic characters of the genus *Echinopogon* are as follows:—Panicle spike-like; spikelets usually 1-flowered, laterally

compressed ; rhachilla disarticulating above the glumes and produced beyond the floret as a minute or elongated bristle ; glumes subequal, keeled, mostly 1-nerved ; lemma becoming indurated, 5–11-nerved, as long as or longer than the glumes, usually awned from the 2-lobed tip or from just below the entire tip ; caryopsis free but tightly embraced by the lemma and palea, and with a linear elongated hilum.

Bentham (Benth. et Hook. f. Gen. Pl. iii. 1145) and Hackel (Engl. u. Prantl, Pflanzenfam. ii. Abt. 2, 48) refer this genus to the tribe *Agrosteae*, on account of the 1-flowered spikelets, but the structure of the lemma, the prolongation of the rhachilla beyond the floret, together with the occasional occurrence in *E. ovatus* of a second floret (N.S. Wales: Richmond River, *Stephenson*) point to a relationship with genera of the *Festuceae*. This is recognized by Morris in Ewart's Flora of Victoria (p. 109), where he transfers it to that tribe.

Echinopogon Beauv. has usually been restricted to the original species *E. ovatus* (G. Forst.) Beauv. An examination of the material of this genus in the Brisbane, Kew and Sydney Herbaria, together with a study of living plants, has demonstrated, however, the existence of a number of well-defined although closely related types which seem worthy of recognition as distinct species. Descriptions of these are given below, together with a key to assist in their identification.

For some years it has been known that *Echinopogon ovatus* (*sensu lato*), commonly known as Rough Bearded Grass, is dangerous to stock.* It causes a peculiar form of staggers, the animals showing a stilted or staggery gait which on excitement increases to complete incoordination of the muscles of locomotion ; thus if the animals are frightened, they rush about and often die as the result of an accident. Calves, kids and lambs are more susceptible than fully grown animals. It is only in its young stages that the grass is harmful and the complaint is apparently only prevalent in the Northern Tableland of New South Wales where the genus attains its greatest development.

Key to the species of Echinopogon.

†Spikelets 5–10 mm. long ; glumes finely acute or acuminate ; lemma with setiform lobes up to 2·5 mm. long :

Panicle nodding or inclined ; peduncle usually slender and smooth, especially just beneath the panicle, sometimes scaberulous ; ovary hairy at the apex, very rarely glabrous :

Spikelets mostly 7–10 mm. long ; glumes loosely and rigidly ciliate on the keels . . . . . 1. *E. Cheelii.*

Spikelets 5–7 (rarely 8) mm. long ; glumes rigidly ciliolate or scabrid on the keels . . . . . 2. *E. nutans.*

* See Henry & Massey in Agric. Gaz. N.S. Wales, xxii. 116 (1911) ; Seddon & Carne, l.c. xxxvii. 684 (1926), and in N.S. Wales, Dept. Agric. Sci. Bull. no. 26, 34 (1926) ; Seddon in Rep. Austral. & New Zeal. Assoc. Adv. Sci. xx. 412, 419 (1931), and in Agric. Gaz. N.S. Wales, xlv. 505 (1934).

Paniele stiffly ereet ; peduncle retrorsely seabrid ; ovary usually glabrous ; spikelets 5–7 mm. long ; glumes loosely and rigidly ciliate on the keels . . . . . 3. *E. intermedius.*

††Spikelets 2·5–5 mm. long ; glumes acute to obtuse ; lemma acutely 2-lobed or entire at the apex, rarely with the lobes setiform and up to 1·5 mm. long ; panicle stiffly ereet, rarely nodding (?) :

Spikelets 3–5 mm. long ; awns usually over 3 mm. and up to 15 mm. long ; glumes smooth or asperulous on the sides, very rarely minutely pubescent and then with well-developed awns ; panicle 0·8–10 cm. long, 0·8–2·5 cm. wide :

Culms loosely to densely tufted, ereet or geniculate at the base, 2–4-noded ; leaf-blades linear, ereet, 1·5–5 mm. wide . . . . . 4. *E. caespitosus.*

Culms loosely clustered or solitary, mostly geniculately ascending from a slender creeping rhizome, 3–7-noded ; leaf-blades lanceolate-linear to linear, the upper spreading or becoming deflexed, 2–8 mm. wide . . . . 5. *E. ovatus.*

Spikelets 2·5–4 mm. long (when over 3·5 mm. then awnless) ; awns or mucros 0·2–3 mm. long :

Paniele 0·6–2 cm. long, 0·6–1·2 cm. wide, bristly ; spikelets 2·5–3·5 mm. long ; lemma usually awned with the awn up to 3 mm. long . . . . . 6. *E. McKiei.*

Paniele 1·5–3 cm. long, 0·6–0·8 cm. wide, not bristly ; spikelets 3·5–4 mm. long ; lemma mucronate, with the mucro 0·2–1·5 mm. long . . . . . 7. *E. phleoides.*

Enumeration of species.

1. **E. Cheelii** *C. E. Hubbard* ; speeies nova, *E. intermedio* C. E. Hubbard affinis, panicula tandem nutante, pedunculo infra paniculam graeillimo plerumque laevi vel fere laevi, spieulis majoribus linearibus vel lineari-lanceolatis, ovario apice dense breviter hirsuto distinguenda.

Gramen perenne, laxe caespitosum, 2–10 dm. altum. *Culmi* erecti vel basi geniculati, graciles vel validiusculi, striati, simpliees, 3–5-nodes, nodos versus retrorse seabri, internodio summo graeillimo infra panieulam laevi vel minute seaberulo raro seabro. *Foliorum vaginae* plerumque retrorse seabrae, striatae, internodiis breviores, glabrae vel inferiores sparse et breviter pilosae ; ligulae truneatae, usque ad 1·5 mm. longae ; laminae lineares vel lanceolato-lineares, apice acutae vel pungentes, usque ad 14 em. longae et 10 mm. latae, planae, firmae, glabrae vel sparse pilosae, seaberulae vel supra et subtus laeves, marginibus seaberulis et plerumque hispidulis. *Panicula* lanceolata vel ovata vel ovato-oblonga, densa, nutans, 2·5–6 em. longa, 1–3 em. lata (aristis inclusis). *Spiculae* lineares vel lineari-lanceolatae, plerumque 7–10 mm. longae, pallide virides, ereetae vel inferiores leviter

patentes. *Glumae* ambitu anguste laneeolatae, tenuiter acutae, spiculae acquilongae, firme membranaeeae, carina superne laxe et rigide eiliatae et scabridae. *Lemma* ambitu lineari-laneeolatum, 6–7 mm. longum, apieem versus minutissime hispidulum, bilobum, lobis seta rigida scabrida usque ad 2·5 mm. longa terminatis, 5–9-nerve; callus pilis usque ad 1·5 mm. longis barbatus; arista rigida, 0·8–2·2 cm. longa, seabra vel inferne minutissime hispidula. *Palea* earinis supra medium eiliolata. *Antherae* 2·5–3 mm. longae. *Ovarium* apiee dense breviter hirsutum.

New South Wales. Gough County: Glen Innes, *Cheel* (type); "Kelso," Kangaroo Camp, Tingha Road, 30 miles from Guyra, 900 m., Jan. 1932, *MeKie* 721; Glencoe, basaltie soil, 1140 m., Dec. 1931, *McKie* 723. Hardinge County: Inverness Road, Ollera, 18 miles N.W. of Guyra, Nov. 1931, *MeKie* 720; Box Hills, 5 miles W. of Ben Lomond, basaltic soil, 1350 m., Dec. 1931, *McKie* 722. Clarke County: Aberfoyle Road, 13½ miles E. of Guyra, red basaltie soil, 1200 m., Nov. 1930, *McKie* 663. Sandon County: Guyra, *McKie* W. 37; Little Lagoon, 5 miles S. of Guyra, Dec. 1930, *McKie* 664. Vernon County: Moona Plains, Mareh 1899, *Crawford*; Yarrawitch, Dec. 1912, *Boorman*. Wallaee County: Mt. Kosciusko, Sawpit Creek, Jan. 1898, *Maiden*. [Commonwealth Territory]: Gudgenby, Queanbeyan, Jan. 1912, *Cambage* 3404.

Readily separated from *E. ovatus* by the more ereet habit, relatively larger nodding panicles, usually smooth peduncles, much larger spikelets and longer awns.

Aeeording to the Rev. Norman MeKie this grass is found all over the Guyra distriet and in practically every kind of soil. It is possible that *MeKie* no. 664 is a hybrid between *E. Cheelii* and *E. intermedius*; it has a glabrous or hairy ovary, and a scabrid peduncle.

2. **E. nutans** *C. E. Hubbard*; speeies nova, ab *E. ovato* (G. Forst.) Beauv., panicula nutante, peduneulo prope paniculam graeillimo laevi vel nonnunquam seabro, spieulis majoribus, lemmate breviter bisetoso distinguenda.

Gramen perenne, e rhizomate gracili ortum, usque ad 7 dm. altum. *Culmi* laxe caespitosi vel solitarii, erecti vel basi geniculati, graciles, simplices, 4–8-nodes, praecipue nodos versus retrorse scabri, prope paniculam gracillimi, laeves vel nonnunquam scabri. *Foliorum vaginae* internodiis tandem breviores, retrorse scabrae, glabrae vel inferiores breviter pilosae; ligulae truncatae, usque ad 1 mm. longae; laminae lineares, breviter acutae vel apice pungentes, 2–15 cm. longae, 3–6 mm. latae, planae, firmae, glabrae, plus minusve seaberulae. *Panicula* nutans, ovato-oblonga vel plerumque oblonga, densa, 2–5·5 cm. longa, 0·8–2 cm. lata (aristis inclusis). *Spiculae* appressae, lineares vel lineari-lanceolatae, 5–7 (raro 8) mm. longae, pallide virides.

Glumae spiculae aequilongae vel inferior paullo brevior, ambitu anguste lanceolatae vel lineari-lanceolatae, tenuiter acutae, firme membranaceae, carina superne rigide ciliolatae vel raro scabrae. *Lemma* ambitu lineare vel lineari-lanceolatum, spiculae plerumque aequilongum, bilobum, lobis seta scabra 1–2 mm. longa terminatis, 5-nerve; callus pilis usque ad 1 mm. longis barbatus; arista rigida, 6–14 mm. longa, scabra. *Palea* carinis supra medium scabra vel rigide ciliolata. *Antherae* circiter 1 mm. longae. *Caryopsis* anguste oblonga, 3 mm. longa, apice dense breviter hirsuta.

Queensland. Port Curtis District: Rosedale, in rocky watercourse, Jan. 1932, *Dovey* G 95. Burnett District: Coalstoun Lakes, fairly common in *Eucalyptus* forest, May 1931, *White* 7715. Wide Bay District: Booyal, via Childers, April 1931, *Coleman* 1. Moreton District: Toogoolawah, April 1931, *Alexander* 4; North Pine River, on somewhat shaded land, Dec. 1930, *Blake* 93; Enoggera Creek, near Brisbane, April 1908, *White*; Taylor Range, Mt. Coot-tha, near Brisbane, on slopes in open *Eucalyptus* forest, shaly soil, 150 m., April 1930, *Hubbard* 2047; Brisbane, Albert Park, *Bailey*; banks of Brisbane River, in partial shade, Nov. 1930, *Hubbard* 4810 (type), *Bailey*, Dec. 1917, *White*; near Mt. Gravatt and Sunnybank Cemetery Reserve, in open *Eucalyptus* forest, March 1931, *Hubbard* 8073; Waterford, *Mead*; Tambourine Mtn., in open *Eucalyptus* forest, together with *Themeda australis* and *Poa australis*, 540 m., May 1930, *Hubbard* 2447; between Calvert and Lanefield, in grassland, cleared *Eucalyptus* forest country, April 1930, *Hubbard* 2112; Mt. Mistake, in open *Eucalyptus* forest, amongst *Themeda australis*, 450 m., Nov. 1930, *Hubbard* 5254; Beenleigh, Jan. 1932, *Michael* 1914; foot of Mt. Barney, in *Eucalyptus* forest, along river courses and on alluvial flats, Dec. 1932, *White* 8752. Darling Downs District: Toowoomba, in partial shade, March 1931, *Hubbard* 5901; hillsides in open forest, 660 m., Feb. 1934, *Blake* 5140; Spring Creek, near Killarney, on slopes in cleared *Eucalyptus* forest country, March 1931, *Hubbard* 5821.

E. nutans var. **major** *C. E. Hubbard*; varietas nova, a typo recedens culmis validioribus usque ad 1·2 m. altis, panicula 4–7·5 cm. longa, aristis usque ad 2 cm. longis, ovario glabro vel fere glabro.

New South Wales. Hardinge County: Wandsworth, 15 miles N.W. of Guyra, 1080 m., Dec. 1931, *McKie* 717, 718, 719 (type).

Echinopogon nutans is of common occurrence in the *Eucalyptus* forests of the Moreton District in Queensland. On account of the slender peduncles, the usually oblong panicles bend over and nod at maturity; by this character the species may be easily distinguished from *E. ovatus* in the field, the latter having stiffly erect, more ovate panicles.

3. **E. intermedius** *C. E. Hubbard*, supra (t. 3261).

Distrib. Southern Queensland and New South Wales.

4. **E. caespitosus** *C. E. Hubbard*; species nova, affinis *E. ovato* (G. Forst.) Beauv., a quo culmis laxe vel dense caespitosis erectis vel basi leviter geniculatis 2–4-nodibus, foliorum laminis inferioribus plerumque longioribus erectis, spiculae rhachilla breviore saepe glabra, ovario saepe glabro vel fere glabro recedit.

Gramen perenne, laxe vel dense caespitosum, usque ad 1 m. altum. *Culmi* erecti vel basi geniculati, graciles vel validiusculi, rigidi, simplices, 2–4-nodes, retrorse scabri vel laeves. *Foliorum vaginae* tandem internodiis breviores, tenuiter striatae, glabrae, retrorse scabrae vel laeves; ligulae truncatae, usque ad 2 mm. longae; laminae lineares, in apicem durum subobtusum attenuatae, usque ad 25 cm. longae, 1·5–5 mm. latae, planae, firmae, glabrae vel nonnunquam pubescentes, scabernulae vel plus minusve laeves. *Panicula* oblonga vel lanceolata, densa vel densissima, continua vel inferne interrupta, erecta vel raro nutans (?), 1–10 cm. longa, 0·8–2 cm. lata (aristis inclusis). *Spiculae* lineari-oblongae vel oblongae, 3–5 mm. longae, virides vel purpurascentes. *Glumae* ambitu lanceolatae, lanceolato- vel lineari-oblongae, acutae vel subacutae, spiculae aequilongae vel paullo breviores, firme membranaceae, carina scabrae vel superne rigide ciliolatae. *Lemma* ambitu lanceolatum vel lanceolato-oblongum, spiculae aequilongum, apice bilobum vel integrum, lobis brevibus obtusis vel acutis raro setiformibus et usque ad 1·5 mm. longis, 5–7-nerve; callus pilis circiter 1 mm. longis barbatus; arista rigida, usque ad 1·4 cm. longa, scabra. *Palea* carinis apicem versus scabra vel scabrido-ciliolata. *Antherae* 1–2 mm. longae. *Ovarium* apice glabrum vel nonnunquam plus minusve breviter pilosum.

Queensland. Darling Downs District: Stanthorpe, Feb. 1889 and 1891, *Bailey*, in cleared *Eucalyptus* forest country, in granite grit, March 1931, *Hubbard* 5710; Wallangarra, Dec. 1903, *Maiden and Boorman*, Nov. 1912 and April 1914, *Boorman*, in *Eucalyptus* forest, 1000 m., Jan. 1933, *Blake* 4421, 4689; Hampton, Oct. 1931, *Kerr*; Wyberba, shady creek bank, 830 m., Jan. 1933, *Blake* 4544. Moreton District: foot of Mt. Barney, along creek sides, Dec. 1932, *White* 8748.

New South Wales. New England, *Stuart*. Clive County: Tenterfield, near Sandy Hills, *Hindman*. Hardinge County: Ollera, light soil (trap rock), 1080 m., Jan. 1932, *McKie* 726, 727; Black Gully, Tingha Road, 7 miles N.W. of Guyra, hard white soil, Dec. 1930, *McKie* 665, Jan. 1932, *McKie* 733. Sandon County: Red Hill, 3 miles N. of Armidale, slate formation, 990 m., Dec. 1931, *McKie* 724, 725. Macquarie County: Hastings River, *Beckler*. Northumberland County: Awaba, near Newcastle, Nov. 1914, *Boorman*. Blue Mountains, Dec. 1882, *Betche*; near Katoomba, in railway enclosure, common, April

1931, *Hubbard* 8453 (type). Paramatta, May 1800, *Caley* (Herb. Mus. Brit.). Hornsby, near Sydney, April and Oct. 1914, *Blakely*. Sydney, *Hooker, Stephenson* 110; Homebush, Sydney, on shale, June 1930, *Vickery* 9, 10; North Sydney, Jan. 1912, *Cleland*; Port Jackson, *Gaudichaud, Moore, Brown* 6217 (Herb. Mus. Brit., partim). Ingleburn, 28 miles S. of Sydney, on shale, May 1931, *Blakely and McKie* 734. Vincent County: Kangaroo Valley, 12 miles W. of Nowra, April 1929, *Rodway*; Huskisson, Jervis Bay, Dec. 1925 and April 1929, *Rodway*. Wynyard County: Wagga Wagga, *Whittet* 1. Without precise locality, *Sieber* 89 (Herb. Mus. Brit.).

In the field, *E. caespitosus* may be distinguished from *E. ovatus* by its compact tufts with more erect and usually taller culms. It shows a considerable range of fluctuation apart from the marked variety described below. In some cases the differences are no doubt due to the varied conditions of soil and moisture under which the species is found. These would account for the range in the size of the inflorescence, plants with greater vigour having elongated and often interrupted panicles. Such variations occur here and there throughout the area of the species and have probably no systematic value. Several of the specimens cited above from Southern Queensland and Northern New South Wales, however, differ from the typical form in often having smooth peduncles and leaf-sheaths, and shortly bisetose lemmas; they may represent a second distinct variety.

E. caespitosus var. **Cunninghamii** *C. E. Hubbard*; varietas nova, a typo recedens pedunculo fere laevi, panicula densissima 3·5 cm. longa 1·5 cm. lata, spiculis 3–3·5 mm. longis, glumis minutissime pubescentibus carina pilis minus rigidis conspicue ciliolatis, lemmate 7–11-nervi.

New South Wales. Wellington Valley, Nov. 1825, *Cunningham* 10.

5. **E. ovatus** (*G. Forst.*) *Beauv.* Agrost. 42, t. 9, fig. 5 (1812); Benth. Fl. Austral. vii. 599 (1878), pro parte; Buchanan, Man. Grasses New Zeal. 27, t. 13b (1880); Moore, Handb. Fl. N.S. Wales, 484 (1893); Maiden, Man. Grasses N.S. Wales, 141 (1898); F. M. Bailey, Queensl. Fl. vi. 1878 (1902); Rodway, Tasman. Fl. 268 (1903); Black, Fl. S. Austral. 68 (1922); Cheeseman, Man. New Zeal. Fl. ed. 2, 150 (1925); Morris in Ewart, Fl. Vict. 144 (1930). *E. aspera* Trin. Fund. Agrost. 126 (1820). *E. Sieberi* Steud. Syn. Pl. Glum. i. 183 (1854). *E. virens* Gandoger in Bull. Soc. Bot. France, lxvi. 300 (1920), in clavi. *E. purpurascens* Gandoger, l.c. *E. novae-zelandiae* Gandoger, l.c. *Agrostis ovata* G. Forst. Prodr. 8 (1786); Labill. Pl. Nov. Holl. i. 19, t. 21 (1804); R. Br. Prodr. 171 (1810). *Cinna ovata* Kunth, Rév. Gram. i. 67 (1829). *Hystericina alopecuroides* Steud. Syn. Pl. Glum. i. 35 (1854).

Gramen perenne, e rhizomate gracili saepe elongato ortum, 1·5–7 dm. altum. *Culmi* laxe fasciculati vel solitarii, plerumque geniculato-ascendentes, graciles, rigidiusculi, simplices, 3–7-nodes, retrorse scabri vel scaberuli, raro laeves. *Foliorum vaginae* internodiis breviores, retrorse scabrae vel scaberulae vel laeves, glabrae vel inferiores pilosae; ligulae truncatae, usque ad 2 mm. longae; laminae lineares vel plerumque lanceolato-lineares, breviter acutae, 1·5–16 cm. longae (superiores usque ad 6 cm.), 2–8 mm. latae, scabridae vel marginibus scaberulis exceptis laeves, glabrae, superiores patentes vel tandem deflexae. *Panicula* rigide erecta, ovata vel oblonga, densa vel densissima, 0·8–5 cm. longa, 1–2·5 cm. lata (aristis inclusis). *Spiculae* lineari-oblongae, 3·5–5 mm. longae, virides, raro purpurascentes, demum horizontaliter patentes. *Glumae* spiculae aequilongae vel paullo breviores, ambitu anguste lanceolatae vel lineari-lanceolatae, acutae vel obtusae, carina scabrae vel rigide ciliolatae. *Lemma* ambitu lineari-lanceolatum, apice minute bilobum vel integrum; arista 3–15 mm. longa, scabra. *Palea* carinis apicem versus ciliolata. *Antherae* 1–1·5 mm. longae. *Ovarium* apice breviter hirsutum. *Caryopsis* lanceolato-oblonga, 2–2·5 mm. longa.

Distrib. Queensland (North Kennedy, Moreton and Darling Downs Districts); New South Wales; Victoria; Tasmania; South Australia; Western Australia; Norfolk Island; New Zealand.

E. ovatus var. **pubiglumis** *C. E. Hubbard*; varietas nova, a typo recedens glumis brevissime pubescentibus, spiculae rhachilla breviore glabra, ovario glabro, panicula densissima.

Western Australia. Without precise locality, *Drummond* 342 (type), 348.

This variety resembles *E. ovatus* in habit, the latter also occurring in Western Australia. The structure of the spikelets is, however, nearer to that of the Queensland and New South Wales species, *E. caespitosus*.

Although *Echinopogon ovatus* is the most widely spread of all the species of this genus, it is very uniform both in habit and structure. In Queensland it is frequently found in moister situations than any of the other species, and this is probably the case in parts of New South Wales; in New Zealand, on the other hand, it grows in dry places (according to Cheeseman).

Echinopogon Sieberi Steud. was based on "*E. ovatus* Sieber Hrbr. N. Holl." A specimen in the Kew Herbarium labelled "Sieber 89" which is referable to *E. ovatus*, may possibly be part of the type-collection. The corresponding specimen in the British Museum Herbarium is, however, *E. caespitosus*. Steudel's description agrees best with *E. ovatus*, e.g. the flaccid leaves 1–2 in. long, the 4 lin. long

panicle, and the bearded apex of the grain. On this account *E. Sieberi* is treated as a synonym of *E. ovatus*.

The types of Gandoger's species, *E. virens*, *E. purpuraseens* and *E. novae-zelandiae*, which are in the Botanical Institute Herbarium, Lyon, have been kindly lent for examination by Dr. J. Beauverie. They represent the same species as *E. ovatus*; in fact the type of *E. novae-zelandiae* is a very good match with a syntype of *Agrostis ovata* G. Forst. in the Kew Herbarium, whilst the other two only differ in having smaller panicles. Gandoger cites Maiden as the collector of *E. virens*, but there is little doubt that the real collector was E. Betche (who collected *E. ovatus* at Waleha in Dec. 1898), and that the specimen was only communicated by Maiden to Gandoger. A duplicate of Betche's plant in the Kew Herbarium exactly matches the type of *E. virens*.

The majority of the specimens used by Bentham in the preparation of the account of *Echinopogon ovatus* for the Flora Australiensis (vii. 599) were correctly named, but one (Liverpool Plains, *Moore* 112) is now placed with *E. intermedius*, and a few others are cited under *E. caespitosus*. In the Agricultural Gazette of N.S. Wales, vol. iii. p. 388, Turner gives an account, together with a plate (t. 28), of *E. ovatus*. The latter illustrates two species, the drawing on the left-hand side and figs. D, B and C (left) being of *E. intermedius*, whilst that on the right and figs. A, B and C (right) are of *E. caespitosus*.

6. **E. McKiei** *C. E. Hubbard*; species nova, affinis *E. ovato* (G. Forst.) Beauv., a quo spiculis minoribus, glumis minute pubescentibus, aristis brevioribus, ovario glabro differt.

Gramen perenne, laxe caespitosum, e rhizomate graeili ortum, 1–3·5 dm. altum. *Culmi* erecti vel basi geniculati, graeillimi, simpliees, 2–4-nodes, nodos et panieulam versus retrorse seaberuli vel fere laeves, internodio summo (peduneulo) usque ad 22 em. longo. *Foliorum vaginae* internodiis tandem breviores, striatae, glabrae vel inferiores sparse pubeseentes, superiores plus minusve retrorse seaberulae vel seabrae; ligulae truneatae, usque ad 1·5 mm. longae; laminae lineares, apice pungentes vel subobtusae, 2–12 em. longae (summae 0·5–1·5 em.), 2–3 mm. latae, supra arete nervosae, hispidulae vel pubeseentes vel glabreseentes, seaberulae vel fere laeves. *Panieula* ereeta, densissima, oblonga, 0·6–2 em. longa, 0·6–1·2 em. lata (aristis inclusis). *Spiculae* lineari-oblongae vel oblongae, 2·5–3·5 mm. longae, virides, tandem horizontaliter patentes. *Glumae* spiculae plus minusve aequilongae, ambitu lineari-oblongae vel lineari-lanceolatae, acutae vel subobtusae, firme membranaeeae vel indnratae, minute pubeseentes, carina pilis rigidis usque ad 0·6 mm. longis eiliolatae. *Lemma* glumis subaequilongum, ambitu lanceolatum vel lineari-oblongum, apice dentibus usque ad 0·3 mm. longis bidentatum, tandem induratum, 5–7-nerve; eallus minute barbatus; arista (vel muero) rigida,

scaberula, usque ad 3 mm. longa. *Palea* lemmati aequilonga, carinis laevis vel prope apicem scaberula. *Antherae* 0·5–1 mm. longae. *Caryopsis* oblonga, 1·5 mm. longa, glabra.

New South Wales. Clive County: Glen Elgin, *White-Haney*. Gough County: Gleneoe, ou camping reserve, Dec. 1931, *McKie* 731. Clarke County: Yellow Gap, Oban Road, N.E. of Guyra, soil of granite formation, Dec. 1931, *McKie* 729 (type); 9 mile post, Ward's Mistake Road, N.E. of Guyra, soil of slate formation, 1290 m., Dec. 1931, *McKie* 728; near Gap View, Day's Mtn., 20 miles N.E. of Guyra, granite soil, Nov. 1930, *McKie* 667. Sandon County: Elderbury Creek, 7 miles S.W. of Guyra, white soil, 1290 m., Dec. 1931, *McKie* 730; Springmount Gate, 9 miles S.S.E. of Guyra, white soil of slate formation, Dec. 1930, *McKie* 666. Vernon County: Waleha District, Dec. 1898, *Betche*.

7. **E. phleoides** *C. E. Hubbard*; species nova, affinis *E. McKiei* C. E. Hubbard, a quo paniculis exaristatis, spiculis paullo majoribus, lemmate mucronato vel apiculato recedit.

Gramen perenne, e rhizomate gracili ortum, 2·5–4 dm. altum. *Culmi* erecti vel basi geniculati, gracillimi, simpliees, 2–4-nodes, nodos et paniculam versus retrorse scabridi vel nodos versus raro laeves. *Foliorum vaginae* internodiis breviores, tenuiter striatae, scaberulae vel laeves, glabrae vel inferiores pubescentes; ligulae truncatae, usque ad 3 mm. longae; laminae lineares, apice subobtusae et callosae, usque ad 18 cm. longae et 4 mm. latae, planae, firmae, supra arete nervosae, laxe hispidulae. *Panicula* densa, cylindrica, ambitu oblonga, erecta, 1·5–3 cm. longa, 6–8 mm. lata. *Spiculae* lineari-oblongae, 3·5–4 mm. longae, pallide virides vel apice purpureae, demum horizontaliter patentes. *Glumae* anguste lanceolatae vel lineari-lanceolatae, acutae, spiculae aequilongae, minute pubescentes, carina pilis rigidis usque ad 0·6 mm. longis ciliolatae. *Lemma* ambitu lineari-lanceolatum, acutum, 3 mm. longum, apice integrum vel minute bidentatum, apiculatum vel mucronatum, mucrone rigido scaberulo 0·2–1·5 mm. longo, 5–7-nerve; callus breviter barbatus. *Palea* lemmati fere aequilonga, carinis laevis vel apicem versus minute ciliolata. *Antherae* 0·8–1 mm. longae. *Ovarium* glabrum.

New South Wales. Hardinge County: Wandsworth, 15 miles N.W. of Guyra, in white soil from quartz porphyry, 1080 m., Dec. 1931, *McKie* 732 (type); Limestone Creek, 5 miles beyond Tenterden, 23 miles N.W. of Guyra, Dec. 1930, *McKie* 668.—C. E. Hubbard.

Echinopogon intermedius.

Fig. 1, plant, *natural size*; 2, spikelet; 3, lower glume, side view; 4, lower glume, flattened; 5, upper glume, side view; 6, floret; 7, lemma, flattened; 8, palea, side view, showing prolongation of rhachilla; 9, palea, flattened; 10, lodicules; 11, stamens and pistil; 12, caryopsis; 13, transverse section of caryopsis. Figs. 2–13, × 6.


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S.R-C.

Tabula 3262.

SCLERANDRIUM TRUNCATIGLUME (*F. Muell.*) *Stapf et C. E. Hubbard.*

Gramineae. Tribus Andropogoneae.

Sclerandrium *Stapf et C. E. Hubbard.* Genus novum, *Lophopogoni* Hack. et *Apocopidi* Nees affine; ab illo racemis elongatis espathatis, racemorum rhachi tenaci vel tarde disarticulante, spiculis valde heteromorphis, gluma inferiore dorso haud transverse barbata, gluma superiore mutica, spiculae pedicellatae anthoecio infero sterili supero ♀, anthoecii fertilis lemmate apice integro et in aristam producto, aristae columna pubescente vel pilosa; ab hac spiculis binatis, sessilibus ♂, pedicellatis ♀ divergens.

Spiculae valde heteromorphae, imbricatae, biseriatae, binatae, altera sessilis, altera pedicellata, in rhachi gracili tenaci vel tarde disarticulante racemorum spiciformium ortae, sessiles dorso compressae plus minusve persistentes, pedicellatae subteretes a pedicellis gracilibus persistentibus facile disarticulantes; callus brevissimus, barbatus. *Anthoecia* duo: inferum in spicula sessili ♂, in spicula pedicellata sterile; superum in spicula sessili ♂, in spicula pedicellata ♀. *Spiculae sessiles* oblongae vel obovato-oblongae. *Glumae* inaequales; inferior superiore brevior, dorso convexa, oblonga vel obovato-oblonga, apice truncata vel late emarginata vel dentata, 6–7-nervis, coriacea vel cartilaginea; superior anguste ovata, ovato-oblonga vel anguste oblonga, obtusa vel truncata, spiculae aequilonga, superne bicarinata, firme membranacea, 3-nervis. *Anthoecium inferum:* lemma lanceolatum vel lineari-lanceolatum, obtusum, uni–subtriplinerve, hyalinum vel tenuiter membranaceum; palea lemmati similis sed obscure 2-nervis. *Anthoecium superum:* lemma lineare vel anguste lanceolatum, apice minute bilobum, mucronatum vel aristatum, 1-nerve, hyalinum; palea ovato-oblonga vel anguste oblonga, lemmati paullo longior, hyalina, enervis vel tenuissime 2-nervis. *Spiculae pedicellatae* anguste oblongae vel anguste oblongo-lanceolatae. *Glumae* aequales, spiculae aequilongae, convolutae, tenuiter coriaceae; inferior (explanata) lanceolato- vel ovato-oblonga vel ovata, apice obtusa, truncata vel minute 2–3-dentata, 3–7-nervis; superior (explanata) elliptico- vel ovato-oblonga vel anguste oblonga, obtusa, obscure 3-nervis. *Anthoecium inferum:* lemma anguste oblongum, obtusum, hyalinum, 1-nerve vel enerve, vel nullum; palea nulla. *Anthoecium superum:* lemma lineari-oblongum,

hyalinum, 1-nerve, in aristam longam geniculatam abiens; palea oblonga vel ovato-oblonga, truncata, hyalina, enervis. *Lodiculae* nullae. *Stamina* 2; antherae lineares. *Ovarium* glabrum; styli distincti, terminales; stigmata plumosa, ex apice anthoecii exserta. *Caryopsis* anguste oblonga.—*Gramina* perennia; foliorum laminae lineares, planae; ligulae breves, membranaceae; racemi terminales, binati vel subdigitati, secundi, densi, sessiles vel brevissime pedunculati.

Species 4, Indo-Chinae, Siamiae et Australiae septentrionalis incolae. Typus: *S. truncatiglume* (F. Muell.) Stapf et C. E. Hubbard.

S. truncatiglume (*F. Muell.*) *Stapf et C. E. Hubbard*, comb. nov. *Ischaemum truncatiglume* F. Muell. ex Benth. Fl. Austral. vii. 518 (1878); F. Muell. Syst. Cens. Austral. Pl. 131 (1882); Second Cens. 221 (1889); Ewart et Davies, Fl. North. Territ. 28 (1917). *Lophopogon truncatiglumis* Haek. in DC. Monogr. Phan. vi. 255 (1889).—Affine *S. intermedio* (A. Camus) C. E. Hubbard,* a quo foliis fere glabris, racemis 3–6, spiculis sessilibus plerumque obovato-oblongis, gluma inferiore spiculae sessilis dorso valde convexa demum cartilaginea differt.

Culmi caespitosi, usque ad 1·5 m. alti, erecti, graciles vel validiusculi, teretes, simplices, 3–5-nodes, glabri laevesque. *Foliorum vaginae* firmae, ore laxe et breviter barbatae vel totae glabrae, laeves, inferiores internodiis longiores, intermediae et superiores internodiis breviores; ligulae truncatae vel oblique truncatae, usque ad 1 mm. longae; laminae basin versus attenuatae, apice tenuiter acutae, usque ad 50 cm. longae et 1 cm. latae, firmae, supra prope ligulam sparse pilosae, ceterum glabrae, marginibus minute scaberulis exceptis laeves. *Racemi* 3–6, erecti, 4–8 cm. longi, graciles; axis primarius usque ad 1·5 cm. longus; racemorum rhachis laxe pilosa, subtrigona vel compressa; pedicelli usque ad 1·5 mm. longi, ciliati. *Spiculae sessiles* 5–6 mm. longae, stramineae. *Gluma inferior* obovato-oblonga, truncata vel plerumque 2–3-dentata, 3·5–5 mm. longa, marginibus et apice pilis erectis albis usque ad 2·5 mm. longis ciliata, dorso glabra et laevis, intus 7-nervis, infra apicem nervis anastomosantibus; gluma superior anguste ovata vel oblonga, obtusa, margines et apicem versus breviter appresse pilosa. *Anthoecium inferum*: lemma lanceolatum, 4–5 mm. longum, margines et apicem versus breviter pilosum vel fere glabrum; palea lemmati similis sed paullo latior, minus pilosa vel fere glabra, tenuissime 2-nervis. *Anthoecium superum*: lemma 4–5 mm. longum, plerumque mucronatum (mucrone usque ad 3 mm. longo), superne breviter pilosum; palea ovato-oblonga, apicem versus breviter pilosa. *Spiculae pedicellatae* 3–3·6 mm. longae, brunneae; callus pilis brevibus densis fulvis barbatus. *Gluma inferior* (explanata) ovata vel ovato-oblonga, obscure 5–7-nervis, pilis brevibus appressis albis demum fulvis induta;

* **Sclerandrium intermedium** (*A. Camus*) *C. E. Hubbard*, comb. nov.—*Lophopogon intermedius* A. Camus in Bull. Mus. Hist. Nat. Paris, 1919, xxv. 285.

gluma superior pilis similibus induta vel glabrescens. *Anthoecium inferum :* lemma usque ad 3 mm. longum, apicem versus pilis paucis praeditum. *Anthoecium superum :* lemma 1·5–2 mm. longum, glabrum vel superne longe ciliatum ; arista 16–22 mm. longa, columna flexuosa, pilosa, 5–9 mm. longa, brunnea ; palea 2·5–2·8 mm. longa, glabra vel fere glabra. *Antherae* 2·5–3·5 mm. longae.

Northern Australia. Arnhem Land, *Mueller* ; Port Darwin, *Allen* 26, *Hb. Brisbane* 44.

Bentham, when describing *Ischaemum truncatiglume* F. Muell. in the Flora Australiensis, stated that the aspect of the species was nearly that of the Asiatic genus *Apocopis*. It is in fact more closely allied to *Apocopis* than to the genus *Ischaemum* in which it was first placed. This was partly recognized by Hackel, who transferred it to *Lophopogon*, a genus which he had segregated from *Apocopis* (*sensu* Benth.). Actually *Sclerandrium* seems to occupy an intermediate position between *Lophopogon* and *Apocopis*. *Lophopogon* Hack. is here restricted to *L. tridentatus* (Roxb.) Hack., the type species, *L. Kingii* Hook. f., and a third undescribed Indian species. Two species originally described under *Lophopogon*, namely, *L. intermedius* A. Camus and *L. tenax* Balansa, are referable to *Sclerandrium* : the former is transferred above, as a specimen of the type-collection has been examined, but the latter has not been seen, and it is only from the description that it is recognized as belonging to this genus. An undescribed species of *Sclerandrium* is represented in the Kew Herbarium by specimens collected in Siam by Dr. A. F. G. Kerr (no. 7735).

It was probably about twenty years ago that the late Dr. Stapf segregated *Ischaemum truncatiglume* as the type of a new genus which he proposed to call *Sclerandrium*. For some time he had been revising all the Kew material of that large and difficult tribe, the *Andropogoncae*, and this led him to depart somewhat from Hackel's arrangement and delimitation of many of the genera. For example, whilst Hackel included *Apocopis*, *Lophopogon* and *Ischaemum angustifolium* (Trin.) Hack. (= *Eulaliopsis* Honda) in the subtribe *Ischaeminae*, Stapf referred them in manuscript to the subtribe *Saccharinae*. These three genera, together with *Sclerandrium*, form a very natural series which appears to be more closely related to *Pogonatherum*, *Pseudopogonatherum* and *Eulalia* than to *Ischaemum*. It was no doubt for this reason that Stapf placed the former series in his group *Polliniastrae* of the *Saccharinae*. He preferred to classify them on general morphological characters rather than on the purely sexual characters used by Hackel. The *Polliniastrae* are characterized by digitate, fascicled, paired or solitary spiciform racemes, usually slender, linear or filiform pedicels and internodes of the rhachis, and 1–2-flowered spikelets. An enumeration of the twelve genera now assigned to the *Polliniastrae* and a key to them, partly based on a manuscript one prepared by Stapf, are given below.

Key to the genera of Polliniastrae.

*Spikelets usually 1-flowered (rarely 2-flowered, *Microstegium* spp.); lower glume distinctly 2-keeled, at least upwards, dorsally compressed, flat or depressed or with a median groove, rarely convex or becoming terete and then with the lower glume not broadly truncate or broad and toothed at the apex (*Homozeugos* and *Pseudopogonatherum*):

Lower glume and lower lemma awnless; spikelets paired (or in threes) with one (or two) sessile and the other pedicelled, rarely both pedicelled:

Spikelets usually in threes at each joint of the rhachis, two sessile and one pedicelled; racemes solitary . . . 1. *Polytrias.*

Spikelets paired at each joint of the rhachis, one sessile, the other pedicelled or both pedicelled; racemes digitate, paired or fascicled, rarely solitary:

Leaf-blades linear or rarely lanceolate-linear, usually gradually passing into the sheaths; racemes more or less villous; lower glume without a narrow median groove; awn of the fertile lemma well developed:

Lower glume dorsally flattened or shallowly concave between the keels; spikelets not terete at maturity; callus obtuse; lemma of the upper floret oblong or at least wider than the awn, 2-lobed or 2-toothed at the apex; perennial.
2. *Eulalia.*

Lower glume convex or becoming convex on the back; spikelets terete at maturity; callus obtuse or acute:

Upper glume usually awned; upper lemma stipitiform; spikelets small (2·5–3·5 mm. long), all pedicelled or with one sessile and the other pedicelled; annuals.
3. *Pseudopogonatherum.*

Upper glume awnless; upper lemma linear; spikelets large (6–18 mm. long), one sessile and the other pedicelled; perennials.
4. *Homozeugos.*

Leaf-blades mostly lanceolate to linear-lanceolate, often contracted at the base, usually thin; racemes rarely villous; lower glume with a narrow median groove; awn very slender, sometimes short or suppressed; usually annual; culms mostly decumbent and rooting at the lower nodes:

Racemes digitate or fascicled, rarely solitary ; rhachis fragile, the internodes filiform or thickened.
5. *Microstegium*.

Racemes solitary ; rhachis tough, flat ; upper lemma deeply 2-lobed . . . . . 6. *Ischnochloa*.

Lower glume shortly 2-awned : upper glume and both lemmas long-awned ; spikelets paired with both spikelets pedicelled.
7. *Polliniopsis*.

**Spikelets 2- or sometimes 1-flowered (*Sclerandrium* and *Pogonatherum*) ; lower glume not 2-keeled, convex on the back, that of the sessile spikelet frequently toothed or broadly truncate at the apex :

Racemes fascicled, digitate or paired, rarely solitary (*Apocopis*) and then with solitary spikelets :

Spikelets paired, one sessile, the other pedicelled :

Spikelets of each pair alike in shape and sex, 2-flowered ; lower glume prominently nerved ; stamens 3 ; lodicules present, each with a tuft of long hairs.
8. *Eulaliopsis*.

Spikelets of each pair more or less different in shape and sex ; stamens 2 ; lodicules suppressed :

Racemes short, very dense and fragile, 2–3 in dense fascicles, sessile on a common pedunele, the fascicles terminal on the culms or on branches which are gathered into spathate panicles ; spikelets slightly heteromorphous, 2-flowered ; lower glume of fertile spikelets with transversely placed tufts of hairs ; upper glume with a bristle-like awn . . . . . 9. *Lophopogon*.

Racemes elongated, less dense, tough or slowly breaking up, 2–6, terminal on the culms, espathate ; spikelets very heteromorphous, sessile 2-flowered, pedicelled 1-flowered ; lower glume without transverse tufts of hairs ; upper glume muticous . . . . . 10. *Sclerandrium*.

Spikelets solitary, sessile, 2-flowered ; pedicelled spikelets reduced to the pedicels ; lower glume broadly truncate or rounded at the apex, sometimes minutely toothed, without transversely placed tufts of hairs . . 11. *Apocopis*.

Racemes solitary ; upper glume and lower lemma with long capillary awns ; spikelets paired, 1–2-flowered ; stamens 2 ; lodicules 0 . . . . . 12. *Pogonatherum*.

Enumeration of the genera of Polliniastrae.

1. **Polytrias** *Hack.* in Engl. u. Prantl, Nat. Pflanzenfam. ii. Abt. 2, 21, 24 (1887); et in DC. Monogr. Phan. vi. 189 (1889).
Species 1, Malayan Region, introduced into Tropical Africa and America.

2. **Eulalia** *Kunth*, Rév. Gram. i. 160 (1829); Enum. Pl i. 479 (1833).
Species 25–30, tropical and subtropical regions of the Old World (China and Japan, India, Malayan Region, Australia, Mascarene Islands, East and South Africa).

3. **Pseudopogonatherum** *A. Camus* in Lecomte, Fl. Gén. Indo-Chine, vii. 254 (1922). *Pulicalum* Stapf ex Haines, Bot. Bihar & Orissa, 1018 (1924).
Species 3, China, India, Malayan Region and Northern Australia.

4. **Homozeugos** *Stapf* in Hook. Ic. Pl. xxxi. t. 3033 (1915); et in Prain, Fl. Trop. Afr. ix. 101 (1917).
Species 3, Tropical Africa (Angola).

5. **Microstegium** *Nees* in Lindley, Nat. Syst. ed. 2, 447 (1836); A. Camus in Lecomte, Fl. Gén. Indo-Chine, vii. 257 (1922). *Pollinia* Trin. in Mém. Acad. Pétersb. sér. 6, ii. 304 (1833), non Spreng. (1815). *Ephebopogon* Nees et Meyen ex Steud. Nomencl. ed. 2, i. 556 (1840), nomen. *Leptatherum* Nees in Proc. Linn. Soc. i. 92 (1841). *Nemastachys* Steud. Syn. Pl. Glum. i. 357 (1854). *Coelarthron* Hook. f. in Fl. Brit. Ind. vii. 163 (1896); et in Hook. Ic. Pl. xxvi. t. 2517 (1897).
Species about 20, tropical, subtropical and warm temperate regions of the Old World (China and Japan, India, Malayan Region, Polynesia, East and South Africa).

6. **Ischnochloa** *Hook. f.* in Hook. Ic. Pl. xxv. t. 2466 (1896); et in Fl. Brit. Ind. vii. 147 (1896).
Species 1, India (North-Western Himalaya).

7. **Polliniopsis** *Hayata*, Ic. Pl. Formos. vii. 76, fig. 45 (1918).
Species 1, Formosa. Not seen.

8. **Eulaliopsis** *Honda* in Tokyo Bot. Mag. xxxviii. 56 (20-iii-1924); et in Journ. Fac. Sci. Imp. Univ. Tokyo, sect. 3, Bot. pt. 1, 43 (1930). *Pollinidium* Stapf ex Haines, Bot. Bihar & Orissa, 1020 (28-iii-1924).
Species 1, *E. binata* (Retz.) C. E. Hubbard,* a native of Afghanistan India, China, Formosa, Siam, Indo-China and the Philippines.

* **Eulaliopsis binata** (*Retz.*) *C. E. Hubbard*, comb. nov.—*Andropogon binatus* Retz. Obs. v. 21 (1789). *Spodiopogon angustifolius* Trin. in Mém. Acad. Pétersb., sér. 6, ii. 300 (1833). *Ischaemum angustifolium* (Trin.) Hack. in DC. Monogr. Phan. vi. 241 (1889). *Eulaliopsis angustifolia* (Trin.) Honda in Tokyo Bot. Mag. xxxviii. 56 (1924). *Pollinidium angustifolium* (Trin.) Haines, Bot. Bihar & Orissa, 1020 (1924). *P. binatum* (Retz.) C. E. Hubbard in Kew Bull. 1932, 72.

9. **Lophopogon** *Hack.* in Engl. u. Prantl, Nat. Pflanzenfam. ii. Abt. 2, 22, 26 (1887); et in DC. Monogr. Phan. vi. 253 (1889), p.p.
Species 3, India.

10. **Sclerandrium** *Stapf et C. E. Hubbard* in Hook. Ic. Pl. t. 3262 (1935).
Species 4, Siam, Indo-China, Northern Australia.

11. **Apocopis** *Nees* in Proc. Linn. Soc. i. 93 (1841); Hack. in DC. Monogr. Phan. vi. 256 (1889). *Amblyachyrum* Hochst. ex Steud. Syn. Pl. Glum. i. 413 (1855); et in Flora, 1856, 26.
Species 8, China, India, Malayan Region.

12. **Pogonatherum** *Beauv.* Agrost. 56, t. 11, fig. 7 (1812). *Homoplitis* Trin. Fund. Agrost. 166 (1820). *Pogonopsis* J. B. Presl in C. B. Presl, Rel. Haenk. i. 333, t. 46 (1830).
Species 3, Japan, China, India, Malayan Region, North Queensland, Mauritius.—C. E. Hubbard.

Sclerandrium truncatiglume.

Fig. 1, plant, *natural size*; 2, pair of spikelets; 3–10, from sessile spikelet:—3, lower glume, side view; 4a, b and c, lower glume, various types; 5, upper glume; 6, lemma of lower floret; 7, palea of lower floret; 8, stamens; 9, lemma of upper floret; 10, palea of upper floret; 11, pedicel; 12, pedicelled spikelet, portion of awn removed; 13–19, from pedicelled spikelet:—13, lower glume; 14, lower glume, flattened; 15, upper glume; 16, lemma of lower floret; 17, lemma of upper floret; 18, palea of upper floret; 19, pistil. Figs. 2–10, 12–19, × 6; 11, × 16.


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Tabula 3263.

ISCHAEMUM FRAGILE *R. Br.*

Gramineae. Tribus Andropogoneae.

I. fragile *R. Br.* Prodr. Fl. Nov. Holl. 205 (1810); Benth. Fl. Austral. vii. 522 (1878); F. Muell. Syst. Cens. Austral. Pl. 132 (1882); F. M. Bailey, Syn. Queensl. Fl. 641 (1883); Queensl. Fl. vi. 1855 (1902); Compreh. Cat. Queensl. Pl. 617 (1913); Hack. in DC. Monogr. Phan. vi. 250 (1889). *Andropogon infirmus* Steud. Syn. Pl. Glum. i. 369 (1854). *Digastrium fragile* A. Camus in Bull. Soc. Bot. France, lxx. 850 (1925).—*Ischaemo rugoso* Salisb. affine, habitu perenni, spicis solitariis, spiculae sessilis gluma inferiore haud rugosa divergens. Descriptio hic emendata.

Gramen perenne, caespitosum, usque ad 1·1 m. altum. *Culmi* erecti vel leviter geniculato-ascendentes, graciles, teretes, simplices, 3–7-nodes, glabri, laeves. *Foliorum vaginae* carinatae, plerumque arcte appressae, pubescentes vel superne pilosae vel glabrescentes, intermediae et superiores internodiis demum breviores; nodi pubescentes vel breviter barbati; ligulae truncatae vel rotundatae, 1–1·5 mm. longae; laminae lineares, basin versus longe attenuatae, apice tenuiter acutae, usque ad 20 cm. longae, 3–7 mm. latae, planae, firmae, subtus dense supra laxe pubescentes, marginibus scabridae. *Racemi* solitarii, subteretes, 4–6 cm. longi, erecti, demum e vagina summa longe exserti; rhacheos internodii (" articuli ") crassissimi, obovati, sursum incrassati, dorso hemisphaerico-convexi, ventre planiusculo membrana scariosa clausi, 3·5–4 mm. longi, 1·8–2 mm. lati, dorso et margine uno vel ambobus serie pilorum instructi, pilis erectis fulvescentibus vel purpureis, ceterum glabri et nitentes, straminei vel pallide virides; pedicelli internodiis plus minusve similes et subcontigui, sed dorso leviter compressi et nonnunquam ovato-oblongi vel oblongi. *Spiculae sessiles* 6–7 mm. longae, inferne pallide virides vel stramineae, superne rufescentes; callus obtusus, brevissimus, pilis purpureis vel fulvescentibus usque ad 2 mm. longis barbatus. *Gluma* inferior oblonga, 5–6 mm. longa, apice minute bidentata, in duabus partibus inferioribus cartilaginea et laevis, in triente superiore chartacea et scaberula, intus 5–7-nervis, marginibus inferne inflexis, supra medium carinatis et in triente superiore anguste alatis; gluma superior ambitu oblique late lanceolata, acuminata, 6–7 mm. longa, in setam usque ad 2 mm. longam

desinentia, carinata, carina et lateribus superne scaberula et marginibus ciliolata, tenuiter coriacea, 5–7-nervis. *Anthoecium inferum* ♂: lemma late lanceolatum vel oblongo-lanceolatum, subacutum, 5 mm. longum, tenuiter membranaceum, tenuissime 1–3-nerve, marginibus superne ciliolatum; palea late lanceolata, acuta, 5 mm. longa, firme membranacea vel tenuiter coriacea, marginibus hyalinis inflexis. *Anthoecium superum* ♀: lemma elliptico-oblongum, 4 mm. longum, hyalinum, basi 3-nerve, lobis lanceolato-oblongis usque ad 3 mm. longis; arista geniculata, 10–18 mm. longa, columna 6–9 mm. longa glabra brunnea; palea anguste ovata, subacuta, 4 mm. longa, hyalina, tenuissime 2-nervis. *Antherae* lineares, 1·5–2·5 mm. longae. *Spiculae pedicellatae* 4–5 mm. longae; callus minutus, breviter barbatus. *Glumae* firme membranaceae; inferior late lanceolata vel anguste ovata, acuta vel obtusa, 6–8-nervis; superior oblique oblongo-lanceolata, acuta, carinata, 3–5-nervis. *Anthoecium inferum* sterile: lemma anguste oblongum vel elliptico-oblongum, 1·5–3·5 mm. longum, hyalinum, tenuissime 1–3-nerve, ciliolatum, vel nullum; palea anguste oblonga, usque ad 2·5 mm. longa, hyalina, vel nulla. *Anthoecium superum* ad lemma ovatum emarginatum vel obtuse bilobum usque ad 1 mm. longum redactum vel nullum.

Queensland. Cook District: Endeavour River, 1770, *Banks and Solander*; Daintree River, open ridges, Feb. 1932, *Brass* 2201.

A new species of *Ischaemum*, closely allied to *I. fragile* R. Br., occurs in Northern Queensland. As it bears on the generic position of *I. fragile*, a description of it is given below.

I. Baileyi *C. E. Hubbard*; species nova, *I. fragili* R. Br. affinis, ligulis paullo longioribus, culmis compressis superne ramosis, racemis plerumque binatis, racemis lateralibus breviter pedunculatis in vaginis spathiformibus inclusis vel ex iis lateraliter exsertis, rhacheos internodiis plerumque subtrigonis, anthoecio infero vel ♀ vel ♂ distinguenda.

Gramen perenne, caespitosum, usque ad 0·9 m. altum. *Culmi* erecti vel leviter geniculato-ascendentes, graciles, leviter compressi, superne uno latere sulcati, 4–6-nodes, e nodis superioribus ramosi, glabri laevesque. *Foliorum vaginae* compressae, carinatae, laxae, internodiis plerumque brevioribus, pubescentes vel superne pilosae vel glabrae, apice auriculatae, auriculis erectis usque ad 3·5 mm. longis, superiores tenues; nodi breviter (dense vel sparse) barbati, vel glabri; ligulae auriculis adnatae, acutae, obtusae vel truncatae, 1·5–3·5 mm. longae; laminae lineares, inferiores basin versus longe attenuatae, apice acutae, usque ad 33 cm. longae, 3–7 mm. latae, planae, firmae, subtus dense supra laxe pubescentes vel glabrae, marginibus scabridae. *Racemi* terminales e vagina summa demum longe exserti, laterales 2–3 breviter pedunculati in vagina spathiformi inclusi vel ex ea lateraliter exserti, omnes binati, raro solitarii, usque ad 5·5 cm. longi;

rhacheos internodii plerumque subtrigoni, 3·5–4 mm. longi, ceterum ut in *I. fragili*; pedicelli internodiis similes. *Spiculae sessiles* 6–7 mm. longae. *Gluma* inferior 5–6 mm. longa, dorso laevis, ceterum ut in *I. fragili*; gluma superior 5·5–7 mm. longa, in setam 2–4 mm. longam desinens, ceterum ut in *I. fragili*. *Anthoecium inferum* ♀ vel ♂: lemma oblongo-lanceolatum, obtusum, 4–5 mm. longum, tenuissime 3-nerve; palea ut in *I. fragili*. *Anthoecium superum* ♀: lemma 3–4 mm. longum; arista 16–19 mm. longa, columna 8–9 mm. longa; ceterum ut in *I. fragili*. *Antherae* oblongae, 0·5–2 mm. longae. *Caryopsis* ovato-elliptica vel elliptica, plano-convexa, 2 mm. longa. *Spiculae pedicellatae* 3·5–6 mm. longae. *Gluma* inferior oblongo-lanceolata vel ovato-oblonga, acuta vel obtusa, 7–9-nervis; gluma superior ut in *I. fragili*. *Anthoecium inferum* vel ♂ vel sterile vel nullum: lemma et palea ut in spicula sessili. *Anthoecium superum* vel ♀ vel sterile vel plerumque nullum: lemma breviter bilobum; arista usque ad 4 mm. longa.

Queensland. Cook District: Mabuiag Island, May 1911, *Bick* 54; Thursday Island, June 1897, *F. M. Bailey*; Somerset, June 1897, *F. M. Bailey* 73 (type).

Hackel in his monograph of the *Andropogoneae* (DC. Monogr. Phan. vi. 250: 1889) proposed a new subgenus *Digastrium* for *Isehaemum fragile* R. Br. It was characterized by solitary racemes, obovate-ventricose joints and pedicels, awned perfect sessile spikelets, and barren pedicelled spikelets reduced to the two glumes. He stated further that *Ischaemum* subgen. *Digastrium* approached *Rottboellia*, no doubt on account of the general resemblance shown in the much-thickened joints and pedicels. More recently A. Camus (in Bull. Mus. Hist. Nat. Paris, xxvii. 372: 1921, in obs.) has raised the subgenus *Digastrium* to generic rank. Later the same author (in Bull. Soc. Bot. France, lxx. 849: 1924) gave a generic description of *Digastrium* and briefly discussed its affinities with *Ischaemum* L. and *Schima* Forsk. Stapf, when working on the genera of the subtribe *Ischaeminae* (probably before 1917), also removed the subgenus *Digastrium* from *Isehaemum*, but he did not publish it as a distinct genus. In some manuscript notes, however, which he had prepared on the genus *Ischaemum*, he wrote as follows regarding Hackel's subgenus *Digastrium*:—"The structure of the lower [sessile] spikelet and especially its lower glume resembles so much that of a typical *Ischaemum*, that it would not be justifiable to separate *Digastrium* generically, although it occupies a somewhat isolated position in the genus." It is probable that this extract was written after Stapf had separated *Digastrium* as a distinct genus in the herbarium, and that, later, a more thorough examination caused him to revise his opinion, but he forgot to transfer the specimens back to *Ischaemum*. The diagnostic characters used by both Hackel and A. Camus for distinguishing *Digastrium* (either as a subgenus or genus) from *Ischaemum* are with one exception (the solitary racemes) found in several undoubted species of *Ischaemum*.

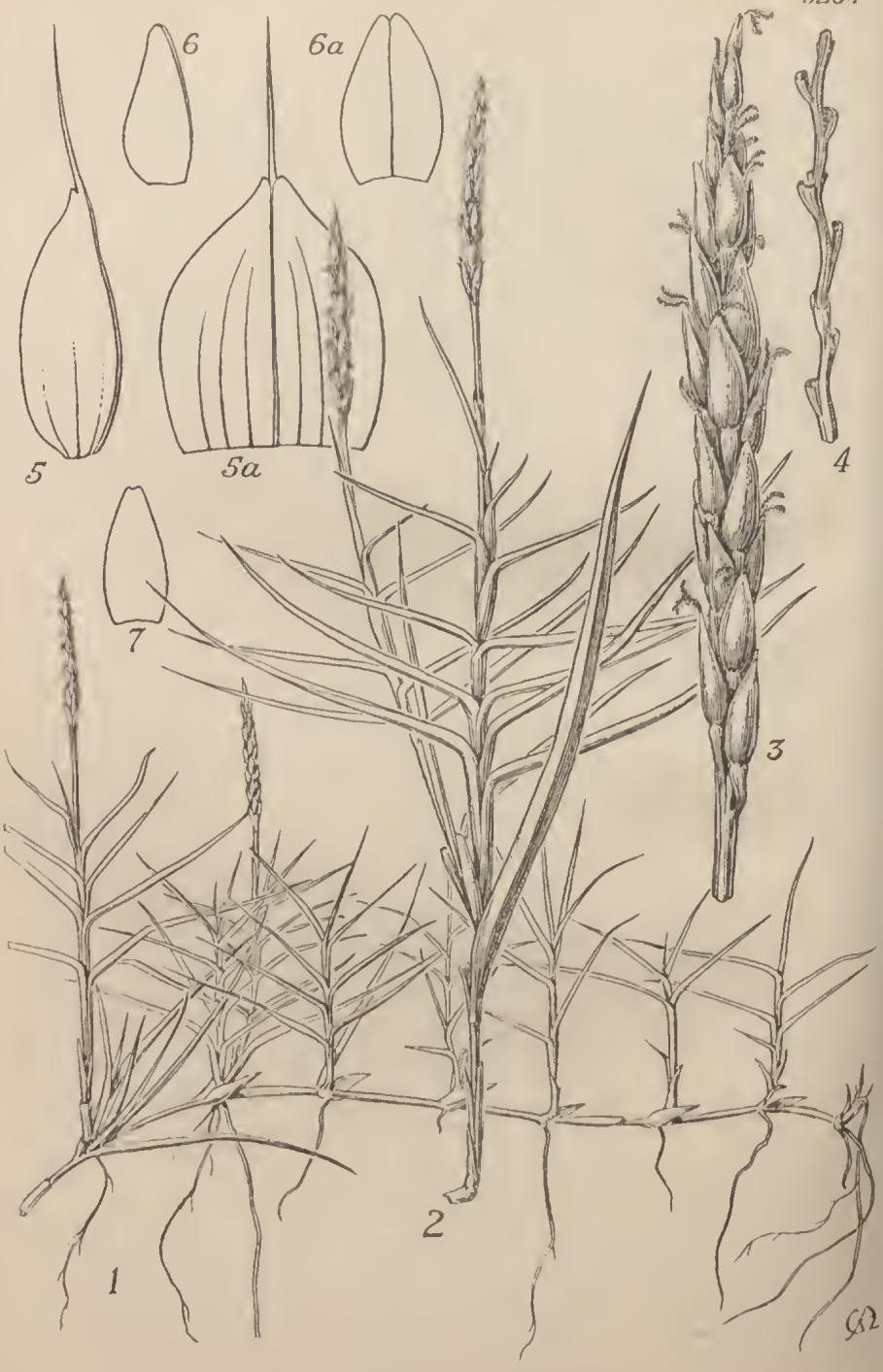
For example, in *I. rugosum* Salisb. the joints and pedicels are somewhat similar in general structure to those of *I. fragile* R. Br., whilst the pedicelled spikelets are frequently much reduced and barren. In *I. fragile* R. Br., however, the pedicelled spikelets are somewhat variable; in some spikelets the lower floret is represented by the lemma and palea, and a rudiment of the upper floret may also be found, while in other spikelets both florets may be suppressed. Hackel apparently had only spikelets of the latter type for examination. The solitary raceme is thus the only distinguishing feature left between *Digastrium* and *Ischaemum*. It is here that a consideration of *Ischaemum Baileyi* becomes important. This species belongs to the same group as *I. fragile* and would have to be placed in *Digastrium* if that were retained as a distinct genus. The racemes are mostly paired as is commonly the case in the genus *Ischaemum*, but solitary racemes are occasionally met with which serve to connect it with *I. fragile*. Thus all the diagnostic characters given for separating *Ischaemum* and *Digastrium* break down.

In his account of *Ischaemum fragile*, Hackel reverses the description of the lemma and palea of the lower floret. This may have been due to having insufficient material for examination, or on the other hand, in the course of dissecting, the various parts may have become detached as is frequently the case. The peculiar palea might then be easily confused with the lemma. This palea is usually thinly coriaceous and has thin hyaline margins which fold over the male flower, whilst the lemma is thinner and narrower.

F. M. Bailey (ll.cc.) gives Port Denison as a locality for *Ischaemum fragile* R. Br., but no specimens from this area were found in the Brisbane Herbarium. Some fragments collected by A. Mitchell in Sept. 1895, on "Frasers Islands," probably belong here. The racemes are solitary, but still partially enclosed in the uppermost leaf-sheaths. If the label is correct and the locality is the same as Fraser Island (Great Sandy Island), then this material considerably extends the known distribution of *I. fragile*. *Ischaemum Baileyi* and *I. fragile*, as far as is known at present, are geographically separated, the former occurring only in the extreme north of Cook District and on the adjacent islands, whilst the latter ranges southwards from the Endeavour River. The specimens of *I. Baileyi* collected by Bick (no. 54) on Mabuiag Island were incorrectly referred to *Polytoca cyathopoda* by F. M. Bailey (Queensl. Agric. Journ. xxvii. 69 : 1911).—C. E. Hubbard.

ISCHAEMUM FRAGILE.

Fig. 1, plant, *natural size*, 14 cm. of culm omitted; 2, pair of spikelets and internode of rhachis; 3–4, internode of rhachis, front and back views; 5, transverse section of internode; 6–15, from sessile spikelet:—6, lower glume; 7, upper glume, side view; 8, lemma of lower floret; 9, palea of lower floret; 10, lodicules from lower floret; 11, stamens; 12, lemma of upper floret; 13, palea of upper floret; 14, lodicules from upper floret; 15, pistil; 16, pedicelled spikelet and pedicel; 17, transverse section of pedicel; 18–21, from pedicelled spikelet:—18, lower glume; 19, upper glume, side view; 20, upper glume, opened out; 21, lemma of lower floret. Figs. 2–21, × 6.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Tabula 3264.

ZOISIA MACRANTHA *Desv.*

Gramineae. Tribus Zoisieae.

Z. macrantha *Desv.* Opusc. 54 (1831) (Mém. Soc. Agric. Angers, i. 158 : 1831). *Z. pungens* R. Br. Prodr. 208 (1810) ; F. Muell. Fragm. Phyt. Austral. viii. 116 (1873) ; et in Vict. Nat. iv. 145 (1888) ; Benth. Fl. Austral. vii. 506 (1878) ; Turner, Census Grasses N.S. Wales, 48 (1890) ; et in Agric. Gaz. N.S. Wales, iii. 231, tab. 13 (1892) ; Moore, Handb. Fl. N.S. Wales, 476 (1893) ; Maiden, Man. Grasses N.S. Wales, 63 (1898) ; F. M. Bailey, Queensl. Fl. vi. 1847 (1902) ; Compreh. Cat. Queensl. Pl. 616 (1913) ; Rodway, Tasman. Fl. 258 (1903) ; Maiden & Betche, Census N.S. Wales Pl. 16 (1916) ; Domin in Bibl. Bot. xx. Heft 85, 286 (1915) ; Black, Fl. S. Austral. 665 (1929) ; Morris in Ewart, Fl. Vict. 119, fig. 38 (1930) ; non Willd. *Z. Brownii* C. Muell. in Bot. Zeit. xiii. 272 (1855). *Z. sedoides* C. Muell. l.c. 273 (?). *Z. iodostachys* Gandoger in Bull. Soc. Bot. France, 1919, lxvi. 303 (1920).—*Z. Matrella* (L.) Merrill affinis, foliorum laminis plerumque longioribus et latioribus, racemis crassioribus, spiculis majoribus differt.

Gramen perenne ; rhizomata et stolones longissimi, graciles vel validiusculi, multinodes, laeves, cataphyllis glabris pallidis vel stramineis teretibus praediti. *Culmi* erecti vel ascendentes, 5–30 cm. alti, graciles, rigidi, multinodes, simplices vel plerumque ramis erectis ramosi, laeves. *Foliorum vaginae* laxae, imbricatae, tenuiter striatae, laeves, ore pubescentes vel pilosae, ceterum glabrae ; ligulae ad seriem ciliorum minutorum redactae ; laminae lineares, in apicem obtusum durum attenuatae, 2–16 cm. longae, planae vel convolutae vel involutae, usque ad 4 mm. latae, rigidiusculae vel rigidae, erectae vel demum horizontaliter patentes, pone ligulam serie pilorum longorum pilosae vel glabrae, laeves. *Racemi* spiciformes, graciles, erecti, densi, 2–5·5 cm. longi, 2–3 mm. diametro, purpurei vel virides ; rhachis flexuosa, rigida, angulata, minute scaberula ; pedicelli inerassati, usque ad 1 mm. longi, minute scaberuli. *Spiculae* appressae, oblique ovato-oblongae vel lanceolato-oblongae vel lanceolatae, obtusae vel acutae, 3·5–5 mm. longae, nitentes. *Gluma superior* minute biloba, mutica vel mucronata vel arista scaberula gracillima usque ad 3 mm. longa instructa, coriacea, obscure 7–9-nervis, laevis, marginibus tenuibus minutissime ciliolata.

Lemma ovato-oblongum vel angustc oblongum, minute bilobum, 2·5–3 mm. longum, carinatum, carina minute scaberula vel laevi, membranaecum vel hyalinum, 1-nerve. *Palea* circiter 2 mm. longa, hyalina. *Antherae* 2–2·5 mm. longae.

Queensland. Port Curtis District: Emu Park, near Rockhampton. Mareh 1910, *Domin*; Port Curtis, Nov. 1847, *McGillivray* B 71. Wide Bay District: Bundaberg, *Michael*; Pialba, in sand on coast above high-water mark, Aug. 1930, *Blake* 35; Fraser Island, dominant grass on sand dunes, forming loose turf, Oct. 1930, *Hubbard* 4444 Moreton District: Sandgate, near Brisbane, on sands near sea, growing with *Sporobolus virginicus*, *Cynodon Dactylon* and *Spinifex hirsutus*, June 1930, *Hubbard* 2937; Bribie Island, April 1914, *White*; on sands above high-water mark, with *Ipomoea pes-caprae* and *Cynodon Dactylon*, May 1930, *Hubbard* 2646; Moreton Island, Jan. 1847, *McGillivray* 71 b; Stradbroke Island, *Scortechini and Bailey*; near Amity Point, covering large areas of sandy ground near sea and mangrove swamps, and sometimes growing amongst "Bracken" on sand dunes, April 1930, *Hubbard* 2202; between Amity Point and Point Lookout, abundant on sand dunes, together with *Spinifex hirsutus*, *Ipomoea pes-caprae*, etc., April 1930, *Hubbard* 2318; Brisbane River, *Dietrich* 2737; Point Halloran, Oct. 1930, *Kunze in Herb. Hubbard* 5454; Tugun, common on sand dunes, together with *Spinifex hirsutus*, Sept. 1930, *Hubbard* 3863; Palm Beach, common on sand dunes, Nov. 1929, *White* 6572, Jan. 1931, *Jackson*.

New South Wales. Near Red Bank River, on salt marshes, *Woolls*; near Newcastle, on sandy shores, Oct. & Nov. 1804, *Brown* 6163 (partim); Sydney, Homebush Bay, salt swamp, Oct. 1930, *Vickery* 59; Port Jackson, *Brown* 6163 (partim); *Maiden in Kneucker Gram. Exsicc.* 184; *Maiden*; *Caley* (Herb. Mus. Brit.).

Victoria. Sandy coast from Cape Howe to Lake Wellington, *Mueller*; sandy coast of East Gippsland, *Mueller*.

Tasmania. King Island, *Neate* (ex Benth.).

The genus *Zoisia* is represented by about six to eight species which are found, mainly along the coasts, in Mauritius, South India and Ceylon, Japan, China, Malayan Region, Solomon Islands, Eastern Australia and New Zealand. In the last-named country, however, the species ascend to comparatively high altitudes inland. The Australasian species, in common with other members of the genus, have usually been included under *Zoisia Matrella* (L.) Merrill (*Z. pungens* Willd.). The area of distribution of the latter extends from Mauritius to the Solomon Islands. It differs from the Australian species *Z. macrantha* Desv. by its narrower leaves, more slender racemes and smaller spikelets (2·3–3·5 mm. long), and from the New Zealand species by its denser racemes, with more numerous and smaller spikelets; whilst *Z. macrantha* Desv. may be distinguished from the New Zealand species by its taller and stouter culms, more rigid and wider leaf-blades, stouter and denser

spikes and more numerous obliquely ovate-oblong or lanceolate-oblong spikelets. The Australian species seems to be more closely allied to *Z. sinica* Hance of China than to the New Zealand species.

Desveaux's species *Z. macrantha* has been somewhat neglected, no doubt owing to the rarity of his "Opuscula." Bentham did not include it in the Flora Australiensis, whilst C. Mueller redescribed it as a new species, *Z. Brownii*. *Z. iodostachys* Gandoger is represented in the Kew Herbarium by a duplicate from the United States National Herbarium communicated by Gandoger. This contains a mixture of *Z. macrantha* Desv. and *Z. Matrella* Merrill, but Gandoger's description applies only to the former.

Zoisia macrantha Desv. is of frequent occurrence on the coasts of Southern Queensland. It often covers large areas on the sand dunes above high-water mark, where it forms pure masses or grows in association with *Sporobolus virginicus* (L.) Kunth, *Spinifex hirsutus* Labill., *Cynodon Dactylon* (L.) Pers., etc. In some places *Zoisia macrantha* grows on sand dunes bordering salt marshes, and it is possible that it might occur in the salt marshes themselves, but such a habitat would be unusual, at least in Queensland. In N.S. Wales, however, it is recorded from salt marshes. So far it has not been recorded further north than Emu Park near Rockhampton, Central Queensland, its place being taken in Northern Queensland by *Thuarea involuta* (Forst.) R. & S., etc. The southernmost locality from which specimens have been examined is the sandy coast of East Gippsland in Victoria. Bentham (Fl. Austral. vii. 506) and Rodway (Tasman. Fl. 258) record a *Zoisia* from islands in the Bass Strait, whilst J. M. Black (Fl. S. Austral. 665) states that *Z. pungens* forms a dense sward near the Rocky River, Kangaroo Island, South Australia. It is probable that both records are referable to *Z. macrantha* Desv.

Zoisia macrantha is commonly known as "Coast Couch Grass" or "Prickly Couch Grass." It is of considerable economic importance as a sand-binder. The roots and rhizomes form a network which consolidates drifting sand, whilst the culms appear to be able to grow up through increasing layers of sand, branching freely and rooting at the nodes. In some situations the sterile shoots form a fairly compact turf, and on this account it might be used, like *Z. japonica* Steud. and *Z. tenuifolia* Trin., as a lawn grass for maritime and inland sands. It is doubtful if *Z. macrantha* has any value as a fodder grass, since its leaves are tough and rigid. According to Maiden, propagation is readily effected by division of the rhizomes; it should also be noted that a fair amount of seed is produced.

There are two types of *Zoisia* present in New Zealand, which may or may not represent distinct species; one (A) has usually solitary awnless spikelets, filiform rolled leaf-blades and dwarf culms; the other (B) has several shortly awned and slightly smaller spikelets in a loose raceme, flat leaf-blades and usually taller culms; both are at present without names. Cheeseman (Man. N. Zeal. Fl. ed. 2, 137: 1925), following earlier authors, refers the New Zealand *Zoisia* to *Z. pungens*

Willd., and cites *Rottboellia uniflora* A. Cunn. (Hook. Comp. Bot. Mag. ii. 37 : 1837) as a synonym. The latter, however, is not a species of *Zoisia*. Cunningham describes the spikes as conjugate, whereas they are always solitary in *Zoisia*. A search through the New Zealand specimens of *Paspalum* at Kew revealed the type of *Rottboellia uniflora* in the cover of *Paspalum vaginatum* Sw., with which it is conspecific. The New Zealand *Zoisia* (type A) was first described by Colenso as *Gaimardia minima* (in Trans. N.Z. Inst. xxii. 491 : 1890). More recently Mez has described a *Zoisia pauciflora* (Fedde, Repert. xvii. 146 : 1921) from New Zealand, based on specimens collected by Berggren, Petrie and Colenso. Judging from his description this appears to be a mixture of both types (A & B).

The question whether there are one or two species of *Zoisia* in New Zealand is one which can be settled only by adequate studies in the field.—C. E. Hubbard.

Fig. 1, plant, showing habit, × $\frac{2}{3}$; 2, part of plant, *natural size*; 3, raceme, × 3; 4, rhachis of raceme, × 3; 5, spikelet, × 7; 5a, upper glume, flattened, from inside, × 7; 6, lemma, side view, × 7; 6a, lemma, flattened, × 7; 7, palea, × 7.


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Tabula 3265.

PENTAS MAGNIFICA *Bullock.*

Rubiaceae. Tribus Hedyotideae.

P. magnifica *Bullock* ; species nova, affinis *P. longitubae* K. Schum., a qua foliis subtus reticulatis, costa et nervis lateralibus prominentibus molliter crispato-subtomentellis, floribus multo majoribus, capsulis apice subrostratis facile distinguitur.

Planta suffruticosa, ramosa, subsuculenta, circiter 1 m. alta, tota breviter pubescens ; caules satis crassi, crispato-pubescentes, internodiis superne circiter 2·5–4 cm. longis. *Folia* elliptica vel anguste ovata, superne sensim angustata, apice acuta, basi acuta, utrinque pubescentia, sed costa et nervis lateralibus (utrinsecus 15–18) infra prominentibus breviter molliterque crispato-subtomentellis, petiolis latis brevissimis ; stipulae breviter vaginato-connatae sed inter petiolos in lobos 5–9 filiformes usque 7 mm. longos fimbriatae. *Cymae* terminales, e basi 3-ramosae ; rami puberuli, usque 5 cm. longi sed saepe breviores, apice irregulariter brevissime ramulosi et 3–6-flori ; bracteae bracteolaeque minutissimae vel obsoletae. *Flores* pentameri, albi, brevissime pedicellati vel subsessiles. *Calyx* (receptaculo incluso) campanulatus, molliter pubescens ; tubus (cum receptaculo) 5–6 mm. longus et circiter 4 mm. diametro, fauce latiore, apice inter lobos glandulis 1–3 parvulis clavatis ornatus ; lobi 5, persistentes, lineares, circiter 1·5 cm. longi et basin versus usque 1·5 mm. lati. *Corolla* longissime tubulosa ; tubus circiter 15 cm. longus, 3 mm. diametro, apicem versus leviter dilatatus, extra plus minusve dense crispato-pubescens, intus fauce et usque 2 cm. infra faucem (parte dilatata) densius et longius villosus, intus ceterum glaber et longitudinaliter striatus ; lobi 5, patentes, obovati, subacuti, 2–2·3 cm. longi et usque 1 cm. lati, extra leviter puberuli, intus glabri. *Stamina* 5, in parte tubi dilatata inclusa ; filamenta brevissima, vix 1 mm. longa, filiformia ; antherae lineares, basi sagittatae, basin versus dorsifixae, 9·5 mm. longae, glabrae. *Ovarium* biloculare, placentis peltatis ; ovula numerosissima. *Stylus* usque 1·5 cm. longe exsertus, 16·5 cm. longus, superne lepidoto-puberulus, inferne glabrescens, apice stigmatosus, dilatatus, bilobatus, lobis ellipticis 3 mm. longis. *Capsula* (? immatura) ovoidea, 1·5 cm. longa, apice subacute rostrata, e calyce exserta, leviter 10-striata, inter loculos canaliculata, apicem versus lobis calycinis persistentibus annulata, valvis 2 lignosis apice dehiscens.

Tanganyika Territory. In crevices on great granite precipices at the summit of Mt. Luemba, Kilossa District, 1800 m., 15 Feb. 1933, *B. D. Burtt* 4555 (type). Among rocks, Morogoro District, 1500 m., 1 April 1932, *G. B. Wallace* 307.

This magnificent plant, recalling such other species of *Pentas* as *P. longituba* K. Schum., *P. graniticola* E. A. Bruce and *P. nobilis* S. Moore in habit and inflorescence, has much larger flowers than any other species hitherto described. The corolla-tube attains 6 inches in length, whilst the limb is as much as 2 inches in diameter. Mr. B. D. Burtt, whose beautifully preserved specimen has been taken as the type, has the note: "magnificent white tubular flowers on bright green semi-succulent bush-herb 3–3½ feet high"; Mr. G. B. Wallace collected the somewhat immature fruits, and observes that it is a "shrub 4 feet high, flowers white," and gives the Kiswahili name as "Ndondoole."

It is unfortunate that no definite information is available as to the existence of heterostyly in this species. In such species as *P. carnosa* Benth. and *P. purpurea* Oliv. this condition, perhaps often overlooked, has led to much confusion. Extensive collections and special field notes are necessary before a satisfactory arrangement of existing herbarium specimens is possible.—A. A. Bullock.

Fig. 1, upper part of flowering branch, *natural size*; 2, longitudinal section of calyx and ovary, × 3; 3, longitudinal section of upper part of corolla, × 1·5; 4, stamen, abaxial view, × 4; 5, upper part of style with stigmas, × 4; 6, part of infructescence, × 1·5.


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Tabula 3266.

BLEPHARIS HORNBYAE *Milne-Redhead.*

Acanthaceae. Tribus Acantheae.

B. (Eublepharis) Hornbyae *Milne-Redhead* ; species nova, *B. Homblei* De Wild. magnitudine florum similis, sed foliis ellipticis vel obovatis, bracteis papyraceis conspicue nervosis facile distinguenda.

Herba scandens, usque 5 m. alta. *Caules* fureati, subquadrangulares, glabri vel subglabri, juventute dense pubescentes, internodiis usque 15 cm. longis. *Folia* pseudo-verticillata, inaequalia, elliptica vel obovata, apice rotundata vel acuta, inferne in petiolum angustata, usque 8·5 cm. longa et 3 cm. lata, margine spinuloso-denticulata, juventute parce pilosa praesertim in nervis, demum glabra ; nervi primarii utroque costae latere circiter 5, manifesti. *Inflorescentiae* numerosae, terminales et axillares, uniflorae ; bracteae steriles circiter 9 ; extima minima, ovato-lanceolata, acuta vel subspinosa, circiter 6 mm. longa et 3 mm. lata, margine spinulis 1–2 instructa, utrinque puberula ; intima maxima, obovato-oblonga, basi leviter angustata, circiter 2 cm. longa et 1 cm. lata, papyracea, conspicue trinervis, superne setis marginalibus usque 6 mm. longis instructa, utrinque minutissime puberula ; bractea fertilis bracteae sterili maximae similis ; bracteolae setaceae, circiter 2·6 cm. longae, basi vix 1 mm. latae. *Calyx* usque ad basin 4-partitus ; segmentum posticum inferne valde concavum (explanatum ellipticum), papyraceum, superne planum, ovato-oblongum, acutum, apiculatum, subpetaloideum, circiter 3 cm. longum et 1 cm. latum, nervis 3 parallelis instructum ; segmenta lateralia lanceolata, mucronata, circiter 1 cm. longa et 0·5 cm. lata, papyracea, uninervia ; segmentum anticum inferne concavum (explanatum oblongo-ellipticum), papyraceum, superne planum, oblongum, subpetaloideum, apice minute bifidum, totum circiter 2·3 cm. longum et 0·8 cm. latum, conspicue binerve. *Corolla* caerulea vel roseo-purpurea vel alba, circiter 3·8 cm. longa ; tubus 12 mm. longus, extra glaber, intus glaber fauce pilis horizontalibus clausa excepta ; labium late ovatum, basi angustatum, apice trilobum, lobo medio parvo suborbiculari, lobis lateralibus medio superatis rotundatis, circiter 2·6 cm. longum et 2·4 cm. latum, extra dense adpresse pubescens, intus marginem versus glabrum, medio dense retrorso-hirsutum lamellis 3 longitudinalibus 1 cm. longis exceptis, basin versus infra lamellas callo longitudinali oblongo rectangulari

9 mm. longo 2·5 mm. lato corneo instructum. *Stamina* 4, fauci affixa; filamenta postica leviter arcuata, sursum angustata, circiter 12 mm. longa, basi 1·5 mm. lata, parce glandulosa; antica subrecta, valde compressa, circiter 12 mm. longa, medium versus 3·5 mm. lata, apice vix biloba, basi parce glandulosa; antherae monotheeae, parce glandulosae, valde ciliato-barbatae, usque 8 mm. longae. *Discus* cupularis, carnosus, circiter 2 mm. altus. *Ovarium* ovoideum, 4·5 mm. altum, 3 mm. diametro, glabrum, apice posticе glandulis duabus papillatis instructum; stylus anguste ensiformis, minute bifidus, 2·1 cm. longus. *Capsula* vix matura oblongo-ellipsoidea, nec compressa, 1·4 cm. longa, 6 mm. diametro, glabra, nitidula. *Semina* non visa.

Tanganyika Territory. Dodoma District: a trailing shrub growing on low-lying dry sandy soil at Mpwapwa, 14 Aug. 1928, *Mrs. Hornby* 1 (type); a very common scandent shrub growing over bushes and small trees on the edge of dongas (dry river-beds), usually in dark brown sandy soil, at Mpwapwa, 1000–1100 m., 18 Aug. 1930, *Greenway* 2401 :—the flowers vary from white through pale magenta to pale and dark blue.

This very beautiful *Blepharis* stands out from among the other species of Section *Eublepharis*, to which it belongs, on account of its robust habit, its large flowers and its conspicuously nerved papery bracts. *B. Homblei* De Wild. has flowers nearly as large but is very different in other respects. Of the species given in the Flora of Tropical Africa, *B. Hornbyae* comes nearest to *B. integrifolia* (L.f.) E. Mey. (*B. molluginifolia* Pers.), which agrees in the possession of bracteoles and in the trailing habit, but is a very much smaller weedy plant with insignificant flowers.

The species is named after Mrs. H. E. Hornby, who, together with her husband, has contributed so many specimens from the district around Mpwapwa, Tanganyika Territory, an area which appears to be very rich in endemics. *B. Hornbyae* grows on sandy soil in the evergreen thickets which fringe the seasonal streams, and uses the evergreen shrubs for its support much in the same way as *Lonicera Periclymenum* L. does in Europe.—E. Milne-Redhead.

Fig. 1, portion of flowering branch, *natural size*; 2, portion of leaf, *natural size*; 3, bracteole, × 1·5; 4, posticous calyx segments, × 1·5; 5, lateral calyx segment, × 1·5; 6, anticous calyx segment, × 1·5; 7, posterior view of corolla, split open, × 1·5; 8, anticous stamen, × 2; 9, posticous stamen, × 2; 10, upper portion of posticous stamen, × 3; 11, pollen grain, × 600 (approx.); 12, gynoecium, with disk, posterior view, × 4; 13, capsule, posterior view, × 2.


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Tabula 3267.

ANISOTES UMBROSUS *Milne-Redhead.*

Acanthaceae. Tribus Justicieae.

A. umbrosus *Milne-Redhead*; species nova, distinctissima, habitu et bracteis *Adhatodae Englerianae* (Lindau) C. B. Clarke similis; sed floribus speciei *Anisotis* similibus instructa.

Frutex circiter 2 cm. altus. *Rami* quadrangulares, dense breviter hirsuti, demum glabrescentes vel puberuli, internodiis usque 3 cm. longis. *Folia* ovata, breviter acuminata vel acuta, basi in petiolum angustata, usque 33 cm. longa, 15 cm. lata, utrinque grosse pubescentia; nervi utrinque conspicui, laterales utroque latere costae 8–12. *Inflorescentiae* axillares, 7–12 cm. longae, dense strobilaceae, pedunculatae, pedunculis usque 3 cm. longis velutinis; bracteae ovatae, acutae vel breviter acuminatae, basi rotundatae vel subcordatae, circiter 2·5 cm. longae, 1·5 cm. latae, quinquenerviae, dense pubescentes; bracteolae anguste lanceolatae, apice subulatae, 12 mm. longae, 2·5 mm. latae, pubescentes et sparse glanduloso-pubescentes. *Calyx* fere usque ad basin 5-partitus, circiter 9 mm. longus, segmentis linearibus extra glanduloso-pubescentibus intus appresse pubescentibus. *Corolla* bilabiata, viridi-alba, extra parce hirsuta et densiuscule glandulosa, intus glabra, circiter 3·5 cm. longa; tubus infernc cylindricus, 4 mm. diametro, glaber, postice infra medium in cavos transversos duo externos parum profundos 2·5 mm. latos excavatus, antice infra faucem in saccum externum callum quadrangularem internum efformantem excavatus; tubus superne leviter compressus cum labium posticum arcuatus, totus circiter 13 mm. longus; petala postica (usque ad apicem connata) trinervia, nervis triadum adaxialibus lamellato-carinatis, nervis lateralibus cujusque triadis in marginem cavi piseiniformis conjunctis ibidemque hirsutis nervo singulo superne hirsuto usque ad basin tubi obliquc descendente; labium posticum lanceolato-lineare, leviter arcuatum, concavum, subacutum, apice minute bidentatum vel integrum, circiter 22 mm. longum; labium antieum liguliforme, plus minusve reflexum, profunde trilobatum, lobis usque 13 mm. longis, medio lateralibus latiore. *Stamina* 2, postica, tubi apicem versus affixa; filamenta compressa, eireiter 2 cm. longa; antherae dithecae, thecis discretis, altera paullo altius affixa, inferiore basi obscure calcarata. *Discus* cupularis. *Ovarium*

circiter 2 mm. longum, parce glandulosum; stylus circiter 2·5 cm. longus, inferne parce hirsutus, superne glaber, apice integer. *Capsula* stipitata, compresso-clavata, apice brevissime rostrata, circiter 2 cm. longa, hirsuta et glandulosa. *Semina* 4, plano-compressa, suborbicularia, leviter rugosa.

Tanganyika Territory. Dodoma District: common along banks of permanent stream in deep shade of riverine fringing forest composed of *Khaya*, *Parkia*, *Albizzia* and *Ficus* species in the Upper Tubugwe Valley, Mpwapwa, 900–1050 m., 3 Aug. 1933, *Burtt* 4776 (type):—a loose shrub 2 m. high; flowers very pale greenish-white; an uncommon scandent shrub on bank of dry stream running into normal riverine forest at Tubugwe near Mpwapwa, 11 Aug. 1933, *Mr. and Mrs. Hornby* 537.

It is not without hesitation that I place this species in *Anisotes*, a genus which up to the present contains only plants with small and inconspicuous bracts and bracteoles. However, the striking similarity of the corollas to those of the other species of *Anisotes* suggests that this is its true position. The West African *A. Zenkeri* (Lindau) C. B. Clarke has many-flowered axillary inflorescences, but they are very shortly pedicelled and are not strobilate. In appearance *A. umbrosus* is remarkably similar to *Adhatoda Engleriana* (Lindau) C. B. Clarke, but the petiolate leaves without auricles and the longer and more slender flowers readily distinguish the former species. The pollen of *A. umbrosus* is "knötchenpollen" with two stoppels, as in both these genera.—E. Milne-Redhead.

Fig. 1, flowering branch, *natural size*; 2, bracteole, × 3; 3, flower with corolla removed, × 3; 4, inside view of posterior half of corolla, × 1·5; 5, inside view of anterior half of corolla, with stamens removed, × 1·5; 6, top of filament with anther thecae, × 6; 7, 8, pollen grains, × 600 (approx.); 9, gynoecium with style removed, × 4; 10, capsule showing seed, × 1·5.


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Tabula 3268.

ANISOTES BRACTEATUS *Milne-Redhead.*

Acanthaceae. Tribus Justicieae.

A. bracteatus *Milne-Redhead*; species nova, ab affini *A. umbroso* Milne-Redhead habitu deciduo, foliis et floribus minoribus, bracteis albo-viridibus, bractcolis majoribus, corollae labii antici lobis brevioribus recedens.

Frutex circiter 3 m. altus. *Rami* teretes, subangulati, brevissime et minutissime appresse pilosi, demum glabrescentes, internodiis usque 6 cm. longis. *Folia* decidua, ovato-lanceolata, vix acuminata, basi in petiolum attenuata, usque 12 cm. longa et 3 cm. lata, juventute utrinque praesertim in nervis minute inconspicue pilosa, demum glabra, exsiccando utrinque cystolithis dense notata; costa et nervi laterales utrinque conspicui, nervi laterales utroque latere costae 5–6; petioli usque 3 cm. longi, dense et minutissime pilosi, demum glabri. *Inflorescentiae* axillares, 4–7 cm. longae, dense strobilaceae, pedunculatae, pedunculis usque 2 cm. longis dense et minutissime subappresse hirsutis; bracteae late ovatae, in apicem breviter acuminatae, basi subcordatae, vix 2 cm. longae et 1·5 cm. latae, inconspicue quinquenerviae, reticulato-venosae, parce pubescentes; bractcolae lanceolatae, apice subulatae, usque 1·9 cm. longae et 0·5 cm. latae, parce pubescentes. *Calyx* profunde 5-partitus, circiter 5 mm. longus; segmenta lineari-lanceolata, acuta, eglandulosa, breviter subappresse pubescentia. *Corolla* bilabiata, circiter 2 cm. longa, viridi-alba, extra parte basali excepta breviter hirsuta et minute glandulosa, intus glabra; tubus inferne cylindricus, 3 mm. diametro, postice infra medium in saccos duo externos profundos 1 mm. diametro excavatus, antice infra faucem in saccum externum callum triangularem internum efformantem excavatus; tubus superne leviter compressus, ut labium posticum arcuatus; petala postica (usque apicem connata) trinervia, nervis triadum adaxialibus lamellato-carinatis, nervis lateralibus cujusque triadis in marginem cornus pisciniformis conjunctis ibidemque hirsutis, nervo singulo superne hirsuto usque ad basin tubi decurrente; labium posticum oblongo-lanceolatum, circiter 12 mm. longum, leviter arcuatum, concavum, apice acutum, integrum; labium anticum ligulaeforme, plus minusve recurvum, apice trilobatum, lobis circiter 2·5 mm. longis. *Stamina* 2, postica, paullo infra apicem tubi affixa; filamenta

circiter 13 mm. longa ; antherae dithecae, thecis discretis, altera paullo altius affixa, inferiore basi brevissime obscure calcarata. *Discus* breviter cupularis. *Ovarium* circiter 1·5 mm. longum, densiuscule glandulosum ; stylus circiter 2 cm. longus, inferne parce hirsutus, superne glaber, apice integer. *Capsula* stipitata, compresso-clavata, apice vix rostrata. *Semina* 4 (?) vel abortu 2, plano-compressa, late ovata, circiter 6 mm. longa et 5 mm. lata, utrinque levia, medio uno latere validius costata.

Tanganyika Territory. Dodoma District: in dense bush on river-banks on dark brown sandy soil at Gulwe, 850 m., 19 Aug. 1930, *Greenway* 2407 (type) :—a much-branched shrub, 2–3 m. high, with greenish-white bracts and white flowers ; locally frequent in *Commiphora-Cordyla* dry thicket at Mpwapwa on road from Gulwe, 1050 m., 26 April 1932, *Burtt* 3917 :—a shrub, 2–2·5 m. high ; inflorescence in dense heads, greenish-creamy-white. Singida District: on a rocky limestone outcrop along Lwumbu River near Matelele, 1200 m., 12 Aug. 1927, *Burtt* 747 :—a woody shrub up to 2 m. high, leaves fallen as it is dry season.

This species is undoubtedly congeneric with *A. umbrosus* Milne-Redhead (t. 3267), and it is accordingly placed likewise in *Anisotes*, although a similar doubt exists respecting its genus. The flowers resemble those of *A. umbrosus*, but they are smaller with the lobes of the anterior lip of the corolla proportionately very much shorter. Relatively to the calyx, the bracteoles are very much larger. *A. bracteatus* agrees with *A. umbrosus* in having pedunculate, strobilate, axillary inflorescences, and in having "knötchenpollen" with two stoppels.—E. Milne-Redhead.

Fig. 1, flowering branch, *natural size* ; 2, bracteole, showing outer side, × 4 ; 3, flower with corolla removed, × 4 ; 4, inside view of opened corolla, with stamens removed, × 3 ; 5, top of filament, with anther, × 6 ; 6, 7, pollen grains, × 600 (approx.) ; 8, disk and gynoecium with style removed, × 8 ; 9, capsule after dehiscence, × 2 ; 10, seed, × 2.


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Tabula 3269.

DISPERIS JOHNSTONI *Rchb. f.*

Orchidaceae. Tribus Ophrydeae.

D. Johnstoni *Rchb. f.* ex Oliver in Trans. Linn. Soc. ser. 2, ii. 349 (1887), nomen; Rolfe in Dyer, Fl. Trop. Afr. vii. 291 (1898); affinis *D. mozambicensi* Schltr., a qua caule bifoliato, petalis semi-ellipticis apice acutis nec superne valde ampliatis, labelli appendicibus dense pubescentibus differt.

Herba terrestris, 6–15 cm. alta; tuber anguste cylindricum, circiter 1 cm. longum, plus minusve tomentoso-pilosum. *Caulis* gracilis, erectus, teres, glaber, remote bifoliatus, basi cataphyllis vaginantibus instructus, apice 2–5-florus. *Folia* sessilia, lanceolato- vel oblongo- vel orbiculari-ovata, acuta vel apiculata, basi cordata amplexicaulia, 1–2·7 cm. longa, 6–15 mm. lata, subtus purpurea. *Flores* sessiles, albi et pallide purpurei; bracteae foliis similes sed minores, usque ad 1 cm. longae. *Sepalum* intermedium lineare, acutum, 9–10 mm. longum, 0·6 mm. latum, cum petalis agglutinatum cucullum latum concavum formans; sepala lateralia oblique semiorbicularia, apiculis divergentibus apiculata, triente inferiore connata, 8–10 mm. longa, 4·5 mm. lata, infra medium margines anticos versus brevissime saccata. *Petala* anguste semi-elliptica, apice acuta, 9–10 mm. longa. *Labellum* basi per 1 mm. columnae adnatum, apice in laminam orbiculari-ovatam subacutam basi medio crista quadrata dense papillosa praeditam dilatatum, ungue lineari medio valde reflexo appendice biloba lobis leviter divergentibus dense pubescentibus instructo; totum labellum 6·5 mm. longum. *Anthera* 1·5 mm. longa; staminodia sub- vel semi-orbicularia, dense papillosa. *Rostelli brachia* leviter incurvata, apice spathulato-dilatata. *Ovarium* 7–11 mm. longum, glabrum.

Tanganyika Territory. Kilimanjaro, 1500–1800 m., *Johnston* (type); Old Moshi, 1200 m., May 1926, *Haarer* 178; Oleli, E. Kilimanjaro, 1200 m., May 1927, *Haarer* 322.

Northern Nigeria. Naraguta, under rocks, Aug. 1921, *Lely* 485.

This species is closely related to *D. mozambicensis* Schltr., *D. Stolzii* Schltr., and *D. Reichenbachiana* Welw. ex Rchb. f. The first-named

differs in the shape of the petals, which are much widened at the apex on the outside. I can see only very slight differences between *D. Johnstoni* and *D. Stolzii*, but in view of the small amount of material available of the latter it seems best to maintain it as distinct for the present. With regard to *D. Reichenbachiana* the flowers on the specimens of *Welwitsch* 694 (the type-collection), both at Kew and at the British Museum, are so poorly preserved that it is difficult to be sure of their exact structure. So far as they can be distinguished, however, they seem to differ from those of *D. Johnstoni*, especially in the lip. There are specimens at Kew from Kenya Colony and Uganda which are very similar to *Welwitsch* 694, and in these the lip, while agreeing with Reichenbach's description of the Angolan species, is quite distinct in structure from that of *D. Johnstoni*.

An interesting feature in all the species here figured is the presence of staminodes, which, so far as I can ascertain, have not been recorded in this genus, and are not shown in any of the illustrations I have seen. They appear to have been interpreted as stigmas by some students of the genus, but at all events in the groups of species here concerned the stigmas and staminodes are quite readily distinguishable from one another, firstly on account of the structure and secondly from the positions occupied. In other groups within *Disperis* the stigmas and staminodes seem to approach one another in structure and in position, and in particular cases it is difficult from dried material only to be certain of the nature of any given organ. In each species so far examined belonging to the groups here illustrated the staminodes are placed at the base of the column, one on each side. In *D. cardiopetala* Summerhayes (tab. 3270) they are very poorly developed, being represented merely by a transverse papillose band, but in the other species they are quite easily visible on dissection.—V. S. Summerhayes.

Fig. 1, flowering plant, *natural size*; 2, dorsal sepal, × 4; 3, lateral sepals, × 4; 4, petal, × 4; 5, lip and column, in lateral view, × 12; 6, lip, in front view, × 12; 7, pollinium, × 16; 8, staminode, × 16:—a, anther; ap, appendage of lip; ll, lamina of lip; loc, anther loculus; r, middle lobe of rostellum; s, stigma; st, staminode; v, viscidia.

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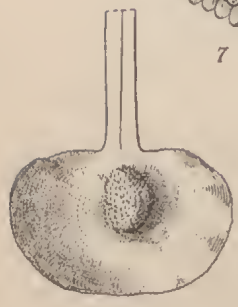

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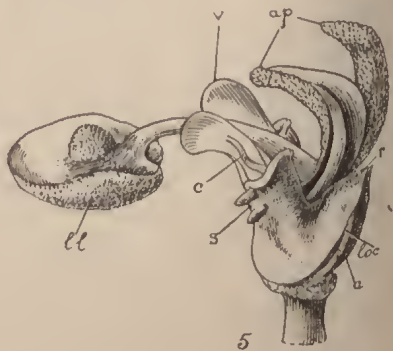

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Tabula 3270.

DISPERIS CARDIOPETALA *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

D. cardiopetala *Summerhayes*, nom. nov. *D. cordata* Summerhayes in Kew Bull. 1933, 252, non Sw.—Affinis *D. togoënsi* Schltr., a qua foliis et bracteis multo majoribus, labelli appendicibus longioribus angulo acuto neque recto divergentibus differt.

Herba terrestris, parva, 5–13 cm. alta; tuber elongato-ovoideum vel ellipsoideum, 1–1·5 cm. longum, 5 mm. diametro, dense tomentoso-hirsutum. *Caulis* gracilis, teres, medio 1- (rarius 2-)foliatus, basi vaginis 1–2 instructus. *Folia* alterna, sessilia, ovata vel rarius sub-orbicularia, obtusa vel acuta, basi cordata, 6–20 mm. longa, 6–12 mm. lata, subcarnosa. *Flores* 3–6, sessiles, in spica brevi subcorymbosa dispositi, rosei; bracteae foliis similes, ovatae vel lanceolato-ovatae, usque 16 mm. longae et 9 mm. latae; ovarium gracile, 8–17 mm. longum. *Sepalum* intermedium lanceolato-lineare, acutum, 7–8 mm. longum, 0·6–1·1 mm. latum; sepala lateralia oblique semiovata, apicibus divergentia, acuta, triente vel quadrante basilari connata, 8·5–9 mm. longa, 4 mm. lata, infra medium margines interiores versus breviter saccata. *Petala* semi-cordata, acuta, margine posteriore recta, anteriore basi dilatata, 7–8 mm. longa, 2–3 mm. lata, sepalo intermedio agglutinata, cucullum leviter concavum basi cordatum formantia. *Labellum* in toto 4·5–5 mm. longum, basi columnae per 1·5 mm. adnatum, superne lineare, apice in laminam orbicularem vel transverse ellipticam, 1·2–1·5 mm. longam, 1·8–2·3 mm. latam, media basi lamella erecta quadrata vel semi-ellipsoidea papillosa instructam dilatatum, unguc supra columnam appendicibus duabus anguste linguiformibus 1·5 mm. longis antice papillosis angulo acuto divergentibus instructo. *Anthera* 1·5 mm. longa; staminodia vix evoluta. *Rostelli* lobus intermedius orbicularis; brachia lateralia recurvata, apice spathulato-dilatata, 1·5 mm. longa.

Dahomey. Atacora Mts., Somba country, between Forfa and Toukountouna, in a gallery forest, 450–550 m., June 1910, *Chevalier* 24060.

S. Nigeria. Bamenda District, Bum, in grassland at edge of forest, 1200 m., April 1931, *Maitland* 1519 (type).

In the structure of the flowers, especially the lip, this species approaches *D. togoënsis* Schltr. and *D. Johnstoni* Rchb. f. From the latter it is readily distinguished by the much dilated lower portion of the petals, as a result of which the galea composed of the joined dorsal sepal and petals is cordate at the base instead of cuneate as in *D. Johnstoni* (see tab. 3269). *D. togoënsis* Schltr. is a very slender plant with extremely small leaves and bracts, these, on the other hand, being well developed in *D. cardiopetala*. It will be seen from the drawings of the lip in *D. Johnstoni* and this species that the so-called "appendages" of the lip are in these cases (and also probably in *D. katangensis* Summerhayes, tab. 3271) formed by the broadening or splitting of the lip claw, which is then sharply reflexed, the inner or lower surfaces on each side of the bend being adnate to one another for a varying distance in the different species. It is doubtful if there is any real outgrowth from the upper surface of the claw, although such development may have started in *D. katangensis*.—V. S. Summerhayes.

Fig. 1, flowering plant, *natural size*; 2, dorsal sepal, × 6; 3, lateral sepals, × 4; 4, petal, × 6; 5, lip and column, × 12; 6, apex of lip, × 12; 7, pollinium, × 12:—a, anther; ap, appendages of lip; c, caudicle; ll, lamina of lip; loc, anther loculus; r, middle lobe of rostellum; s, stigma with pollen masses; v, viscidium (all drawn from *Chevalier* 24060).

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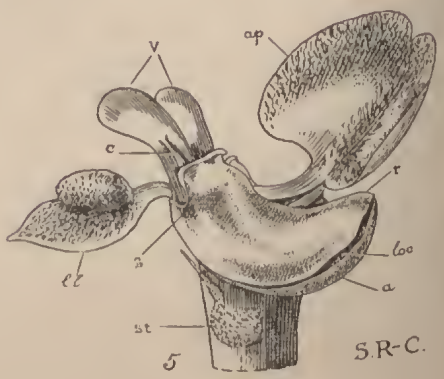

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S.R-C.

Tabula 3271.

DISPERIS KATANGENSIS *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

D. katangensis *Summerhayes* in Kew Bull. 1931, 384; affinis *D. mozambicensi* Schltr. et *D. Stolzii* Schltr., a quibus labelli appendice ambitu subreniformi apice sinu acuto emarginata vel breviter biloba nec valde biloba lobis anguste ellipticis differt.

Herba terrestris, 6–13 cm. alta; tuber ellipsoideum, tomentoso-pilosum. *Caulis* gracilis, 1–2-foliatus, teres, glaber, basi vagina instructus, apice uni- vel biflorus. *Folia* patentia, sessilia, ovata vel late ovata, basi cordata, apiculata vel breviter acuminata, 8–12 mm. (lobis basalibus inclusis 9–15 mm.) longa, 8–14 mm. lata. *Flores* sessiles, albi vel rosei; bracteae foliis bene similes, subpatentes, ovario circiter dimidio breviores, 5–11 mm. longae. *Sepalum* intermedium lineare, superne sensim attenuatum, 1·6–1·8 cm. longum; sepala lateralia triente inferiore connata, longitudinaliter semiorbicularia, latere antico stricto, apice apiculata et divergentia, 1·2–1·7 cm. longa, 7–8 mm. lata, medio margines anticos versus in sacculum humilem obtusissimum producta. *Petala* oblique elliptico- vel lanceolato-ovata, subacuta, 1·6–1·7 cm. longa, cum sepalo intermedio galeam semisphaeroideam 1·2–1·5 cm. longam formantia. *Labellum* basi facici columnae adnatum, superne refractum, apice ovato-spathulatum, cuspidatum, supra crista integra instructum, papillato-pubescens, parte integra labelli in toto 5 mm. longa; labelli appendix erecta, e basi cuneata ambitu reniformis apice sinu acuto emarginata, in toto 2·5–3·5 mm. longa, 4 mm. lata, superne dense pubescens. *Anthera* 2 mm. longa; staminodia semiorbicularia antice in appendicem subulatam producta. *Rostelli brachia* circinatim incurva, apice erecta, brevia, obtusissima. *Ovarium* glabrum, leviter 6-alatum, 0·8–1·4 cm. longum.

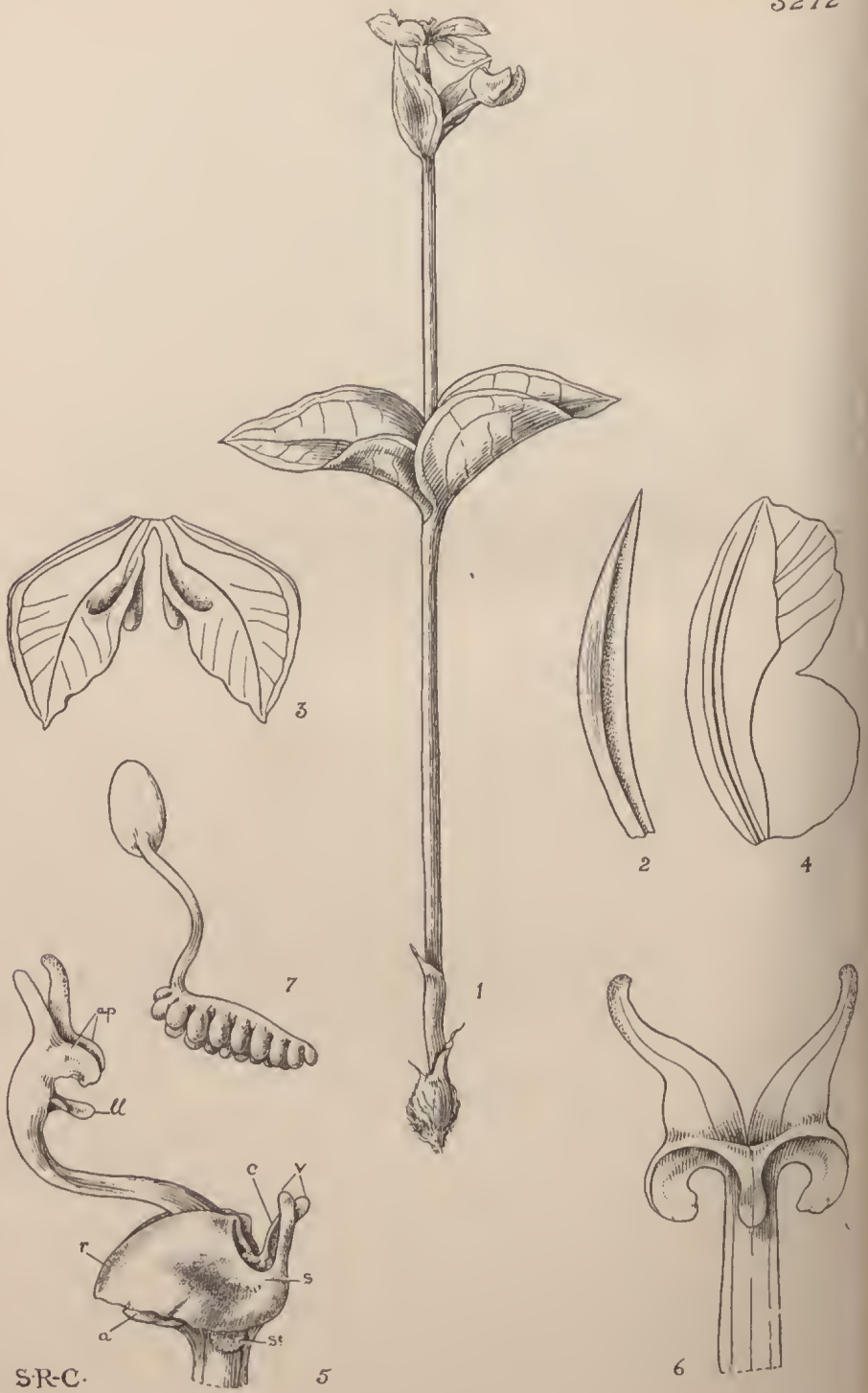
Northern Rhodesia. Mwinilunga District, in bush, 1350–1500 m., Feb., *Marks* 102.

Belgian Congo. Katanga, Kisinga Valley, in shady moist places, May 1924, *C. W. von Hirschberg* 168 (type):—"The hood is pale-pink veined with pink, the lip darker pink. The leaves are white-veined and are magenta beneath."

This species is most closely related to *D. Stolzii* Schltr., a native of the Livingstone Mountains in southern Tanganyika Territory, and to *D. mozambicensis* Schltr., which occurs in Mozambique. It also has relationships with two species occurring in southern India and with some from Madagascar. From all these it differs in the massive broad appendage to the lip, the appendage in the other species being deeply bilobed with narrow lobes or segments. The flowers are also somewhat larger in *D. katangensis* than in any of its allies. The staminodes are very remarkable, each being drawn out at the anticous end into a long subulate point which projects upwards and sideways.

V. S. Summerhayes.

Fig. 1, flowering plants, *natural size*; 2, dorsal sepal, × 2; 3, lateral sepals, × 2; 4, petal, × 2; 5, lip and column in lateral view, × 8; 6, the same, from the front, × 6:—a, anther; ap, appendage of lip; c, caudicle; ll, lamina of lip; loc, anther loculus; r, middle lobe of rostellum; s, stigma; st, staminode; v, viscidia.



S.R-C.

Tabula 3272.

DISPERIS DICEROCHILA *Summerhayes.*

Orchidaceae. Tribus Ophrydeae.

D. dicerochila *Summerhayes*; species nova affinis *D. virginali* Schltr. et *D. Nelsonii* Rolfe; ab illa sepalorum lateralium calcaribus brevioribus, ab utraque labelli appendicibus satis brevioribus lobulis fere sessilibus differt.

Herba terrestris, usque ad 15 cm. alta; tubera ellipsoidea vel fere sphaeroidea, circiter 1 cm. diametro, dense tomentoso-hirsuta, radicibus flexuosis glabris. *Caulis* erectus, teres, glaber, basi vaginis saepius 2 instructus, medio bifoliatus, apice 1–3-florus. *Folia* opposita, ovata vel lanceolato-ovata, acuta vel breviter acuminata, basi vaginantia, supra vaginam rotundata vel fere cordata, lamina 1·5–3 cm. longa, 1–2 cm. lata. *Flores* subumbellati, sessiles, albi, rosco- vel purpureo-tincti; bracteae foliaceae, sessiles, lanceolatae, acuminatae, usque ad 1·5 cm. longae. *Sepalum* intermedium anguste lanceolato-lineare, acutum, leviter incurvatum, 7–11 mm. longum, cum petalis agglutinatum cucullum latum dorso convexum haud calcaratum formans; sepala lateralia basi tantum connata, oblique rhomboideo-ovata, acuta, latere antico infra medium breviter et obtuse calcarata, 7–10 mm. longa, 4–5 mm. lata. *Petala* ambitu β-formia, leviter curvata, apice obtusa, 7–10 mm. longa, 3·5–4 mm. lata. *Labellum* basi per 2 mm. columnae adnatum, longe unguiculatum, apice breviter reflexum, totum 7–9 mm. longum, juxta apicem pagina superiore appendicibus duabus bilobulatis 2·2 mm. longis, lobulo appendicis utriusque postico erecto basi oblongo deinde modo cornus angustato apice papilloso, lobulo antico auriculato obtuso recurvato, instructum. *Anthera* 2·5 mm. longa; staminodia semiorbicularia, papillosa. *Rostelli lobi laterales* erecti, vix torti, 1·5 mm. longi. *Ovarium* 1·1–1·4 cm. longum, glabrum.

Uganda. Ruwenzori, Nyinabitaba, 2550 m., among moss, Aug. 1931, *Fishlock and Hancock* 25; Aug. 1933, *Eggeling* 1382 (type).
Kenya Colony. Kinangop, in forest in dense shade, 2400 m., Dec. 1930, *Napier* 635. Mau Plateau, in forests, *Battiscombe* 947.

D. dicerochila belongs to a group of species bearing a pair of opposite leaves, and to the smaller section of this, in which the hood formed

by the dorsal sepal and petals is rounded and not prolonged into a cylindrical spur. There are five other species in this minor group, two, *D. Kerstenii* Rchb. f. and *D. leuconeura* Schltr., being natives of Tanganyika Territory; two more, *D. virginalis* Schltr. and *D. Nelsonii* Rolfe, occurring in the Transvaal; while the fifth, *D. oppositifolia* Lindl., is widely distributed in the Mascarene Islands. *D. dicerochila*, in spite of being the northernmost representative of the group, resembles most closely the two South African members, both of which have the two appendages of the lip longer and each provided with a distinct claw below the point of divergence into lobules. In *D. Kerstenii* this elongation is much more pronounced, the claws of the appendages being as long as the claw of the lip proper, and many times longer than the reflexed apex of the lip. In *D. leuconeura* and *D. oppositifolia* the structure of the lip is quite different in plan from that in the other species. Superficially, however, all the species bear a very close resemblance to one another, at any rate so far as dried specimens are concerned, and only careful examination of the flowers reveals the technical differences.

It is remarkable that *D. dicerochila* is so widely separated geographically from its nearest relatives, but it is probable that other species of *Disperis* remain to be discovered in Africa. Like all the other northern members of the genus the new species occurs in mountain regions at high altitudes. The specimens in the two Kenya Colony gatherings are more robust and have larger flowers than those from Ruwenzori, but the floral structure is apparently identical.

The specific epithet refers to the shape of the lip, which resembles to a remarkable extent the head of an animal bearing two erect horns.

V. S. Summerhayes.

Fig. 1, flowering plant, *natural size*; 2, dorsal sepal, × 6; 3, lateral sepals, × 4; 4, petal, × 6; 5, lip and column, in lateral view, × 8; 6, apex of the lip, opened out, × 12; 7, one pollinium, in lateral view, × 16:—a, anther; ap, appendages of the lip; c, caudicle; ll, apex of lip; r, middle lobe of rostellum; s, stigma; st, staminode; v, viscidia. (Fig. 1 drawn from *Napier* 635; figs. 2–7 from *Eggeling* 1382.)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Tabula 3273.

EXOCHOGYNE AMAZONICA *C. B. Clarke.*

Cyperaceae. Tribus Cryptangieae.

Exochogyne *C. B. Clarke* in Verh. Bot. Ver. Brandenb. xlvii. 101 (1906); descriptio hic ampliata.

Inflorescentia spiciformis. *Greges spicularum* femineārum et masculārum plus minusve basibus bracteārum incineti. *Spiculae masculae* breviter pedicellatae; pedicelli in pedunculo brevissimo bracteae adnato inserti; glumae vacuae 2, floriferae 2–7; stamina 2 in glumis interioribus omnibus inclusa vel gluma summa vacua; filamenta tenuissima glabra. *Spiculae femineae* vel mediae et terminales vel basales et extra spiculas masculas dispositae, pedicellatae; stylus simplex, stigmatibus 2 filiformibus crispule furfuraceo-pubescentibus. *Nux* rostrata, breviter stipitata.

Herbae perennes, humiles, rhizomate plus minusve repente squamis fibrosis pilosulis instructo. *Culmi* triquetri. *Folia* linearia, acuta, marginibus recurvis, costa supra in sulco impressa et puberula, subtus prominente. *Inflorescentia* rhachi glabra flexuoso-angulata, bracteis basi cymbiformibus, marginibus longe pilosis, bractea inferiore longa et foliacea, ceteris multo brevioribus sursum decrescentibus, parte superiore setaceis. *Spiculae masculae* 2-10 in bracteis omnibus; glumae vacuae inaequales, lanceolatae, acutae, glumae interiores lineares. *Spiculae femineae* 2-3 in bracteis omnibus, una quam ceterae duplo longius pedicellata; glumae 4.

A small and rather isolated genus of *Cryptangieae* occurring on savannahs in north-eastern South America and known only from three collections, two from the Amazons in the neighbourhood of Manaos and one from the Potaro River in British Guiana. The three known species resemble one another rather closely in external appearance, but as far as can be seen from the limited material available the floral characters which separate them are quite constant.

The following is a key to the species:—

Leaves long pilose, rhizome far creeping, male spikelets 2–4. *E. megalorrhyncha.*

Leaves glabrous or nearly so, rhizome short, male spikelets 6–10:

Male spikelets 10, female spikelets 3 . . . . . *E. decandra.*

Male spikelets 6, female spikelets 2(–3) . . . . . *E. amazonica.*

E. amazonica *C. B. Clarke* in Verh. Bot. Ver. Brandenb. xlvii. 101 (1906); a ceteris speciebus spiculis masculis 6, staminibus 6 in spiculis singulis differt.

Rhizoma brevissime repens, culmos complures approximatos emittens. *Folia basalia* 5–7, libera, vaginis haud distinguendis, per centimetros basales 4 pilosula; lamina c. 15–30 cm. longa, 1·5–2 mm. lata, rigidiuscula, marginibus recurvis nonnunquam sparse pilosis, subtus fere plana, costa prominente glabra. *Culmus* 9–15 cm. longus, plerumque e foliis basalibus omnino liber, 0·5 mm. diametro, glaberrimus; folium caulinum solitarium, raro nullum, e dimidio inferiore culmi emissum, foliis basalibus simile. *Inflorescentia* 4·5–6 cm. longa, spiculis imis saepe 1 cm. sub ceteris orientibus, plerumque femineis; bractea inferior usque 30 cm. longa, foliis similis, braeteae mediae 1–1·2 cm. longae. *Spiculae masculae* 6, pedicellis 1 mm. longis; glumae exteriores vacuae 2, altera 2 mm. longa, altera 3 mm. longa, interiores 4, 6–6·5 mm. longae, lineares, acutae, ima satis carinata, carina apicem versus breviter hispida, ceterae glabrae; stamina 6, filamentis usque 7 mm. longis; antherae circiter 3·5 mm. longae. *Spiculae femineae* vel 2, centrales, terminales, altera pedicello 2 mm. longo, altera pedicello 1 mm. longo praedita, vel 3; glumae ovatae, acutae, glabrae, exteriores circiter 1·2 mm. longae, interiores 2 mm. longae; stylus c. 2 mm. longus, stigmatibus circiter 7 mm. longis. *Nux* subglobosa, 2 mm. longa rostro incluso, 1·25 mm. diametro, subito in rostrum satis tenue c. 0·4 mm. longum contracta, stipite brevi.

Brazil. Amazonas: campinas near Cachoeiras de Marmellos, a tributary of the Madeira, March 1902, *Ule* 6128 (Herb. Kew.).

Several groups of spikelets, each with two female spikelets, were dissected by the writer and Mr. N. Y. Sandwith. Three specimens, each with three female spikelets as shown in fig. 3, were seen by the artist.

T. G. Tutin.

Fig. 1, entire plant, *natural size*; 2, ♂ spikelet, with empty glumes detached, × 4; 3, group of three ♀ spikelets, × 6; 4, nut, × 12.

S.R-C.

Tabula 3274.

EXOCHOGYNE MEGALORRHYNCHA *Tutin.*

Cyperaceae. Tribus Cryptangieae.

E. megalorrhyncha *Tutin*; species nova, foliis basalibus longe vaginatis, laminis longe supra culmi basin orientibus dense patenter pilosis (pilis 1·5 mm. longis), spiculis masculis 2–4 in bracteis omnibus staminibus 4 praeditis a congeneribus distinguenda.

Rhizoma longe repens, culmis solitariis. *Folia* basalia 3–4, vaginis pilosulis arcte imbricatis 3–5 cm. longis antice brunneo-membranaceis mox longitudinaliter fissis nisi annulo apicali; lamina circiter 7–30 cm. longa, 1·5–2 mm. lata, satis tenuis, supra canaliculata, marginibus recurvatis longe pilosis, nervis utroque costae latere compluribus quorum unus prominens longe pilosus senectute scabridus, subtus fere plana costa prominente longe pilosa, ceterum glabra. *Culmus* 10·5–19 cm. longus, inferne in vaginis foliorum inferiorum inclusus, tenuis, 0·5 mm. diametro, glaber nisi angulo singulo sub costa folii caulini; folium caulinum singulum, dimidio caulis superiore oriens, vagina 7–10 mm. longa dorso costata antice membranacea senectute nisi annulo apicali fissa, lamina iis foliorum basalium simili. *Inflorescentia* 4–5 cm. longa; bractea ima foliacea, indumento foliorum praedita, ad 13 cm. longa; bracteae mediae 1·8–2 cm. longae, omnes laete virides, marginibus dense longe albido-pilosis. *Spiculae masculae* 2–4, statu vivo albidae; glumae extimae imae vacuae, brevissimae, exterior 1·5–2 mm. longa, interior 2·8–3·5 mm. longa; interiores duae 7–8 mm. longae, apicem versus hispidulae; stamina 4, filamentis glumis paullo longioribus, antheris exsertis circiter 3 mm. longis loculis basi sagittatis. *Spiculae femineae* centrales, terminales, 2, altera longipedicellata pedicello 3 mm. longo, altera pedicello breviore 1 mm. longo; glumae exteriores ovatae, acutiusculae, 1 mm. longae, interiores usque 2 mm. longae, dimidio superiore breviter ciliolatae; stylus circiter 1·5 mm. longus, stigmatibus statu vivo rubris, 6–7 mm. longis. *Nux* ovoideo-oblonga, 1·5 mm. longa, 1·2 mm. lata, sensim in rostrum crassum 0·75 mm. longum attenuata, stipite circiter 0·5 mm. longo.

British Guiana. Potaro River: Kaietuk Savannah, in rather open dry sandy ground, 28 Aug. 1933, *Tutin* 634 (type in Brit. Mus., duplicate at Kew).—T. G. Tutin.

Fig. 1, plant, with small part of rhizome, *natural size*; 2, base of plant, showing lower leaves and sheaths, *natural size*; 3, scale from rhizome, × 3; 4, transverse section of lamina, × 8; 5, two ♂ spikelets, × 6; 6, inner empty glume of ♂ spikelet, flattened, × 6; 7, a fertile glume of the same, flattened, × 6; 8, two ♀ spikelets, × 6; 9, outer glume of ♀ spikelet, × 6.


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Tabula 3275.

EXOCHOGYNE DECANDRA *Tutin*.

Cyperaceae. Tribus Cryptangieae.

E. decandra *Tutin*; species nova, spiculis femineis tribus extra masculas dispositis, spiculis masculis 10, staminibus 10 in spiculis omnibus, glumis spicularum femearum latissimis orbiculari-quadratis apice erosis a congeneribus distinguenda.

Rhizoma breviter repens, culmos complures approximatos emittens. *Folia* basalia 3–4, libera, vaginis haud distinguendis, per centimetros basales 4 pilosula; lamina supra canaliculata glabra, subtus fere plana glabra. *Culmus* 7–15 cm. longus, plerumque e foliis basalibus omnino liber, 1 mm. diametro, obtuse triqueter, omnino glaber, foliis caulinis nullis. *Inflorescentia* 3·5–8 cm. longa, spiculis imis plerumque femineis saepe 1–2 cm. sub ceteris orientibus; bracteа ima usque 30 cm. longa, folio caulino similis, bracteae mediae 1·5–2 cm. longae, marginibus longe griseo-pilosae. *Spiculae masculae* 10 in bracteis omnibus, pedicellis 1 mm. longis; glumae exteriores duae, vacuae, altera 2–2·5 mm. altera 3·2–3·3 mm. longa, tum quinque interiores stamina includentes, lineares, acutae, incurvae, inferior apicem versus hispidula, 7 mm. longa, secunda glabra, 7 mm. longa, ceterae tres 5·5 mm. longae, denique gluma intima 4·5 mm. longa, obtusiuscula, sine staminibus; filamenta 6·5 mm. longa; antherae 4 mm. longae loculis basi rotundatis. *Spiculae femineae* 3, extra spiculas masculas exsertae (nec ut in speciebus ceteris inter eas centrales), una pedicello 6–6·3 mm. longo, ceterae pedicellis 3–3·5 mm. longis; glumae 4, latissime ovatae usque suborbiculares, glabrae, exteriores duae 1·3–1·8 mm. longae, interiores duae 1·8–2·5 mm. longae; stylus c. 2 mm. longus, stigmatibus usque circiter 7 mm. longis. *Nux* ovoideo-ellipsoidea, 1·5–2 mm. longa, 0·75 mm. lata, sensim in rostrum crassum obtusum 0·75–1 mm. longum attentuata, stipite 0·2 mm. longo.

Brazil. Rio Negro: campinas of Ensociada grande, Manaos, June 1910, *Ule* 8816 (type).—T. G. Tutin.

Fig. 1, plant, *natural size*; 2, ♂ spikelet, × 4; 3, ♀ spikelet, × 6; 4, outer glume of ♀ spikelet, × 6; 5, nut, × 12.


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Tabula 3276.

GERANIUM ARISTATUM *Freyn et Sint.*

Geraniaceae. Tribus Geranieae.

G. aristatum *Freyn et Sint.* in Bull. Herb. Boiss. v. 587 (1897); Halácsy, Consp. Fl. Graec. i. 295 (1900); Bierbach ex Degen in Mag. Bot. Lap. i. 92 (1902), et in Math. u. Naturw. Ber. Ungarn xix. 369 (1904); Adamović in Denkschr. Akad. Wiss. Wien, Math.-Naturw. Kl. lxxiv. 136 (1904); Knuth in Engl. Pflanzenr. iv. 129, 133 (1912); Bornmüller in Engl. Bot. Jahrb. lix. 446 (1925); Hayek, Prodr. Fl. Penins. Balcan. i. 569 (1925); Markgraf in Fedde, Repert. Beih. xlv. 194 (1927); a *G. reflexo* L. indumento praecipue in partibus superioribus dense glanduloso-piloso, floribus multo majoribus, sepalis longe aristatis facile distinguitur.

Herba perennis, caulibus erectis inferne patule vel plus minusve retrorsum hispidulis superne et ad inflorescentiam patule et molliter glanduloso-pilosis usque ad 3·3 dm. altis siccitate longitudinaliter sulcatis fere a basi ramosis flexuosis superne dichotomo-paniculatis; rhizoma crassum, 1·4 cm. diametro, dense squamosum. *Folia* basalia longissime petiolata, petiolis usque ad 1·9 dm. longis retrorsum hispidulis vel patule glanduloso-pilosis, lamina ambitu fere orbiculari-pentagona vel -hexagona 7·5 cm. diametro palmato-partita, segmentis rhomboideis 3–5-lobis acute grosse dentatis, utrinque plus minusve dense pilosa et interdum glandulosa; caulina omnia opposita, inferiora basalibus similia sed leviter majora et petiolis brevioribus, superiora minora petiolis brevibus, suprema sessilia; stipulae lanceolatae, superne sensim acuminatae, aristatae, inferiores circiter 2–2·5 cm., superiores 6–8 mm. longae, dorso plus minusve pilosae vel infimae glabrae, badiae vel fuscae. *Pedunculi* biflori, strieti, folio tandem duplo longiores, usque ad 9 cm. longi sed saepissime breviores. *Pedicelli* 1–3·2 cm. longi, tandem deflexi. *Sepala* oblongo- vel ovato-elliptica, 9–10 mm. longa (arista exclusa), 3–5 mm. lata, superne obtusa vel fere truncata, arista apicali 5–6 mm. longa praedita, quinquenervia, dorso longe pilosa, exteriores omnino, interiores in costa solum, post anthesin patula, deinde subdeflexa, tandem erecta. *Petala* reflexa, obovato-elliptica, apice interdum leviter apiculata interdum breviter emarginata, basi brevissime unguiculata et barbato-ciliata, circiter 1·6 cm. longa, 6–7·5 mm. lata, pallide molochina, nervis primariis 5, lateralibus basi

dichotomis. *Filamenta* inferne anguste lanceolata ciliata, superne tenuiter subulata glabra, 9 mm. longa; antherae oblongo-ellipsoideae, dehiscentes 2·5 mm. longae. *Gynoecium* 8 mm. altum; valvulae adpresse albo-hirsutae, 1·5 mm. longae.

THESSALY. Auf dem Pindus in Felsspalten des Berges Plaka beim Dorfe Chaliki, selten, *Sintenis* 1896, No. 673 (non vidi).

ALBANIA. Çermenika: Bergwiese bei Teke Balim Sultan i 'epër, 1500 m. ü. d. M., Kalk; blühend. 8.6.24. n. 533, *Markgraf* (non vidi). District of Moskopolë, west of Korçë, Ostrovicë Range, 4 July 1933, 1900 m., bare broken limestone slopes, *Alston and Sandwith* 2083:—"Flowers purple-veined: the flower colour is exactly that of pale *Malva sylvestris*."

N. MACEDONIA. Dudica-planina, Mala-rupa, auf der Kečí-kaja, im Gebüsch der Buchenwälder, Mai 1918, *Biesalski* 475 (non vidi); südlich von Üsküb am Aufstieg zum Peplak oberhalb Crni-vrh, *Bierbach* (non vidi).

S. MACEDONIA. Krystallopegae (Smrdesh), 19 June 1932, 1540 m., grassy and shady spots among limestone rocks, near edge of mountain plateau east of village, *Alston and Sandwith* 925:—"Petals reflexed, pale lilac-mauve with darker redder veins."

This interesting species, endemic in the Balkan Peninsula, has apparently a somewhat limited distribution from Thessaly to the southern parts of Albania. Its affinity is with *G. reflexum* L., which occurs in the same area but has a wider distribution, being found also in Central Italy. In foliage and in the general characters of the aerial parts there is a definite resemblance to *G. bohemicum* L., a species with a wide distribution in Central and in certain parts of South Europe, and which also occurs fairly widely in the Balkan Peninsula. *G. bohemicum* is, however, an annual, or at most a biennial, while *G. aristatum* is a perennial.

The material collected by Alston and Sandwith on their two expeditions is in the flowering condition only. Certain differences between the South Macedonian and the Albanian plants call for comment. The Macedonian specimens have a denser indumentum, especially on the lower parts of the stems and the petioles, and somewhat larger leaves than the Albanian. The leaf segments are also somewhat broader or are more nearly contiguous or even slightly overlapping in the former, while they diverge, often considerably, in the latter.

Bornmüller (l.c.) has pointed out certain inaccurate statements in the original description. Observations on the new specimens confirm Bornmüller's remarks.—W. B. TURRILL.

FIG. 1, basal portion of plant, *natural size*; 2, upper portion of plant, *natural size*; 3, portion of pedicel, × 4; 4, exterior sepal, outer surface view, × 3; 5, interior sepal, outer surface view, × 3; 6, internal sepal, inner surface view, × 3; 7, petal, × 2; 8, stamen, × 4; 9, gynoecium, 4.


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S.R.C.

Tabula 3277.

CEPHALORRHYNCHUS GLANDULOSUS *Boiss.*

Compositae. Tribus Cichorieae.

C. glandulosus *Boiss.* Diagn. Ser. I. no. 4, 28 (1844), et Fl. Or. iii. 820 (1875); Hausskn. in Mitt. Thür. Bot. Ver., Neue Folge vii. 55 (1895); Rouy, Illustr. Pl. Eur. Rar. fasc. 7, t. 162 (1896); Haláesy, Consp. Fl. Graec. ii. 215 (1902); Jávorka, Magyar Flora 1198 (1925); Bornmüller in Engl. Bot. Jahrb. lx. Beibl. 136, 120 (1926). *C. glandulosus* Boiss. var. *cataractarum* Simk. in Természetr. Füz. i. 169 (1877); *C. cataractarum* Simk. (1877) et *Lactuca cataractarum* Simk. sec. Nyman, Consp. Suppl. ii. 203 (1889). *Cicerbita glandulosa* (Boiss.) Beauverd in Bull. Soc. Bot. Genève, 2me Sér. ii. 140 (1910). *Mycelis glandulosa* (Boiss.) Hayek, Prodr. Fl. Penins. Balean. ii. 842 (1931).—A *C. Candolleano* Boiss. pedunculis valde glandulosis, cypselis brevioribus, pappi pilis longioribus differt.

Planta biennis, radice tuberosa. *Caules* 7·6–12·1 dm. alti, foliosi, inferne haud ramosi vel ramis brevibus debilibus praediti, superne paniculato-ramosissimi, fistulosi, glanduloso-hispidi pilis patulis rigidis instructi, siccitate longitudinaliter costati. *Folia* glabra vel fere glabra, infra glauca, infima runcinatim lyrato-pinnatipartita, segmentis lateralibus oblongis usque ad 3·5 cm. longis et 2·5 cm. latis irregulariter dentatis, terminali triangulari acuto, 2·4 dm. longa, inferne in petiolum usque ad 8·5 cm. longum basi ampliatum sed non auriculatum abeuntia; intermedia lyrato-pinnatipartita segmentis paucioribus, sessilia vel petiolo alato basi late auriculata, gradatim minora; suprema plus minusve integra in bracteas transientia. *Capitula* 39–125 in corymbos laxos compositos terminales disposita, inflorescentiae ramis pedunculisque glanduloso-hispidis; pedunculi 5–13 mm. longi; bracteae lineares vel subulatae, basi ampliato-auriculatae, 3–30 mm. longae. *Involucrum* glabrum; phylla lanceolato-linearia vel fere linearia, viridia, ea seriei exterioris 5–6, superne attenuata, 4–8 mm. longa, 1–1·5 mm. lata, ea interioris 8, apice rotundata puberula, 11·5 mm. longa, 1·5 mm. lata, membranaceo-marginata, superne purpureo-nigricantia, in fructu leviter elongata demum reflexa. *Flosculi* 10–11. *Corolla* 12·5 mm. longa, apice fere 2 mm. lata, laeteo-alba, tubo 3 mm. longo apice patule pubescente, dentibus 5 apicalibus oblongo-triangularibus 0·3–0·5 mm. longis. *Tubus staminеus* 4·5–5 mm. longus. *Stylus* complanatus,

11 mm. longus, superne ciliolatus. *Ovarium* oblongum, complanatum, apice abrupte contractum, 1·5 mm. altum, 0·5 mm. latum. *Cypsela* subteres, subincurva, basin versus leviter angustata, superne sensim angustata in rostrum viride filiforme 1·5 mm. longum apice in corpusculum semipyriforme superne planum 0·5 mm. diametro inerassatum, 7 mm. longa (rostro incluso), 0·75 mm. diametro, minute tuberculata, apicem versus aculeolata, atro-brunnea. *Pappi* setae sordide albae, exteriores numerosissimae, densae, brevissimae, circiter 0·2 mm. longae, interiores 7 mm. longae, seabridulae.

Albania. Melesin, above Leskovik, 19 June 1933, 1100 m., in shady ravine at top of limestone cliffs in humus with *Clematis* and *Fraxinus Ornus*, *Alston and Sandwith* 1784 :—" Erect tall herb. Root tuberous. Leaves glaucous beneath. Flowers creamy white, cypselas brownish-chocolate. Pappus dirty white."

Banat (ad confines Romaniae). In fagetis montium inter pagos Veriorova et Guravoie loco " Eisernes Thor," *Degen* 2670, Fl. Exsicc. Austr.-Hung.

Asia Minor. Forêts situées au N.O. du Défilé des Portes Ciliciennes, Juillet 1855, *Balansa*.

Beauverd (l.c.) retains the name *Cicerbita* Wallroth (pro max. parte) for a genus which, in his sense, includes *Mulgedium* Cass., *Lactucopsis* Schultz Bip., *Mycelis* Cass., *Cephalorrhynchus* Boiss., and *Steptorhamphus* Bunge as sections or subgenera, but is distinguished from *Sonchus* and *Lactuca* by the structure of the pappus. Generic limitations, at least in such a family as the *Compositae*, are bound to be governed very largely by subjective bias and scientific convenience. It is obviously advantageous to separate from *Lactuca* those plants having so distinctive a type of pappus as that found in *Cicerbita* sensu lato. Whether they should be all retained in one genus or distributed amongst five or fewer is a matter of secondary importance. Here the original name for the plant figured is retained, since it appears to be of no advantage to sink the genus to the rank of a subgenus without change of content, and still less to place it in the genus *Mycelis*.

The problems connected with the species itself are much more interesting. It was first described by Boissier from material collected by himself in Lydia, western Asia Minor : " in Sipylo suprà Magnesiam ubi fructiferum Julio 1842." In the Flora Orientalis (iii. 820 : 1875), specimens collected by Balansa in the same locality and at Yachamichlar Kiöi, Phrygia, are placed with the type. Haussknecht (l.c.) recorded it from " collibus dumosis supra Kalabaka pr. mon. Meteora." This Thessalian material was collected by Haussknecht in the summer of 1885. He notes that the species was collected by Borbas on the lower Danube at the Iron Gate. Jávorka (l.c.) adds the synonym " *C. hispidus* auct., var. *cataractarum* Simk." Bornmüller (l.c.) records the species from North (Serbian) Macedonia, " Demir-kapu : Felsige, waldige Abhänge der Bergrücken rechts vom Vardar " and also notes

that he collected it on the Logman near Amasia in 1889. The evidence so far available thus indicates *Cephalorrhynchus glandulosus* to be one of the numerous plants common to Asia Minor and the Balkan Peninsula, but one which has a strongly discontinuous distribution on both sides of the Aegean Sea. It is no doubt one of those species which attained distribution in Europe and Asia when the Aegean continent gave a continuous land connection, and its occurrence as far north as south-western Roumania, as far west as Albania, and as far east as Amasia, combined with the apparent wide discontinuity of its stations, suggest it is of Tertiary and not of recent origin.

Alston and Sandwith describe the floret colour as white, or more accurately as a dingy or creamy-white. Beauverd says that Bornmüller gives the floret colour as "ligules violettes" on a label of his material of No. 5237, iter Anatol. III. 1899. When the plant is dried and the florets of the capitula are connivent, a more or less violet colour is evident. Boissier does not describe the florets. Hayek (l.c.) says "flores lutei."

The structure of the pappus is distinctive. The cypsela tapers into a beak which is green and not dark-brown as is the main part of the fruit. The beak at its apex enlarges to form a pyriform hemispherical swelling which is flat at the top. The disk portion of this swelling easily becomes detached from the ripe fruit. It bears the bristles of the pappus which are in two very differently constituted series. The outer consists of very numerous short hairs which form a dense and persistent fringe. The inner series consists of much longer scabrid whitish soft bristles which break off with the greatest ease, at least in the dried material examined. Boissier seems to have wrongly interpreted the structure of the pappus and to have thought that there was only one series of bristles whose fused bases surrounded the central umbo of the disk at the top of the beak. When these bristles broke away they left a beak disk crowned with a white fimbriated margin. His description is somewhat ambiguous but gives the impression that the fimbriations are left behind after the fall of the bristles because they were the bases of these. The truly double nature of the pappus was noted by Cassini (1824) and by other authors, and is clearly explained by Beauverd (op. cit. 110, 116).—W. B. Turrill.

Fig. 1, habit, × ½; 2, leaf, *natural size*; 3, lower lateral branch of inflorescence, *natural size*; 4, involucre, × 3; 5, floret, some of long pappus hairs removed, × 6; 6, two stamens, × 8; 7, cypsela, × 6; 8, top of beak of cypsela, long pappus hairs removed, × 16; 9, upper portion of long hair of pappus, × 24.

S.R.C.

Tabula 3278.

SOLENANTHUS SCARDICUS *Bornm.*

Boraginaceae. Tribus Borageae.

S. scardicus *Bornm.* in Fedde, Repert. xvii. 276/436 (1921); a *S. Biebersteinii* DC. habitu robustiore, floribus majoribus, corollae tubo lobis 4–5-plo longiore differt.

Herba perennis vel biennis (?), caulibus nonnullis e collo crasso 5 cm. diametro ortis. *Caules* erecti, 5 dm. alti et multo altiores (usque ad 1 m. sec. *Sandwith*), inferne teretes elevatim striati, superne plus minusve sulcati, patenter vel subpatenter molliter pubescentes vel fere tomentosi, dense foliati. *Folia* integra, basalia lamina elliptica obtusa brevissime apiculata basi in petiolum 6–9 cm. longum superne supra sulcatum decurrente 2–2·4 dm. longa 7·5–10·8 cm. lata supra minutissime adpresse puberula infra albo-tomentosa costa supra inferne sulcata superne nervisque lateralibus (siccitate) leviter prominentibus infra ubique prominentibus; caulina infima lamina elliptica anguste elliptica vel elliptico-oblanceolata obtusa in petiolum longum angustato-decurrente 2–6 cm. longa; inferiora et media gradatim majora lamina elongato-elliptica vel lineari apice rotundata obtusa vel plus minusve acuta basi in petiolum gradatim breviorem angustata vel (media) sessili usque ad 2·9 dm. longa et 4 cm. lata supra puberula infra tomentella; superiora gradatim breviora; suprema (inflorescentiae ramos subtendentia) sessilia, lanceolata-ovata, basi interdum semi-amplexicaulia. *Inflorescentia* paniculata, ramis inferne nudis brevibus vel elongatis plus minusve lanatis; flores ebracteati et ebracteolati; pedicelli floriferi 5–6 mm. longi, fructiferi 2 cm. vel longiores, dense adpresse pubescentes vel sublanati. *Calyx* floriferus fere ad basin partitus, laciniis anguste lanceolatis vel oblongo-lanceolatis subobtusis 5–9 mm. longis 1·75–3 mm. latis extra sublanatis intus glabris reticulatim venosis apice subpenicillatim albo-pilosis; calyx fructiferus laciniis 11 mm. longis 5 mm. latis. *Corolla* 7 mm. longa, tubulosa, pallide sordide roseo-violascens, tubo fere glabro pilis perpaucis in sinibus praedito, lobis erectis oblongo-triangularibus obtusis 1·6 mm. longis basi 1·4 mm. latis, fornicibus e media parte corollae tubi ortis pilosiusculis anguste oblongo-triangularibus vel fere linearibus superne clavatis. *Filamenta* tota 6·8 mm. longa, fere usque ad corollae sinus corollae tubo adnata, 2·5 mm. supra corollae lobos exserta;

antherae breviter oblongae, 0·75–1·5 mm. longae. *Stylus* 7 mm. longus sed post anthesin usque ad 10 mm. auctus et inferne inerassatus. *Nuculae* (fere maturae) ambitu late semiobovatae vel ellipticae, 9 mm. longae, 7 mm. latae, 4 mm. altae, leviter marginatae, facie exteriore (superiore) planae et glochidiatae, margine vix elevato et facie interiore (inferiore) curvato densissime brevius glochidiatae, cicatrice obovata 5 mm. longa.

Albania. Ostrovicë Range, 1700–1850 m., upper slopes, on stony ground, and in open beech woods, 4 July 1933, *Alston and Sandwith* 2072 :—" Plant erect; flower a curious pale, dingy pinkish-mauve; stamens exserted."

N. Macedonia. Inter Gostivar et alpes Korab in montibus Scardicis australibus supra Mavrova in fagetis umbrosis subalpinis, altitudine 1350 m., 2 Jun. 1918, *Bornmüller* (type).

The genus *Solenanthus* contains about 18 known species. It has a wide Eurasiatic distribution and extends also into North Africa. *S. Reverehonii* Degen is confined to southern Spain. *S. petiolaris* DC. is recorded from as far east as Afghanistan and also, as are other species, from Central Asia. Six species are known from Europe, in addition to the one described above, and of these four occur in the Balkan Peninsula. The nearest genus is *Cynoglossum*, from which *Solenanthus* differs chiefly in the exserted stamens. Several species now included in the latter, including *S. apenninus* (L.) Hohenack., the longest known species, have at one time or another been placed in *Cynoglossum*.

The above description has been prepared from the material at Kew of *Alston and Sandwith* 2072. We are greatly indebted to Prof. Bornmüller for the loan of type material. This has enabled a comparison to be made between two of the original sheets and the abundant Albanian specimens. The material sent by Prof. Bornmüller as " Typus herb. Bornm." consists of " nur der untere und oberste Teil." Obviously the plant it represents was a very robust specimen. No extreme base (rootstock) is present. Prof. Bornmüller definitely describes the plant as " biennis." It is not possible to check this on the material received on loan from him. Nor is it possible to check the description of the habit as having floriferous branches right to the base and " ergo thyrsum unicum maximum latum formante." This, if correct, is probably a peculiarity of the extremely robust individual plant, at least it is not found in Alston and Sandwith's specimens. Hayek (Prodr. Fl. Penins. Balcan. ii. 52 : 1928) keys the species on the character " caulis a basi pyramidatum ramosus ramis omnibus floriferis " as contrasted with " caulis a medio circiter ramosus." This is unfortunate since the new Albanian material comes into the second category.

The original description requires a number of modifications. The shape and position of the coronal lobes (" fornices ") as given by Bornmüller do not agree with that found in the original material. In both the Macedonian and the Albanian plants the coronal lobes arise

just at or less than 0·5 mm. above the middle of the corolla-tube, and their shape is certainly not ovate narrowly oblong-triangular or oblong linear and clavately thickened in the upper part. This matter is of some importance since Braud (Pflanzenreich IV. 252. 153 : 1921) uses as a primary character in his key the position of the coronal lobes. For *S. Biebersteinii*, Brand (l.c. 159) describes the position of the coronal lobes as "ad faucem affixi." There is a certain amount of fluctuation in the size of the anthers in *S. scardicus*, but when moistened they are decidedly longer than (up to three times as long as) 0·5 mm., which is the length given by Bornmüller.

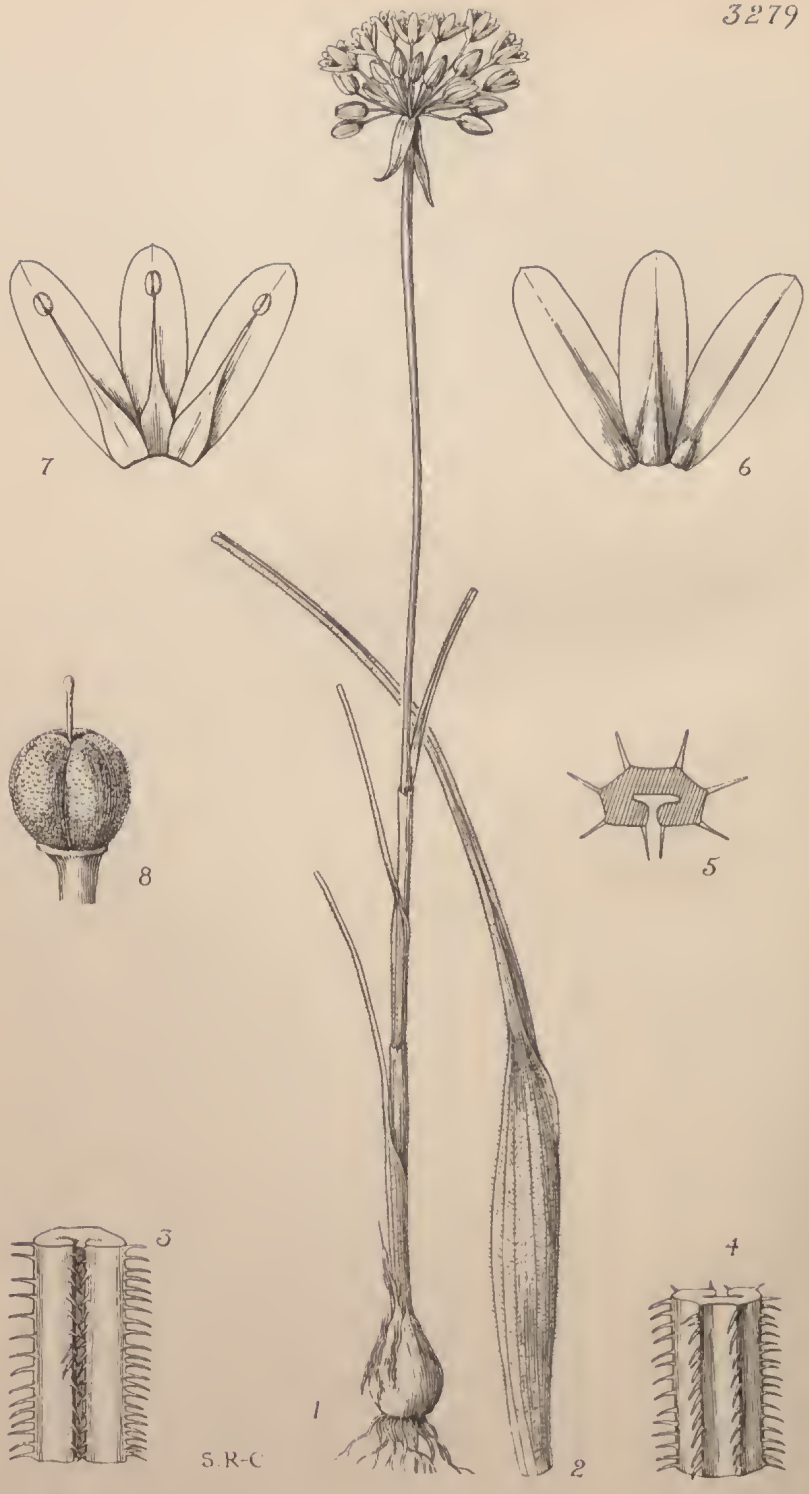
S. Biebersteinii DC. (Prodr. X. 165 : 1846), a species of the Crimea and Caucasus, with which *S. scardicus* is compared, differs specifically in the short corolla and the less robust habit. *S. Reverchonii* Degen from S. Spain, which with *S. Biebersteinii* and *S. scardicus* shows the filaments long-adnate to the upper half of the corolla-tube, is of very distinctive habit.

The other species of *Solenanthus* from the Balkan Peninsula appear to be quite distinct from *S. scardicus*. *S. albanicus* Deg. et Bald. (Magy. Bot. Lap. ii. 315 : 1903), originally described (Nuov. Giorn. Bot. Ital. vi. 337 : 1899) as a species of *Cynoglossum*, is known only from northern Epirus "in aridis alpestribus ad fortem Bočikopoulon district. Pogoni." It is characterized (and differentiated from *S. scardicus*) *inter alia* by the nearly sessile fruiting calyx. *S. stamineus* (Desf.) Wettst. ap. Stapf in Denkschr. Akad. Wiss. Wien, Math.-Naturw. Kl. l. 88 (1885) is known from eastern Anatolia, Armenia, Syria, Iraq and northern and western Persia. Haláesy (in Magy. Bot. Lap. iv. 259 : 1905 and Consp. Fl. Graec. Suppl. i. 77 : 1908) records it from Mt. Chelmos in Greece "supra Sudena Achaiae." This record needs confirmation. *S. stamineus* differs from *S. scardicus* in many characters including the position of the coronal lobes and the freedom of the filaments. *S. apenninus* (L.) Hohenack. has a fairly wide distribution in the Italian Peninsula, from the south to between 42° and 43° N., and in northern Sicily. Early records for Corfu and Zacynthos have been questioned, but Hayek (in Denkschr. Akad. Wiss. Wien, Math.-Naturw. Kl. xcix. 156 : 1924) gives it for Albania "zwischen Buchengebüsch am Westabhänge des Paštrik, zirka 1700 m." The position of the coronal lobes in *S. apenninus* is, as in *S. scardicus*, at the middle of the corolla-tube. It differs in the less exserted anthers and in the elevated margin to the nutlets.

S. scardicus has been described above as biennial or perennial with a question mark indicating that some doubt is felt on this point. Messrs. Alston and Sandwith did not notice any old fruiting stems of previous years on the plants of which material was collected and which one might expect to find on a robust perennial herb. On the other hand, the "rootstock" is thick and bears sometimes at least two and probably often several more stems. If they are not perennials some of the plants are of unusual habit for biennials. The inflorescence varies considerably, especially with age. The lower half or more of the stem

is foliaceous, but has (in all the material seen) no axillary branches to the rather crowded leaves. Usually a little above the middle of the stem, the leaves subtend branches which bear the flowers either directly or more often after a little further branching. In young plants the whole inflorescence is dense, with the branches much shorter than the leaves, but in older plants, or on older stems, the branches have elongated to give the appearance of a rather loose panicle.—W. B. Turrill.

Fig. 1, whole plant, × ½; 2, upper part of flowering plant, *natural size*; 3, flowering calyx, × 4; 4, corolla laid open, showing the coronal lobes and androecium, × 4; 5, portion of corolla from outside, × 4; 6, immature fruit and fruiting calyx, × 2; 7, nutlet, outer (upper) surface, × 3; 8, nutlet, inner (lower) surface, × 3; 9, marginal glochidia of nutlet, × 16.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Tabula 3279.

ALLIUM BORNMÜLLERI *Hayek.*

Liliaceae. Tribus Allieae.

A. Bornmülleri *Hayek* in Fedde, Repert. Spec. Nov. xxi. 260 (1925) et Prodr. Fl. Penins. Balcan. iii. 48 (1932); Bornmüller in Engl. Bot. Jahrb. Beibl. 140, 142 (1928); ab *A. moschato* L. floribus minoribus, tepalis roseo-purpureis, filamentis tepalis subaequilongis differt.

Bulbus ovoideus vel anguste ovoideus, simplex, tunicis fuscis tenuiter fibrosis vestitus. *Scapus* erectus vel leviter flexuosus, ad 20 cm. altus, inferne in tertia parte foliatus, teres, in siccitate longitudinaliter striatus. *Folia* angustissime linearia, 1·5–3 cm. longa, 0·75–1 mm. lata, canaliculata, margine anguste membranacea ciliata, nervis longitudinalibus breviter pubescentibus, vaginis breviter denseque pubescentibus. *Spatha* bivalvis, valvis inferne ovato-lanceolatis superne in partem longam vel brevem angustissime linearem angustatis in summa 8–14 mm. longis plus minusve inaequalibus reflexis. *Inflorescentia* 4–22-flora, subglobosa, 1·5–2·5 cm. diametro, haud bulbillifera, pedicellis (in floribus maturis) saepe subaequalibus 0·4–1·2 cm. longis apice leviter dilatatis. *Perigonium* ovatum, tepalis anguste ellipticis apice obtusis 4 mm. longis 1·6 mm. latis, pallide roseo-purpurascentibus dorso praecipue inferne carinatis. *Filamenta* anguste elongato-triangularia, superne fere subulata, 3·5 mm. longa, roseo-purpurea; antherae ovatae, 0·7 mm. longae, purpureae. *Ovarium* ambitu brevissime oblongum, 1·8 mm. longum, 1·5 mm. diametro, densissime papillosum; stylus 0·8 mm. longus.

South Macedonia. Kastoria, 770 m., limestone rocks on mountains above the town, 27 June 1932, *Alston and Sandwith* 1017.

The above description has been drawn up from Alston and Sandwith's material at Kew. It differs from the original description of Hayek as follows: the leaves have a ciliated (not scabrid) margin, and have lines of short but distinct hairs along the longitudinal nerves on the lower (convex) surface, and pubescent sheaths (the sheaths are not mentioned by Hayek); the tepals are obtuse (not shortly acuminate); the anthers are purple (not yellow). It is possible that Hayek described only the dried flowers, in which the tepals appear to be shortly acuminate and

the anthers are covered with pale yellow pollen. If, on the other hand, Hayek has correctly described the characters and these be stable, then Alston and Sandwith's plant probably represents a new species.

Hayek's material was collected by Vandas at Galičan near Drenovo and on the Koziak east of Prilep. Bornmüller quotes in addition specimens from near Trojaci (Nikoloff) and Lubenica (Herzog). The above localities are all in North (Serbian) Macedonia, or Vardar as it is now termed. Alston and Sandwith's material is from South (Greek) Macedonia, about 100 km. to the south of Prilep.—W. B. Turrill.

Fig. 1, entire plant, *natural size*; 2, leaf, × 3; 3, portion of leaf from adaxial side, above sheath, × 16; 4, same from abaxial side, × 16; 5, same, transverse section, × 16; 6, three tepals, showing outer surfaces, × 6; 7, three tepals and three stamens, from inside, × 6; 8, gynoecium, × 6.


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Tabula 3280.

BRACHYPODIUM SERPENTINI *C. E. Hubbard.*

Gramineae. Tribus Festuceae.

B. serpentini *C. E. Hubbard*; species nova, affinitate nulla obvia, culmis simplicibus et innovationibus intravaginalibus dense caespitosis, foliorum innovationum vaginis marginibus connatis, laminis setaceis filiformibus conduplicatis vel involutis, spiculis imbricatis pallidis 5–8-floris, rhachilla minute pubescente, lemmatibus arete imbricatis acutis 5–6-nervibus, paleis lemmatibus multo brevioribus distinguenda.

Gramen perenne, dense caespitosum, usque ad 40 cm. altum, innovationibus intravaginalibus basi paullo inerassatis. *Culmi* erecti vel leviter geniculati, graciles, simplices, 2–3-nodes, nodis purpureis, glabri vel minute pubescentes, laeves. *Folia* plerumque basalia, glauco-viridia; vaginae apicem versus asperulae vel laeves, glabrae; illae innovationum purpureae, persistentes, marginibus connatis; illae culmorum arcte appressae, teretes, internodiis multo breviores, marginibus liberis; ligulae brevissimae, truncatae; laminae filiformes, setaceae, apice acutae, usque ad 12 cm. longae, conduplicatae vel involutae et usque ad 0·5 mm. latae, rigidiusculae, arcuatae, extra glabrae, intus minute puberulae, carina et marginibus plus minusve scaberulae. *Racemus* erectus vel in exemplis siccis leviter curvatus, 4·5–6·5 cm. longus, 6–14-spiculatus; rhachis gracillima, glabra, laevis, internodiis 5–8 mm. longis; pedicelli fere obsoleti. *Spiculae* lineari-lanceolatae vel lineari-oblongae, cylindricae, demum leviter lateraliter compressae, erectae, 1·6–2·4 cm. longae, 2–3 mm. latae, fere glabrae, 5–8-florae, albido-virides, nitidulae. *Glumae* explanatae elliptico-oblongae, acutae, leviter asymmetricae, coriaceae, marginibus angustis membranaceis, apicem versus carina scaberula, extra microscopice punctatae, intus microscopice strigosae; inferior 7–8 mm. longa, 3-nervis; superior 8–9 mm. longa, quinquenervis usque subseptemnervis. *Lemmata* arete imbricata, explanata elliptico-oblonga vel oblonga, acuta, 12–9 mm. longa, coriacea, marginibus angustis membranaceis, 5 6-nervia, extra microscopice punctata, intus microscopice strigosa, apice aristata, arista recta 2·5–4·5 mm. longa; internodia rhachillae minute pubescentia, 2 mm. longa. *Paleae* oblanceolato-oblongae, obtusae, minute bilobae, usque ad 6·5 mm. longae, intus microscopice strigosae, carinis

superne rigide ciliolatis. *Lodiculae* circiter 1·5 mm. longae, superne minute pubescentes. *Antherae* 3–3·5 mm. longae, oblongo-lineares. *Ovarium* apice dense villosulum. *Caryopsis* oblanceolato-oblonga, 4–5 mm. longa.

Albania. Slopes above Voskopoj (Moskopolë), west of Korçë, on serpentine rock in gully, 1200 m., July 1933, *Alston and Sandwith* 2016 (type); *ibid.*, in a neighbouring gully, August 1935, *Alston and Sandwith* 2708; near Gjergjevicë, west of Korçë, on serpentine rocks in a deep gorge, 1200–1400 m., August 1935, *Alston and Sandwith* 2584; Boboshticë, south of Korçë, abundant on serpentine rocks in a narrow ravine at the base of mountains behind the village, 900 m., August 1935, *Alston and Sandwith* 2704.

The following note on the habitat of this grass has been contributed by the collectors: "The grass grows abundantly in three of the ravines which descend to the village of Voskopoj from the mountains rising immediately to the south-west. These mountains are of the serpentine formation; their slopes are mostly bare and stony, except for scattered pine trees and bushes of juniper and box. They possess an interesting flora of rare and local species which are mainly confined to the serpentine; for example, *Gypsophila spergulifolia* Griseb., *Linum hologynum* Reichb., *Fumana Bonapartei* Maire et Petitm., *Minuartia Baldaccii* (Hal.) Mattf., *Thymus teucrioides* Boiss. et Sprun., *Centaurea ptarmicifolia* Hal. ex Hayek (*C. epirotica* Hal., non *C. epirota* Hal.). Streams rush down the gullies and are bordered by masses of the pale lilac flowers of *Pinguicula hirtiflora* Ten. The *Brachypodium* grows on undisturbed serpentine rock along the stream-beds of these gullies, but it was also traced as far up as the summits of the mountains at their head, and here it attains an altitude of about 1500 m. The grass reappears in the serpentine gorge east of Gjergjevicë, about three miles south of Voskopoj. Finally, it was found in great abundance in an exactly similar habitat, but at a lower altitude, near Boboshticë, south of Korçë. This locality extends the distribution of the species considerably, since it lies at the base of the Morova Planina and is separated from the Voskopoj mountains by the plain of Korçë; the distance from Voskopoj must be at least twelve miles as the crow flies. It was noticed that the *Brachypodium* is found only on bare, untouched, serpentine rock, where it grows in great abundance and is frequently unaccompanied by any other species of phanerogam; it was never seen on loose rubble, nor does it grow on the sandstones of neighbouring slopes.

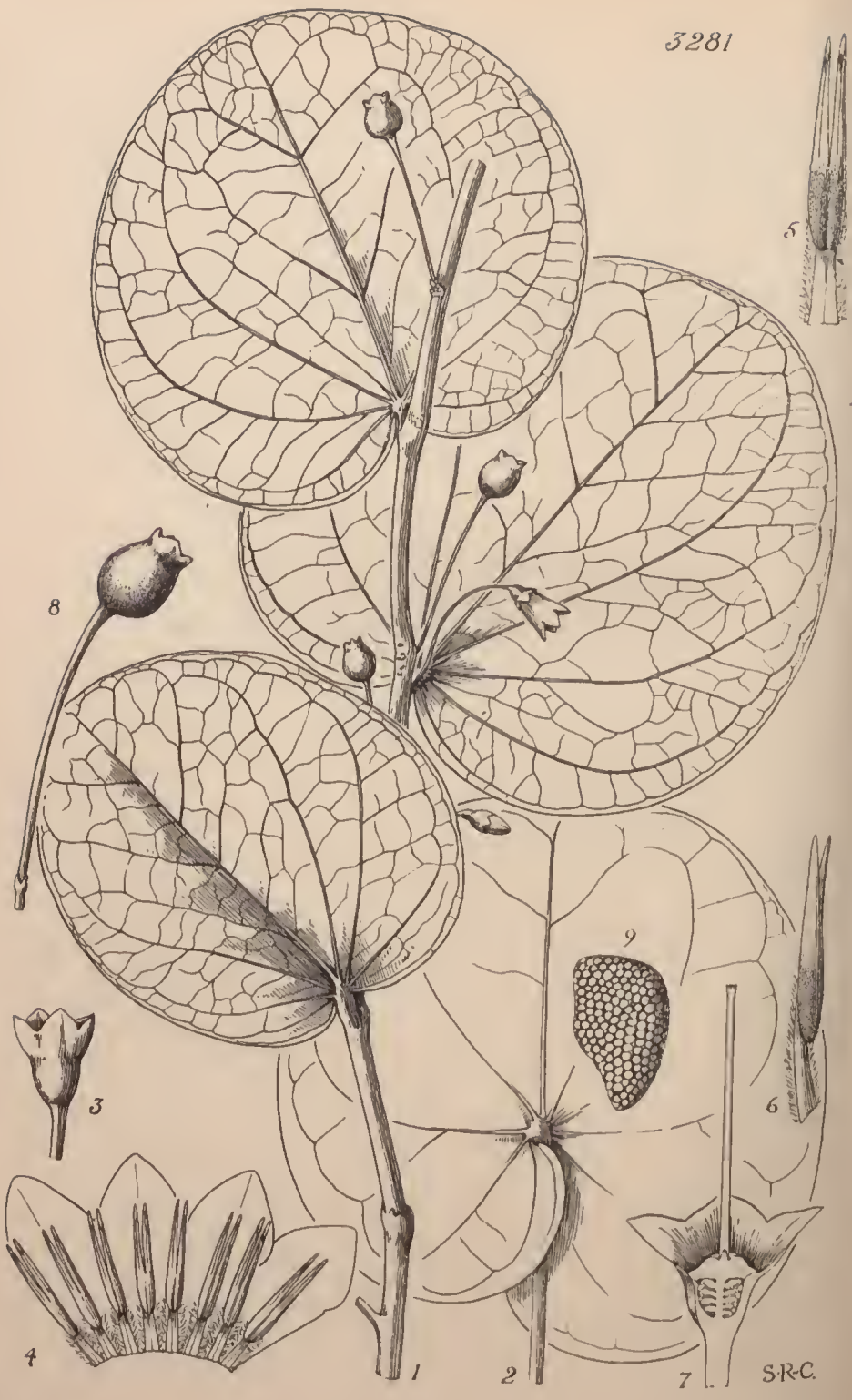
Other grasses found associated with it in August 1935, and not yet identified, were species of *Sesleria*, *Agrostis*, *Avenastrum*, *Molinia*, *Koeleria*, *Poa*, *Bromus*, *Festuca* and *Brachypodium* (possibly *B. pinnatum*). The area in which this species grows had not previously been explored by botanical collectors, although the serpentine region (Kamia, Topit) lying only a day's journey to the north has been visited by Markgraf and by Bourcart."

Brachypodium serpentini C. E. Hubbard does not show obvious affinity with any other species of the genus. Its densely caespitose habit, very short rhizomes, simple culms, entire leaf-sheaths of the innovations, setaceous filiform leaf-blades, pallid spikelets, minutely pubescent rhachilla, and 5–6-nerved lemmas serve to distinguish it readily from the five species recorded by Hayek from the Balkan Peninsula (see Hayek, Prodr. Fl. Penins. Balcan. in Fedde, Repert. Beih. xxx. No. 3, 216–218 : 1933). If the inflorescence be excluded, then *B. serpentini* bears a distinct resemblance to certain species of *Festuca*, more especially to those of sect. *Variae* Hack. The caespitose habit, the anatomical structure of the leaf-blade, and the entire sheaths of the innovations are characters often met with in species of that genus, whilst the colour of the spikelets, texture of glumes and lemmas, are somewhat similar to those of *F. flavescens* Bell. The inflorescence is, however, that of a typical *Brachypodium*. The type-specimen is in the flowering condition, but mature racemes were gathered in 1935 by Messrs. Alston and Sandwith. In these only a small percentage of the florets contained caryopses and in quite a number of cases the anthers had been only partially exserted. It seems probable that the scarcity of seed and the non-completion of anthesis were connected with the prolonged drought during the summer of 1935. The few caryopses available are somewhat similar to those of other species of *Brachypodium*. They possess the same elongated linear hilum, whilst the starch grains are simple and rounded and thus characteristic of the subtribe *Brachypodinae*.

Saint-Yves in his "Contribution à l'Étude des Brachypodium (Europe et Région méditerranéenne)" (Candollea, v. 427–493 : 1934) has adopted Ascherson and Graebner's (Syn. Mitteleurop. Fl. ii. I. 631–640 : 1901) division of the genus into two sections, I. *Eu-Brachypodium* Aschers. et Graebn. (l.c. 631 : 1901) and II. *Trachynia* (Link) Nym. (Consp. Fl. Europ. 843 : 1882), whilst Rouy (Fl. France, xiv. 294–295 : 1913) treats these divisions as subgenera. Recently Nevski (in Komarov, Fl. URSS. ii. 596 : 1934 and in Acta Univ. Asiae Mediae, ser. 8b, Bot., fasc. 17, 36 : 1934) has proceeded a stage further and on account of cytological and morphological differences has revived the genus *Trachynia* Link, restricting *Brachypodium* to the sect. *Eu-Brachypodium* Aschers. et Graebn. This section (sensu Aschers. et Graebn.) he has subdivided into two sections, I. *Leptorhachis* Nevski (l.c. 36) and II. *Eu-Brachypodium*, the former containing caespitose species, such as *B. sylvaticum* (Huds.) R. et S., with abbreviated rhizomes and long-awned lemmas, and the latter more or less caespitose species, such as *B. pinnatum* (L.) Beauv., with creeping rhizomes and shortly awned or muticous lemmas. Whether *Trachynia* Link is treated as a section of *Brachypodium* or as a distinct genus does not concern us here, as our new species is so very different, but it is necessary to consider the relationship of the latter to the sections *Leptorhachis* and *Eu-Brachypodium*. By its caespitose habit and abbreviated rhizomes *B. serpentini* approaches sect. *Leptorhachis*, whilst the short-awned lemmas resemble

those of sect. *Eu-Brachypodium*. Our plant differs, however, in so many respects from either that it is proposed to treat it as the basis of a new section, *Brachypodium* sect. **Festucopsis** *C. E. Hubbard*. The Latin specific diagnosis given above will serve also as a sectional description.—C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, transverse section of leaf-blade, × 96; 3, ligule, × 18; 4, lower glume, × 6; 5, upper glume, × 6; 6, floret, side view, × 6; 7, lemma, × 6; 8, palea, × 6; 9, internode of rhachilla, × 12; 10, lodicules and stamens, × 6; 11, lodicules, × 8; 12, ovary, × 18.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Tabula 3281.

COSTERA CYCLOPHYLLA (*Airy-Shaw*) *J. J. Smith et Airy-Shaw.*

Ericaceae. Tribus Thibaudieae.

C. cyclophylla (*Airy-Shaw*) *J. J. Smith et Airy-Shaw*, comb. nov. *Cymothoë cyclophylla* Airy-Shaw in Kew Bull. 1935, 151.—A *C. ovalifolia* J. J. Smith foliis plerumque suborbicularibus basi auriculato-cordatis, floribus tetrameris, calycis dentibus haud glanduloso-apiculatis, corolla alte sympetala, androecio diplostemono, seminibus numerosis recedit.

Frutex parvus, saepe epiphyticus, laxe subscandens, 2–3 m. altus, totus glaber. *Ramuli* rigidi, parce et irregulariter ramosi, optime teretes, usque 4 mm. diametro, cortice vetustiore cinereo juniore castaneo. *Folia* alterna, suborbicularia, multo rarius latissime ovata vel elliptico-ovata, 5–12 cm. diametro (rarius 5·5–6·5 cm. longa et 4–6 cm. lata), basi rotundata usque cordata et saepe auriculato-imbricata velut amplexicaulia, auriculis magnis rotundatis, apice optime rotundata vel levissime retuso-truncata, margine plano integerrimo ima basi juxta petiolum glandula unica hydathodiiformi utrinque praedito, rigide coriacea, persistentia, paginis inter se simillimis sed plerumque superiore nitidula inferiore obscura; costa et nervi utrinque elevati; nervi primarii utroque latere costae 3–4, ab ima basi ejus palmatim orti, quam costa vix tenuiores, marginem versus late arcuati atque varie sed regulariter anastomosantes; nervi secundarii a costa superne pinnatim orti et a nervis primariis latere exteriore orti cum proximo nervo primario anastomosantes; venuli ultimi manifeste et crebre reticulati; petioli brevissimi, subnulli usque 7 mm. longi, robusti, basi articulati. *Flores* valde irregulariter editi, axillares vel saepe manifeste extra-axillares, interdum ut videtur e ramis propriis aphyllis gracilioribus orti, fasciculati (pedunculo obsoleto), fasciculis 1–2-floris basi perulis nonnullis minutis fuscis suffultis; pedicelli gracillimi, 1–2·7 cm. longi, paullo supra basin bracteolis binis ovato-oblongis acutis vix 1 mm. longis saepe unilateraliter connatis plus minus adpressis instructi, apice sensim inerassati, in ovarium sine articulo transeuntes, glaberrimi, alabastro apice cernui, sub anthesi stricti. *Ovarium* 4-loculare, sub anthesi breviter oblongum, 1–1·5 mm. longum et latum, glabrum, nitidulum; placentae axiles, ovulis numerosis. *Calyx* breviter et late cupularis, 1–2 mm. longus, brevissime et latissime 4-dentatus,

subcoriaceus, glaber, nitidulus, lobis latissime triangularibus subcuspidatis acutiusculis basi 1·5–2 mm. latis. *Corolla* alabastro conico-oblonga, sub anthesi infundibulari-campanulata, 6–7 mm. longa, rosea, glabra : tubus circiter 4 mm. longus ; lobi deltoideo-ovati, subobtusi, 2–3 mm. longi et basi subaequilati, aestivatione imbricati, sub anthesi erecti. *Stamina* 8, inclusa, aequalia, tota circiter 5 mm. longa ; filamenta applanata, circiter 2 mm. longa, inter se libera, aequilonga, ima basi corollae adnata, marginibus praecipue superne longe ciliata, ciliis adscendentibus ; antherae lineari-lanceolatae, 3–4 mm. longae, paullo supra basin dorsifixae, basi obtusae, papillosae, dorso ecalcaratae, in rostra omnino libera teretia obtusiuscula poro apicali oblongo introrso dehiscentia sensim angustatae. *Discus* inconspicuus, annularis, integer. *Stylus* modice gracilis, 5–6 mm. longus, teres, glaber, stigmate truncato vel obscure 4-lobo. *Fructus* maturus breviter ovoideus, 4–5 mm. diametro, obsolete 4-locularis, loculis circiter 15-spermis, calyce persistente erecto vel incurvo coronatus, ut videtur durus, subexsuccus. *Semina* obtuse angulata, 1–1·5 mm. longa, 0·5–1 mm. lata, testa laete castanea pulcherrime foveolato-reticulata.

Sarawak. In moss-forest, Dulit Ridge, 1230 m., 12 Sept. 1932, *Richards* 1740 :—" Small woody scrambler, about 3 m. long. Flowers mauvish-pink. Leaves thick and leathery." In white-sand forest, Ulu Koyan, 900 m., 15 Sept. 1932, *Richards* 1829 :—" Straggling shrub. Corolla pink, conical." Open moss-forest on exposed peak, Dulit Ridge (commoner in shady moss-forest), 1100 m., 17 Sept. 1932, *Richards* 1890 (type) :—" Straggling woody climber, often epiphytic, about 2 m. high. Corolla pink."

This striking plant was recently described (Kew Bull., l.c.) as the type of a new genus, distinct both from *Costera* and from the Philippine *Iaera* H. F. Copeland. Dr. J. J. Smith, however, informs the writer that he has received material of several new species, exhibiting combinations of characters which manifestly break down the supposed generic distinctions between *Costera*, *Iacra* and *Cymothoë*. A paper on *Costera* (sensu lato) by Dr. Smith will shortly be published in the Buitenzorg Bulletin : it is therefore unnecessary to go into further details here. The writer is much indebted to Dr. Smith for bringing the matter to his notice and for kindly proposing to make the necessary transferences under joint authorship.

Some justification may be offered for referring this genus to the *Thibaudieae*, the better-known and more " typical " members of which have large, conspicuous, brightly coloured flowers. There seems little doubt that we are dealing with a much reduced type, whose evolution may be illustrated (and possibly more or less indirectly represented) by the series *Thibaudia—Themistoclesia—Sphyrospermum—Costera*, etc. The feature which at once singles out this line of development from the great bulk of the tribe is the absence of the characteristic articulation between pedicel and ovary. *Costera* (incl. *Iaera* and *Cymothoë*) is the

only Old World genus so characterized, and therefore, from a phytogeographical point of view, extremely interesting. For a fuller discussion of some of the problems raised, the reader is referred to the original paper by the writer in the Kew Bulletin (l.c. supra).

H. K. Airy-Shaw.

Fig. 1, part of flowering branch (from type specimen), *natural size*; 2, leaf, lower surface, showing auricled base, from *Richards* 1740, *natural size*; 3, calyx, × 4; 4, corolla and androecium, × 4; 5, stamen, adaxial view, × 8; 6, the same, lateral view, × 8; 7, flower in longitudinal section, corolla and stamens removed, × 6; 8, fruit, showing partly connate bracteoles at base of pedicel, × 2; 9, seed, × 16.


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Tabula 3282.

JASMINUM PELLUCIDUM *Airy-Shaw.*

Oleaceae. Tribus Jasmineae.

J. (§ **Unifoliolata**) **pellucidum** *Airy-Shaw*; species nova e grege *J. Cumingii* Merr., *J. apoënsis* Merr., *J. crassifolii* Bl., et fortasse *J. sarawacensis* King et Gamble, a quibus foliis exsiccando tenuiter sed firme membranaceis translucentibus (fere *Hymenophylli* ad instar), venulis pulcherrime reticulatis, ultimis abrupte terminantibus, inflorescentia longe et laxe thyrsoidea abunde distincta.

Frutex scandens, ramis sat gracilibus 2–3 mm. diametro teretibus vel subtilissime striolatis, cortice griseo usque subeastaneo glabro. *Folia* ovato-lanceolata, 10–14 cm. longa, 3–5 cm. (raro usque 6·5 cm.) lata, basi rotundata usque subcuneata, apice acuminata acuta, margine integerrima saepe revoluta, tenuiter sed firme membranacea, aureo-brunneo-translucentia, glaberrima, juniora nitida; costa gracilis, infra prominens, supra impressa; nervi laterales utrinque 6–9, saepe suboppositi, a costa angulo 45°–60° orti, prope marginem anastomosantes, axillis infra brevissime barbatis, venulis ultimis pulcherrime reticulatis abrupte quasi praesectis utraque pagina prominulis, mesophyllo siccitate pellucido minutissime punctato; petioli 1–2 cm. longi. *Inflorescentiae* axillares, nonnunquam e gemmis serialibus ortae, anguste thyrsoideae, longitudine valde variabiles, 5–40 cm. (plerumque 10–20 cm.) longae, aphyllae, parte inferiore quarta usque dimidia eramosae, superne breviter et regulariter ramosae, sub lente minutissime puberulae; ramuli oppositi vel suboppositi, patuli usque fere patentes, 1–2 cm. longi, basi bractea subulato-filiformi 4–9 mm. longa suffulti, apice cymulam trifloram regulariter gerentes; cymulae bracteis binis filiformibus 2–3 mm. longis suffulti; pedicelli 5–6 mm. longi. *Calyx* totus 3–5 mm. longus, minutissime puberulus: tubus cupularis, 2–3 mm. diametro; dentes subulato-filiformes, tubo subaequilongi. *Corolla* alba, glabra: tubus anguste cylindricus, 1·8–2·3 cm. longus, circiter 1 mm. diametro; limbi 5–8-partiti segmenta oblongo-elliptica, 1–1·4 cm. longa, utrinque angustata, apice acutissima, pagina superiore siccitate subglauca. *Stamina* 2: filamenta filiformia, circiter 2 mm. longa, medio tubo corollae inserta, glabra; antherae anguste oblongae, 2 mm. longae, 0·8 mm. latae, utrinque obtusae vel apice subcuspidatae,

glabrae, thecis lateraliter dehiscentibus. *Ovarium* oblongum, vix 1 mm. longum et latum, apice truncatum, glabrum. *Stylus* clavatus, 4–6 mm. longus, glaber. *Fructus* ignotus.

Sarawak. Baram District, Entoyut River, Nov. 1894, *Hose* 419. Dulit, in secondary forest, under 300 m., Aug. 1932, *Richards* 1385 (type) :—" Woody climber on tree 15 m. high. Flowers pure white." Tenompok, 1500 m., March 1932, *J. & M. S. Clemens* 30299 :—" Fls. white."

The remarkable translucency of the leaves (at least when dried), and the long narrow thyrses, at once mark off this species from its nearest allies. It appears to be most closely related to the Philippine *J. Cumingii* Merr., which differs in its broadly ovate leaves, almost truncate at the base, and in its much shorter inflorescences. The reticulations of the ultimate veinlets in the present species, and their abrupt terminations, are extremely beautiful when seen under a lens by transmitted light against the golden-brown of the pellucid mesophyll.

H. K. Airy-Shaw.

Fig. 1, flowering branch, showing habit, × ½ ; 2, leaf, lower surface, *natural size* ; 3, portion of leaf, lower surface, showing venation, × 6 ; 4, part of inflorescence, *natural size* ; 5, calyx and style, × 6 ; 6, corolla, opened out, showing stamens, × 2 ; 7, stamen, adaxial view, × 6 ; 8, gynoecium, × 6.


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Tabula 3283.

HETERACHNE ABORTIVA (*R. Br.*) *Druce.*

Gramineae. Tribus Eragrosteae.

H. abortiva (*R. Br.*) *Druce* in Rep. Bot. Exch. Club Brit. Isles, 1916, 627 (1917). *Poa abortiva* R. Br. Prodr. 181 (1810). *Heterachne Brownii* Benth. in Hook. Ic. Pl. xiii. 40 (1877); Fl. Austral. vii. 635 (1878); F. M. Bailey, Syn. Queensl. Fl. 667 (1883); Queensl. Fl. vi. 1909, t. 86 (1902); Compreh. Cat. Queensl. Pl. 632 (1913); Ewart and Davies, Fl. North. Territ. 51 (1917).—Affinis *H. Gulliveri* Benth., a qua spiculis late oblongis vel late ovatis majoribus, anthoeciis sterilibus plerumque 4-22 differt.

Gramen annuum. *Culmi* fasciculati vel solitarii, erecti vel geniculati, 10–35 cm. alti, graciles, rigidi, simplices vel ramosi, ramis erectis, 3–5-nodes, glabri, laeves, internodio summo (pedunculo) usque ad 7 cm. longo. *Foliorum vaginae* marginibus ciliatae et ore barbatae vel glabrae laevesque; ligulae ad seriem ciliorum redactae; laminae anguste lineares, acutae, 5–16 cm. longae, arcte convolutae, explanatae usque ad 2·5 mm. latae, erectae, rigidae, supra laxe vel dense pilosae vel glabrae et scaberulae, subtus laeves. *Panicula* anguste oblonga, oblonga vel elliptico-oblonga, spiciformis, densissima, continua vel basi leviter interrupta, 1·5–5 cm. longa, 1–2 cm. lata; rhachis glabra; rami breves, dense spiculati; pedicelli brevissimi, pilosi. *Spiculae* arcte imbricatae, late oblongae vel late ovatae, obtusae, 3–10 mm. longae, 3–6 mm. latae, purpurascentes vel stramineae. *Glumae* ambitu oblique ovatae, acuminatae, apice obtusae vel acutae, marginibus ciliolatis, carina superne scaberula; inferior 1–1·5 mm. longa; superior 1·8–2·5 mm. longa. *Anthoecia fertilia* 1–2; lemmata ambitu oblique et anguste ovata vel optime ovata vel ovato-oblonga, obtusissima, plerumque emarginata, 2·6–3·5 mm. longa, ala scaberula vel scabrido-ciliolata; paleae 2–2·8 mm. longae, alis ciliolatis. *Anthoecia sterilia* plerumque 4–22, raro 2, arcte imbricata; lemma iis anthoeciorum fertilium similia sed leviter angustiora et plerumque integra, oblongo-ovata vel lanceolato-oblonga. *Antherae* 0·3–0·5 mm. longae. *Caryopsis* 1·3–1·5 mm. longa.

Northern Australia. Port Darwin, *Herb. Brisb.* 23, *Schultz* 302 (ex Benth.); Pine Creek, on granite rock in creek, June 1886, *Lea* (Herb. Mus. Brit.).

Queensland. Burke District: Gulf of Carpentaria, Island C, Nov. 1802, *Brown* 6268 (type); Bentinck Island, June 1901, *Bailey* K. 24; Carron Creek, *Armit.* Cook District: Musgrave, *Millar* K. 26.

For many years the genus *Heterachne* Benth. (Hook. Ic. Pl. xiii. 39: 1877) has consisted of only two species from Northern Australia and Queensland, namely, *H. abortiva* (R. Br.) Druce and *H. Gulliveri* Benth. A new species, *H. Baileyi* C. E. Hubbard, is now added and also a variety of *H. Gulliveri*, both from Northern Queensland. It has accordingly been considered advisable to give an emended description of *H. Gulliveri* Benth. and a key to the three species.

Key to the Species.

Spikelets broadly oblong or broadly ovate, 3–10 mm. long, 3–6 mm. wide, with 1–2 fertile and usually 4–22 sterile florets, the latter much exceeding the fertile florets . . . . . 1. *H. abortiva.*

Spikelets orbicular, ovate-orbicular or broadly ovate, with 1, rarely 2 fertile and 2–5 sterile florets, the latter equalling or slightly exceeding the fertile florets:

Lemmas and paleas ciliate:

Spikelets 2–2·5 mm. long and wide; leaf-blades 0·5–1 mm. in diameter . . . . . 2. *H. Gulliveri.*

Spikelets 3–4 mm. long and wide; leaf-blades opening out and up to 3·5 mm. wide . . . . . 2. *H. Gulliveri*, var. *major.*

Lemmas and paleas quite glabrous; spikelets 3–3·5 mm. long. 3. *H. Baileyi.*

1. **H. abortiva** (*R. Br.*) *Druce* (vide supra).

2. **H. Gulliveri** *Benth.* in Hook. Ic. Pl. xiii. 39, t. 1250 (1877); Fl. Austral. vii. 635; F. M. Bailey, Syn. Queensl. Fl. 667 (1883); Queensl. Fl. vi. 1910 (1902); Compreh. Cat. Queensl. Pl. 632 (1913); Ewart and Davies, Fl. North. Territ. 51 (1917).—Descriptio hic emendata.

Gramen annuum. *Culmi* laxe caespitosi, erecti vel leviter geniculati, usque ad 25 cm. alti, gracillimi, filiformes, ramosi vel simplices, 2–3-nodes, glabri, laeves, internodio summo (pedunculo) usque ad 14 cm. longo. *Foliorum vaginae* vel ore breviter barbatae et marginibus ciliatae vel totae glabrae; ligulae ad seriem ciliorum redactae; laminae filiformes, setaceae, siccitate arcte convolutae, 3·5–12 cm. longae, 0·5–1 mm. diametro, rigidiusculae, erectae, extra glabrae laevesque, intus sparse pilosae. *Panicula* angusta, interrupta, 2–7·5 cm. longa, 4–10 mm. lata; rhachis gracillima, glabra; rami dense spiculati, pilosi, inferiores usque ad 3 cm. distantes et 1·5 cm. longi; pedicelli brevissimi, dense pilosi. *Spiculae* dense imbricatae, orbiculares, 2–2·5 mm. longae et latae, purpurascentes. *Glumae* ambitu oblique ovatae, obtusae vel acutae, marginibus minute ciliolatis, carina superne minute scaberula;

inferior 1–1·5 mm. longa; superior 1·5–2 mm. longa, trinervis. *Anthoecium fertile* 1; lemma ambitu oblique ovato-oblongum, obtusissimum, apice emarginatum vel breviter bidentatum, 2–2·5 mm. longum, ala superne minute ciliolatum; palea 1·5–1·8 mm. longa, alis ciliolatis. *Anthoecia sterilia* 2–3; lemmata ci anthoecii fertilis similia sed anguste ovato-oblonga vel anguste oblonga; paleae nullae. *Antherae* 0·3 mm. longae. *Caryopsis* 1 mm. longa.

Northern Australia. Settlement Creek, around springs, June 1923, *Brass* 371.

Queensland. Burke District: Normanton, *Gulliver*; between Gilbert and Norman Rivers, *Gulliver* (type). Cook District: Etheridge River, *Armit*.

H. Gulliveri *Benth.* var. **major** *C. E. Hubbard*; varietas nova, culmis plerumque validioribus et saepe altioribus, ore vaginarum longe barbato, panicula densiore spiciformi, spiculis majoribus a typo recedens.

Culmi erecti, 10–40 cm. alti, graciles, rigidi, 2–4-nodes, internodio summo (pedunculo) 3–12 cm. longo. *Foliorum vaginae* marginibus ciliatis, ore longe barbato; laminae 7–16 cm. longae, siccitate convolutae vel inferne explanatae et usque ad 3·5 mm. latae, erectae, supra laxe pilosae. *Panicula* lineari-lanceolata vel anguste oblonga, spiciformis, densissima, basin versus interrupta, superne plus minusve lobata, 3–12 cm. longa, 4–17 mm. lata; rami dense pilosi, inferiores usque ad 4 cm. distantes et 2 cm. longae. *Spiculae* dense imbricatae, suborbiculares vel ovato-orbiculares, 3–4 mm. longae et latae. *Glumae* acutae vel obtusae; inferior 1·3–2 mm. longa; superior 2–2·8 mm. longa. *Anthoecium fertile* 1 (raro 2); lemma 2·8–3·5 mm. longum, marginibus et ala minute ciliolatum; palea 2–2·5 mm. longa, alis dense ciliolatis. *Anthoecia sterilia* 3–5; lemmata apice ciliolata. *Antherae* 0·3–0·5 mm. longae. *Caryopsis* 1·2–1·5 mm. longa.

Queensland. Cook District: near Chillagoe, on limestone, Feb. 1910, *Domin*; Forest Home Station, Gilbert River, on hard flats on ridges, March 1931, *Brass* 1838; Gilbert River, in clay pans, March 1925, *Brass* 438, on hard country, Feb. 1927, *Brass* 1716 (type); Gilbert River, 1877, *Armit*.

The specimen collected by Domin at Chillagoe was identified by him as *H. Gulliveri* Benth. in Biblioth. Bot. xx. 409 (1915).

3. **H. Baileyi** *C. E. Hubbard*; species nova, ab *H. Gulliveri* Benth., foliorum laminis latioribus, pedicellis minus pilosis, spiculis glabris majoribus, glumis angustioribus acutis longioribus distinguenda.

Gramen annuum. *Culmi* laxe fasciculati, erecti vel leviter geniculati, usque ad 36 cm. alti, graciles, teretes, ramosi, 4–6-nodes, glabri, laeves, internodio summo (pedunculo) usque ad 15 cm. longo. *Foliorum*

vaginae laxae, glabrae laevesque vel sparse pilosae ; ligulae ad seriem ciliorum redactae ; laminae lineares, acutae, usque ad 7 cm. longae et 3·5 mm. latae, planae vel siccitate laxe convolutae, glabrae vel supra sparse pilosae. *Panicula* lanceolata vel linearis, interrupta, usque ad 12 cm. longa et 2 cm. lata ; rhachis gracillima, pilis debilibus patulis sparse pilosa ; rami patentes, arcte spiculati, 0·5–4 cm. distantes, inferiores usque ad 3·5 cm. longi ; pedicelli brevissimi, breviter pilosi. *Spiculae* arcte imbricatae, late ovatae vel orbiculares, 3–3·5 mm. longae, 2–3·5 mm. latae, glabrae, stramineae, nervis viridibus. *Glumae* ambitu lanceolatae vel anguste ovatae, subaequales, 1·8–3 mm. longae, carina scaberula ; gluma superior trinervis. *Anthoecium fertile* 1 ; lemma ambitu ovato-oblongum, rotundato-obtusum, 2·8–3·2 mm. longum, carina laevi ; palea lemmate brevior, glabra. *Anthoecia sterilia* 1–2 ; lemmata eo anthoecii fertilis similia sed angustiora ; paleae nullae.

Queensland. Cook District : Weipa, on the Embley River, June 1901, *J. F. Bailey* (Herb. Kew. et Herb. Brisb.).

The systematic position of the genus *Heteraehne* Benth. requires reconsideration. Bentham (Hook. Ic. Pl. xiii. 39 : 1877) placed his new genus in the tribe *Festuceae* (sensu lato), and stated that it was allied to *Eetrosia* R. Br. and *Elytrophorus* Beauv. Later (in Benth. et Hook. f. Gen. Pl. iii. 1188 : 1883), whilst retaining *Eetrosia* and *Heteraehne* in the *Festueeae*, he referred them to different subtribes, namely, *Eetrosia* to the *Eragrosteae* and *Heteraehne* to the *Melieeae*. Haekel (Engl. u. Prantl, Nat. Pflanzenf. ii. Abt. 2, 70 : 1887) treated both genera as members of the subtribe *Meliceae*. *Heteraehne* differs from *Eetrosia* by its awnless lemmas, but resembles it in possessing sterile florets above the fertile, a character which no doubt greatly influenced Haekel in associating these genera with *Melica* Linn. This classification is, however, a very unnatural one. *Melica* is a temperate genus, differing from both *Heteraehne* and *Eetrosia* in having 7–9-nerved convex lemmas. In my opinion a more satisfactory arrangement is to place the last two genera with *Eragrostis* in the tribe *Eragrosteae* with which they agree in the possession of 3-nerved lemmas.

In studying Australian grasses, a number of cases of cleistogamy have already been noted, and it appears probable that it occurs also in all species of *Heteraehne*, as, in dissecting mature florets, the very small anthers have been frequently found still enclosed in the floret at the apex of the caryopsis.—C. E. Hubbard.

Fig. 1, plant, *natural size* ; 2 and 3, spikelets, × 12 ; 4, lower glume, × 12 ; 5, upper glume, × 12 ; 6, fertile lemma, side view, × 12 ; 7, palea, with caryopsis, × 12 ; 8, lodicules, × 20 ; 9, flower, × 16 ; 10, caryopsis, × 12 ; 11, transverse section of caryopsis, × 12 ; 12, sterile lemma, × 12.


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Tabula 3284.

ISEILEMA WINDERSII *C. E. Hubbard.*

Gramineae. Tribus Andropogoneae.

I. Windersii *C. E. Hubbard*; species nova, affinis *I. membranaceo* (Lindl.) Domin, a quo inflorescentia laxiore, spathis longioribus, spatharum carina glandulas minutas sessiles gerente, racemis et spiculis majoribus, spicularum involucralium gluma inferiore brevissime pubescente, arista longiore differt.

Gramen annuum, usque ad 40 cm. altum. *Culmi* fasciculati vel solitarii, erecti, graciles, leviter compressi, rigidi, ramosi vel simplices, infra inflorescentiam 1–2-nodes, nonnunquam pruinosi, glabri, laeves. *Folia* glabra, glauca; vaginae compressae et acute carinatae, internodiis breviores, nonnunquam pruinosae, laeves vel carina superne scaberula; ligulae truncatae, usque ad 1·5 mm. longae, tenuiter membranaceae, ciliatae; laminae lineares, acutae, usque ad 16 cm. longae et 6 mm. latae, conduplicatae et carinatae vel demum explanatae, firmae, marginibus et carina plerumque scabridae, ceterum laeves vel supra scaberulae. *Inflorescentia* foliacea, erecta, angusta, 6–18 cm. longa; internodia primaria 3–6, filiformia, inferiora usque ad 7 cm. longa, superiora gradatim breviora; foliorum vaginae carina glandulas minutas sessiles gerentes; spathae ambitu angustissime ellipticae vel oblique lanceolatae, acuminatae, acute carinatae, 1–2 cm. longae, virides, demum brunneae vel rubido-brunneae, tenuiter nervosae, herbaceo-membranaceae, demum papyraceae, marginibus hyalinis, carina ut vaginae glandulifera et insuper scabrida. *Racemi* demum lateraliter exserti, oblongi vel elliptico-oblongi, 8–10 mm. longi, tandem e pedunculis disarticulantes; pedunculi filiformes, superne minutissime pubescentes vel scaberulae, 4–5 mm. longi; rhachis 0·8 mm. longa, glabra. *Spiculae involucrales* ♂, contiguae, oblongae vel elliptico-oblongae, 5–6·5 mm. longae; pediccelli validi, 1·5–2 mm. longi, basi connati et pilis albis sericeis 2–3 mm. longis dense barbati; gluma inferior obtusa vel acuta, dorso plus minusve applanata, cartilaginea, marginibus angustis inflexis membranaceis, crebre 12–20-nervis, brevissime et dense pubescens; gluma superior oblanceolato-oblonga, acuta, dorso convexa, coriacea, marginibus hyalinis inflexis, 3–7-nervis, glabra vel prope basin pilis brevissimis pubescens; lemma inferius oblongum vel oblanceolato-oblongum, truncatum vel laceratum,

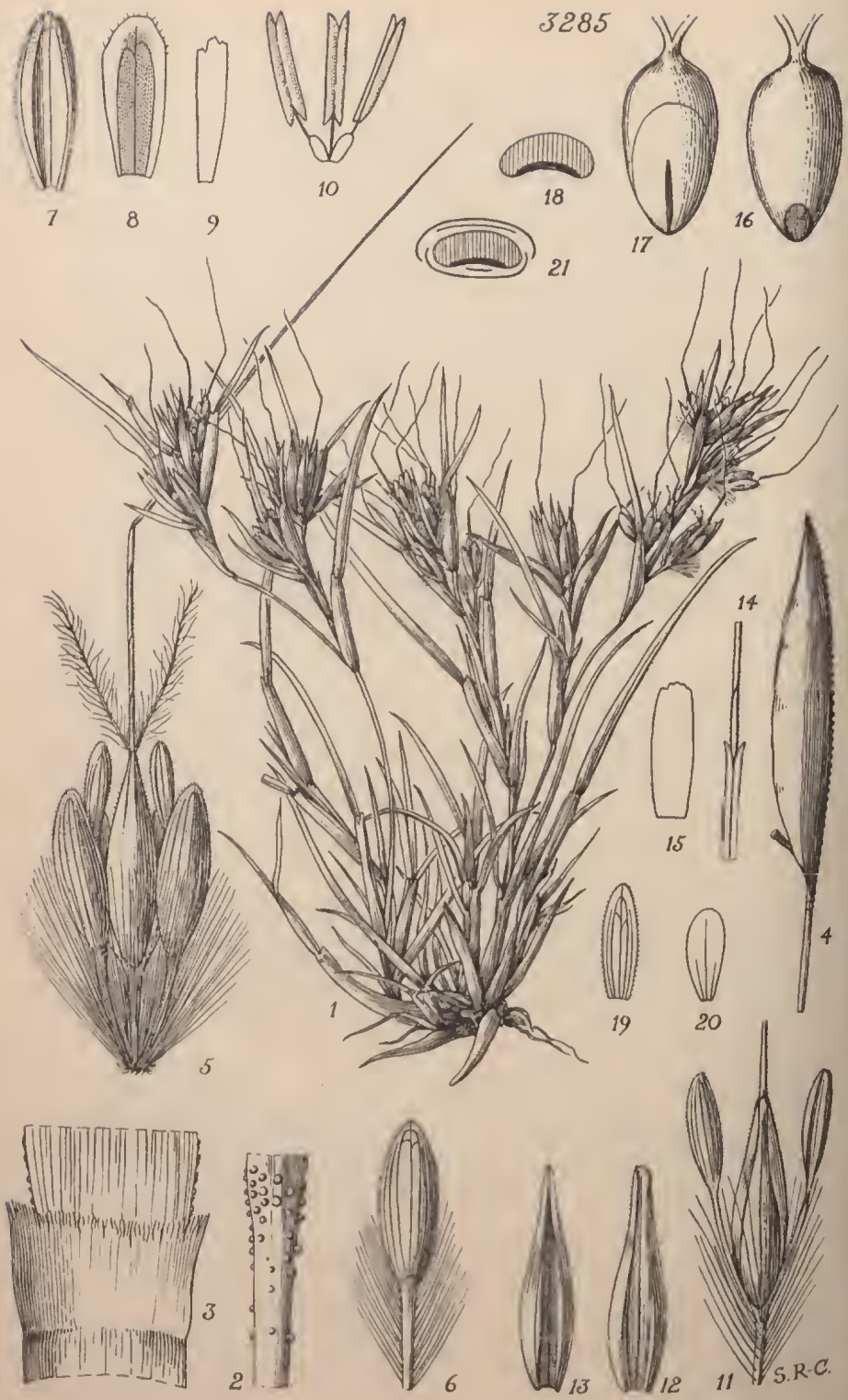
4–6 mm. longum, hyalinum, enerve; palea inferior nulla; lemma superius lineare, 5 mm. longum, hyalinum, vel plerumque nullum; palea superior nulla; lodiculae truncatae; antherae 1·5–2·2 mm. longae. *Spicula fertilis* ♀, lanceolata, acuminata, 7–8 mm. longa; gluma inferior minute biloba vel truncata, dorso applanata vel leviter concava, coriacea, 8–10-nervis, marginibus brevissime et dense pubescens; gluma superior lanceolata, acuminata, tenuiter acuta, dorso infra medium leviter convexa, coriacea, marginibus hyalinis, 3-nervis, carina superne scabrido-ciliolata, ceterum glabra; lemma inferius oblongo-ovatum, 3–4 mm. longum, hyalinum, enerve; palea inferior nulla; lemma superius lineare, bilobum, lobis angustissimis usque ad 1 mm. longis, 1-nerve, hyalinum, 4–5 mm. longum; arista geniculata, brunnea, minute scaberula, 1·8–3·3 cm. longa, columna usque ad 2 cm. longa; palea superior nulla; caryopsis obovata vel oblonga, 2·5–3·5 mm. longa. *Spiculae pedicellatae* ♂, anguste ellipticae vel lanceolato-ellipticae, acutae, 4–5 mm. longae; pedicelli 3–3·5 mm. longi, gracillimi, brevissime pubescentes; gluma inferior membranacea, 7–11-nervis, brevissime pubescens; gluma superior lanceolata vel anguste elliptica, acuta, membranacea, 3-nervis, nervo medio prope apicem scabrido-ciliolata, ceterum glabra; lemma inferius anguste oblongum, 3·4·5 mm. longum, hyalinum, enerve; antherae usque ad 1·5 mm. longae.

Queensland. Burke District: Rocklands Station, near Camooweal, 1931, *Little* 17; Morstone Downs Station, near Camooweal, *Manager, per Agric. Chemist* Lab. No. 5685; Bundoran, near Nonda, in *Astrebla* grassland, in heavy dark-brown soil, 165 m., Feb. 1931, *Hubbard and Winders* 7286 (type); near Hughenden, in grassy places, March 1910, *Domin* (Herb. Domin.).

The collection of Dr. Domin's Queensland grasses, which he has kindly lent for study, includes four sheets of specimens from the neighbourhood of Hughenden, which have been identified by him as *Iseilema membranaceum* (Lindl.) Domin in Biblioth. Bot. xx. Heft 85, 281 (1915). Two sheets are referable to *I. vaginiflorum* Domin, one to *I. Windersii* C. E. Hubbard and the fourth to *I. convexum* C. E. Hubbard.

C. E. Hubbard.

Fig. 1, plant, *natural size*; 2, spathe; 3, raceme; 4, involucral spikelet; 5–8, details of involucral spikelet:—5, lower glume, from inside; 6, upper glume, from outside; 7, lemma of the lower floret, with male flower; 8, diagram of involucral spikelet; 9, fertile and pedicelled spikelets; 10–16, details of fertile spikelet:—10, lower glume; 11, upper glume; 12, lemma of the upper floret; 13, pistil; 14, lemma of the lower floret; 15 and 16, caryopsis; 17, transverse section of caryopsis. Figs. 2–7, 9–17, × 6.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Tabula 3285.

ISEILEMA DOLICHOTRICHUM *C. E. Hubbard.*

Gramineae. Tribus Andropogoneae.

I. dolichotrichum *C. E. Hubbard*; species nova, ab *I. membranaceo* (Lindl.) Domin foliis glandulas minutas gerentibus, basibus racemorum et pedicellis spicularum involucralium pilis usque ad 5 mm. longis dense barbatis, gluma inferiore spicularum involucralium fere laevi, arista longiore distinguenda.

Gramen annuum, circiter 8 cm. altum. *Culmi* laxe fasciculati, erecti vel geniculati, graecillimi, infra inflorescentiam 1–2-nodes, tuberculos minutos glandulosos infra nodos gerentes, nodis glabri vel sparse pilosi, ceterum glabri laevesque. *Folia* glabra, glauca; vaginae compressae, acute carinatae, internodiis plerumque breviores, tenuiter nervosae, marginibus hyalinis, praeter carinam glandulis sessilibus minutis obsitam laeves; ligulae truncatae, usque ad 1 mm. longae, membranaceae; laminae anguste lineares, acutae, usque ad 4 cm. longae, conduplicatae et acute carinatae, explanatae usque ad 2·5 mm. latae, rigidae, carina et marginibus ut vaginis glanduliferae etiam scaberulae. *Inflorescentia* foliacea, densa, 3–4·5 cm. longa; internodia primaria filiformia, inferiora usque ad 1·8 cm. longa, superiora gradatim breviora; spathae ambitu angustissime ellipticae vel oblique lanceolatae, acutae, acute carinatae, 10–12 mm. longae, virides, tandem pallide brunneae, tenuiter nervosae, herbaceae, marginibus latis hyalinis, carina glanduliferae et scaberulae. *Racemi* demum lateraliter exserti, 7–8 mm. longi, tandem a pedunculis disarticulantes; pedunculi filiformes, usque ad 2 mm. longi, apice tuberculos minutos glandulosos gerentes; rhachis triquetra, usque ad 2 mm. longa, longe ciliata. *Spiculae involucrales* vel ♂ vel steriles, fere contiguae, elliptico-oblongae vel oblongae, obtusae, 3–3·6 mm. longae, dorso compressae, pallide virides; pedicelli graecillimi, compressi, 2·2·5 mm. longi, basin versus longe ciliati, basi connati et pilis albis sericeis usque ad 5 mm. longis dense barbati; gluma inferior dorso plana vel leviter convexa, firme chartacea, marginibus angustis inflexis tenuiter membranaceis, 7–9-nervis, dorso sparse asperula, carinis scaberula; gluma superior oblanceolato-oblonga, explanata late obtusa, firme membranacea, apice et marginibus hyalinis, 3-nervis, apice ciliolata; lemma inferius anguste oblongum, late obtusum, 3–3·3 mm. longum, hyalinum, enerve, glabrum; lemma

superius et paleae desunt; antherae 0·8–1·2 mm. longae. *Spicula fertilis* ♀, lanceolata, acuminata, 4·5–5 mm. longa; gluma inferior apice anguste truncata, inferne marginibus incurvis, superne bicarinata, carinis scaberula, ceterum laevis, coriacea, 10-nervis; gluma superior lanceolata, acuminata, apice obtusa, coriacea, marginibus hyalinis inflexis, 3-nervis, nervo medio apicem versus scaberula, ceterum laevis; lemma inferius ovato-oblongum vel oblongum, obtusum, usque ad 3 mm. longum, hyalinum, enerve, glabrum; palea inferior nulla; lemma superius oblongo-lineare, apice breviter et acute bilobum, usque ad 3 mm. longum, hyalinum, 1-nerve; arista geniculata, brunnea, usque ad 2 cm. longa, minute scaberula, columna usque ad 8 mm. longa; palea superior nulla; caryopsis obovata vel elliptico-obovata, 2 mm. longa. *Spiculae pedicellatae* vel ♂ vel steriles, spiculis involucralibus similes sed minores et angustiores, 2·3–3 mm. longae; pedicelli tenuiter filiformes, 2·5–3 mm. longi, scabrido-ciliolatae; gluma inferior firme membranacea, 7-nervis; gluma superior tenuiter membranacea, 3-nervis; lemma inferius anguste oblongum, 2 mm. longum, vel nullum.

Queensland. Gregory North District: Duchess, banks of gully, on hard reddish-brown soil, 354 m., Feb. 1931, *Hubbard* 7347.

Only one specimen of *Iseilema dolichotrichum* was collected, but its apparent rarity was no doubt due to the exceptionally dry conditions prevailing during the summer season of 1930–1931. Duchess is situated in extremely arid hilly country, broken by rocky gullies. The main vegetation consists of a fairly close covering of a spiny-leaved grass (*Triodia* sp.), whilst the gullies are fringed with trees of *Eucalyptus* and *Melaleuca*. It was along the banks of such a gully that the new species was found growing in association with various other annual grasses, such as *Perotis rara* R. Br., *Digitaria ctenantha* Hughes, *Triraphis mollis* R. Br., *Dactyloctenium radulans* R. Br., etc.—C. E. Hubbard.

Fig. 1, plant, *natural size*; 2, portion of stem near a node, × 16; 3, ligule, × 12; 4, spathe; 5, raceme; 6, involucral spikelet and pedicel; 7–10, details of involucral spikelet:—7, lower glume; 8, upper glume; 9, lower lemma; 10, male flower; 11, fertile and pedicelled spikelets; 12–18, details of fertile spikelet:—12, lower glume; 13, upper glume; 14, upper lemma; 15, lower lemma; 16 and 17, caryopsis; 18, transverse section of caryopsis; 19 and 20, details of pedicelled spikelets:—19, lower glume; 20, upper glume; 21, diagram of fertile spikelet. Figs. 4–15, 19–20, × 6; figs. 16–18, 21, × 12.


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Tabula 3286.

ISEILEMA CALVUM *C. E. Hubbard.*

Gramineae. Tribus Andropogoneae.

I. calvum *C. E. Hubbard*; species nova, ab *I. Windersii* C. E. Hubbard foliorum vaginis et spathis vix vel haud glandnliferis, racemis fere glabris, lemmate inferiore 1–3-nervi, lodiculis apice appendiculis acutis praeditis distinguenda.

Gramen annuum, caespitosum, 15–40 cm. altum. *Culmi* erecti vel basi geniculati, graciles, subteretes, rigidi, infra inflorescentiam 4–6-nodes, internodiis inferioribus brevibus, e nodis ramosi, glabri, laeves, plerumque pruinosi. *Folia* glauca, glabra; vaginae compressae, acute carinatae, laeves vel lateribus asperulae, inferiores pruinosae, internodiis longiores vel breviores; ligulae truncatae, membranaceae, usque ad 1 mm. longae, ciliolatae; laminae lineares, tenuiter acutae, usque ad 25 cm. longae, 3–6 mm. latae, erectae, primum conduplicatae et acute carinatae, demum explanatae, firmae, carina et marginibus scabridae vel omnino scaberulae. *Inflorescentia* erecta vel curvata, foliacea, angusta, densa vel interrupta, 4–25 cm. longa; internodia primaria 3–5, inferiora usque ad 15 cm. longa; foliorum vaginae carina scaberulae, haud glanduliferae; spathae ambitu oblique ellipticae, acutae, 1·2–1·7 cm. longae, acute carinatae, carina scabridae et glandulas minutas paucas nonnunquam gerentes, demum papyraceae, marginibus hyalinis, pallide virides, demum rubido-brunneae. *Racemi* inclusi vel demum lateraliter subexserti, oblongi, 7–9 mm. longi, demum e pedunculis disarticulantes; pedunculi filiformes, 3·5–6 mm. longi, minute scaberuli; rhachis 0·5 mm. longa, glabra. *Spiculae involucrales* ♂, arete contiguae, late oblongae vel late elliptico-oblongae, 5·5–6·5 mm. longae, fere glabrae; pedicelli validi, 0·8–1 mm. longi, basi connati, glabri; gluma inferior acuta, dorso plerumque convexa, cartilaginea, marginibus angustissimis membranaceis inflexis, apice extra nervosae, intus crebre 17–21-nervis, basi pilis brevissimis rigidis exceptis glabra, dorso plus minusve et carinis supra medium minute scaberula; gluma superior oblanceolato-oblonga, acuta, tenuiter coriacea, marginibus hyalinis inflexis, 3-nervis, glabra, laevis; lemma inferius explanatum anguste oblongum, obtusum, 5·5·5 mm. longum, membranaceum, 1–3-nerve; lemma superius et paleae desunt; lodiculae apice appendiculis angustis acutis praeditae; antherae 1·5 mm.

longae. *Spicula fertilis* ♀, lanceolata, acuminata, 6–7 mm. longa, glabra; gluma inferior truncata, dorso leviter convexa, tenuiter coriacea, 8–12-nervis, carinis apicem versus scaberulis exceptis laevis; gluma superior lanceolata, acuminata, acuta, tenuiter coriacea, 3-nervis, carina prope apicem scaberula, ceterum laevis; lemma inferius lanceolatum, acuminatum, acutum, 5·5–6 mm. longum, membranaceum, 3-nerve, laeve; palea inferior nulla; lemma superius lineare, integrum vel apice minutissime et obscure bilobum, 3–5 mm. longum, 1-nerve; arista geniculata, 1·5–2·2 cm. longa, columna 5–10 mm. longa; palea superior nulla; caryopsis elliptico-oblonga, oblonga vel obovata, 3 mm. longa. *Spiculae pedicellatae* ♂, lanceolatae vel ellipticae, 3–5 mm. longae; pedicelli gracillimi, 3·5–4 mm. longi, apicem versus minute scaberuli; gluma inferior membranacea, 11–13-nervis, minute scaberula; gluma superior elliptica, acuta, tenuiter membranacea, 3-nervis, laevis; lemma inferius anguste ellipticum, 3–4 mm. longum, 3-nerve, tenuissimum; antherae 1·5 mm. longae.

Northern Australia. Sturt's Creek, *Gregory*.

Queensland. Burke District: Nonda, between Hughenden and Cloncurry, damp depression in grassland, 154 m., Feb. 1931, *Hubbard and Winders* 7304; Hughenden, June 1919, *Hawthorn*; Jardine Valley, near Hughenden, in open *Astrebla lappacea* grassland, heavy dark-brown soil, 350 m., Feb. 1931, *Hubbard and Winders* 7173 (type). Cook District: Gilbert River, *Wildash*.

Gregory's specimen from Sturt's Creek was cited under *Anthistiria membranacea* Lindl. by Bentham (Fl. Austral. vii. 543).

Two species of *Iseilema*, *I. calvum* C. E. Hubbard and *I. vaginiflorum* Domin, were growing in abundance at Jardine Valley, near Hughenden, and ample material of each was gathered for examination. Amongst a large number of specimens of *I. calvum*, two plants (*Hubbard and Winders* 7173B) were found which are probably the product of hybridization between the above two species. In general habit they closely resemble *I. calvum*, but in other respects they approach *I. vaginiflorum*. The longer more slender pedicels of the involucral spikelets being bearded at the base recall those of the latter species, whilst the larger male involucral spikelets with firmer glumes are more characteristic of the former. One important feature which serves to emphasize the relationship to *I. calvum* is the 1–3-nerved lower lemmas; these organs being nerveless in all other Australian species with the exception of that species.

The genus *Iseilema** Anderss. comprises about 16 species, seven of which occur in India, Ceylon, Burma, Siam and Indo-China, whilst the remainder are confined to Australia. It forms, with *Themeda* Forsk. (*Anthistiria* L. f.) and *Germainia* Balansa et Poitrass., a well-defined

* Hackel (DC. Monogr. Phan. vi. 681: 1889) points out that *Iseilema* is neuter and that Andersson was in error in treating it as feminine. Andersson's mistake has been perpetuated by many other botanists.

group of the *Andropogoncae* which Stapf has named the *Themedastrae* (Prain, Fl. Trop. Afr. ix. 8: 1917). These genera are characterized by the few-noded, much-contracted solitary racemes, and by the homogamous male or neuter lower pairs of spikelets which form a false involucre around the 1–3 fertile spikelets and the male or neuter pedicelled spikelets. *Iseilema* may be readily distinguished from *Themeda*, as each raceme is articulated with its pedunele and falls away as a whole at maturity, whereas in *Themeda* the involucral spikelets are persistent and the remainder of the raceme is deciduous.

The Australian species are found throughout the Commonwealth with the exception of Victoria and Tasmania and the southern part of Western and South Australia, but are most abundant in the tropical or subtropical drier parts of the continent where the major portion of the rainfall takes place in the summer months. Queensland possesses by far the greater number of species, as all those at present known from Australia, with the exception of *I. trichopus*, are to be found in this state. Several species are widely spread, whilst others, as far as is known at present, are rather local in their distribution. *I. membranaceum* occurs over a very wide area extending from Camooweal and Mt. Emu Plains Station in Northern Queensland to the southern part of New South Wales and the northern part of South Australia. *I. vaginiflorum* has a still wider distribution stretching from northern Western Australia through Northern Australia to Queensland and southwards to New South Wales and South Australia. It does not appear, however, to be so common in N.S. Wales as *I. membranaceum*. The other species are confined to the tropical portions of Australia and, with the exception of *I. calvum* and *I. trichopus*, are at present known only from the Burke and Cook Districts of Queensland. The Australian species of *Iseilema* are frequently associated with the Mitchell Grasses (*Astrebla* spp.) on the open grassland of the downs and plains, growing in bare places on heavy black or brown soils between the tufts of the latter, or forming almost pure stands.

In Australia these grasses are collectively known as "Flinders Grass," but they have also been called "Landsborough Grass," "Red Gulf Grass," and "Bareoo Grass." Recently *I. membranaceum* has been termed "Small Flinders Grass," *I. vaginiflorum* "Red Flinders Grass," whilst C. T. White records "Bull Mitchell Grass" as the name for *I. macratherum* on the Gilbert River in Queensland. Although described as annuals, most species produce leafy sterile shoots, which, if conditions were more favourable, might enable the plants to behave as biennials. The root-system usually extends only a few inches into the ground and rarely appears as much as a foot in length (Francis in Queensl. Agric. Journ. n.s. xliii. 274: 1935); on this account the plants are readily pulled up. Specimens vary greatly in size, ranging from a few to about 24 inches in height, and, if the rainfall is poor, even very small plants will flower and produce seed. Flinders Grasses respond quickly to the summer rains which occur from January to April; they make rapid growth and soon reach maturity.

From an economic point of view the Flinders Grasses are exceedingly valuable to sheep and stock-owners in the drier and warmer parts of the Australian continent. They are usually described as excellent fodder grasses and are often reputed to be more palatable than the renowned Mitchell Grasses (*Astrebla* spp.). Some species are more fragile than others but all break up when dry. The broken fragments of all species are said to provide much forage which is relished by stock, whilst frequent reference is made to the fact that sheep even lick up the small pieces from the ground (Everist in Queensl. Agric. Journ. n.s. xliii. 377–382 : 1935).

The correct interpretation of the structure of the spikelets of *Iseilema* is far from obvious. The involucral spikelets usually consist of two glumes, a hyaline nerveless scale, 2 lodicules and 3 stamens, with occasionally a rudimentary ovary. Such a structure is indicated in the diagram given on tab. 3284 (*I. Windersii*). The dotted lines denote the missing parts. The hyaline scale, which is the lemma of the lower floret, might at first be thought to represent the palea of the upper floret as it is opposite the lodicules. That this latter interpretation is incorrect, is seen when a comparison is made with the corresponding scale in *I. calvum*. In this species the scale is 1–3-nerved and very like the upper glume. The number of nerves at once leads one to the conclusion that it is not a palea and that it must be the lower lemma. The upper floret is thus without lemma or palea, although a rudiment of the former is sometimes present. The fertile spikelet is usually described as hermaphrodite, although Hackel (DC. Monogr. Phan. vi. 678 : 1889) was doubtful as to this point, for he writes in describing this spikelet "♂ (v. interdum ♀?)" and "Stamina (sp. fertilis) non vidi." In all the Australian species the fertile spikelet is female and no traces of stamens, other than rudimentary filaments, have been found ; but in the Indian species some of the fertile spikelets are definitely hermaphrodite. The racemes are subjected to considerable compression, owing partly to crowding and partly to being more or less confined in the spathes and floral sheaths. This compression has caused reduction in the size of some organs and suppression of others. In the species dealt with below, various stages of reduction are encountered, the most noticeable being in the involucral spikelets of *I. vaginiflorum*. These are sterile and mostly reduced to the lower glume, or the latter may be much reduced in size or even completely suppressed.

The "seed" is usually composed of the whole raceme which disarticulates from the peduncle at maturity, the involucral spikelets serving to protect the central fertile spikelet. In a few cases, however, the fertile spikelet has been found to disarticulate from the rhachis ; in such cases it has no pungent bearded callus as have species of *Themeda*. The racemes are very light and in many species possess a basal tuft of hairs which no doubt assists in dispersal by wind, although since the introduction of sheep the presence of an awn provides the raceme with an additional means of dispersal. The distribution of these grasses is being extended towards the coast by the spread of "seed" along stock-

routes and railway tracks by means of sheep and other animals. In *I. vaginiflorum* the spikelets are almost wholly enclosed in the floral sheaths, which become indurated at maturity and finally detached from the inflorescence, thus forming a special type of "seed."

Key to the Australian species of Iseilema.

*Inflorescence not disarticulating at the nodes at maturity; racemes becoming laterally exserted and finally disarticulating from their peduncles; floral leaf-sheaths herbaceous, becoming papery, always sharply keeled:

Involucral spikelets 4–6·5 mm. long, their pedicels from one-sixth to one-third their length:

Racemes glabrous at the base; lower glume of the involucral spikelets glabrous on the back; lower lemmas 1–3-nerved. 1. *I. calvum.*

Racemes densely bearded at the base; lower glume pubescent or scaberulous on the back; lower lemmas nerveless:

Lower glume of the involucral spikelets densely ciliate on the keels, scaberulous on the back; lower glume of the fertile spikelet glabrous . . . . . 2. *I. ciliatum.*

Lower glume of the involucral spikelets scaberulous on the keels, pubescent on the back; lower glume of the fertile spikelet pubescent to tomentose:

Floral leaf-sheaths glandular on the keel; racemes oblong or elliptic-oblong; involucral spikelets 5–6·5 mm. long; lower glume of the involucral spikelets more or less flattened on the back:

Racemes bearded at the base with hairs 2–3 mm. long; involucral spikelets oblong or elliptic-oblong; lower glume of fertile spikelet densely pubescent only along the sides. 3. *I. Windersii.*

Racemes bearded at the base with hairs about 4·5 mm. long; involucral spikelets elliptic; lower glume of fertile spikelet tomentose all over . . . . . 4. *I. trichopus.*

Floral leaf-sheaths eglandular; racemes elliptic or oblong-elliptic; involucral spikelets 4–5 mm. long; lower glume very convex on the back. 5. *I. convexum.*

Involucral spikelets 3–4 mm. long, their pedicels about one-third to half their length:

Spathes closely glandular on the keel; base of racemes bearded with hairs up to 5 mm. long; lower glume of involucral spikelets nearly smooth . . . 6. *I. dolichotrichum.*

Spathes eglandular or sparingly glandular; base of racemes bearded with hairs up to 2 mm. long or glabrous; lower glume scabrid or scaberulous on the back. 7. *I. membranaceum.*

**Inflorescence usually readily disarticulating at the nodes at maturity; involucral spikelets 3–4·5 mm. long, their pedicels about one-third their length; raceme-bases bearded with hairs 1–2 mm. long or glabrous.

Floral leaf-sheaths herbaceous, or indurated downwards, keeled; racemes finally exserted; involucral spikelets 4–4·5 mm. long; awns 2–3 cm. long . . . . . 8. *I. macratherum.*

Floral leaf-sheaths becoming indurated and cartilaginous, rounded on the back downwards; racemes almost wholly enclosed and tightly embraced by the spathes and sheaths; involucral spikelets 3–4 mm. long or suppressed; awn 1·5–2 (rarely 2·3) cm. long . . . . . 9. *I. vaginiflorum.*

Enumeration of Species.

1. **I. calvum** *C. E. Hubbard*, supra (t. 3286).

Distrib. Northern Australia and Queensland (Burke and Cook Districts).

2. **I. ciliatum** *C. E. Hubbard*, species nova; ab *I. trichopodi* C. E. Hubbard, inflorescentia congesta, racemorum basi pilis brevioribus barbata, spiculis involucralibus oblongis, spicularum involucralium pedicellis paullo brevioribus et glumis inferioribus striatis ad carinas molliter ciliatis, spiculae fertilis glumis glabris distinguenda.

Gramen annuum, circiter 35 cm. altum. *Culmi* erecti, graciles, laeves. *Foliorum laminae* lineares, acutae, usque ad 12 cm. longae. *Inflorescentia* densa, contracta, circiter 7 cm. longa et 7 cm. lata; foliorum vaginae carina glanduloso-punctatae et scabridae; spathae ambitu ellipticae, acuminatae, acutae, 1·2–1·5 cm. longae, acute carinatae, herbaceae, marginibus hyalinis, virides, demum rubido-brunneae, tenuiter nervosae, carina et nonnunquam nervis glandulos minutos sessiles gerentes. *Racemi* oblongi, 7·5–8 mm. longi, demum lateraliter subexserti, tandem e pedunculis disarticulantes; pedunculi gracillimi, 2·5–3 mm. longi, prope apicem tuberculis minutis glandulosis praediti; rhachis 1 mm. longa, pilis albis sericeis 2 mm. longis barbata. *Spiculae involucrales* ♂, arete contiguae, oblongae vel anguste oblongae, 5–5·5 mm. longae; pedicelli validi, 1·5 mm. longi, basi connati et pilis albis usque ad 2 mm. longis dense barbati, ceterum glabri; gluma inferior obtusa vel subacuta, dorso striato-sulcata et nervis scaberula, cartilaginea, marginibus angustissimis membranaceis inflexis, prominenter 7–11-nervis, carinis dense ciliata et apice glandulas minutas paucas gerens; gluma

superior oblanceolato-oblonga, acuta, coriacea, marginibus hyalinis inflexis, 3-nervis, glabra, laevis; lemma inferius oblongum, 5 mm. longum, hyalinum, enerve; lemma superius et paleae desunt; lodiculae truncatae; antherae 2 mm. longae, aurantiacae. *Spicula fertilis* ♀, lanceolata, acuminata, 7 mm. longa; gluma inferior apice emarginata, dorso leviter convexa, coriacea, 6-nervis, glabra, carinis apicem versus sparse scaberula et glandulas minutas sessiles gerens; gluma superior lanceolata, acuminata, acuta, coriacea, 3-nervis, glabra, carina apicem versus scaberula; lemma inferius hyalinum, enerve, oblongum, bilobum, 4 mm. longum; palea inferior nulla; lemma superius lineare, breviter bilobum, 2 mm. longum, 1-nerve; arista geniculata, 1·8–2·2 cm. longa, columna 1–1·2 cm. longa; palea superior nulla. *Spiculae pedicellatae* ♂, lanceolato-ellipticae, acutae, 3–3·5 mm. longae; pediccelli gracillimi, 3·5 mm. longi, sparse ciliati vel glabri; gluma inferior membranacea, 7–9-nervis, glabra, carina et nervo medio glandulas minutas paucas gerens; gluma superior oblongo-elliptica, membranacea, 3-nervis, glabra, laevis; lemma inferius oblongum, 3 mm. longum, 3-nerve, hyalinum, nervo medio ut gluma inferior glanduliferum vel laeve.

Queensland. Burke District: near Hughenden, towards Mt. Walker, in grassy places, Feb. 1910, *Domin* (Herb. Domin.).

The specimen cited above was referred to *I. membranaceum* Domin var. *trichopus* (Benth.) Domin, by Domin in Biblioth. Bot. xx. Heft 85, 281 (1915) and the description there given is based on that specimen and not on the type of *Anthistiria membranacea* var. *trichopus* Benth.

3. **I. Windersii** *C. E. Hubbard*, supra (t. 3284).

Distrib. Queensland (Burke District).

4. **I. trichopus** *C. E. Hubbard*; species nova. *Anthistiria membranacea* Lindl. var. *trichopus* Benth. Fl. Austral. vii. 544 (1878). *Iseilema Mitchellii* Anderss. var. *trichopus* (Benth.) Hack. in DC. Monogr. Phan. vi. 685 (1889). *I. membranaceum* Domin var. *trichopus* (Benth.) Domin in Biblioth. Bot. xx. Heft 85, 281 (1915), excl. specim. et descr.—Species ab *I. Windersii* C. E. Hubbard, foliorum vaginis inferioribus lateribus asperulis et minutissime papillosis, racemorum basi pilis longioribus barbata et pedunculo apice tuberculos minutos gerente, racemis laxiusculis, spicularum involucralium pedicellis gracilioribus paullo longioribus, spiculis involucralibus ellipticis acutis, spiculae fertilis glumis fere omnino brevissime tomentosis distinguenda.

Gramen annuum, circiter 25 cm. altum. *Culmi* erecti, graciles, compressi, rigidi, infra inflorescentiam 1–2-nodes, e nodis ramosi, glabri, tuberculos minutos glandulosos infra nodos gerentes, ceterum laeves. *Foliorum vaginae* internodiis breviores, compressae, acute carinatae,

carina sparse glanduloso-punctatae, inferiores lateribus asperulae et minutissime papillosae et carina scaberulae, superiores laeves; ligulae truncatae, 1 mm. longae, ciliolatae; laminae lineares, acutae, usque ad 12 cm. longae, primum conduplicatae et carinatae, demum explanatae et usque ad 5·5 mm. latae, firmae, glabrae, marginibus carina et supra scaberulae. *Inflorescentia* foliacea, angusta, erecta, contracta, 12 cm. longa; internodia primaria circiter 6, inferiora 3·5 cm. longa; foliorum vaginae carina glanduloso-punctatae; spathae ambitu anguste ellipticae, acutae, 1·2–1·5 cm. longae, acute carinatae, pallide virides, tandem papyraceae, marginibus hyalinis, tenuiter nervosae, carina et nonnunquam nervis glandulas minutas sessiles gerentes. *Racemi* demum lateraliter exserti, late oblongi, 9–10 mm. longi, tandem e pedunculis disarticulantes; pedunculi filiformes, circiter 3 mm. longi, apice tuberculos minutos glandulosos gerentes; rhachis 1 mm. longa, pilis paucis usque ad 3 mm. longis praedita. *Spiculae involucrales* ♂, contiguae, ellipticae, 5–6 mm. longae; pedicelli graciliusculi, 2 mm. longi, basi connati et pilis albis sericeis usque ad 4·5 mm. longis dense barbati, ceterum glabri; gluma inferior acuta, dorso plana, cartilaginea, marginibus angustis inflexis hyalinis, 13–17-nervis, parte apicali excepta dense et brevissime pubescens, carina tuberculos paucos glandulosos minutissimos gerentes; gluma superior anguste elliptica, acuta, coriacea, marginibus hyalinis inflexis, 3-nervis, glabra, laevis; lemma inferius oblongum, 3·5–5·5 mm. longum, hyalinum, enerve; lemma superius et paleae desunt; lodiculae truncatae; antherae 1·5 mm. longae vel ultra. *Spicula fertilis* ♀, lanceolata, acuminata, 7 mm. longa; gluma inferior minute biloba, dorso plana, crustacea, circiter 8-nervis, omnino brevissime tomentosa; gluma superior lanceolata, acuminata, acuta, tenuiter coriacea, marginibus hyalinis inflexis, 3-nervis, dorso inferne brevissime tomentosa; lemma inferius 3 mm. longum, hyalinum, enerve, ovato-oblongum; palea inferior nulla; lemma superius lineare, bilobum, lobis angustissimis 0·5 mm. longis, 1-nerve, 4 mm. longum; arista geniculata, 1·5–1·8 cm. longa, columna 6 mm. longa; palea superior nulla; caryopsis elliptica, 3–3·5 mm. longa. *Spiculae pediccllatae* steriles, lanceolatae, acutae, 3–4 mm. longae; pedicelli gracillimi, brevissime pubescentes, 3–3·5 mm. longi; gluma inferior tenuiter membranacea, 9-nervis, minute pubescens; gluma superior anguste elliptica, 3-nervis, vel plerumque redacta et minutissima; lemma inferius minutissimum vel nullum.

Northern Australia. Hooker's Creek, *Mueller*.

The specimen referred by Domin (l.c.) to *I. membranaceum* Domin var. *trichopus* (Benth.) Domin represents a distinct species, *I. ciliatum* C. E. Hubbard (supra, n. 2).

5. **I. convexum** *C. E. Hubbard*; species nova, ab *I. Windersii* C. E. Hubbard, foliorum vaginis haud glanduliferis, spatharum carina sparse glandulifera, racemis ellipticis vel oblongo-ellipticis paullo minoribus,

spicularum involucralium saepissime sterilium gluma inferiore 11–15-nervi dorso valde convexa breviore et lemmate inferiore plerumque nullo, spiculae fertilis glumis fere omnino pubescentibus distinguenda.

Gramen annuum, usque ad 70 cm. altum. *Culmi* laxe fasciculati, erecti vel geniculati, graciles, leviter compressi, rigidi, infra inflorescentiam 2–3-nodes, simplices vel sparse ramosi, primum pruinosi, glabri, laeves. *Folia* glabra, glauco-viridia; vaginae internodiis breviores, compressae et acute carinatae, laeves vel carina apicem versus scaberulae, inferiores nonnunquam pruinosae; ligulae truncatae, 0·5 mm. longae, ciliolatae; laminae lineares, acutae, usque ad 18 cm. longae et 5·5 mm. latae, primo conduplicatae, demum explanatae, firmae, marginibus carina et pagina superiore scaberulae. *Inflorescentia* foliacea, erecta, angusta, laxiuscula, usque ad 35 cm. longa; internodia primaria 4–6, inferiora usque ad 20 cm. longa; foliorum vaginae carina laeves, haud glanduliferae; spathae ambitu anguste ellipticae, acutae, acute carinatae, 1–1·6 cm. longae, pallide virides vel purpureo-tinctae, herbaceo-membranaceae, marginibus hyalinis, tandem papyraceae, carina scaberulae et eglanduliferae vel glandulas paucas minutas sessiles gerentes. *Racemi* demum lateraliter exserti, elliptici vel oblongo-elliptici, 6·5–8 mm. longi, tandem e pedunculis disarticulantes; pedunculi filiformes, 4–5 mm. longi, glabri vel prope apicem minute scabridi; rhachis 0·8 mm. longa. *Spiculae involucrales* vel ♂ vel plerumque steriles, contiguae, oblongae vel elliptico-oblongae, 4–5 mm. longae; pedicelli validi, 1–1·5 mm. longi, basi connati et pilis albis 2–2·5 mm. longis dense barbati; gluma inferior obtusa vel acuta, dorso convexa, cartilaginea, marginibus angustis hyalinis inflexis, 11–15-nervis, brevissime et dense pubescens; gluma superior elliptico-oblonga, acuta, dorso convexa, coriacea, marginibus hyalinis inflexis, 3–7-nervis, glabra vel prope basin pilis brevissimis pubescens; lemma inferius hyalinum, 0·5 mm. longum, vel plerumque nullum; lemma superius et palcae desunt; lodiculae truncatae; antherae 1·5 mm. longae. *Spicula fertilis* ♀, lanceolata, acuminata, 5·5–6·5 mm. longa; gluma inferior minute biloba, dorso plana vel leviter concava, coriacea, 8–9-nervis, omnino dense et brevissime pubescens; gluma superior lanceolata, acuminata, tenuiter acuta, coriacea, marginibus hyalinis inflexis, 3-nervis, dorso inferne dense et brevissime pubescens; lemma inferius ovato-oblongum, bilobum, 2·5–3 mm. longum, hyalinum, enerve; palea inferior nulla; lemma superius lineare, bilobum, lobis angustissimis usque ad 1 mm. longis, 1-nerve, 3 mm. longum; arista geniculata, 1·6–2 cm. longa, columna usque ad 1 cm. longa; palea superior nulla; caryopsis obovata, 2·5 mm. longa. *Spiculae pedicellatae* vel ♂ vel steriles, elliptico-lanceolatae vel ellipticae, acutae, 3–4 mm. longae; pedicelli gracillimi, 2·5–3 mm. longi, brevissime pubescentes; gluma inferior membranacea, 9-nervis, minute pubescens; gluma superior lanceolata, 3-nervis; lemma inferius oblongum, 2–2·5 mm. longum, hyalinum.

Queensland. Burke District: Wongalee Station, 30 miles N. of Hughenden, amongst *Dichanthium* sp., etc., on black soil flats, Feb. 1931, *Hubbard and Winders* 7461; Jardine Valley, near Hughenden, in open *Astrebla lappacea* grassland, on heavy brown soil, 350 m., Feb. 1931, *Hubbard and Winders* 7173A; near Hughenden, in grassy places, March 1910, *Domin* (Herb. Domin.). Darling Downs District: cultivated on the property of Dr. Hirschfeld at Bybera, Jan. 1934, *White* 9741 (type).

Domin's specimen from near Hughenden was included under *Iseilema membranaceum* (Lindl.) Domin, by Domin in Biblioth. Bot. xx. Heft 85, 281 (1915). His description of that species is apparently based on this specimen as he states that the involucral spikelets are up to 5 mm. long, whereas in a specimen of *I. Windersii* C. E. Hubbard (which he also included under *I. membranaceum*) they are 5–6·5 mm. long.

6. **I. dolichotrichum** *C. E. Hubbard*, supra (t. 3285).

Distrib. Queensland (Gregory North District).

7. **I. membranaceum** (*Lindl.*) *Domin* in Biblioth. Bot. xx. Heft 85, 280 (1915), excl. descr. et specim.; Maiden and Betche, Census N.S. Wales Pl. 15 (1916); Black, Fl. S. Austral. 56 (1922), partim. *Anthistiria membranacea* Lindl. in Mitch. Journ. Trop. Austral. 88 (1848); F. Muell. Fragm. v. 207 (1866), partim; Benth. Fl. Austral. vii. 543 (1878), partim; F. M. Bailey, Syn. Queensl. Fl. 646 (1883); Moore, Fl. N.S. Wales, 480 (1893); Turner in Agric. Gaz. N.S. Wales, iv. 81, fig. (1893), et in Journ. Dept. Agric. W. Austral. xiii. 67, fig. (1906); Turner, Austral. Grasses, 11, fig. (1895); Maiden, Man. Grasses N.S. Wales, 94 (1898); Breakwell, Grasses and Fodder Pl. N.S. Wales, 200, fig. 98 (left) (1923). *Iseilema Mitchellii* Anderss. in Nov. Act. Soc. Sci. Upsal., Ser. 3, ii. 252 (1856); Hack. in DC. Monogr. Phan. vi. 684 (1889), partim, excl. var. *trichopus*; F. M. Bailey, Queensl. Fl. vi. 1871 (1902), partim, et Compreh. Cat. Queensl. Pl. 620 (1913), et in Queensl. Agric. Journ. xxv. 290 (1910). *I. actinostachys* Domin in Biblioth. Bot. xx. Heft 85, 282, tab. 12, fig. 1, tab. 13, fig. 2 (1915); J. M. Black in Trans. & Proc. Roy. Soc. S. Austral. lvii. 144 (1933).

Gramen annuum, laxe caespitosum, 5–40 (raro usque ad 90) cm. altum. *Culmi* erecti vel geniculato-adscendentes, gracillimi vel graciles, compressi vel subteretes, ramosi, infra inflorescentiam 0-2-nodes, glabri, laeves. *Folia* glabra, glauca vel viridia; vaginae internodiis breviores, compressae, acute carinatae, laeves; ligulae truncatae, circiter 1 mm. longae, membranaceae, ciliolatae; laminae lineares, acutae, 2–20 cm. longae, 2–5 mm. latae, primum conduplicatae, demum explanatae, asperulae vel fere laeves. *Inflorescentia* conglomerata,

foliacea, interrupta, usque ad 18 cm. vel ultra longa; vaginae acute carinatae, herbaceae, laeves vel carina nonnunquam sparse glanduliferae; spathae ambitu anguste ellipticae vel ellipticae, acutae, 0·8–1·2 mm. longae, acute carinatae, herbaceae, marginibus hyalinis, tenuiter nervosae, carina plus minusve scaberulae et nonnunquam sparse glanduliferae. *Racemi* dense fasciculati, demum lateraliter exserti, oblongi, 5–7 mm. longi, e pedunculis demum disarticulantes; pedunculi filiformes, 1–3 mm. longi, laeves vel scaberuli; rhachis 0·5–1 mm. longa, apice pilis usque ad 2 mm. longis praedita. *Spiculae involucrales* vel ♂ vel steriles, oblongae vel elliptico-oblongae, 3–4 mm. longae; pedicelli graciles, 1·5–2 mm. longi, basi connati et pilis albis usque ad 2 mm. longis barbati vel raro glabri; gluma inferior obtusa vel acuta, dorso plana, plerumque tenuiter coriacea, marginibus angustis inflexis, dorso et carinis dense scaberula vel scabrida vel scabrido-puberula, prominenter 9–15-nervis; gluma superior explanata elliptica, obtusa, tenuiter coriacea, marginibus hyalinis inflexis, 3-nervis, laevis; lemma inferius anguste oblongum, usque ad 3·5 mm. longum, hyalinum, enerve; lemma superius et paleae desunt; antherae 1·5 mm. longae. *Spicula fertilis* ♀, lanceolata, acuminata, 5–6 mm. longa; gluma inferior apice minute bifida vel truncata, coriacea, dorso scabrida vel scaberula, 8-nervis; gluma superior lanceolata, acuminata, tenuiter coriacea, marginibus hyalinis inflexis, dorso scaberula, 3-nervis; lemma inferius oblongo-ovatum, usque ad 3 mm. longum, hyalinum, enerve; palea inferior nulla; lemma superius lineare, integrum, usque ad 3·5 mm. longum, 1-nerve, aristatum vel muticum; arista geniculata vel recta, usque ad 1·5 cm. longa; palea superior nulla; caryopsis oblonga, 2–2·2 mm. longa. *Spiculae pedicellatae* vel ♂ vel steriles, ovatae vel ellipticae, 2–3·5 mm. longae; pedicelli gracillimi, 2·5–3 mm. longi, scabrido-ciliolati vel scabridi; gluma inferior 7–9-nervis, nervis scaberulis; gluma superior 3-nervis.

Queensland. Burke District: Morstone Downs Station, near Camooweal, *Manager, per Agric. Chemist* Lab. No. 5685A; Mt. Emu Plains, 64 miles north of Hughenden, amongst *Eriochloa* sp., on black soil flats, Feb. 1931, *Hubbard and Winders* 7513; Wongalee Station, 30 miles north of Hughenden, amongst *Dichanthium* sp., on black soil flats, Feb. 1931, *Hubbard and Winders* 7458; Mt. Walker, in grassy places, near Hughenden, March 1910, *Domin* (Herb. Domin.); on Rolling Downs, near Hughenden, in grassy places, March 1910, *Domin* (Herb. Domin.). Gregory North District: Georgina River, Sept. 1910, *Bick* 47. North Kennedy District: near Pentland, March 1910, *Domin* (Herb. Domin.). Mitchell District: Prairie, in open grassland, on black soil, 320 m., Feb. 1931, *Hubbard and Winders* 7081; Muttaburra, April 1919, *White* AE.; Longreach, March 1930, *Agric. Chemist* Lab. No. 4223A, March 1934, *Barth* E.; Blackall, March 1934, *Stringer*, Leichhardt District: Peak Downs, *Mueller*; Fernlees, on open downs, Oct. 1933, *Garvey* 13 FG. Port Curtis District: between Rockhampton and Westwood, Feb. 1927, *White* 3394; Biloela, Dec. 1933, *Strong*

A 28. Warrego District: Yanna Siding, near Charleville, *Hutchinson*. Maranoa District: between Amby and Eurella, common on side of railway track, Jan. 1931, *Hubbard and Winders* 6322; Pickanjinnie, near Wallumbilla, *Belson*; Yeulba, April 1933, *Bowman*. Darling Downs District: Noondoo Station, Dec. 1932, *Young* 14A; Dalby, April 1916, *White*; Oakey, *Donges* 17; cultivated at Inglewood, on property of Dr. Hirschfeld, Jan. 1934, *White* 9746. Moreton District: cultivated at Lawnton, near Brisbane, Nov. 1933, *White* 9904.

New South Wales. Evelyn County: Yandaina, on red soil, April 1906, *Mullen*. Narran County: banks of Narran River, March 1846, *Mitchell* 55 (type of *Anthistiria membranacea* Lindl.); Quantambone, near Brewarrina, Feb. 1907, *Mullen*; Murray Downs, near Walgett, March 1911, *Black*; Hay, Jan. 1917, *Little*; Borambil, March 1913, *Cameron*; Darling River, *Neilson*.

South Australia. Abminga, Aug. 1931, *Cleland* H. 404; Mt. Lyndhurst, May 1898, *Koch*; Cordillo Downs, in watercourse, May 1924, *Cleland* H. 275.

8. **I. macratherum** *Domin* in Biblioth. Bot. xx. Heft 85, 283, t. 12, fig. 3, t. 13, fig. 3 (1915).

Gramen annuum, caespitosum, 25–70 cm. altum. *Culmi* erecti vel geniculato-adscendentes, graciles, subteretes, infra inflorescentiam 1–3-nodes, ramosi, glabri, laeves, prope nodos nonnunquam pruinosi. *Folia* glauco-viridia vel purpurea, glabra; vaginae compressae, acute carinatae, internodiis breviores, laeves vel carina superne scaberulae; ligulae truncatae, membranaceae, circiter 1 mm. longae, ciliolatae; laminae lineares, acutae, usque ad 25 cm. longae, 2–6 mm. latae, conduplicatae vel explanatae, firmae, carina et marginibus scabridae, ceterum asperulae vel scaberulae, marginibus glandulas minutas gerentes. *Inflorescentia* foliacea, erecta, densa, 5–20 cm. longa, nodis demum disarticulans; internodia 3–6, inferiora usque ad 10 cm. longa; foliorum vaginae acute carinatae, carina glanduloso-punctatae vel glandulas minutas gerentes, herbaceae vel basin versus induratae et stramineae; spathae ambitu oblique lanceolatae vel anguste ellipticae, acutae, 1–1·6 cm. longae, acute carinatae, herbaceae, carina scabridae et glandulas minutas gerentes. *Racemi* demum lateraliter exserti, oblongi, 8–10 mm. longi, demum e pedunculis disarticulantes; pedunculi filiformes, 2–3·5 mm. longi, superne scaberuli; rhachis 1–2 mm. longa, apice pilis albis usque ad 3 mm. longis praedita. *Spiculae involucrales* vel steriles vel ♂, oblongae vel elliptico-oblongae, 4–4·5 mm. longae; pedicelli graciles, compressi, 1·5–2 mm. longi, basi connati et pilis albis usque ad 2 mm. longis dense barbati; gluma inferior obtusa, dorso plana scaberula vel asperula, carinis scabrida, firme membranacea vel cartilaginea, marginibus angustis inflexis, 9–11-uervis; gluma superior oblonga, obtusa, 2·5–4·5 mm. longa, membranacea vel hyalina, 3-nervis; lemma inferius anguste oblongum, 4 mm. longum,

hyalinum, enerve, vel nullum; lemma superius et paleae desunt; antherae 1·5 mm. longae. *Spicula fertilis* ♀, lanceolata, acuminata, 6–7 mm. longa; gluma inferior apice truncata, coriacea, 6–9-nervis, glabra, carinis supra medium scabrida, ceterum laevis; gluma superior lanceolata, acuminata, acuta, coriacea, marginibus hyalinis inflexis, 3-nervis, glabra, carina apicem versus scaberula; lemma inferius oblongo-ovatum vel oblongum, 3 mm. longum, hyalinum, enerve; palea inferior nulla; lemma superius lineare, integrum, usque ad 5 mm. longum, 1-nerve; arista geniculata, 2–3 cm. longa, columna 0·8–1·5 cm. longa; palea superior nulla; caryopsis oblonga, 2·5 mm. longa. *Spiculae pedicellatae* ♂, lanceolatae, 3–5 mm. longae; pedicelli gracillimi, 3·5–4 mm. longi, ciliolati vel scabrido-ciliolati; gluma inferior 5–7-nervis; gluma superior 3-nervis; lemma inferius 2–4 mm. longum.

Northern Australia. Settlement Creek, on black soil plains, April 1922, *Brass* 155.

Queensland. Cook District: Chillagoe, on calcareous ground at foot of hill, Feb. 1910, *Domin* (type in Herb. Domin.); Chillagoe, in open *Eucalyptus* forest and in depressions near river, reddish-brown soil, 350 m., Jan. 1931, *Hubbard and Winders* 6775; Chillagoe, *Atherton*; Gilbert River, Forest Home, Feb. 1914, *Biek* 144; Feb. 1922, *White* 1478; March 1927, *Brass* 1732; in Gilgai country, Feb. 1925, *Brass* 432; March 1931, *Brass* 1833.

Closely related to *I. vaginiflorum* Domin, but usually larger and with a more profusely branched inflorescence.

9. **I. vaginiflorum** *Domin* in Biblioth. Bot. xx. Heft 85, 281, t. 12, fig. 2, t. 13, fig. 1 (1915); J. M. Black in Trans. & Proc. Roy. Soc. S. Austral. lvii. 144 (1933).

Gramen annuum, caespitosum, usque ad 75 cm. altum. *Culmi* erecti vel basi geniculati, graciles, subteretes, ramosi, infra inflorescentiam plerumque 1–3-nodes, glabri, laeves, prope nodos nonnunquam pruinosi. *Folia* glabra, glauca vel viridia; vaginae compressae, acute carinatae, internodiis breviores, laeves; ligulae truncatae, 0·5–1 mm. longae, membranaceae, ciliolatae; laminae lineares, tenuiter acutae, usque ad 20 cm. longae, 2·5–6 mm. latae, primo conduplicatae, demum planae, scaberulae vel infra laeves, marginibus scabridis. *Inflorescentia* foliacea, erecta, densa, angusta, usque ad 22 cm. longa, demum nodis disarticulans; foliorum vaginae imbricatae, 6–15 mm. longae, primum herbaceae, demum induratae et cartilagineae, marginibus scariosae, compressae, lateribus demum convexis, inferne dorso ecarinatae, superne carinatae, carina prope apicem minute scaberulae, haud glanduliferae vel carina sparse glanduloso-punctatae, stramineae vel

purpureae; spathae ambitu anguste ellipticae, acutae, 0·9–1·2 cm. longae, acute carinatae, herbaceae, marginibus hyalinis, vel demum induratae, carina scaberulae, haud glanduliferae vel glandulas minutas paucas gerentes. *Racemi* in spathis et vaginis fere omnino arcte inclusi, oblongi, 7–8 mm. longi; pedunculi filiformes, 1–2 mm. longi, laeves; rhachis circiter 1 mm. longa, apice pilos paucos usque ad 2 mm. longos gerens vel glabra. *Spiculae involucrales* steriles, anguste oblongae, 3–4 mm. longae vel multo redactae vel nullae; pedicelli graciles, usque ad 1·5 mm. longi, basi connati et pilis albis 1–1·5 mm. longis barbati vel glabri, vel nulli; gluma inferior obtusa, membranacea, marginibus angustissimis inflexis, 5–9-nervis, carinis minute scaberula, dorso sparse asperula vel laevis, vel nulla; gluma superior minutissima, vel nulla, raro usque ad 3 mm. longa, hyalina et enervis; lemma superius usque ad 2 mm. longum, vel plerumque nullum. *Spicula fertilis* ♀, lanceolata vel anguste lanceolata, acuminata, 5·5–7 mm. longa, glabra; gluma inferior apice minute bifida, tenuiter coriacea vel firme membranacea, 8–10-nervis, carinis apicem versus scaberula, ceterum laevis; gluma superior lanceolata, acuminata, acuta, 3-nervis, laevis; lemma inferius anguste oblongum, 3·5–4 mm. longum, hyalinum, enerve; palea inferior nulla; lemma lineare, integrum vel minutissime bilobum, usque ad 5·5 mm. longum, 1-nerve; arista geniculata, 1·5–2·3 cm. longa, columna 6–9 mm. longa; palea superior nulla; caryopsis oblonga, 2·5–3 mm. longa. *Spiculae pediccllatae* vel ♂ vel steriles, apice e spathis et vaginis exserto, lanceolatae vel oblongae, acutae, 3–5 mm. longae; pedicelli gracillimi, 2·5–3 mm. longi, scaberuli vel minute pubescentes; gluma inferior tenuiter membranacea, 5–7-nervis; carinis minute scaberula; gluma superior lanceolata, tenuissima, 2–3-nervis; lemma inferius oblongum vel anguste oblongum, 2–4 mm. longum, hyalinum, enerve; antherae 1–2 mm. longae.

Western Australia. Roebourne, Mulyie Station, March 1899, *Morrison*.

Northern Australia. Sturt's Creek, *Mueller*; Victoria River, April 1856, *Mueller* (Herb. Melb.); Tanumbirini, March 1912, *Hill* 815; Newcastle Waters, July 1911, *Hill* 472 (Herb. Melb.); Port Darwin, Spring Vale, *Giles* (Herb. Brisb.); Arnhem Land, *Basedow* 45; Nichol Bay, *Croueh* (Herb. Melb.).

Central Australia. Macdonald Downs, *Cleland* H. 529.

Queensland. Burke District: Rocklands Station, near Camooweal, *Little* 8, 9; Morstone Downs Station, near Camooweal, *Manager, per Agric. Chemist* Lab. No. 5685B; Julia Creek, *Agric. Chemist* Lab. No. 4747; Richmond, March 1905, *Berney*; Bundoran, near Nonda, between Hughenden and Cloncurry, common in *Astrebla* grassland, heavy dark-brown soil, 160 m., Feb. 1931, *Hubbard and Winders* 7273; Nonda, amongst annual grasses, 150 m., Feb. 1931, *Hubbard and Winders*, 7239; Marathon Station, west of Hughenden, on heavy dark-brown soil, amongst *Astrebla lappacea*, 230 m., Feb. 1931, *Hubbard* 7750;

near Hughenden, on the Rolling Downs, Feb. 1910, *Domin* (Herb. Domin.); Hughenden, June 1919, *Hawthorn*; March 1933, *McCarthy*; Jardine Valley, near Hughenden, in open *Astrebla lappacea* grassland, heavy dark-brown soil, 350 m., Feb. 1931, *Hubbard and Winders* 7177; Mt. Emu Plains, 64 miles north of Hughenden, in black soil, amongst *Dichanthium* sp., Feb. 1931, *Hubbard and Winders* 7495; Chudleigh Park Station, 110 miles north of Hughenden, in open grassland, black soil, 810 m., Feb. 1931, *Hubbard and Winders* 7650. Mitchell District: Prairie, open grassland, black soil, 424 m., Feb. 1931, *Hubbard and Winders* 7053; March 1903, *Chisholm*; Muttaburra, March 1919, *White*; Longreach, March 1930, *Agric. Chemist* Lab. No. 4223B; March 1934, *Barth* D; Brixton, May 1931, *Rawson*. North Kennedy District: Charters Towers, *Pollock in Herb. Hubbard.* 8635. Leichhardt District: Peak Downs, Emerald, Dec. 1930, *Carey*; Emerald, March 1934, *Carey* 9. Gregory South District: Windorah, *Rose*. Warrego District: Yanna Siding, near Charleville, *Hutchinson*. Darling Downs District: cultivated on the property of Dr. Hirschfeld at Inglewood, Jan. 1934, *White* 9743. Moreton District: cultivated at Lawnton, near Brisbane, Nov. 1933, *White* 9886.

New South Wales. Tongowoko County: Tibooburra, Olive Downs, May 1900, *Johnson*.

South Australia. Near Oodnadatta, Jan. 1913, *Staer*; vicinity of Lake Eyre, Sept. 1903, *Spencer, Andrews* 153; Cordillo Downs, in watercourse, May 1924, *Cleland* H. 275A; Mt. Lyndhurst, May 1898, *Koch*.

I. vaginiflorum is the most widely spread of all the Australian species.

The following specimens from the Leichhardt District of Queensland may be hybrids between *I. vaginiflorum* Domin and *I. membranaceum* Domin:—Emerald, in open grassland, amongst *Dichanthium* and *Astrebla* spp., on black soil, Feb. 1931, *Hubbard* 7931; between Emerald and Peak Downs, in *Dichanthium* grassland, heavy black soil, Feb. 1931, *Hubbard* 7945; Clermont, March 1927, *White* 3418. They resemble *I. vaginiflorum* in habit and in possessing partially indurated floral sheaths, and *I. membranaceum* in having partially exserted racemes, better-developed involucral spikelets and firmer glumes.

The references given below apply either wholly or in part to this species:—*Iseilema membranaceum* Black, Fl. S. Austral. 56 (1922), partim; Gardner, Enum. Pl. Austral. Occid. 6 (1931). *Anthistiria membranacea* F. Muell. Fragm. v. 207 (1866), partim; Benth. Fl. Austral. vii. 543 (1878), partim; F. M. Bailey, Illustr. Monogr. Grasses Queensl. i. t. 7 (1878); Ewart & Rees in Proc. Roy. Soc. Viet., n.s. xxv. 106 (1912); Ewart & Davies, Fl. North. Territ. 32 (1917); Fitzgerald in Journ. & Proc. Roy. Soc. W. Austral. iii. 112 (1918); Breakwell, Grasses and Fodder Pl. N.S. Wales, 200, fig. 97 (right) (1923). It is

probable that other references in Australian botanical literature which are under the above names or under *Iseilema Mitchellii* may refer at least in part to this species.—C. E. Hubbard.

Iseilema calvum.

Fig. 1, plant, *natural size*; 2, spathe; 3, raceme; 4, involucral spikelet; 5–8, details of involucral spikelet:—5, lower glume, from inside; 6, upper glume, from outside; 7, lemma of the lower floret, with male flower; 8, lodicules; 9, fertile and pedicelled spikelets; 10–17, details of fertile spikelet:—10, lower glume; 11, upper glume; 12, lemma of the lower floret; 13, lemma of the upper floret; 14, pistil; 15 and 16, caryopsis; 17, transverse section of caryopsis. Figs. 2–7, 9–17, × 6; fig. 8, × 16.


2
1
S.R.C.

Tabula 3287.

ASPLENIUM PAUCIJUGUM *Ballard.*

Polypodiaceae.

A. paucijugum *Ballard*; species nova, *A. longicaudae* Hook. proxima, a quo foliis 1–2-jugatis atro-viridibus, stipitibus laminis aequilongis vel longioribus, soris inter costam et margines aequaliter dispositis distinguitur.

Rhizoma longe repens, paleis exclusis usque 3 mm. crassum, paleas pallide brunneas vel atro-brunneas lanceolatas acuminatas deciduas gerens. *Folia* fasciculata, usque 50 cm. longa, simplicia vel semel pinnata (imparipinnata), pinnis unijugatis vel raro bijugatis. *Stipes* usque 30 cm. longus, plerumque lamina longior, pallidus, juvenilis paleis anguste lanceolatis vel capillaribus plus minusve squamosus, demum glabrescens. *Pinnae* (vel folia simplicia) oblongo-ellipticae vel lanceolatae, 4–20 cm. longae, 1·8-6·5 cm. latae, terminalis lateralibus plerumque paullo major, acuminatae, apice cauda lineari usque 2 cm. longa saepe terminatae, cauda gemmam proligeram nonnunquam gerente, atrovirides, herbaceae vel tenuiter coriaceae, marginibus sinuatae vel crenato-serratae, basi leviter cordatae usque cuneatae, glabrae. *Sori* numerosi, inter costam et margines oblique et aequaliter dispositi, nec costam nec margines attingentes.

French Guinea. Between Lola and Nzo, *Chevalier* 20994 (Herb. Chev.); between Timbikounda and Farakoro, *Chevalier* 20627 (Herb. Chev.); Kouria, *Caille* 14714, 14715 (Herb. Chev.).

Ivory Coast. Mt. Niéuokué, 500 m., granitic formation 20 km. N.E. of Fort Binger, *Chevalier* 19480 (Herb. Chev.).

Gold Coast. Near Bompata, 225 m., in forest, Jan. 1933, *Vigne* 2712.

St. Thomas Island. In shady woods, 750 m., Dec. 1860, *Welwitsch* 63; 800 m., *Moller* 19.

Uganda. Lake Victoria, Sesse Island, 1170 m., *Dawe* 72.

Tanganyika Territory. Usambara District, Silai, virgin forest, Feb. 1893, *Holst* 2307; Gonja, virgin forest, Sept. 1893, *Holst* 4246 (type).

Madagascar. Without locality, *Humblot* 314.

The recognition of the present species is the outcome of an attempt to separate *Asplenium longicauda* Hook. from a mass of herbarium material which has been erroneously associated with it. Good characters are readily found to maintain a strict *A. longicauda* though the specimens gathered here under *A. paucijugum* do not, it must be confessed, maintain the same high degree of homogeneity.

Hooker's *A. longicauda* possesses the following characters :—

1. The greyish green, almost glaucous blade.
2. The 2–4-jugate fronds.
3. The terminal pinna usually long-caudate.
4. Sori nearer to the margin of the pinna than to the midrib.
5. The angle between costa and lateral nerves ranging from 37°–43°.
6. Stipe apparently shorter than the blade.

On the other hand *A. paucijugum* may be distinguished as follows :—

1. The blades are dark green in colour.
2. The fronds are simple or 1-jugate.
3. The terminal pinna is acuminate but *not* long-caudate.
4. The sori are *not* nearer the margin than the midrib.
5. The angle between costa and lateral nerves ranges from 48°–65°.
6. The stipe is as long as or longer than the blade.

It has been suggested above that *A. paucijugum* is not so homogeneous a species as one might wish. In general characters the specimens resemble one another fairly well, but certain differences in the rhizome scales lead one to wonder whether some of the plants may possibly represent juvenile states of other well-known species. We have in *Asplenium*, unfortunately, a genus which is notoriously difficult to catalogue. Christensen has indicated this very clearly in his Pteridophyta of Madagascar, pp. 85–86, where he points out the astonishing degree of variation occurring in many of the species and suggests that the genus may be passing at present through a period of rapid development.

In the present case, one has, at any rate, clarified the position of *Asplenium longicauda* Hk., and whether *A. paucijugum* represents a taxonomic unit or merely a morphological state, is a matter for future investigation.

A. longicauda in the strict sense is found only in Fernando Po, Princes Island and Gaboon. *A. paucijugum*, on the other hand, enjoys a much wider distribution, from French Guinea in the west, through the Gold Coast and central and east tropical Africa as far as Madagascar in the east.—F. Ballard.

Fig. 1, entire plant, *natural size* ; 2, rhizome scale, × 24.

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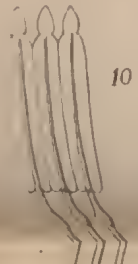

10

S.R-C.

Tabula 3288.

SENECIO JOHNSTONI *Oliver.*

Compositae. Tribus Senecionideae.

S. Johnstoni *Oliver* in Trans. Linn. Soc., Bot., ser. II. ii. 340, t. 60 (1887); Mildbr. in Fedde, Repert. xviii. 229 (1922); a *S. kilimanjari* Mildbr. foliis tenuibus glabris ovatis longe petiolatis, capitulis anguste campanulatis, florum radii ligulis patentibus aureo-flavis distinguitur.

Arbor usque 10 m. alta. *Truncus* pro rata elongatus, tenuis, usque 20 cm. crassus, valde ramosus, foliis marcescentibus non vestitus, inferne cortice crassiusculo obtectus. *Folia* pauca, longe petiolata, tenuia (desiccatione membranacea), ovata vel ovato-orbiculata, cordata, dentata, basin versus interdum fere serrata, dentibus hydathodiis coronatis; lamina 25–40 cm. longa, 20–30 cm. lata (in plantis juvenilibus non ramosis saepe majoribus), supra glabra, infra primum leviter pilosa demum glabrescens, costa et nervorum basibus pubescentibus, nervis lateralibus distinctissimis 1–2 cm. distantibus; petiolus usque 20 cm. longus, anguste alatus, 1–2 cm. latus alis inclusis, basin versus latior. *Inflorescentia* bracteata, paniculata, usque 1 cm. alta, capitulis in ramulis lateralibus gracilibus adscendentibus laxe dispositis; axis ramulique primum leviter pilosi demum glabrescentes; bracteae inferiores foliosae, obovato-panduratae. *Capitula* heterogama, anguste campanulata, 12 cm. longa, 8–10 mm. lata, longissime pedunculata. *Involucri bracteae* 3-seriatae, extimae lineares, 10 mm. longae, 1 mm. latae, interiores 2-seriatae, oblongo-lanceolatae, 11–12 mm. longae, 2–4 mm. latae. *Flores radii* pauci (10–15), longe ligulati, aureo-flavi; ligula 15 mm. longa, 4–5 mm. lata. *Flores disci* pro rata pauci (circa 30), tubo inferne cylindrico, superne leviter dilatato; antherae exsertae. *Achacnia* matura non vidi.

Tanganyika. Southern slopes of Kilimanjaro, 2550–3000 m. (rarely to 3150 m.), 1884, *H. H. Johnston* 15, partim; above Marangu, Sept. 1893, *Volkens* 958 (Herb. Berol. et Mus. Brit.); Urwald, March 1906, *F. Jaeger* 158 (Herb. Mus. Brit.); Bismarck Hut, Aug. 1930, *B. D. Burtt* 4005; above Bismarck Hut, Aug. 1931, *F. R. Sanders* 14; between Umbwe and Weru Weru rivers, Aug. 1932, *P. J. Greenway* 3150, 3152; above Bismarck Hut, Feb. 1934, *P. J. Greenway* 3852.

S. Johnstoni was the first representative of the tree Senecios of the African equatorial mountains to be discovered. It was collected by Sir Harry Johnston during his expedition to Kilimanjaro in 1884, and was described by Daniel Oliver in 1887 in the Transactions of the Linnean Society. In the light of the knowledge which we have to-day, it is obvious that the name covered more than one species. Oliver pointed out, indeed, that the two specimens of inflorescence at Kew showed important differences in the form of their capitula.

For 35 years, however, any tree *Senecio* observed or collected on Kilimanjaro was referred to *S. Johnstoni*. It was not until after the well-known paper by R. E. and Th. Fries on the Senecios of Mt. Kenya and the Aberdares had emphasized the presence of several species on those mountains that a second species, *S. kilimanjari*, was detected by Dr. J. Mildbraed amongst the material in the Berlin Herbarium. But the true position with regard to the occurrence and distribution of the species on Kilimanjaro was only realized after the publication of the third one in 1930 (Kew Bull. 1930, 108). Of this species (*S. Cottonii*), the most striking and perhaps the most abundant of the three, magnificent illustrations showing the habit had already been published by Engler under the name of *S. Johnstoni*. After the discovery of *S. Cottonii* a detailed questionnaire with regard to the many discrepancies in the literature was sent to all botanists likely to be interested, and as a result ample material with valuable notes were received at Kew. By means of these it has been possible to elucidate the problems presented in the old accounts and to correct the errors which have occurred in nearly all papers, including that in K.B. 1930.

It is now known that there are three very distinct species on Kilimanjaro, and that these occur in zones in different ecological habitats, namely, in the forest, the subalpine zone and the high alpine zone. The species are, moreover, quite distinct from those at corresponding altitudes on other mountains. These high mountain Senecios are, in fact, comparable to island endemics, being separated by mountain plateaux instead of by seas. The uppermost species, which are the most specialized, are very distinct; the lower species have more in common with each other, but by general consent they are, with one or two doubtful exceptions, sufficiently distinct to be regarded as separate species. Of the latter group, *S. Johnstoni* on Kilimanjaro is one of the most marked, and very distinct—with the possible exception of a form on Mt. Meru only 70 miles distant—from those on all other mountains. Most of the references in the literature to *S. Johnstoni* on Kilimanjaro, and all the records of its occurrence on other mountains, refer to other species.

S. Johnstoni occurs as isolated trees or in small groups from about 2550 m. to 3000 m., in very moist ground or actual water channels, in the uppermost part of the forest belt. It is confined to the shade, being found either in the forest itself, or forest islands, or in ascending tongues of forest which fringe the ravines. This being the case, it is not so conspicuous as those which occur on the open mountain side. As a

result, it has, since Johnston's time, been generally overlooked by botanists, a fact which largely explains how the name has become associated with, or indeed actually transferred to, each of the other species.

In common with the forest species on other mountains, *S. Johnstoni* is less striking in appearance and less grotesque than the alpine forms. It shares with them the habit of a small forest tree, well branched and possessing a slender trunk with shoots bearing small rosettes of relatively thin leaves. The mass of marcescent foliage characteristic of the upper species is absent. The large, erect inflorescence is lax and the capitula are small and campanulate. These characters separate it at once from *S. kilimanjari* (3300–3600 m.), and still more so from *S. Cottonii* (3450–4200 m.). From species occupying the same altitude on other mountains it is distinguished by the large, ovate or orbiculate-ovate leaves with cordate base, and by the long, slightly winged petiole. (A very similar plant but with thin leaves tending to be elliptical, with or without a cordate base, has been discovered by Mr. Greenway in a particular area on Kilimanjaro. The taxonomic status of this plant is uncertain and the diagnosis of *S. Johnstoni* has not been modified to include it.)—A. D. Cotton.

Fig. 1, under surface of mature leaf, × ⅔; 2, portion of margin of under surface of leaf showing hydathodes, × 4; 3, inflorescence, *natural size*; 4, young narrowly campanulate capitulum, *natural size*; 5, portion of receptacle, × 6; 6, ray flower, × 4; 7, style and stigma of ray flower, × 6; 8, disk flower, × 6; 9, portion of pappus, × 10; 10, group of three stamens, × 6; 11, swollen portion of filament, × 60; 12, pollen grain, × 450; 13, style and stigma of disk flower, × 6; 14, stigma of disk flower, × 14; 15, immature achene, × 12.

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Tabula 3289.

SENECIO KILIMANJARI *Mildbraed.*

Compositae. Tribus Senecionideae.

S. kilimanjari *Mildbraed* in Fedde, Repert. xviii. 229 (1922). *S. Johnstoni* auctt. non Oliver.—Ab affini *S. Cottonii* foliis brevibus petiolis alatis et lamina infra minus lanata cum margine tomentosa, capitulis minoribus, florum radii ligulis recurvis pallide flavis distinguitur.

Arbor usque 5 m. alta. *Truncus* crassus, parce ramosus, foliis marcescentibus saepe usque ad basin vestitus. *Folia* apice trunci ramorumque rosulato-conferta, magna, crassa, ovata usque ovato-oblonga, basi obtusa in petiolum latum crassum decurrentia, dentata, basin versus interdum serrata, dentibus hydathodiis magnis coronatis; lamina 30–35 cm. longa, 15–18 cm. lata, adulta supra glabra, costa praeter partem superiorem et petiolo dense longeque albido-lanato-tomentosis, infra erispato-pilosa, costa dense longeque albido-sericeo-lanata, margine inter dentium apices glabros albo-lanato-tomentosa, nervis lateralibus modice distinctis 1–2 cm. distantibus; petiolus usque 8–10 cm. longus, late alatus, 3–4 cm. latus alis inclusis. *Inflorescentia* braeteata, paniculata, usque 1 cm. alta, capitulis in ramulis lateralibus adscendentibus dense dispositis; axis ramulique dense albo-lanati; bracteae inferiores foliosae, oblongae vel oblongo-lanceolatae. *Capitula* heterogama, late campanulata, 15 mm. lata, 10 mm. longa, breviter pedunculata. *Involucri bracteae* 3-seriatae, extimae lineares, 10 mm. longae, 1 mm. latae, interiores circa 16, 2-seriatae, oblongo-lanceolatae, 11–12 mm. longae, 2–4 mm. latae. *Flores radii* pauci (10–15), longe ligulati, pallide flavi; ligula 14–15 mm. longa, 3–4 mm. lata, recurva. *Flores disci* circiter 105, tubo inferne cylindrico superne leviter dilatato; antherae exsertae. *Achaenia* matura non vidi.

Tanganyika Territory. Southern slopes of Kilimanjaro: chiefly between 3150 and 3450 m., Nov. 1889, *H. Mayer* 319; Oct. 1891, *Uhlig* 72 (Herb. Amani.); Oct. 1893, *Volkens* 1173; Oct. 1902, *Engler* 1808; Nov. 1908, *Alluaud* 70 (Herb. Paris.); 1912, *Janssens* s.n. (Herb. Brux.); below Peter's Hut, 3300 m., July 1931, *W. A. Robertson* 6; below Peter's Hut, 3390 m., Aug. 1931, *F. R. Sanders* 6, 7; Dec. 1932, *Geilinger* 4660, 4667, 4671, 4698; below Peter's Hut, 3300 m., Feb. 1934, *P. J. Greenway* 3793. Mt. Meru: South side, in *Erica* region, 3400 m., Nov. 1901, *Uhlig* 685 (fide *Mildbraed*).

As explained under plate 3288, this Kilimanjaran species, which for 35 years had passed as a form of *S. Johnstoni*, was described by Mildbraed in 1922. No flowers were available, but the leaves afforded good characters. His paper has been largely overlooked and apparently Engler did not accept his view (Pflanzenwelt Afrikas, Band 5, Heft 1, p. 265). Recent material confirms the validity of Mildbraed's species, and the specimens he cited have been verified and found correct. His statement, however, as to the altitudinal range must be modified, since it covered also the uppermost species (*S. Cottonii*).

S. kilimanjari occurs in boggy meadows and in ravines in the subalpine zone and is apparently plentiful above Moshi since abundant material from this area exists in the Berlin Herbarium. It is the species which occurs in the bog at about 3300 m. on the track from Marangu to Peter's Hut, and was illustrated by the writer (Kew Bulletin 1930, 108). Being distinct from *S. Cottonii* it was at the time regarded as a form of *S. Johnstoni*. The species apparently seldom flowers, since no fertile material exists at Berlin, and, though specially sought for by various botanists during the past four years, no good flowers were observed until 1934, when they were collected and forwarded to Kew by Mr. P. J. Greenway. From *S. Cottonii*, to which it is clearly allied, it differs in certain small but definite and constant particulars. The leaf characters which separate it are the much less dense indumentum of the lamina, the very marked marginal rim of white woolly tomentum interrupted only by the hydathodes, and the petiole consisting of a short, very broadly winged leaf base. In *S. Cottonii* the very dense indumentum of the lamina is uniform, and the exceedingly long, stout petiole is not winged. The floral differences consist in the smaller capitula, with about 100 flowers instead of 150, the fewer involucral bracts and the conspicuous ray florets the ligules of which are reflexed. Greenway notes, moreover, that the flowers are lemon-coloured, whereas those of *S. Cottonii* are orange. The two species overlap at Peter's Hut but no trace of intermediates has been found.

A. D. Cotton.

Fig. 1, under surface of leaf, × $\frac{2}{3}$; 2, margin of under side of leaf showing hydathodes and marginal rim of tomentum, × 3; 3, inflorescence, *natural size*; 4, portion of receptacle, × 6; 5, ray flower, × 4; 6, style and stigma from ray flower, × 6; 7, disk flower, × 4; 8, group of stamens, × 6; 9, pollen grain, ×450 (approx.); 10, stigma of disk flower, × 12; 11, immature achene, × 8.

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Tabula 3290.

SENECIO COTTONII *Hutch. et Taylor.*

Compositae. Tribus Senecionideae.

S. Cottonii, *Hutch. et Taylor* in Kew Bull. 1930, 115; *S. kilimanjari* affinis, a quo petiolis robustis longis non alatis et lamina infra dense albo-lanata, capitulis majoribus, florum radii ligulis brevioribus aurantiacis distinguitur.

Arbor usque 5 m. (raro 7 m.) alta. *Truncus* crassus, parce ramosus, foliis marcescentibus saepe usque ad basin vestitus. *Folia* ad apicem ramorum rosulato-conferta, magna, crassa, oblonga vel ovato-elliptica, cordata, integra vel dentata, basin versus interdum serrata, dentibus hydathodiis magnis coronatis; lamina 30–35 cm. (raro usque 50 cm.) longa, 15–18 cm. (raro usque 25 cm.) lata, supra primum lanata, adulta glabra, costa sericeo-lanata, infra dense et crebre albo-lanata, costa longe sericeo-lanata, nervis lateralibus modice distinctis 1·5–2 cm. distantibus; petiolus usque 15–20 cm. longus, cylindricus vel leviter complanatus, dense et longe lanatus, superne 2 cm., basin versus usque 7 cm. latus. *Inflorescentia* bracteata, paniculata, usque 1 m. alta, capitulis in ramulis lateralibus adscendentibus dense dispositis; axis ramulique dense albo-lanati; bracteae inferiores foliosae, oblanceolatae. *Capitula* heterogama, turbinata, 2·5 cm. lata, 2 cm. longa, longe pedunculata. *Involucri* bracteae 3-seriatae, extimae lineares, 8 mm. longae, 1 mm. latae, interiores circa 20–22, 2-seriatae, oblongo-lanceolatae, 12–13 mm. longae, 3–4 (raro 5) mm. latae. *Flores radii* pauci (10), breves, aurantiaci, ligula oblonga 7–9 mm. longa 1·5–2 mm. lata recurva. *Flores disci* circiter 150, tubo infernc cylindrico, superne leviter dilatato; antherae exsertae. *Achaenia* 6 mm. longa, striata, glabra.

Tanganyika. S. Kilimanjaro, 3300–4200 m., upper zone, Oct. 1904, *Alluaud* 190 (Herb. Paris.); Förster Thal, Jan. 1913, *Grote* 6094 (Herb. Amani.); without precise locality, 1927, *Piemeisel and Kephart* 435 (Herb. Mus. Brit.); above Peter's Hut, Sept. 1929, *Cotton and Hitchcock* 34, 35; about 3900 m., July 1931, *W. A. Robertson* 1, 2, 3; above Peter's Hut, Aug. 1931, *F. R. Sanders* 3, 9 et alii; up to 4200 m., Feb. 1934, *P. J. Greenway* 3757, 3772.

The specimens on which *S. Cottonii* is based were collected by Dr. A. S. Hitchcock and the writer on Kilimanjaro in September 1929. They were recognized by Dr. J. Hutchinson as representing a new species and were described jointly by him and Dr. G. Taylor of the British Museum, the latter institution possessing specimens collected two years previously for the Washington Herbarium by Messrs. Piemeisel and Kephart. The species was regarded by the Engler school as a form of *S. Johnstoni*, as may be learned from the letterpress to Engler's photograph of a group of trees (Die Pflanzenwelt Afrikas i. Heft 1, t. 18), and elsewhere he states "die letztere Art (*S. Johnstoni*) ein sehr verschiedenes Aussehen über 4000 m. und bei 2900 bis 3000 m. zeigt . . . phaenotypisch . . . nicht genotypisch" (op. cit. v. Heft 1, 265). It is remarkable, however, that practically no material of such a striking plant had been collected, especially as it is perhaps the most abundant of the three species, a single gathering at Paris and another at Amani being the only herbarium specimens in existence before 1927. Since its description in 1930 it has been collected and photographed repeatedly, and ample material now exists in European herbaria. With the aid of the additional specimens the original description, especially as to the leaf, has been amplified and emended.

The features distinguishing *S. Cottonii* from *S. kilimanjari*, which occurs in the zone below it, have been given under that species and need not be repeated. The plant is characteristic of the high alpine zone and commences at about 3450 m., continuing to the limit of general phanerogamic vegetation, i.e. about 4200 m. Isolated weather-beaten specimens may occur above that level. It is a water-loving species occurring in ravines, bogs, or shallow pools, the surface of which in the upper altitudes is often frozen over during the night. The plants are usually shorter than the two lower species, though at about the middle of the zone, between Peter's Hut and the saddle in the Mawenzi direction, very fine specimens, tall and sometimes well branched, may occur. Engler's illustration also shows very tall but less-branched specimens.—A. D. Cotton.

Fig. 1, under surface of mature leaf, × ⅔; 2, portion of margin of under surface of leaf, × 3; 3, one of lower branches of inflorescence, *natural size*; 4, portion of receptacle, × 6; 5, ray flower, × 4; 6, disk flower, × 4; 7, group of three stamens, × 6; 8, pollen grain, × 450 (approx.); 9, stigma of disk flower, × 12; 10, achene, × 8.


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Tabula 3291.

BARLERIA TETRAGLOCHIN *Milne-Redhead.*

Acanthaceae. Tribus Barlerieae.

B. (Prionitis) tetraglochin *Milne-Redhead*; species nova, affinis *B. proximae* Lindau, a qua spinis longe stipitatis, floribus majoribus albis, calyce glabro facile distinguitur.

Planta perennis, lignosa, spinosa; caules annotini usque 40 cm. longi; caules novelli floriferi, erecti, glabri, sub anthesin usque 10 cm. longi, nodis sparse minuteque strigosis, internodiis usque 3 cm. longis. *Folia* subsessilia, oblanceolata, apice acuta, mucronata, basi angustata, circiter 3 cm. longa et 1 cm. lata, subtus in costa sparse et minute strigosa, margine minute strigoso-ciliata, ceterum glabra, supra cystolithis dense instructa. *Spinae axillares* stipitatae, stipite usque 1 cm. longo, radiis 4 usque 1·3 cm. longis albis patentibus instructae. *Inflorescentiae* 1–2-florae, axillares, apicem versus ramulorum ortae; bracteae anguste lanceolatae, concavae, apice spinosae, circiter 2·5 cm. longae et 5 mm. latae, margine et in costa extra minute strigosa; bracteolae anguste lanceolatae, leviter concavae, apice spinosae, circiter 2 cm. longae et 3 mm. latae, strigoso-ciliatae. *Calycis segmenta* 4, libera, glabra; posticum ovato-lanceolatum, apice spinosum, circiter 2 cm. longum et 7 mm. latum; lateralia lanceolato-subulata, 1·2 cm. longa et 2 mm. lata, intus adpresse hirsuta; anticum lanceolatum, apice integrum vel minute bispinosum, circiter 1·8 cm. longum et 6 mm. latum. *Corolla* alba, circiter 4 cm. longa, bilabiata; tubus cylindricus, medium versus leviter constrictus, circiter 2 cm. longus et 3 mm. diametro, superne extra minute pubescens; labium posticum 2 cm. longum, 4-lobatum; lobi obovati, apice rotundati, basi brevissime unguiculati, circiter 1·5 cm. longi et 1·2 cm. lati; labium anticum circiter 1·5 cm. longum, integrum, obovatum, basi in unguem angustatum. *Stamina* 4; duo antica circiter 17 mm. longa, filamentis angustissime ligulatis puberulis, antheris ditheeis circiter 4 mm. longis; duo lateralia valde redacta, filamentis vix 2 mm. longis hirsutis, antheris ditheeis circiter 1·5 mm. longis. *Discus* cupularis, liber, margine undulatus, circiter 1 mm. altus. *Ovarium* conicum, circiter 3 mm. altum, glabrum; stylus filiformis, circiter 2·5 cm. longus; stigma subcylindrico-capitatum. *Capsula* non visa.

Anglo-Egyptian Sudan. Kordofan Province: near dry khor east of road between Dilling and Kadulgi, Nuba Mountains, 700–800 m., 28 Jan. 1934, *Dandy* 322 (type):—"Woody herb with basal inflorescences; corolla white." El Fung Province: near Abu Gemai, 15 Dec. 1929, *Alymer* 53:—"Herb with white flowers."

This very beautiful species seems to have no close ally among those hitherto described, though in certain respects it appears to be related more closely to *B. proxima* Lindau than to other species of the Section *Prionitis*. It is readily distinguished from all previously described members of the section having two-lipped corollas by its spines being in fours on stalks often longer than the spines themselves. Additional characters distinguishing it from *B. proxima* are the glaucous leaves, the larger white flowers, and the glabrous calyx with relatively smaller lateral segments. The specimen figured was from the type gathering made by Mr. J. E. Dandy of the Botanical Department of the Natural History Museum, and kindly presented to Kew by the Keeper.

E. Milne-Redhead.

Fig. 1, portion of plant, *natural size*; 2, bracteoles and calyx, posterior view, × 2; 3, same, with bracteoles and anterior calyx segment removed, × 2; 4, lateral calyx segment, × 4; 5, anterior lobe of corolla, × 2; 6, part of corolla with anterior lobe removed, showing stamens, × 2; 7, anterior stamen, × 3; 8, pollen grain, × 300 (approx.); 9, disk and ovary, × 8; 10, stigma, × 8.


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Tabula 3292.

BARLERIA PROXIMA *Lindau.*

Acanthaceae. Tribus Barlerieae.

B. (Prionitis) proxima *Lindau* in Ann. Istit. Bot. Roma vi. 72 (1896); C. B. Clarke in Dyer, Fl. Trop. Afr. v. 145 (1899). *B. Smithii* C. B. Clarke in Dyer, Fl. Trop. Afr. v. 147 (1899) partim, non Rendle.—Species a *B. Smithii* Rendle foliis minoribus et angustioribus, calycis segmentis eglandulosis in spinam angustatis differt.

Planta perennis, lignosa, spinosa; caules basi dense ramosi, usque 15 cm. longi, novelli dense minuteque puberuli, nodis sparse et adpresse strigosis, internodiis brevibus usque 1 cm. longis. *Folia* subsessilia, oblanceolata, apice acuta, spinoso-mucronata, basi attenuata, usque 2·6 cm. longa et 9 mm. lata, utrinque minute strigosa, cystolithis inconspicuis instructa. *Spinae axillares* subsessiles, radiis 4 gracilibus usque 2·6 cm. longis albis patentibus instructae. *Inflorescentiae* uniflorae, axillares, apicem versus ramulorum spicatim aggregatae; bracteae inferiores foliis similes, superiores angustiores; bracteolae lineares, spiniformes, usque 1·5 cm. longae, inferne leviter compressae, concavae, ciliatae, superne glabrae, pruinosae. *Calycis segmenta* 4, libera; posticum ovato-ellipticum, superne in spinam angustatum, circiter 1·5 cm. longum et 4 mm. latum, extra inferne sparse adpresse hirsutum, superne glabrum, pruinosum, intus inconspicue adpresse pubescens; lateralia anguste lanceolata, apice spinosa, circiter 1·1 cm. longa et 1·5 mm. lata, extra subadpresse hirsuta, intus inconspicue adpresse pubescentia; anticum ovato-ellipticum, acuminatum, apice minute bispinosum vel integrum, circiter 1·3 cm. longum et 4 mm. latum, ut segmentum posticum pubescens. *Corolla* flava, fauce sanguinea, circiter 3 cm. longa, bilabiata; tubus cylindricus, supra medium leviter constrictus, circiter 1·2 cm. longus et 2·5 mm. diametro, superne extra, ut limbus, minute pubescens; labium posticum circiter 1·8 cm. longum, inferne tubiforme, superne expansum, 4-lobatum; lobi postici obovati, in unguem angustati, apice rotundati, circiter 1·1 cm. longi et 6 mm. lati; lobi laterales elliptici, apice subacuti, basi in unguem latiorem angustati, circiter 1 cm. longi et 6·5 mm. lati; labium anticum ellipticum, apice rotundatum, haud unguiculatum, 8–9 mm. longum et 4–5 mm. latum. *Stamina* 4; duo antica circiter 1·7 cm. longa, filamentis angustissime ligulatis minute puberulis,

antheris dithecis circiter 3 mm. longis; duo lateralia valde redacta, filamentis vix 1 mm. longis hirsutis, antheris dithecis circiter 1 mm. longis. *Discus* cupularis, liber, margine irregulariter undulatus, circiter 1 mm. altus. *Ovarium* conicum, circiter 3 mm. altum, inferne glabrum, superne puberulum; stylus filiformis, circiter 2·2 cm. longus, glaber; stigma cylindrico-capitatum. *Capsula* disperma, rostrata, 1·2 cm. longa, superne extra minute pubescens.

Abyssinia. Ogaden, in desert, 30 Dec. 1892, *Riva* 366 (type in Berlin Herb.). Bia Kaboba [Biyo Kaboba], 900 m., 17 Feb. 1900, *Ellenbeck* 304 (Berlin Herb.).

British Somaliland. On stony sandstone slopes north of Hargeisa, 1300 m., 23 Sept. 1932, *Gillett* 3990 :—"Flowers bright-yellow with crimson centre; native name 'Godoh Toulch' [full of thorn]." Hargeisa, July 1929, *Mrs. Burne* 103 :—"Somali name 'Aran Ara.'" Hargeisa, 20 July 1894, *Donaldson Smith* (Brit. Mus.). Adda Galla [probably Aidagalla], *James and Thrupp*. Ahl Mountains, in rock fissures, 2000 m., March 1873, *Hildebrandt* 857 (Brit. Mus.). Between Dobar and Hammer, 1897, Sok Soda, 1897, and Upper Sheik, 1897, *Mrs. Lort Phillips* (Brit. Mus.).

The specimen figured on the accompanying plate was from the collection made by Mr. J. B. Gillett when he was attached to the British Somaliland Boundary Commission in 1932. Mr. Gillett in his notes states that in the neighbourhood of Hargeisa it is "a very common and widespread species."

Through the kindness of the Director of the Botanic Gardens at Berlin, the specimen has been compared with the type of *Barleria proxima* Lindau, and has been found to agree very well with that species. The slight differences between some of the measurements here given and those of the original description are without significance.

B. proxima is characterized by its spines being arranged in fours on very short stalks, by its hairy eglandular spine-tipped calyx segments, and by its two-lipped corolla which is bright-yellow with a crimson throat and is shortly pubescent outside. Mr. Gillett collected another specimen (no. 4147) which is very closely allied to *B. proxima*, and which may prove to be a variety. It differs in having the spines on considerable stalks, and in having lemon-yellow flowers without a crimson throat.—E. Milne-Redhead.

Fig. 1, part of a plant, *natural size*; 2, lateral view of flower, with corolla removed showing the bract and one bracteole, × 3; 3, calyx with posterior segment removed to show pistil, × 3; 4, anterior segment of calyx, from within, × 3; 5, lateral segment from within, × 3; 6, anterior lobe of corolla, with the corresponding part of the tube, × 3; 7, anterior view of remainder of corolla, upper part of lobes removed, × 3; 8, anterior stamen, × 4; 9, disk and ovary, × 8; 10, stigma, × 8; 11, infructescence, with posterior calyx segment removed to show capsule, × 3.

S.R-C.

Tabula 3293.

BARLERIA QUADRISPINA *Lindau*.

Acanthaceae. Tribus Barlerieae.

B. (Prionitis) quadrispina *Lindau* in Ann. Istit. Bot. Roma vi. 72 (1896); C. B. Clarke in Dyer, Fl. Trop. Afr. v. 147 (1899) partim; affinis *B. wagganae* Rendle et *B. setigerae* Rendle, a qua habitu spinosissimo, calyce glabro differt.

Planta perennis, usque 2 dm. alta, lignosa, spinosissima; caules ramosi, subquadrangulares, novelli glabri, demum minute puberuli, nodis sparse et adpresse strigosis, internodiis brevibus usque 1 cm. longis. *Folia* subsessilia, oblanceolata, apice mucronata, basi attenuata, usque 3·5 cm. longa et 1 cm. lata, utrinque glabra vel pilis adpressis in nervos sparsissime inspersa, et cystolithis dense instructa. *Spinae axillares* stipitatae, stipite usque 8 mm. longo, radiis 4 gracilibus usque 2·5 cm. longis albis patentibus instructae. *Inflorescentiae* usque 4-florae, infra spinam axillarem apicem versus ramulorum ortae; bracteae primariae foliis similes, usque 3·5 cm. longae, secundariae minores et angustiores; bracteolae floris centralis lineares, spiniformes, usque 2·2 cm. longae, strigoso-ciliatae et parce glandulosae; bracteolae florum lateralium similes sed minores. *Calycis segmenta* 4, plus minusve libera, glabra; posticum lanceolatum, subulato-spinosum, usque 1·2 cm. longum; lateralia similia, 1 cm. longa; anticum simile, 1·1 cm. longum. *Corolla* alba, circiter 2 cm. longa, glabra; limbus subaequaliter 5-lobatus, haud bilabiatus; tubus cylindricus, haud constrictus, 1·3 cm. longus, 2 mm. diametro; lobi postici oblongi, obtusi, 8 mm. longi, 3·5 mm. lati; lobi laterales obovati, subacuti, 8 mm. longi; lobus anticus obovato-oblongus, apice rotundatus, 8 mm. longus. *Stamina* 4; duo antica circiter 14 mm. longa, filamentis angustissime ligulatis minute puberulis, antheris dithecis circiter 2 mm. longis; duo lateralia valde redacta, filamentis vix 2 mm. longis hirsutis, antheris dithecis vix 1 mm. longis. *Discus* cupularis, liber, margine vix undulatus, circiter 1 mm. altus. *Ovarium* conicum, circiter 3 mm. altum, glabrum; stylus filiformis, circiter 1·7 cm. longus, glaber; stigma cylindrico-capitatum. *Capsula* ignota.

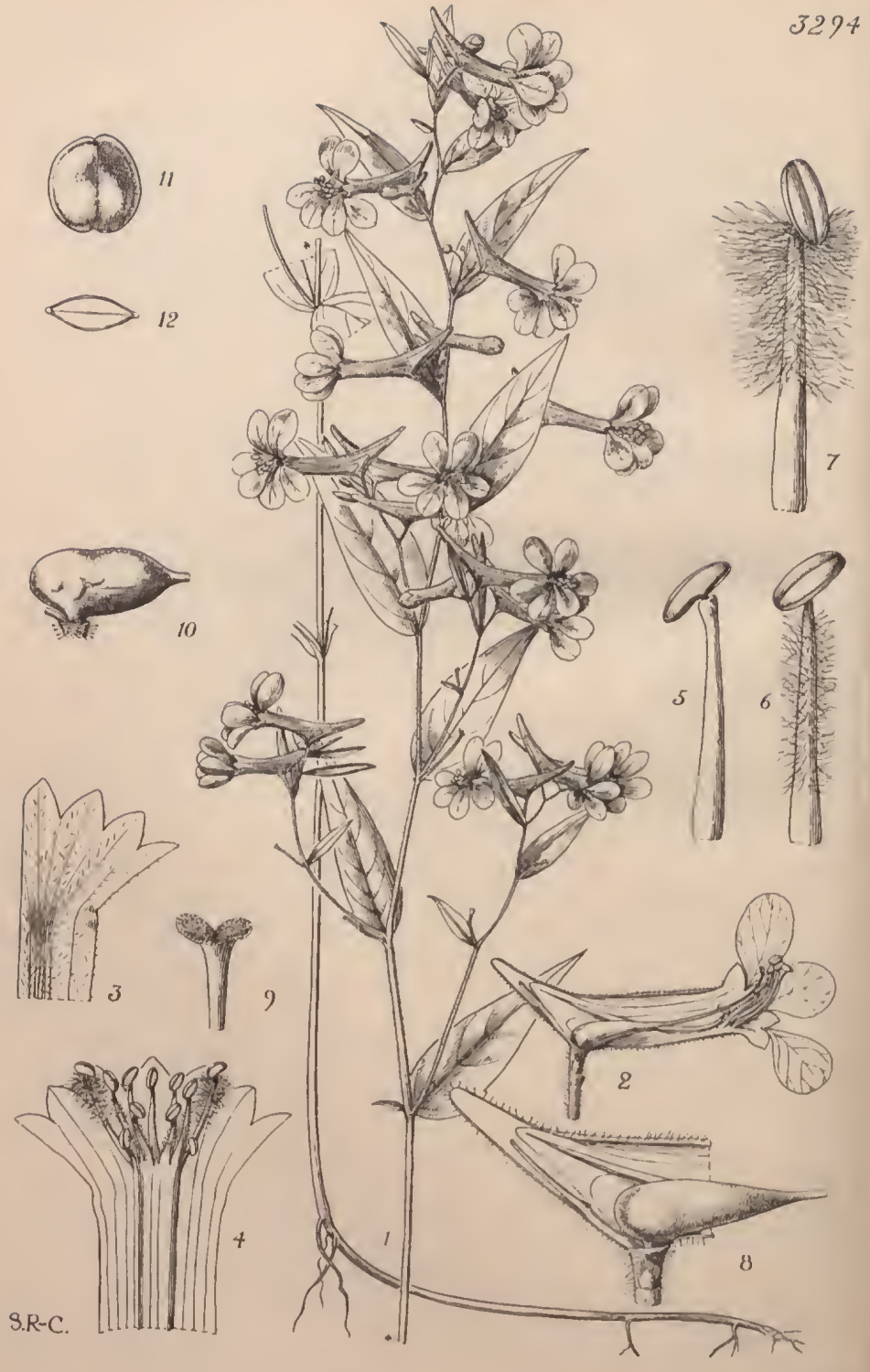
Abyssinia. Harar, 1889, *Robecchi* 10 (type in Berlin Herb.). Ankober, *Roth* 487.

British Somaliland. On stony sandstone slopes north of Hargeisa, 1300 m., 23 Sept. 1932, *Gillett* 3994 :—" Flowers white ; native name ' Aran Ad.' " Okoto, 8 Sept. 1894, *Donaldson Smith* (Brit. Mus.).

Barleria quadrispina Lindau was described from sterile material. Clarke (l.c.) gives a description of the flowers, apparently based on *B. linearifolia* Rendle, a species which he had incorrectly reduced to the synonymy of *B. quadrispina*, and which has two-lipped corollas and narrowly lanceolate calyx segments. It is practically certain that *Roth* 487 in the Kew Herbarium is the same species as that described by Lindau, and *Gillett* 3994 also agrees very closely with the type of *B. quadrispina*. Both these specimens have flowers which are subequally five-lobed, and subulate tips to the calyx segments. The specimen here figured and described is from this latter gathering and is slightly less hairy than the type, whilst in Dr. Roth's specimen the indumentum is rather more plentiful.

B. quadrispina is closely allied to *B. waggana* Rendle and *B. setigera* Rendle, both of which occur in the same area, and agrees with them in having a small subequally five-lobed corolla. It differs in its more spiny habit and shorter internodes, and in the calyx being entirely glabrous. The type specimen of *B. setigera* Rendle var. *pumila* Rendle is too incomplete to make its identification with *B. quadrispina* certain, so I refrain from quoting this variety as a synonym.—E. Milne-Redhead.

Fig. 1, flowering branch, *natural size* ; 2, anterior view of inflorescence, × 2 ; 3, a bract and one bracteole, × 2 ; 4, calyx with anterior segment removed to show pistil, × 4 ; 5, posterior and lateral segment of calyx, from within, × 4 ; 6, anterior lobe of corolla with corresponding part of tube, × 3 ; 7, anterior view of remainder of corolla, × 3 ; 8, anterior stamen, × 6 ; 9, disk and ovary, × 8 ; 10, stigma, × 8.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Tabula 3294.

CUPHEA HINTONI *Bullock.*

Lythraceae. Tribus Lythreae.

C. (§ **Ornithocuphea**) **Hintoni** *Bullock*; species nova, speciosa, *C. avigerae* Robins. et Seaton affinis, sed disco filiformi elongato basin versus calyci adnato, floribus multo majoribus, caleari multo longiore, petalis saturate purpureis multo majoribus facile distinguenda.

Herba annua, usque ad 50 cm. alta; caules graciles, primum procumbentes et unilateraliter radicantes, sed mox erecti, superne leviter ramosi, internodiis superioribus pilis longis patentibus glandulosis parce obtectis, ceterum satis dense crispato-puberuli. *Folia* opposita, sessilia, in quovis pari saepe inaequalia, lanceolata vel anguste ovato-lanceolata, apice acutiuscule attenuata, basi truncata vel truncato-subcordata, usque ad 7·5 cm. longa et basin versus 2·5 cm. lata, sed plerumque circiter 3 cm. longa et 1 cm. lata, tenuiter penninervia, utrinque scabriuscule puberula, inferne mox decidua, superne minora, bracteiformia. *Inflorescentia* foliata, laxa, e ramulis axillaribus filiformibus circiter 1–6-floris composita; bracteae superiores lineares, in quovis pari maxime inaequales, altera saepe subnulla; pedicelli filiformes, glanduloso-pilosi, circiter 5 mm. longi, bracteolis 1–3 minutissimis vel subobsoletis praediti; flores saturate purpurei. *Calyx* totus 2 cm. longus, horizontalis, longissime calcaratus, glanduloso-pilosus, faucem versus purpurascens, intus glaber et dorso leviter bialatus; calcar pallide purpureum, 5–6 mm. longum, gracile, obtusum, rectum vel leviter adscendens; lobi 6, late triangulares, sub anthesin patentes. *Petala* ut videtur subaequalia, dorsiventraliter patentia, 2 dorsalia elliptica, circiter 6 mm. longa et 3 mm. lata, 4 ventralia obovata, 5 mm. longa et 3 mm. lata. *Stamina* 11, ut in icone biserialiter inserta, polymorpha; filamenta glabra, vel breviter vel longe pilosa, ut in icone depicta; antherae ellipsoideae, dorsifixae. *Ovarium* ambitu horizontaliter lanceolatum, glabrum, 4–6-ovulatum. *Stylus* gracilis, exsertus, 9 mm. longus, apice stigmatoso-bifidus. *Discus* elongatus, filiformis, ut in icone calyci adnatus et in calear projectus, post anthesin delapsus. *Capsula* membranacea, ovario paullo major. *Semina* 4, lentiformia, brunnea, laevia vel minutissime punctulata, in sicco leviter rugosa.

Mexico. District of Temascaltepec, State of Mexico: Rincon del Carmen, in woods, Nov. 1932, *Hinton* 2691 (type); Rincon del Carmen, 1340 m., under oaks, Oct. 1932, *Hinton* 1958; Rincon del Carmen, Nov. 1934, *Hinton* 7008; Nanchititla, in oak woods, "very sticky," Nov. 1934, *Hinton* 7069; Tejupilco, Dec. 1934, *Hinton* 7079.

The most striking morphological features of *Cuphea Hintoni* are the long, ascending, straight spur and the peculiar disk. As indicated above, it is readily distinguishable from *C. avigera* Robins. et Seaton, which was hitherto known only from Pringle's no. 4349, collected near Lake Chapala in the State of Jalisco. Mr. G. B. Hinton has now sent specimens of this species (no. 2661) from Tejupilco, District of Temascaltepec, State of Mexico, collected in a wet barranca. Dissection of a young flower shows that the disk is represented by a small knob just behind the ovary. This could not be found in an older fruiting stage. The present plant, as shown in fig. 8, has a most remarkable disk, modified to form a nectariferous gland projecting into the spur. In this case the disk is adnate to the calyx for an appreciable distance, and, as the flower fades, the free portion withers and drops off. The pedicels of *C. Hintoni* show very minute bracteoles, which are in some cases almost obsolete, and have the appearance of small tufts of hairs.

Kochne (in Engler, Pflanzenr., Lythrac. 80: 1903) recognized twelve sections of *Cuphea*, of which the last, *Diploptychia*, included three subsections. Of these, *Ornithocuphea*, including only *C. avigera*, was described as having no disk, and ebracteolate pedicels, by which it was separated from subsections *Trichoptychia* and *Leioptychia*.

In view of these facts, the writer has thought it advisable to separate *C. avigera* and *C. Hintoni* as a distinct section, to be distinguished from section *Diploptychia* by means of the straight, ascending spur, adnate disk, and relatively few ovules, as follows:—

Sect. **Diploptychia** *Koehne*.—Discus manifestus, liber, parvus, deflexus; ovula satis numerosa, plerumque 10–30 sed usque 62 (*fide* Kochne); calcar breve, incurvum; pedicelli manifeste bibracteolati.—Herbae perennes, erectae, plus minusve lignosae.

Sect. **Ornithocuphea** (*Koehne*) *Bullock*, emend., status novus.—Discus calyci adnatus, parte libera subobsoleta vel filiformi et elongata; calcar pro rata elongatum, rectum, adscendens; pedicelli minutissime vel subobsolete 1–3-bracteolati vel bracteolae nullae.—Herbae annuae, haud lignosae, caulibus basin versus procumbentibus radicantibus.—*Cuphea* subsect. *Ornithocuphea* Kochne, l.c. 88, 179.

The formation of adventitious roots on the procumbent portion of the stem in both *C. avigera* and *C. Hintoni* bears no relation to the insertion of the leaves. These roots are strictly confined to the lower side of the stem. In some cases the testa of the seed is still attached

to Mr. Hinton's specimens, and it can be clearly seen that the primary root system, developed from the radicle, remains very small, the chief absorptive organs being the later developed adventitious roots.

A. A. Bullock.

Fig. 1, entire small plant, *natural size*; 2, longitudinal section of a flower, × 2; 3, portion of the outer surface of the calyx, × 4; 4, upper part of calyx laid open to show the androecium, × 4; 5, one of the three glabrous stamens of the outer whorl, × 12; 6, one of the two long stamens of the inner whorl, × 12; 7, one of the lateral stamens of the outer whorl, × 12; 8, base of a flower in longitudinal section, showing the ovary, disk and spur, ×4; 9, stigma, × 40; 10, capsule, × 4; 11, seed, abaxial view, × 6; 12, seed, transverse section, × 6.


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Tabula 3295.

HINTONIA LATIFLORA var. LEIANTHA *Bullock.*

Rubiaceae. Tribus Condamineae.

Hintonia *Bullock.* Genus novum, affine *Portlandiae* P. Br., a qua foliis herbaceis haud nitide coriaceis, capsula septicide dehiscente, seminibus alatis differt; a *Coutarea* Aubl., quacum hactenus confusum, foliis satis longe petiolatis, corollae tubo recto haud asymmetrico, limbo haud obliquo, capsula ellipsoidea levissime compressa 6–8-costata plerumque lenticellis suberosis ornata septicide dehiscente, seminibus subpendulis longe recedit.

Calyx 6-lobatus, lobis plus minusve foliaceis anguste lanceolatis acutis demum deciduis. *Hypanthium* turbinatum, 6- vel 8-costatum. *Corolla* infundibuliformis, haud obliqua, alabastro plicato-valvata sed marginibus scariosis loborum imbricatis, 6- vel 8-lobata, 6- vel 8-costata, lobis late triangularibus sub anthesin late apertis apice obtusiuscule apiculatis, costis e sinibus loborum ad basin conspicuis glabris vel interdum valde villosis plus minusve anguste aliformibus. *Filamenta* corollae tubo basi inserta, recta, filiformia. *Antherae* lineares, basifixae, introrse longitudinaliter dehiscentes, haud vel vix exsertae. *Discus* annularis, vix conspicuus. *Ovarium* 2-loculare, placentis septo affixis subcarnosis; stylus filiformis, stamina aequans, apice leviter clavellato-bifidus. *Capsula* ellipsoidea, levissime compressa, conspicue 6-costata atque lenticellata, septicide dehiscens. *Semina* biseriata, pendula, numerosa, compressa, satis late alata; testa minutissime punctulata.—*Frutices* erecti vel *arbores* parvae. *Folia* late elliptica vel ovata, vel anguste lanceolata vel oblongo-lanceolata, herbacea, petiolata, primum plus minusve pubescentia, demum glabrata. *Flores* solitarii, speciosi, albi, axillares, pedicellati, pedicellis minute bibracteolatis vel ebracteolatis.

Species 4–5, Mexici et Guatemalae incolae. Typus: *H. latiflora* (Sessé et Moc. ex DC.) Bullock.

H. latiflora (vide p. 4) var. **leiantha** *Bullock*; var. nova, a typo floribus fructibusque multo majoribus, corollae tubo intus fere glabro, antheris sesquilongioribus recedit.

Frutex vel *arbor* (parva), ut videtur decidua ; rami teretes, primum lenticellis conspicuis ornati, demum grisei, lenticellis suberiferis inconspicuis, internodiis laevibus usque ad 5 cm. longis vel brevissimis, cortice cicatricibus foliorum delapsorum tuberculato. *Stipulae* triangulares, interpetiolares, circiter 3 mm. longae, apice acutae vel interdum 2–3-dentatae, demum scariosae, deciduae. *Folia* elliptica vel oblongo-elliptica, petiolis gracilibus 1–2 cm. longis ; lamina membranacea usque ad 9 cm. longa et 4 cm. lata, apice acutiuscule breviter acuminata, basi in petiolum satis abrupte acute angustata, supra glabra, subtus primum (axillis nervorum praesertim) plus minusve pubescens, mox glabrescens, nervis lateralibus utrinsecus 6–7 arcuatis venis reticulatis demum (statu fructifero) supra conspicuis subtus obscuris. *Flores* albi, speciosi, solitarii, ex axillis foliorum superiorum orti ; pedicelli glabri, 2–2·5 cm. longi, infra medium bracteolis 2 oppositis lineari-subulatis circiter 3 mm. longis ornati. *Hypanthium* (receptaculum) glabrum, turbinatum, prominenter 6-costatum, 6 mm. longum et apice 3–4 mm. diametro. *Calycis limbus* fere usque ad hypanthium 6-lobatus, glaber ; lobi subfoliacei, anguste lanceolati, apice acutissimi, inter se aequales, 2 cm. longi et basin versus 3 mm. lati, basin versus aculeis minutis intus et margine ornati. *Corolla* infundibuliformis, 6-lobata, 6-angulata, angulis angustissime membranaceo-alatis, extra glaberrima, intus basin versus minutissime et parce puberula ; tubus usque ad 7 cm. longus, basi 2·5 mm., fauce 4·5 cm. diametro ; lobi ambitu late triangulares, rotundati, obtuse apiculati, apiculo minutissime tuberculato, circiter 1–1·2 cm. longi, basi 2·5 cm. lati, sub anthesiu declinato-patentes. *Stamina* 6, corollae tubo basi inserta ; filamenta recta, filiformia, glabra, 4 cm. longa ; antherae lineares, apice acutae, basi breviter sagittatae, basifixae, 2·5 cm. longae, vix exsertae. *Stylus* circiter 6·5 cm. longus, filiformis, apicem versus tortus, apice clavellato-bifidus. *Capsula* ellipsoidea, levissime applanata, 3–4 cm. longa et (diametro longiore) 2 cm. lata, conspicue 6-costata, lenticellis suberosis irregulariter ornata, demum septicide dehiscens. *Semina* imbricata, applanata, elliptica, alata ; testa minutissime punctulata.

Mexico. District of Temascaltepec, State of Mexico : Ixtapan, 1000 m., Aug. 1932 (fl.), *Hinton* 1258 (type) ; Luvianos, July 1933 (young fl.), *Hinton* 4317 ; Nanchititla, Feb. 1933 (fr.), *Hinton* 3413. State of Sinaloa : near Culiacan, Sept. 1904, *T. S. Brandegee* (U.S.) ; without precise locality, Aug. 1897, *J. N. Rose* 2281 (U.S.). State of Colima : without precise locality, July 1897, *E. Palmer* 93 (U.S.).

The taxonomic position of *Hintonia* presents something of a problem, so long as the old method of segregating the tribes by means of the presence or otherwise of winged seeds is rigorously maintained. *Portlandia*, with exalate, angulate seeds, is placed in the *Condamineae*, whilst *Coutarea* with winged seeds is placed in the *Cinchoneae*. It may be safely said, however, that the only character in which *Hintonia*

approaches *Coutarea* is in the winged seeds. These are descending in *Hintonia*, but almost vertically ascending in *Coutarea*. In addition, the capsules of the two genera are markedly dissimilar. The flattened obovate, loculicidally dehiscent capsule of *Coutarea* is typical of the *Cinchoneae*, whilst the ellipsoidal, scarcely flattened, strongly ribbed, septicidal capsule of *Hintonia* is similar in general appearance to that of *Portlandia*. The latter, however, is loculicidal, and is usually crowned by the persistent calyx.

Examination of the corolla in the three genera concerned shows even closer agreement between *Hintonia* and *Portlandia*, as contrasted with *Coutarea*. The last genus usually has a curved tube, often gibbous near the base, and contorted aestivation; *Hintonia* and *Portlandia* have straight tubes, never gibbous at the base, and plicate-valvate aestivation (the scarious margins of the lobes overlapping in an imbricate manner). The stamens of *Coutarea* are exserted, and have strongly arcuate filaments; those of *Hintonia* and *Portlandia* are included and have straight filaments. The leaves, though not here regarded as presenting characters of prime generic importance, also afford useful indications. In *Portlandia* they are leathery and shining, whilst in *Coutarea* and *Hintonia* they are thinly herbaceous; in the latter, however, distinctly longer petioles are found.

Clavis specierum generis Hintoniae.

Flores hexameri:

Capsula prominenter pallide lenticellata, costis 6 robustis ornata, glabra; corolla in sicco virescens; folia plus minusve elliptica, circiter 5–9 cm. longa et 2·5–5 cm. lata; pedicelli minute bibracteolati:

Capsula circiter 2–2·5 cm. longa; calycis lobi circiter 1 cm. longi; corolla circiter 6 cm. longa; pedicelli 1–1·5 cm. longi. 1. *H. latiflora.*

Capsula 4 cm. longa; calycis lobi 2 cm. longi vel ultra; corolla 8 cm. longa; pedicelli 2 cm. longi vel ultra. 1. *H. latiflora*, var. *leiantha.*

Capsula vix distincte lenticellata, pro rata parva, circiter 1–1·5 cm. longa; corolla in sicco flavescens:

Folia anguste lanceolata vel oblongo-lanceolata, 10–12 cm. longa, 2·5 cm. lata; corolla 11 cm. longa; antherae 1·5 cm. longae; capsula robuste 6-costata; pedicelli bibracteolati. 2. *H. Lumacana.*

Folia elliptica vel ovata, 4–7 cm. longa, 2–4 cm. lata; corolla 6 cm. longa; antherae 3 cm. longae; capsula levissime 6-costata; pedicelli ebracteolati . . . . . 3. *H. Standleyana.*

Flores octomeri; pedicelli ebracteolati; folia plus minusve elliptica, pro rata parva, circiter 2·5 cm. longa, usque ad 1·5 cm. lata. 4. *H. octomera.*

All the specimens cited in the following enumeration have been examined, those preserved in the United States National Herbarium at Washington and not represented at Kew being indicated by the letters U.S. in brackets after the collector's name and field number.

Enumeration of Species.

1. **H. latiflora** (*Sessé et Moc. ex DC.*) *Bullock*, comb. nov. *Coutarea latiflora* Sessé et Moc. ex DC. in DC. Prodr. iv. 350 (1830); Alph. DC. Calq. Dess. t. 458 (1874); Hemsl. Biol. Centr.-Amer., Bot. ii. 12 (1882); non Standl. in North Amer. Fl. xxxii. 127 (1921), nec in Contr. U.S. Nat. Herb. xxiii. 1367 (1926). *Portlandia pterosperma* S. Wats. in Proc. Amer. Acad. xxiv. 52 (1889). *Coutarea pterosperma* (S. Wats.) Standl. in North Amer. Fl. xxxii. 127 (1921), et in Contr. U.S. Nat. Herb. xxiii. 1367 (1926).

Mexico. State of Sonora: near Alamos, *Rose, Standley and Russell* 12870 (U.S.); Guamas, *Palmer* 298 (1887) (type of *Portlandia pterosperma*); Guaymas, *Johnston* 3099. Tres Marias Islands: Maria Madre Is., *Nelson* 4211 (U.S.); *Ferris* 5602 (U.S.). State of Chihuahua: Batopilas, *Doldman* 223 (U.S.). State of Sinaloa: Fuerte, *Rose, Standley and Russell* 13499 (U.S.); Mazatlán, *Ortega* 5607 (U.S.); *Rose, Standley and Russell* 13786 (U.S.); San Blas, *Rose, Standley and Russell* 13621; Rosario, *Rose, Standley and Russell* 14540 (U.S.); La Peonia, Choix, 610 m., *Montes and Salazar* 635 (U.S.); Culiacan, *Palmer* 1515 (1891) (U.S.); without exact locality, *Ortega* 4845 (U.S.); 6354 (U.S.). State of Tepic: Acaponeta, *Rose, Standley and Russell* 14352 (U.S.). State of Durango: Sianori, *Ortega* 5376 (U.S.). State of Mexico: Anonas, Temascaltepec, *Hinton* 6333. State of Guerrero: Acholtla, 900 m., *Reko* 5044 (U.S.).

Many of the specimens cited show fruit only, and these vary considerably in size and in the number and size of the corky lenticels, which, the writer is convinced, are of great taxonomic importance, at any rate specifically. A few of them may actually belong to var. *leiantha*.

There seems to be no doubt that Sessé and Mociño's *Coutarea latiflora*, described from their drawing by De Candolle in the Prodromus, has been wrongly identified by later authors. The drawing and description of the fruit are definitely indicative of the later described *Portlandia pterosperma* S. Wats. and not of the plant accepted by Standley as "*Coutarea latiflora*." The presence of conspicuous lenticels is decisive. The native name "copalchi" given by De Candolle is almost universally applied to *Portlandia pterosperma*, and rarely to Standley's "*Coutarea latiflora*," which is more usually called "quina" or "falsa quina." The native names are probably reliable, since the bark of both plants is of value—"copalchi" for malaria, lung affections, and for pinto, and "quina" as a febrifuge.

The greater part of both drawing and description is equally applicable to both plants, the only feature definitely suggestive of Standley's

"*Coutarea latiflora*" rather than *Portlandia pterosperma* being the absence of bracteoles. In the latter, these are very small and comparatively early deciduous, and might be easily overlooked unless their presence or absence is known to be important. It is suggested that Sessé and Mociño, not realizing their importance, neglected them, whilst De Candolle, at once observing a specific character, wrote "... pedicellis ebracteatis."

The balance of evidence is therefore strongly in favour of the identification adopted above, *Portlandia pterosperma* becoming a synonym of *Hintonia latiflora*, and *Coutarea latiflora* DC. sec. Standl. receiving the new name *Hintonia Standleyana*.

H. latiflora var. **leiantha** *Bullock* (vide p. 1).

The specimen (*Hinton* 1258) from which the figures of the flower have been drawn is so strikingly different from the type of Watson's *Portlandia pterosperma* that it was at first decided to describe it as a distinct species. It was realized, however, that the material available for study at Kew was inadequate, and through the generous loan of the material in the United States National Herbarium the writer has been able to examine a very large series of specimens, most of which had been used in the preparation of the North American Flora. These show most remarkable gradations in nearly all the characters usually considered to be of specific importance, and, taken in conjunction with the extensive geographical distribution, given in some detail above, indicate that the present plant is no more than an extreme form which is, however, worthy of varietal rank.

The variety is a shrub about 6 feet high, bearing large axillary white flowers. According to Mr. G. B. Hinton, the macerated leaves are taken internally for malaria, and boiled in a bath for the pigmentation disease known as pinto. The vernacular name given by Mr. Hinton is "copalche," a name which, as noted above, is in general use throughout Mexico for the typical form.

2. **H. Lumaeana** (*Baill.*) *Bullock*, comb. nov. *Coutarea Lumaeana* Baill. in Adans. xii. 301 (1879); Standl. in N. Amer. Fl. xxxii. 128 (1921), et in Contr. U.S. Nat. Herb. xxiii. 1367 (1926). *Portlandia Lumaeana* (Baill.) Baill. Hist. Pl. vii. 333 (1880).

GUATEMALA. Dept. Guatemala, 1500 m., May 1892, *Donnell-Smith* 2757:—"In hortis Lumanis seminibus a San Jorje (3000 pp.) in Depart. Chimaltenango advectis producta."

This species, the only one confined to Guatemala, is at once distinguished by its long, narrow leaves. The fruit, known to the writer only from a few fragments in a capsule on the Kew sheet, shows the ribs characteristic of the genus.

3. **H. Standleyana** *Bullock*, nom. nov. *Coutarea latiflora* DC. sec. Standley in N. Amer. Fl. xxxii. 127 (1921), et in Contr. U.S. Nat. Herb. xxiii. 1367 (1926); non Sessé et Moc. ex DC. Prodr. iv. 350 (1830).

Mexico. Chihuahua: *Palmer* 16 (1895); Tepic: *Lumholtz* (U.S.); Puebla: *Andrieux* 337; *Pringle* 8583; *Seler* 849 (U.S., ex herb. Berol.); *Rose and Hay* 5932 (U.S.); *Rose, Painter and Rose* 10123 (U.S.). Oaxaca: *Purpus* 3279 (U.S.); *Conzatti* 3966 (U.S.); *Reko* 4253 (U.S.); *Pringle* 7473 (U.S.); *Pringle and Conzatti* 271 (U.S.). Guerrero: *Nelson* 6985 (U.S.); *Langlassé* 234.
Guatemala. Gualan, *Deam* 6365 (U.S.).

An extremely variable species, particularly as to the amount of indumentum on the leaves, hypanthium, and the outside of the corolla. With an even greater geographical range, it is at once distinguished from *H. latiflora* (as here understood) by the small, almost smooth fruit, which is not obviously lenticellate. As pointed out above, the absence of bracteoles led to its confusion with that species. In the dried state the two species are readily separable by means of the colour difference noted in the key. *H. Standleyana* is used in Mexico as a febrifuge, and the vernacular name is "quina," or a variant thereof.

4. **H. octomera** (*Hemsl.*) *Bullock*, comb. nov. *Coutarea octomera* Hemsl. Biol. Centr.-Amer., Bot. iv. 101 (1887); Standl. in N. Amer. Fl. xxxii. 127 (1921), et in Contr. U.S. Nat. Herb. xxiii. 1367 (1926).

Mexico. Yucatan: Cozumel Is., April 1895, *Gaumer* 148 (type); Port Silam, 1895, *Gaumer* 682; sin. loc., *Gaumer* 27271; *Gaumer* 23780 (U.S.); Chichen Itza, June 1929, *J. Bequaert* 40 (U.S.):— "Bush about 15 ft. high with somewhat hanging and trailing branches, and white flowers."

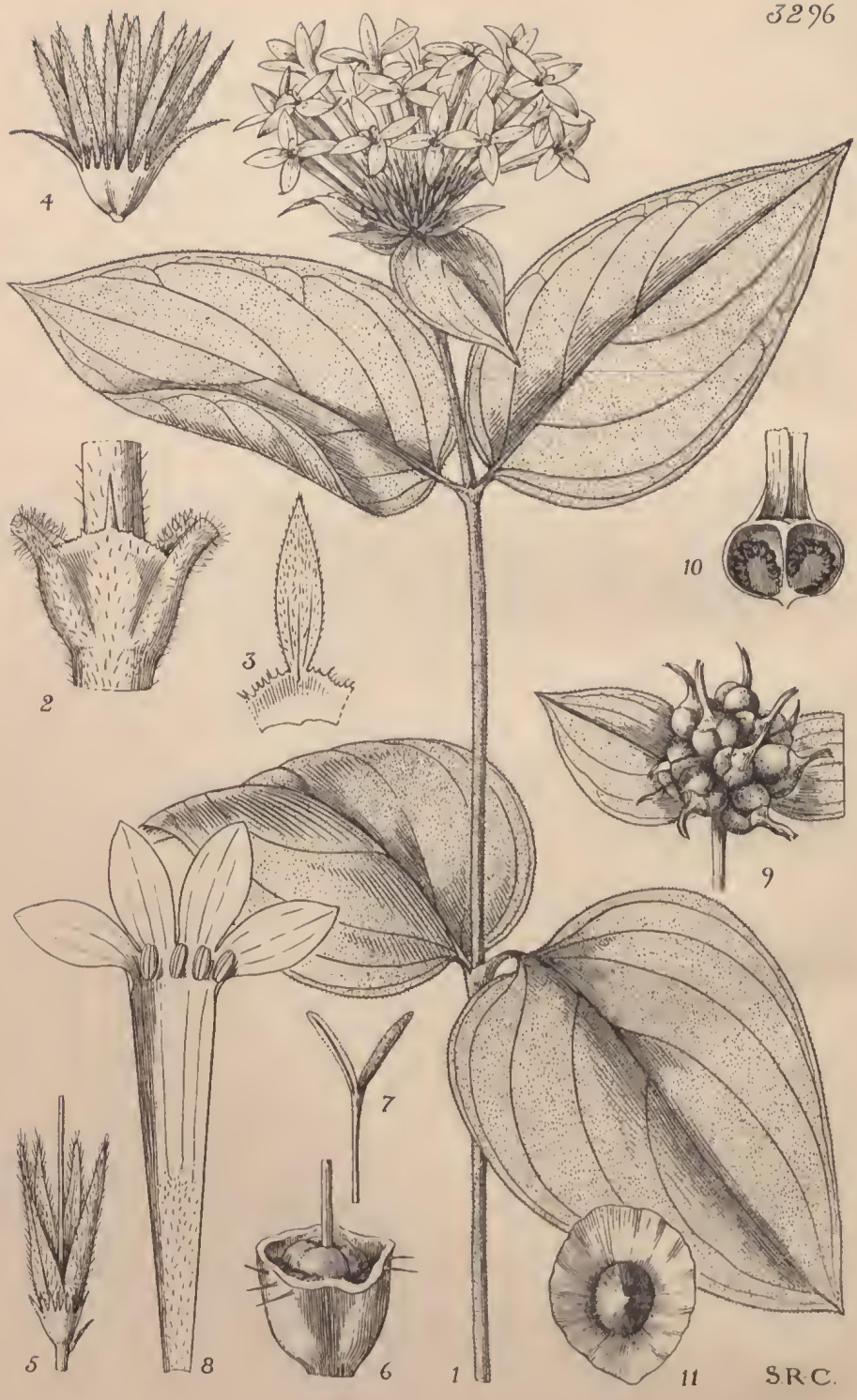
A very distinct species, at once characterized by its octomerous flowers and comparatively small leaves. It is the only species occurring in Yucatan. The size of the flower is very variable, being from 3 to 7 centimetres in length.

Two specimens of *Hintonia* in the United States National Herbarium collected by Dr. B. P. Reko at Calabazas, Jalisco, in 1925, are named respectively "*Coutarea latiflora* M. & S." (no. 4882) and "*Coutarea pterosperma* (Wats.) Standl." (without number). These appear to be conspecific, and the writer is inclined to the belief that they represent a further undescribed species of *Hintonia*. Further material, including fruit, is necessary before a definite conclusion can be reached.

After segregating the genus *Hintonia* from the Central American species of *Coutarea* as understood by Standley, there remains only one species, *C. hexandra* (Jacq.) K. Schum., indigenous in that region. Of

the Mexican specimens of this species seen by the writer, there is in the Kew Herbarium one from Vera Cruz, collected by Dr. Gouin in 1867. This is an extension of the Mexican range (Oaxaca and Chiapas) given by Standley. *Coutarea mexicana* Zucc. et Mart. was rightly transferred by Hemsley to *Portlandia*, in which genus it is retained by Standley. There are thus three species of *Hintonia*, one of *Coutarea*, and one of *Portlandia* indigenous in Mexico, the fourth species of *Hintonia* being confined to Guatemala.—A. A. Bullock.

Fig. 1, flowering branch, *natural size*; 2, calyx with two lobes removed, and gynoecium, × 2; 3, lower part of calyx-lobe, from the inside, × 6; 4, part of corolla and androecium thrown open, *natural size*; 5, tip of corolla-lobe from the outside, × 2; 6, base of corolla-tube from the inside to show the insertion of the stamens, × 3; 7, infructescence, *natural size*; 8, fruit in longitudinal section, × 1·5; 9, seed, × 4.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Tabula 3296.

BOUVARDIA CAPITATA *Bullock*.

Rubiaceae. Tribus Cinchoneae.

B. capitata *Bullock*; species nova, floribus fructibusque sessilibus capitato-glomeratis distinctissima.

Frutex ramosus, 1–2 m. altus; rami teretes, primum crispato-pubescentes, mox glabrati, cortice demum pallide pergamentaceo, internodiis (ramulorum floriferorum) 3–6 cm. longis. *Folia* opposita, breviter petiolata, late ovata, usque ad 7·5 cm. longa et 5 cm. lata, apice acuta vel acutiuscule acuminata, basi plerumque late rotundata vel truncata, interdum subcordata, nonnunquam breviter cuneata, utraque pagina parce crispato-pubescentia, subtus praesertim in nervis, leviter discoloria, nervis lateralibus utrinsecus 3–4 acute adscendentibus marginem versus tenuissimis arcuatis, petiolis pubescentibus circiter 3 mm. longis; stipulae ut in icone (fig. 2) depictae. *Flores* subsessiles, apice ramulorum dense capitato-glomerati, in inflorescentias iterum atque iterum ternatim ramosas (ramis valde contractis) dispositi; singulae triades inflorescentiarum florumve necnon singuli flores singulis vaginis bractealibus circumcinctae; pedunculus brevis vel subobsoletus; bracteae exteriores foliaceae, oppositae, basi vaginato-connatae, interiorum laminis gradatim redactis et demum obsoletis. *Calyx* 4-lobatus, lobis erectis subaequalibus triangulari-lanceolatis 5 mm. longis 1–1·5 mm. latis acutis extra pubescentibus, tubo (hypanthio excluso) cylindrico 2 mm. longo; hypanthium minutum, subglobosum, glabrum. *Corollae tubus* 2 cm. longus, lineari-cylindricus, apicem versus levissime ampliatus, extra glaber, intus basin versus leviter pubernlus; lobi 4, cruciato-patentes, oblongo-ovati, 6 mm. longi, extra levissime striguloso-puberuli. *Stamina* 4, fauce inserta, inclusa; filamenta filiformia, 0·5 mm. longa; antherae oblongae, 2 mm. longae, dorsifixae. *Ovarium* biloculare; ovula in loculis numerosa, placentis carnosis septo basin versus affixis. *Discus* annularis, carnosus, leviter 4-crenatus. *Stylus* filiformis, exsertus, 2·3 cm. longus; stigmata 2, linearia, 1·5 mm. longa. *Capsula* didyma, circiter 7 mm. diametro, loculicide dehiscens, apice calyce persistente coronata, glabra, leviter reticulata. *Semina* numerosa, nigra, disciformia, alata, cum ala 3 mm. diametro.

Mexico. District of Temascaltepec, State of Mexico: Palmar, in a barranca, plant 1 m. high, July 1934 (fl.), *Hinton* 6319 (type); Ixtapan, 1000 m., by the river, shrub 2 m. high, Aug. 1932 (fl. jun.), *Hinton* 1268; Tejupilco, 1340 m., in oak woods, shrub 2 m. high, Nov. 1932 (fr.), *Hinton* 2657.

Bouvardia capitata is at once distinguished by its congested terminal inflorescence, which is not closely paralleled by any other member of the genus. The inflorescence is evidently a much contracted ternately branched cyme, the middle "branch" at each forking being formed by the main axis. Each flower is subtended by a membranous, more or less fimbriate involucel (fig. 5), homologous with a pair of sheathing stipules, the opposite leaf-laminae having become obsolete. The flowers with their involucels are combined in threes into partial inflorescences enclosed in a further larger involucel of similar form, as shown in fig. 4. Here two rudimentary leaf- (or bract-) laminae are present. The partial inflorescences are again combined in a similar manner, and again the involucral leaves (bracts) increase in size at the expense of the sheathing stipular base. This process is repeated until the bracts assume ordinary leaf-form, and the stipular sheath is reduced proportionately. An intermediate stage is shown at fig. 3. The minute bracteolar appendage shown in fig. 5 is apparently not a constant feature.

Small lateral inflorescences are occasionally produced from the axils of the uppermost pair of leaves, but this apparently is merely a case of predevelopment of branches which would otherwise remain dormant until the following year.

On the old stems of the specimens examined, three, four or five branches arise from the same level, although in every case the leaves on the young shoots are strictly opposite. This is due to the development of secondary buds at the extreme base of the axillary branches, so that at later stages the branches appear to arise from the same node on the main axis. Such buds can be seen in some cases.

The writer has been unable to find any really close affinity for *B. capitata*. Applying Standley's key (in Fl. N. Amer. xxxii. 100: 1921), it falls within a group of species characterized by opposite (not whorled) broad leaves, relatively large, spreading (not erect) corolla-lobes, and glabrous or only slightly hairy corolla-tubes. It is not, however, closely related to any of the thirty species enumerated by Standley.

A. A. Bullock.

Fig. 1, flowering branch, *natural size*; 2, stipule, × 8; 3, part of an involucel (see text), × 4; 4, a partial inflorescence, showing three calyces and an involucel, × 3; 5, calyx, enclosed in its involucel, and a bracteolar appendage, × 3; 6, ovary, disk, and lower part of the style, × 12; 7, stigmas and upper part of the style, × 12; 8, corolla laid open to show the androecium, × 3; 9, infructescence, *natural size*; 10, longitudinal section of an almost mature fruit, × 2; 11, seed, × 6.


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Tabula 3297.

BOUVARDIA CATAPHYLLARIS *Bullock.*

Rubiaceae. Tribus Cinceoneae.

B. cataphyllaris *Bullock*; species nova, affinis *B. versicolori* Ker, sed floribus majoribus paucioribus, corollae tubo extra distincte pubescente, lobis suberectis obtusis, habitu stricto, internodiis ramulorum multo longioribus recedit.

Frutex erectus, circiter 0·75 m. altus; rami annotini graciles, strieti, cortice laevi griseo pergamentaceo, internodiis 5–7 cm. longis, foliis delapsis; ramuli hornotini laterales, ex axillis foliorum delapsorum orti, plerumque inflorescentiis terminati, usque ad 4·5 cm. longi sed plerumque breviores, graciles, dense villoso-pubescentes, basi cataphyllis instructi. *Folia ramulorum* per paria duo (rarissime tria) disposita; inferiora parva, subcataphyllaria, circiter 5–9 mm. longa; superiora lanceolata, vel anguste ovata, apice acuta, basi subcuneata usque rotundata, 1·5–2·5 cm. longa, 5–8 mm. lata, discoloria, subtus albicantia, utraque pagina parce pubescentia, nervis lateralibus utrinseeus 2–3 obliquis, petiolis brevissimis pubescentibus; stipulae cum petiolis vaginato-connatae, e basi subtruncata subulatae, parte libera 1·5 mm. longa. *Flores* in cymas 3–5-floras terminales dispositi, interdum ex axillis foliorum superiorum solitarii; bracteae lineares, vel lineari-lanceolatae et inferne valde angustatae, usque ad 1·3 cm. longae, sed saepe minores et interdum filiformes vel subobsoletae; bracteolae nullae vel minutissimae; pedicelli pubescentes, usque ad 4 mm. longi. *Calyx* fere usque ad hypanthium subglobosum dense pubescens in lobos 4 divisus; lobi lineari-subulati, 3–4 mm. longi, parcissime pubescentes, interdum inaequales, nonnunquam bifidi. *Corolla* 3 cm. longa, anguste cylindrica, extra pilis patentibus unicellularibus parce induta, intus basin versus parce pilosa: lobi 4, erecti, oblongo-ovati 3 mm. longi, obtusi. *Stamina* fauce inserta; filamenta 0·5 mm. longa; antherae inclusae, oblongae, utrinque obtusae, 2·5 mm. longae. *Stylus* inclusus, 2 cm. longus, filiformis; stigmata oblongo-linearia, 1·75 mm. longa, erecto-subdivergentia. *Discus* annularis, carnosus, pubescens. *Ovarium* biloculare; ovula in loculis numerosa, valde appressa; placentae septo basin versus peltato-affixae. *Fructus* non visi.

MEXICO. Temascaltepec, District of Temascaltepec, State of Mexico, a shrub 0·75 m. high, on a dry hill, 1780 m., 28 July 1932, *Hinton* 1131.

Bouvardia cataphyllaris belongs to a very typical group of species characterized by erect or suberect corolla-lobes, in striking contrast to those of *B. capitata*, figured in plate 3296. It appears to be an erect shrub with the ultimate branches strict and slender. The flowering branches are lateral, arising from the axils of fallen leaves, and normally consist of four internodes surmounted by a 3–5-flowered simple cyme. The two lowest internodes are extremely short, and their presence is indicated by two cataphyllary sheaths, the lower being split into two parts, one on each side of the axis. The third internode is longer, and the two leaves at its apex, although small, are rarely reduced to the condition of cataphylls. The fourth internode is surmounted by a pair of normal, fully developed leaves, which often have solitary flowers in their axils. The axis continues for one internode as an inflorescence rhachis, bearing at its apex a pair of bracts and three pedicelled flowers. These bracts are often foliaceous, but are always much smaller than the uppermost pair of leaves, and are sometimes linear or even filiform. Filiform bracteoles sometimes occur on the pedicels or at the base of the hypanthium, but are not constant. The calyx-lobes are sometimes very unequal and occasionally bifid.

A. A. BULLOCK.

FIG. 1, branch one year old, with flowering branchlets, *natural size*; 2, node of branch showing the basal cataphylls of two flowering branchlets, × 6; 3, lower node of flowering branchlets, × 6; 4, subtending bract of flower, × 4; 5, calyx and gynoecium, × 3; 6, hypanthium, most of the calyx removed to show the disk, × 12; 7, corolla laid open, × 3.


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Tabula 3298.

BASANACANTHA ECHINOCARPA

(*Sessé et Moc. ex DC.*) *Bullock*.

Rubiaceae. Tribus Gardenieae.

B. echinocarpa (*Sessé et Moc. ex DC.*) *Bullock*, comb. nov. *Randia echinocarpa* Sessé et Moc. ex DC. in DC. Prodr. iv. 385 (1830); Alph. DC. Calques Dess. Fl. Mex. t. 469 (1874); Hemsl. Biol. Centr.-Amer., Bot. ii. 40 (1881); Standl. in Contr. U.S. Nat. Herb. xxiii. 1374 (1926), et in N. Amer. Fl. xxxii. 163 (1934). *Genipa echinocarpa* (Sessé et Moc. ex DC.) A. Gray in Proc. Amer. Acad. xxi. 380 (1886).—Species valde distincta, fructibus viridibus tuberculis elongatis angustis irregularibus usque ad 2 cm. longis indutis.

Frutex ramosus, spinosus vel rarissime inermis, usque ad 4 m. altus; ramuli floriferi robusti, plerumque primum dense pubescentes, apice spinis 4 patentibus 1–3 cm. longis vel interdum valde redactis ornati. *Folia* brevissime petiolata, apice ramulorum floriferorum per paria 2–3 orta; lamina elliptica vel ovata vel obovata, usque ad 10 cm. longa et 5 cm. lata, apice obtusa vel rotundata, interdum apiculata, basi obtuse vel acute angustata vel cuneata, utraque pagina satis dense pubescens, subtus in nervis praesertim, nervis lateralibus utrinsceus 6–8; stipulae parvae, late ovatae, obtusae vel acuminatae, intus plus minusve pilosae. *Flores* 5-6-meri, hermaphroditi vel polygamo-dioici, solitarii vel (teste *Standley*) fasciculati, sessiles. *Calyx* extra sericeus; tubus (ovario incluso) cylindricus, leviter obliquus, circiter 9 mm. longus; limbus 5-6-dentatus, dentibus filiformibus vel subulatis 3·5–4 mm. longis. *Corolla* flava; tubus cylindricus, 2·5–4·5 cm. longus, extra appresse pubescens, intus dimidio superiore inter stamina lineis pilorum ornatus. *Stamina* inclusa vel apice tantum exserta; filamenta brevia; antherae oblongae, 8 mm. longae, apice connectivo apiculato acutae, basi obtusae, dorsifixae. *Ovarium* biloculare; ovula in loculis numerosa. *Stylus* filiformis, 2·5–3 cm. longus; stigmata 2, linearia, 7–8 mm. longa. *Fructus* depresso-globosus, circiter 7·5 cm. diametro et 5 cm. altus, praeter umbonem terminalem excrescentiis subconicis plurialatis et planis aliformibus dense obtectus, totus dense hirsuto-velutinus. *Semina* complanata, ambitu rhombica, 6 mm. longa et lata; embryo satis magnus, cotyledonibus foliaceis orbicularibus, radicula tereti.

Mexico. "Dry thickets and hillsides, Chihuahua and Sonora to Guerrero and Veracruz"—*teste* Standley.

District of Huetamo, State of Michoacan: Santa Cruz, *Hinton* 5965; Tacupa, *Hinton* 5970; Mal Paso, *Hinton* 7121, 7875. District of Temascaltepec, State of Mexico: Tejupilco, *Hinton* 7154, 7817; Limones, *Hinton* 7840; Bejucos, *Hinton* 7882; Cañitas, *Hinton* 7890; Chorrera, *Hinton* 7903. District of Coyuca, State of Guerrero: Pungarabato, *Hinton* 7241, 7852, 7855 (same plant as 7241); Balderrama, *Hinton* 7844; Coyuca, *Hinton* 7867. Flowering April–June, fruiting December–April.

Vernacular name: "Cirian Chino."

Although *Basanacantha echinocarpa* appears to be widely distributed in Mexico, it was represented at Kew by only two rather poor specimens (*Palmer*, 1885 coll., and *Palmer*, 1887 coll., no. 106) until Mr. G. B. Hinton's excellent material came to hand. The only figure of this species hitherto published is very poor, and is inaccessible to the majority of students.

The writer agrees with Prof. Bremekamp (Rec. Trav. Bot. Néerl. xxxi. 265: 1934) in maintaining *Basanacantha* as a genus distinct from *Randia*, which should be interpreted in the strict Linnean sense, with *R. aculeata* L. as the standard-species of a comparatively small and entirely American genus. The name of the present plant is accordingly changed to *Basanacantha echinocarpa*, in spite of the fact that the flowers, as shown by Mr. Hinton's specimens, are not always dioecious.

Mr. Hinton states that variability in this species is not pronounced in his area (i.e. Temascaltepec, Mexico, Huetamo, Michoacan, and Coyuca, Guerrero), where the plant is frequent at altitudes below 1300 m. The seed, which is embedded in pulp, is edible, while the shell of the fruit is used medicinally.—A. A. Bullock.

Fig. 1, upper part of flowering shoot, showing a hexamerous flower, *natural size*; 2, calyx of a pentamerous flower, × 2; 3, corolla of a hexamerous flower, laid open, *natural size*; 4, stamen, abaxial view, × 4; 5, longitudinal section of ovary and disk, × 4; 6, upper part of style, *natural size*; 7, fruiting branch, *natural size*; 8, seed, × 2; 9, longitudinal section of seed, × 2.


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Tabula 3299.

GENTIANA SALPINX *Griseb.*

Gentianaceae. Tribus Swertieae.

G. (§ Pneumonanthe) salpinx *Griseb.* in Linnaea, xxii. 44 (1849); Hemsl. Biol. Centr.-Amer., Bot. ii. 351 (1882); Kusn. in Act. Hort. Petrop. xv. 181 (in clavi) et 185 (descr. et obs. crit.) et pp. var. in obs. (1904). *G. calyculata* Ehrenb. MS. in Herb. Berol., non La Ll. et Lex. Nov. Veg. fasc. i. 18 (1824).—Species insignis, formosa, *G. calyculatae* La Ll. et Lex. affinis, sed floribus rubris, corollae tubo calycem duplo superante distincta; a ceteris speciebus *Pneumonanthes* aberrans, ad sectionem *Coelanthen* accedens, sed foliis minoribus marginibus scabriusculis, calyce scabriusculo facile ab ea distinguenda.

Herba erecta, usque ad 1 m. (plerumque circiter 7 dm.) alta, perennis; caules simplices, minutissime scabriusculi sed ceterum glabri, internodiis superioribus 5–7 cm. longis inferioribus gradatim brevioribus. *Folia* opposita, lanceolata vel oblonga vel ovata, 3–6 cm. longa, 1–2·5 cm. lata, apice acuta vel acuminata, basi angustata, in vaginam 2–4 mm. longam connata, 3-nervia, sub anthesin marcescentia, marginibus minutissime scabriusculis; paria inferiora cataphyllaria ad vaginam bilobam redacta (vel forsan laminae foliorum inferiorum delapsae?). *Flores* rubri, praeter terminalem ex axillis foliorum superiorum redactorum orti, brevissime pedicellati vel sessiles, supremi in cymam paucifloram aggregati; bracteolae binae, basi connatae, calycem amplectentes eumque subaequantes, anguste lanceolatae, dense minutissime scabriusculae, circiter 1·5 cm. longae. *Calycis tubus* campanulatus vel tubuloso-cupularis, 1 cm. altus, 0·5 cm. diametro, apice inter lacinias truncatus vel 5-denticulatus, extra praeter partes interstitiales V-formes minutissime scabriusculus, intus glaber; laciniae 5, lineares, usque 1 cm. longae, minutissime scabriusculae. *Corolla* tota circiter 4 cm. longa, tubo 1 cm. diametro, glandulis paucis (resinosis?) punctata; tubus verus 2·5 cm. longus sed, ob partes inferiores loborum erectas plicis apice inaequaliter bidentatis 3–4 mm. longis cohaerentes, primo visu circiter 3 cm. longus; plicae membranaceae, bidentatae ac in aestivatione plicatae (fig. 6); lobi 5, alabastro contorti, superne obovati, 7 mm. lati, apice rotundati sed

apiculis subulatis eireiter 1 mm. longis ornati, partibus superioribus obovatis sub anthesin reflexis, toti 1·5 em. longi, intus minutissime papillosi. *Filamenta* applanata, eireiter 2·5 em. longa, glabra, eireiter 1 em. supra basin tubi affixa. *Antherae* lineares, 4–4·5 mm. longae, basin versus dorsifixae, valde exsertae. *Discus* eupuliformis, erenulato-lobatus. *Ovarium* fere 2·5 em. longum, anguste eylindrieum, apiee aeute angustatum, eireiter 1 mm. stipitatum; stylus spiraliter tortus, exsertus, 1 em. longus, apiee bifidus, ramis primum ereetis eohaerentibus demum divergentibus. *Capsula* eorolla et ealyee persistentibus eir-eumeineta, longe stipitata, semi-exserta; stipes crassus, 2–2·5 em. longus, medio vel apieem versus demum abrupte sigmoideo-reflexus, eorollae tubo sigmoideo vel interdum unilateraliter rupto; eapsula pendula, fusiformis, complanata, 2–2·5 em. longa, 5–7 mm. lata, apiee stylo persistente eoronata, demum seeus plaeentas valvis 2 perga-mentaeeis naviculiformibus dehiscens, marginibus valvarum leviter reeurvis eartilagineis. *Semina* brunneo-albieautia, numerosissima, subfusiformia, apice aeuta, basi truneata, 2·5 mm. longa, basin versus 0·5 mm. lata, testa membranaeea utrinque produeta, lineata, minute retieulata; albumen eum embryone minutum, pallide brunneum, ovoideum.

Mexico. Distriet of Temasealtepee, State of Mexieo: "In sylvis prope Temasealtepee, reg. temp., floribus sanguineis pulchris, April 1831," *C. Ehrenberg* 450 (typus in Herb. Berol.); Temasealtepee, "Eseape?" 30 Mareh 1932, *Hinton* 459; Rineon, 1960 m., "in oak woods," 19 April 1933, *Hinton* 3707; Naranjo, 860 m., "in a wet barranea, flowers red," 21 April 1933, *Hinton* 3810; between Cumbre and Tejupileo, 31 May 1935 (fr.), *Hinton* 7837.

As far as ean be ascertained, *Gentiana salpinx* was previously known only from the type eolleetion, preserved as three exeellent sheets in the Berlin Herbarium. The plant was diseovered by Ehrenberg in April 1831, and the figure has been made from speeimens eollected in the same district by Mr. G. B. Hinton in Mareh 1932 and April 1933—just over a eentury later. The remarkable eapsule, deseribed above for the first time, was ineluded in Mr. Hinton's latest eolleetion of the speeies, reeeived after the plate was made.

The taxonomie position of *Gentiana salpinx* is somewhat isolated. There seems no doubt that Grisebaeh and Kusnezow were correct in plaeing it near *G. calyculata* La Ll. et Lex., in the seetion *Pneumonanthe*. On the other hand, the red flowers, with their exserted stamens, at onee reeall the seetion *Coelanthe*, and *G. salpinx* may perhaps be eited as a eonnecting link between the two seetions. In general flower strueture, however, especially that of the "plieae" (see figs. 6–7), in habit, and in the peeuliar scabridity of the leaf margins (fig. 4) and ealyx, it is a typieal member of the seetion *Pneumonanthe*. Opposing eharaeters usually found in the section *Coelanthe* are mueh larger, thinly herbaeeous leaves, with a persistent basal rosette.

The writer is much indebted to the authorities at the Berlin Herbarium for the loan of Ehrenberg's type collection.

A. A. Bullock.

Figs. 1 and 2, upper and middle portions of the same flowering stem, *natural size*; 3, lower portion of a different (flowering) stem, *natural size*; 4, leaf margin, × 20; 5, calyx, × 1·5; 6, corolla, opened out, the lobes on the right being in their natural relative positions, and those on the left stretched apart so as to show the plicae, *natural size*; 7, portion of corolla from the inside, showing plicae, × 3; 8, stamens, front and back views, × 3; 9, ovary, × 1·5:—all drawn from *Hinton* 3810.


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Tabula 3300.

CEPHAËLIS POTAROËNSIS *Sandwith.*

Rubiaceae. Tribus Psychotrieae.

C. potaroënsis *Sandwith*; species nova, *C. Duckei* Standley affinis, ramulis adpresse pilosis pilis stricte ascendentibus (haud villosis pilis deorsum directis), involucro e bracteis 4–5 flores 1–3 tantum subtendentibus constituto distinguenda.

Frutex usque 5 m. altus; ramuli summi teretes vel novelli plus minusve sulcati, dense adpresse pilosi, pilis stricte ascendentibus; nodi summi saepe formam turbinatam praebentes. *Stipulae* vagina truncata integra ad 2 mm. longa, dentibus vel appendiculibus utroque latere 2 lineari-subulatis ad 2 mm. longis per vaginam petiolos versus decurrentibus instructae. *Folia* oblanceolata vel varie elliptica, apice longe acute acuminata, basi attenuata cuneata, 5–13 cm. longa, 1–5·2 cm. lata, chartacea, satis tenuia, utrinque et praecipue secus nervos principales adpresse pilosa, nervis primariis utroque latere costae 9–10 e costa angulo acuto arcuatim ascendentibus atque marginem versus anastomosantibus, secundariis plus minusve horizontalibus, omnibus utrinque praesertim subtus prominulis, venulis tertiariis vix obviis; petiolus 0·5–1·5 cm. longus, indumento ramulorum adpresso praeditus. *Involucra* apice ramulorum solitaria, subsessilia, basi foliis binis valde redactis vel etiam minutis albo-squamiformibus lanceolato-subulatis subtenta; bracteae involueri 4 (rarissime 5), cruciatim per paria saepius inaequalia (interiora angustiora) dispositae, primo ascendentes mox patulae vel recurvae, laete aurantiacae, serius rubescentes, elliptico-lanceolatae usque late ovatae, acutae, basi abrupte contractae ac ibi tantum connatae, magnitudine formaque valde variabiles, 1·8–3·5 cm. longae, 0·5–1·5 cm. latae, utrinque praesertim extra molliter subadpresse pilosae, palmatim 7–13-nerviae sed nervis siccitate saepe vix obviis. *Flores* heterostyli, capitati, in dichasio simplici sessili trifloro dispositi, sed vulgo flos terminalis singulusque lateralis tantum (vel etiam flos terminalis tantum) evolvuntur; bracteae bracteolaeque vulgo desunt sed bracteola unica lineari-oblonga pubescens 7 mm. longa 1 mm. lata sub flore unico laterali (vide fig. 3) est inventa. *Receptaculum* compresso-cupuliforme, extra dense villosum, ab ovario satis facile sejunctum, 1–1·5 mm. longum, apice 2 mm. latum. *Calyx* cylindrico-tubularis, 5-dentatus, senectute saepe fere usque dimidium

fissus, dentibus inclusis 1–1·5 cm. longus, 5–5·5 mm. latus, extra dense adpresse pilosus, intus dimidio superiore adpresse pilosus inferne glaber vel glabrescens; dentes inferne late deltoidei, tum abrupte subulati acuti, valde ciliato-pilosi, 2–2·5 mm. longi, basi circiter 1·5 mm. lati. *Corolla* alba, demum flavescens, heteromorpha, tubularis vel maturitate hypocrateriformis lobis plus minusve patulis; tubus 2–2·6 cm. longus, floris longistyli quam brevistyli brevior, 5 mm. latus, extra dense patule albo-villosus triente inferiore excepta, intus minutissime papillosus necnon 2–3 mm. (in flore brevistylo altius, 3 mm.) supra basin zona vel annulo pilorum 2–3 mm. lato praeditus; lobi 5, valvati, anguste oblongo-lanceolati, obtusi, circiter 5·5 mm. longi, 1·6–2·2 mm. lati, extra densissime albo-villosi, intus minutissime papillosi. *Stamina* in flore brevistylo prope faucem alte inserta antheris exsertis, in flore longistylo prope medium tubum inserta antheris inclusis; filamenta complanata, minutissime papillosa, 2–3·75 mm. longa (in flore brevistylo quam in longistylo longiora), 0·6–1·2 mm. lata; antherae linearioblongae, apiculatae, 4–5 mm. longae. *Ovarium* compresso-cupuliforme, 1·5 mm. altum, 1·75 2 mm. latum; discus glaber, 1–2 mm. altus, 1·5–3·5 mm. latus, in flore longistylo quam in brevistylo major. *Stylus* glaber, in flore longistylo corollam subaequans, stigmatibus plus minusve oblongis circiter 2 mm. longis; in flore brevistylo 1·3 cm. tantum longus, stigmatibus linearibus 3 mm. longis. *Drupa* globosa, adulta caerulea, dense adpresse pilosa, 1·2–1·5 cm. longa, 1·2–1·4 cm. diametro; pyrena circiter 8·5 mm. longa, 7 mm. lata, facie convexa 4-costata, facie plana longitudinaliter anguste leviter (haud profunde) sulcata.

British Guiana. Scattered along the Potaro River and its tributaries: Waratuk Portage, 60 m., Aug. 1933, *Tutin* 470 (type: Brit. Mus., Kew Herb.); *ibid.*, Oct. 1898, *Jenman* 7458; *ibid.*, March 1933, *Martyn* 390; May 1935, *Mrs. McTurk* in *Martyn* 423; Nov. 1907, *Bartlett* in *Jenman Herb.* no. 8746; May 1910, *Jenman Herb.* no. 8804; Feb. 1879, *im Thurn*; Sheenabowa, Sept.–Oct. 1881, *Jenman* 1286; Kangaruma, Oct. 1922, *Abraham* 341; Cawaie Creek, Chenapowu River, 420 m., April 1926, *Altson* 458; Anandabaru, Kopinang River, 540 m., April 1926, *Altson* 486; Kaietuk Falls, 1872, *Appun* (Brit. Mus.).

From the evidence of field-notes the plant is a small shrub from 4 to 15 feet in height; the involucral bracts are a vivid orange-yellow, becoming dark red after flowering; the calyx is greenish or yellow, with the teeth purple; the corolla white or cream when young, turning yellow or almost orange with age; and the ripe fruit is shining and bright blue.

Vernacular name (Patamona dialect): "Wailehu-Yek," according to Altson.

This shrub of many gaudy colours is one of the most striking of the remarkable species which appear to be confined to the valley of the

Potaro River in British Guiana. Few travellers have failed to notice it, and dried specimens have been accumulating for many years, but without ripe fruit it was impossible to assign the plant to any known genus, although the large coloured bracts of the involucre suggested *Cephaëlis* in the wide sense. Mr. T. G. Tutin, who took part in the Cambridge University Expedition to British Guiana in 1933, has made the present description and figure possible by his collection of spirit material of the large blue fruits. A close examination of the plant shows that it is nearer to *Cephaëlis* as understood by most authors than to any other known genus, and it runs down to *Cephaëlis* in Wernham's Key to Tropical American Rubiaceae in Journ. Bot. liv. 326–334 (1916). Moreover, a close ally has been discovered in *Cephaëlis Duckei* Standley in Field Museum, Publ. Bot. viii. 374 (1931), a plant of forests near the mouth of the Amazons in the State of Pará, Brazil, and represented at Kew by a photograph of the type and by a duplicate specimen of the type collection (*Ducke* 18828). It is unfortunate that Standley's description leaves out several important details of floral structure, and that the Kew material is insufficient for dissection, but it is obvious at a glance that it must be associated with *C. potaroënsis*, and no other species has been seen which presents any such affinity. *C. Duckei* has the leaves, stipules, orange-coloured bracts and large shaggy white corollas of the British Guiana species, but is easily distinguished by the villous branchlets with spreading, downward directed hairs, and by the possession of a less reduced inflorescence. This, in the Kew specimen, is composed of 8 involucral bracts which surround 4 flowers; but it is almost certain that more than 4 will be found in future specimens. On the other hand, in all the numerous specimens of *C. potaroënsis* the involucre is normally composed of 4 (very rarely of 5) bracts, and the inflorescence is a reduced simple sessile dichasium of 1–3 flowers.

Up to the year 1934 this plant might well have been placed in *Cephaëlis* without further hesitation, but in that year there appeared an extremely important account, accompanied by a separate paper with critical notes, of the *Rubiaceae* of Surinam (Fl. Surinam, iv. 113–298; Rec. Trav. Bot. Néerl. xxxi. 248–308). In this the author, Prof. C. E. B. Bremekamp, gives an original and necessarily revolutionary treatment of the genera of the *Psychotricae*. The *Psychotria* and *Cephaëlis* of Bentham and Hooker's Genera Plantarum are broken up into a number of new or revived genera, and the result is a far more natural grouping of species with similar facies and habit than was attained by Müller of Argau in the Flora Brasiliensis (1881) or by K. Schumann in the Pflanzenfamilien (1891). A large number of characters have been used in the key, drawn from many parts of the plant, and it is obvious that, if they are by no means of equal value, they are at any rate based upon important morphological considerations. The present plant has been carefully studied in relation to this valuable work which, it must be remembered, is concerned only with species occurring in Surinam. It differs:—

(a) From restricted *Cephaëlis* Sw. in the absence of bracts and

bracteoles from the individual flowers (a single bract or bracteole has been found in one instance); in the ring of hairs near the base of the corolla-tube; and in the shallow furrow on the flat side of the pyrene. Perhaps one may add the different position of the stamens in the long-styled (near the middle of the tube) and short-styled (near the throat) flowers, since Bremekamp describes the insertion of the stamens of *Cephaëlis* as "inserted midway in the tube."

(b) From restricted *Psychotria* L. in the form of the inflorescence, and in the ring of hairs near the base of the corolla-tube.

(c) From *Palicourea* Aubl. in the form of the inflorescence, and in the corolla-tube which is not swollen unilaterally near the base although it possesses a ring of hairs.

(d) From Schumann's *Uragoga* L., sections *Hiantocalyx* and *Codonocalyx*, in the normal absence of bracteoles and of a second series of bracts, in the form of the calyx, and in the ring of hairs at the base of the corolla-tube.

Other genera were much less closely allied, both in facies and in taxonomic characters. It became apparent that the nearest generic affinity of the Potaro Valley plant was with *Cephaëlis* (sensu stricto), and this conclusion has been provisionally accepted by Prof. Bremekamp to whom the above description, with notes, was submitted. He believes, however, that the absence of bracts and bracteoles, the shallowness of the furrow on the flat side of the pyrene, and the small number of flowers in the inflorescence would justify the creation of a new genus.

The present writer does not feel qualified to take this step. In the first place, a proper generic description could not be drawn up without a thorough investigation of the morphology of the inflorescence of *Cephaëlis Duckei*, which is certainly congeneric, but adequate material of that species is not yet available. Secondly, if—as one hopes—Prof. Bremekamp's researches are to be extended to cover the whole of the Tropical American *Psychotricae*, a thorough examination of all the described species must be undertaken, before the differential value of morphological characters for taxonomic purposes can be completely understood. It might be discovered, for instance, that several other species with few large flowers which have been placed without adequate description in *Cephaëlis* will help to constitute a new or revived genus by the side of *C. potaroënsis* and *C. Duckei*. On the other hand, a slight re-widening of the limits of some genera might be found desirable or at any rate convenient. It is evident that only a specialist in *Rubiaceae* will have the requisite knowledge and time for this work and, accordingly, the Potaro Valley plant is described and figured for the present as a species of *Cephaëlis*.—N. Y. Sandwith.

Fig. 1, flowering branch, *natural size*; 2, node showing stipules and leaf-scar, × 3; 3, calyx and a bracteole, × 2; 4, short-styled flower laid open, × 1·5; 5, stamen from short-styled flower, × 4; 6, long-styled flower laid open, × 1·5; 7, ovary and disk, × 6; 8, fruit, *natural size*; 9, pyrene, showing flat side with shallow furrow, × 2; 10, same, showing ribbed convex side, × 2.