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BOTANICAL SURVEY OF INDIA

SS. NO. 582

BOOK NO

2400-2 : vol-4 : 5r:5

ACC NO

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1939

# HOOKER'S ICONES PLANTARUM



OB

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

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FIFTH SERIES

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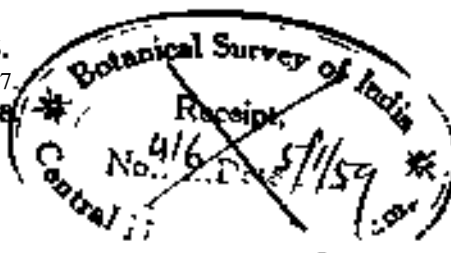
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VOL. IV.

OR VOL. XXXIV. OF THE ENTIRE WORK.

PART I. 3301-3325, December 1936.  
PART II. 3326-3350, September 1937.  
PART III. 3351-3375, September 1938.  
PART IV. 3376-3400, March 1939.



DULAU & CO., LTD.

29 DOVER STREET, LONDON, W.1.

1939.



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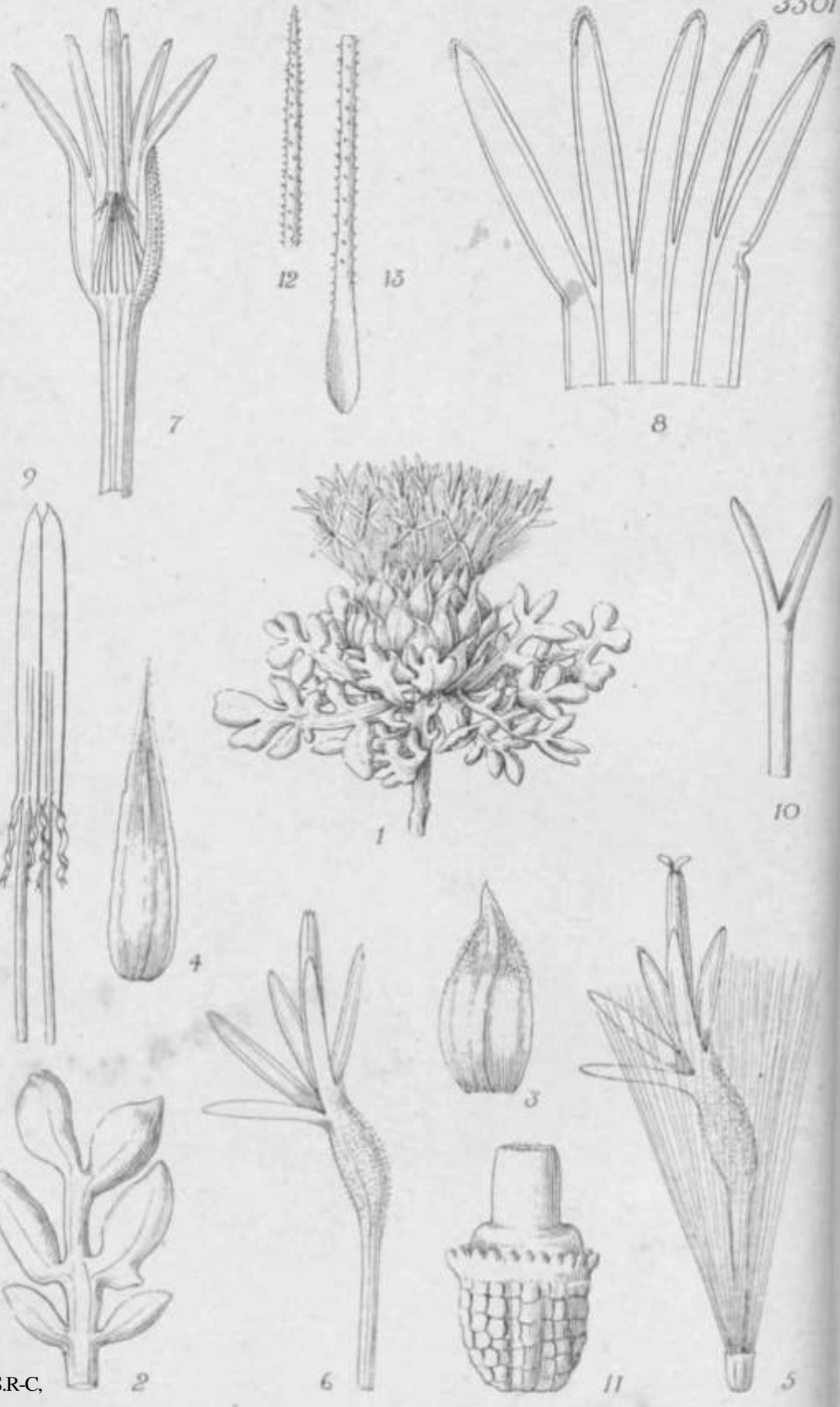
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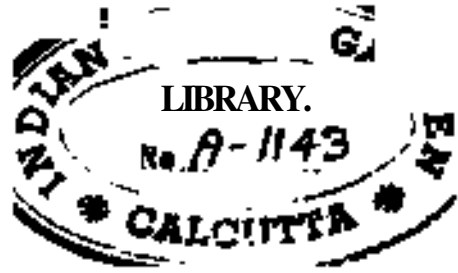
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— <i>laxiflorum</i> F. M. Bailey	3364	— <i>cochinchinensis</i> C. E. Hubbard.	3313,3314
— • <i>leiocladus</i> C. E. Hubbard	3364	— <i>pubescens</i> G.E.Hubbard	3313, 3314
— <i>Mjoebergii</i> Cheel	3364	— • <i>rariflora</i> G. E. Hubbard	3313
— <i>nitidum</i> Pers.	3364	<i>Thellungia</i> Stapf.	3319
— <i>forma aristatum</i> C. E. Hubbard	3364	<i>Trichoneura</i> Anderss.	3319
— <i>plumosum</i> Beauv.	3364	<i>Tridens</i> Roem. et Schult.	3319, 3336
— <i>var. piligerum</i> Domin	3364	• <i>Triodia pungens</i> R. Br.	3336
— <i>var. robustissimum</i> Domin	3364	— <i>viscida</i> Roem. et Schult.	3336
— <i>var. typicum</i> Domin	3364	— <i>vulnerans</i> Domin	3336
— <i>serratum</i> O. Kuntze	3364	<i>Triphlebia</i> Stapf.	3319
— <i>var. genuinum</i> Domin	3364	<i>Triplasis</i> Beauv.	3319
— <i>var. majus</i> Domin	3364	<i>Tripogon</i> Roth ex Roem. et Schult.	3319
— <i>var. nitidum</i> Domin	3364	<i>Triraphis</i> R. Br.	3319
— <i>stipoideum</i> C. A. Gardner et C. E. Hubbard	3364	— <i>bromoides</i> F. Muell.	3385
— <i>sudanense</i> Stapf	3364	— <i>danthonioides</i> F. Muell.	3385
— <i>tropicum</i> Buse	3364	— <i>pungens</i> R. Br.	3385
— <i>var. muticum</i> Nets	3364	— <i>rigidissima</i> Pilger	3385
— <i>verticilliflorum</i> Stapf	3364	• <i>Trixis decurrens</i> DC.	3348
— <i>vulgare sudanense</i> Hitchc.	3364	• <i>Tulipa Borszczowii</i> Regel	3356
<i>Spathulopetalum</i> Dicapuae Chiov.	3340	<i>Tussilago lyrata</i> Pers.	3345
<i>Stapfiola</i> O. Kuntze	3319	— <i>nutans</i> L.	3345
<i>Stiburus</i> Stapf.	3319	<i>Urochloa insculpta</i> Stapf	3363
<i>Swertia brevicomis</i> H. B. K.	3399	— <i>lata</i> C. E. Hubbard	3363
— <i>plantaginea</i> H. B. K.	3399	— <i>panicoides</i> Beauv.	3363
<i>Symplococarpon</i> Airy-Shaw	3342	— <i>paspaloides</i> Presl	3363
— • <i>Hintoni</i> Airy-Shaw	3342	— <i>praetervisa</i> Hughes	3363
<i>Terebinthua Kerberi</i> Rose	3395	— <i>reptans</i> Stapf	3363
• <i>Teucrium aroanium</i> Orph.	3303	— <i>setigera</i> Stapf	3363
— <i>cypricum</i> Post	3328	<i>Valeriana chionophila</i> Sandwith	3349
		— <i>Comberi</i> Sandwith	3349
		— • <i>parnassiifolia</i> Sandwith	3349



S.R.C.





TABULA 3301.

**JURINEA TAYGETEA** *Haldcsy.*

COMPOSITAE. Tribus CYNAREAE.

*J. taygetea* *Haldcsy* in Magyar Bot. Lap. xi. 163 (1912) (Consp. Fl. Graec, Suppl. ii); Hayek, Prodr. Fl. Penins. Balcan. ii. 702 (1931); a *J. Gouani* Rouy et *J. Bocconi* Guss. rhizomate tenui, involucri bracteis conspicue carinatis basi latioribus difEert; a priore laciniis foliorum obtusis distinguitur.

*Herba* perennis, acaulis, nana, monocephala. *Radix* lignosus, tenuis. *Folia* sessilia, 2-2\*5 cm. longa, pinnatipartita, supra araneoso-pubescentia, infra dense albo-lanata, laciniis oblongo-ovatis vel obovatis 4-5mm.longis 3 mm.latis obtusis saepe emarginatis vel bifidis marginibus revolutis. *Capitula* sessilia vel breviter pedunculata, late campanulata, usque ad 2-8 cm. longa, 2 cm. diametro. *Involucri bractee* circiter 4-seriatae, exteriores ovato-lanceolatae, uninerves, carinatae, 8 mm. longae, 4 mm. latae, glabrae, apice sparse araneoso-pubescentes, acutae, interiores gradatim longiores et leviter angustiores, apice membranaceae, longe acuminatae, leviter ciliatae. *Flores* dilute rosei. *Corolla* 1\*7-2 cm. longa, tubi parte inferiore angustata 8-9 mm. longa glabra, parte superiore ampliata 5-6 mm. longa papillosa vel scabrida, lobis linearibus 4-5 mm. longis. *Filamenta* 6 mm. longa, glabra; antherae 7 mm. longae. *Stylus* superne roseus, 2-2 cm. longus. *Achaenia* juvenilia verrucosa, crasse costata; pappus setosus, circiter 1\*8 cm. longus.

GREECE. Mt. Taygetos, rocks, 2100 m., July 1934, *S. C. Atckley* 2259.

*Jurinea taygetea* was originally described from a single specimen collected by H. Zahn in the locality given as follows :—"Laconia : in mt. Taygetos loco Koromilia dicto." This seems to be the only station for the plant at present, but as it could easily be overlooked on account of its size, it is possible that it may occur also on other mountain ranges of the Peloponnese. Our specimens were collected by Mr. S. C. Ajbchley on Mt. Taygetos at 2100 m., July 1934, and as there is no other material of *J. taygetea* in the Herbarium at Kew they have been compared with the original description of that species in Magyar Bot. Lap. xi. 163 (1912). In this description attention is called to the similarity of *J. taygetea* to *J. Gouani* Rouy (Fl. France ix. 100: 1905) and to *J. Bocconi* Guss. (Fl. Sic. Syn. ii. 448 : 1843). The former occurs in the Pyrenees and possibly North Africa, and the latter in Spain and Sicily. These two species are closely allied and it would seem that *J. Gouani* hardly merits specific rank on such slight differences as exist in the size and shape of the leaves. *J. taygetea* is more nearly related



9



1 SRC.



7



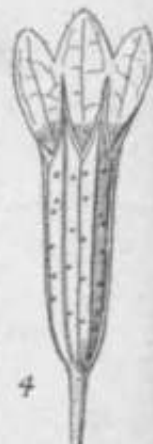
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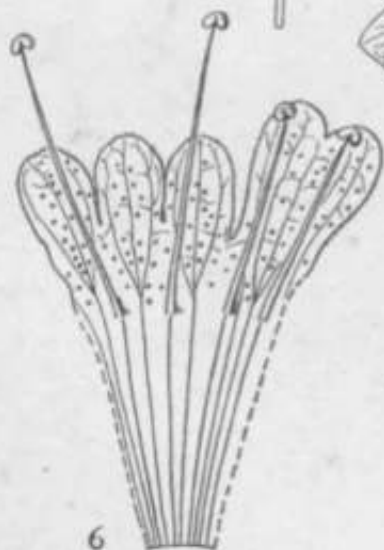
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TABULA 3302.

AMABACUS SCABER (*Boiss. et Heldr.*) Briq.  
subsp. PTTLCHER (*Boiss. et Heldr.*) Hayek.

LABIATAE. Tribus SATUREJAEAE.

*A. scaber* (*Boiss. et Heldr.*) Briq. subsp. *pulcher* (*Boiss. et Heldr.*) Hayek Prodr. Fl. Penins. Balcan. ii. 332 (1929). *Origanum sipyleum* L. sec. Sibth. et Sm. Prodr. Fl. Graec. i. 417 (1806), pro parte ; Fraas, Fl. Class. 182 (1845); non L. *Origanum puhhrum* Boiss. et Heldr. in Boiss. Diagn., Ser. 2, iv. 11 (1859); Boiss. Fl. Or. iv. 549 (1879) ; Nyman, Consp. Fl. Eur. 592 (1881); Halácsy, Consp. Fl. Graec. ii. 553 (1902). *Amaracus pulcher* Briq. in Engl. u. Prantl, Pflanzenfam. iv. 3A. 306 (1895). A subspecie *eu-scabro* Hayek foliis obtusis marginibus laeviusculis raro sparse scabris differt.

*Suffrutex* perennis. *Radix* lignosus ; rhizoma repens. *Caules* erecti, usque ad 4 dm. alti, simplices vel inferne ramosi, glabri vel puberuli saepe glanduloso-punctati, internodiis 8-10 mm. longis. *Folia* late ovata vel suborbicularia, obtusa, basi cordata vel truncata, sessilia, 1-2-8 cm. longa, 7-22 mm. lata, utrinque glabra et glanduloso-punctata, nervis infra prominentibus supra subprominentibus, marginibus laevibus raro sparse scabris. *Inflorescentia* ramosa ; spicae compactae oblongo-ovoideae, 1-5-2-5 cm. longae, 1-1-5 cm. latae; pedicelli usque ad 1-5 mm. longi, glanduloso-puberuli; bractae inferiores foliis subsimiles sed minores; bractae florales imbricatae, purpureae, ovatae, acutae, basi cuneatae, plus minusve membranaceae, 6-10 mm. longae, 5-9 mm. latae, utrinque glabrae, supra glanduloso-punctatae, infra haud vel sparse glanduloso-punctatae, nervis utrinque prominentibus, marginibus apice interdum sparse scabris. *Calyx* cylindricus, 4-6 mm. longus, extra glanduloso-punctatus et sparse glanduloso-puberulus, tubo 1-5 mm. diametro intus fauce piloso, labio superiore 2-5 mm. longo tridentato dentibus subaequalibus ovatis subacutis vix 1 mm. longis, marginibus saepe sparse scabris, labio inferiore bidentato dentibus lanceolatis acutis 1-1-5 mm. longis. *Corolla* purpurea vel rosea, 8-10 mm. longa, puberula, glanduloso-punctata, tubo 5-7 mm. longo ; labium superius suborbiculare, 2 • 5 mm. diametro, emarginatum vel breviter bifidum ; labium inferius trilobum lobis subaequalibus circiter 1\*5 mm. diametro. *Filamenta* glabra, circiter 5 mm. et 3 mm. longa, exserta. *Ovarium* glabrum, vix 1 mm. diametro; stylus glaber, 1\*2 cm. longus. *Nuculae* fuscae, ovoideae, 0-5 mm. diametro.

GREECE. In lapidosis m. Delphi, Euboea, 1500 m., Aug. 1848, *Heldreich* ; copiose in lapidosis mobilibus regionis superioris Montis Dirphyis a montis Xerovuni Euboea, 1350-1650 m., Aug. 1858, *Heldreich Hb. Gr. norm.* 784 ; Euboea ins. in m. Kandyli Euboeae septentrionalis, prope cacumen loco dicto Oxygattos, 1350 m., Aug. 1871, *Orpkanides* in



## TABULA 3303.

### TEUCRIUM AHOANIUM *Orph.*

LABIATAE. Tribus AJUGAEAE.

**T. aroanium** *Orph.* in Boiss. Diagn., Ser. 2, iv. 55 (1859); Boiss. PL Or. iv. 807 (1879); Nyman, Consp. Fl. Eur. 564 (1881); Kouy, Illustr. PL Eur. Rar. fasc. xii. t. 293 (1899); Halácsy, Consp. Pl. Graec. ii. 469 (1902), et Suppl. i. 82 (1908); Hayek, Prodr. FL Penins. Balcan. ii. 243 (1929); a *T. brevifolio* Schreb. foliis latis planis subtus albotomentosis nee elliptico-linearibus revolutis, calyce glanduloso, floribus majoribus facile distinguitur.

*Suffrutex* perennis, multicaulis. *Cauks* inferne lignosi, e basi decumbente vel adscendente erecti, usque ad 2 dm. longi, ramis novellis adpresse lanato-tomentosis, internodiis 0\*7 cm. longis. *Folia* obovata vel obovato-elliptica, obtusa, in petiolum attenuata, 0\*5-2 cm. longa, 3-9 mm. lata, integra vel repando-crenulata, supra viridia araneoso-pubescentia, subtus dense adpresse albo-tomentosa. *Inflorescentiae* pauciflorae, caulem et ramulos terminantes, circiter 2'5 cm. longae; bractee foliis subsimiles sed minores; pedicelli glanduloso-puberuli, usque ad 0-5 cm. longi. *Calyx* aperte campanulatus, 7\*5 mm. longus, tubo 4 mm. longo 3 mm. diametro, extra glanduloso-puberulus nervis piominentibus, dentibus ovato-triangularibus acutis subaequalibus usque ad 3-5 mm. longis et 2\*5 mm. latis. *Corolla* 2 cm. longa, extra sparse glanduloso-puberula, basi gibba; tubus 0-3 cm. longus, 0-25 cm. diametro, fauce leviter pilosus; labii lobus anticus trifidus lobuio terminali elliptico-ovato 9 mm. longo 6 mm. lato, lobulis lateralibus ut lobi laterales fere 6 mm. longis, 3 mm. latis, lobulis extra secus nervum medium longe pilosis. *Filamenta* longissime exserta, 2\*5 cm. longa, inferne pilosa, superne glabra. *Ovarium* oblongum vel ellipsoideo-oblongum, apice villosum, basi glabrum; stylus 3 cm. longus, glaber.

GREECE. In regione superiori montis Chelmos (montes Aroanii) prope Stygem (rara), 1350-1740 m., Jul. 1852, *Orphanides* 102; Chelmos, near the valley of the Styx, May 1862, *J. S. Mill*; Chelmos (Styx Valley), cliffs, 1950 m., July 1934, *Giuseppi* 48; Mt. Chelmos, limestone rocks, 1950 m., July 1934, *S. O. Atchley* 2088.

*Teucrium aroanium* is known only from two localities, about 80 kilometres apart, in the Peloponnese. Mt. Chelmos (Achaia), where the specimen figured was recently collected by Mr. S. C. Atchley, is the type locality. According to Halácsy in Consp. Fl. Graec. Suppl. i. 82 (1908), Maire collected material of this species on the Taygetos range "inter Karveli et Khanakia".

The occurrence of *T. aroanium* in these two isolated localities suggests

that it is a very old or relict species whose area of distribution, formerly more or less extensive, has been reduced by climatic and other contributory changes. Also in line with this view is the fact that the species has no near morphological affinity within the Peloponnese. *T. brevifolium* Schreb., a maritime species occurring in Attica, the Cyclades and Crete, is most nearly related, while *T. fruticans* L., common in the Iberian Peninsula and Italy, also has some characters in common with *T. aroanium*.—A. K. JACKSON.

FIG. 1, flowering branch, *natural size* ; 2, calyx, x 5 ; 3, corolla-tube, x 4 ; 4, lip of corolla flattened out, upper surface, x 3 ; 5, the same, lower surface, x 3 ; 6, upper part of style with stigma, x 3 ; 7, ovary and disk, x 12.



## TABULA 3304.

### SCROPHULARIA LACINIATA Waldst. et Kit. var. MACEDONICA Stoyanoff.

SCROPHULARIACEAE. Tribus CHELONEAE.

**S. laciniata** Waldst. et Kit. var. **macedonica** Stoyanoff in Bull. Soc. Bot. Bulg. i. 79 (1926) ; Stoyanoff i Stefanoff, Flor. Balg. ed. 2, 920 (1933). *S. heterophylla* Willd. subsp. *laciniata* (Waldst. et Kit.) Maire et Petitm. var. *pulverulenta* (Janka) Hayek, Prodr. PI. Penins. Balcan. ii. 151 (1929), pro parte. *Scrophularia lasiocaulis* Schur sec. Urum. in Spis. Balg. Akad. Nauk. xxviii. 153 (1923), vix Schur.—A planta hungarica genuina indumento dense vel densissime minute glanduloso, foliis viridibus, inferioribus plus minusve pinnato-incisis, reliquis anguste oblongis anguste lanceolatis lanceolato-ovatis vel rhomboideis distinguitur.

*Herba* perennis, valde ramosa, caulibus erectis vel ascendentibus densissime brevissime glandulosis interdum fere glanduloso-pulverulentis usque ad 4 dm. altis. *Foliorum. laminae* ambitu variables, virides, infimum plus minusve profunde pinnato-incisae segmentis acute dentatis, reliquorum anguste oblongae, anguste lanceolatae, lanceolato-ovatae, vel rhomboideae, apice acutae, in basin cuneatae, usque ad 6 cm. longae et 3-5 cm. latae, grosse dentatae vel dupliciter dentatae vel inciso-lobatae, interdum fere rectangulariter dentatae, utrinque brevissime glandulosae, demum glabrae vel glabrescentes costa nervisque pagina inferiore conspicuis superiore subconspicuis ; petioli usque ad 4 cm. longi, plus minusve glanduloso-puberuli. *Inflorescentia* elongata, cymoso-ramosa, multiflora, ramis 1-10 (saepissime 1-3)-floris pilis glandulosis brevibus densissime obtectis; bractae infimae foliis superioribus similes sed angustiores, mediae et superiores anguste lineares, sursum gradatim breviores; pedicelli saepissime circiter 5 mm. longi, densissime glandulosi. *Sepala* subaequalia, late suborbicularia, 2-3 mm. lata, margine late membranacea, minutissime et irregulariter denticulato-crenulata, dorso leviter glandulosa, intus glabra. *Corolla* 6 • 5 mm. longa, tubo fere 4 mm. longo, lobis adaxialibus reniformibus 3-5 mm. latis atro-sanguineis, lateralibus asymmetricis, abaxiali oblongo-ovato. *Stamina* subaequalia, exserta, filamentis minute glandulosis. *Staminodium* reniforme, fere 2 mm. latum. *Gynoecium* glabrum ; ovarium late ovoideum, 2 mm. altum, fere 2 mm. diametro; stylus 5 mm. longus. *Capsula* late obloidea,\* in stylum plus minusve persistentem abrupte acuminata, 5 mm. alta, fere 6 mm. lata. *Semina* breviter cylindrica, interdum leviter curvata, circiter 1-5 mm. longa, transverse corrugata et plus minusve foveolata.

\* For the definition of the term " obloideus " (" obloid "), Bee Kew Bull. 1929, 160; 174, fig. 13.



BULGARIA. Grown in the Herbarium Experimental Ground, Rew, 1934-1935, from seed collected on Mt. Pirin, S.W. Bulgaria (Bulgarian Macedonia), 1932, communicated by *B. Stefanoff*.

Stoyanoff (I.e.) has an interesting account of the species of *Scrophularia*, of the *S. ladniata* group, which occur in Bulgaria. He points out that in the Balkan Peninsula it is difficult to define the limits between *S. ladniata* and *S. heterophylla* and also between *S. variegata* and *S. heterophylla*. The indumentum, the shape of the leaves, the size of the flowers, and even the shape of the staminodes vary considerably. The shape of the staminode has\* generally been accepted as a character of considerable taxonomic importance. If sufficient material in properly collected samples were available, statistical studies should enable its real value to be ascertained. In the absence of such material the taxonomist can base only a tentative conclusion on sporadically collected specimens.

The type of the var. *macedonica* is recorded as having been found "auf den Kalkfelsen der alpinen Region des Pirin-Gebirges. Auf dem Gipfel Arnautski Vrch (ca 2500 m.); in August." Stoyanoff also suggests that very probably other material from the Rodopes (from near Cukurovo ; between Chvojna and Bela Crkva ; and near Trigrad) belongs to the same variety. .

The material from which the plate was made was grown from seed received under the name *S. lasiocaulis*. This name was first used by Schur (Enum. Pl. Transs. 486 : 1866) apparently, though wrongly, as a synonym for *S. rupestris* M. Bieb., a Crimean species. Schur's description and specimens refer, of course, to the Transsilvanian plant, not to the Crimean. Hayek has combined *S. lasiocaulis* and *S. ladniata* var. *macedonica* with *S. pulverulenta* Jka. (as *S. heterophylla* ssp. *ladniata* var. *pulverulenta*). *S. lasiocaulis* is certainly similar in many characters to the Pirin plant, but the middle and upper leaves are more deeply divided, and this species (or variety or subspecies of *S. ladniata*) has a more northern distributional area.—W. B. TURRILL.

FIG. 1, upper part of plant, *natural size*; 2, lower cauline leaf, *natural size*; 3, calyx, x 6; 4, flower, x 6; 5, flower in longitudinal section, x 6; 6, corolla spread open showing androecium, x 4; 7, adaxial lobes of corolla, and staminode, x 8; 8, stamen, x 12; 9, ovary and receptacle, x 4; 10, capsule, x 4; 11, seed, x 16; 12, transverse section of seed, x 16.



## TABULA 3305.

### CRYPTOCOBYNE CONSOBRINA *Schott.*

ARACEAE. Tribus AREAE.

**C consobrina** *Schott* in *Bonplandia*, v. 222 (1857); *Prodr. Aroid.* 16 (1860); *Engl. in DC. Monogr. Phan.* ii. 626 (1879); *Hook. f. PL Brit. Ind.* vi. 493 (1893); *Engl. in Engl. Pflanzenr.* iv. 23F. 247 (1920); C E. C. Fischer in *Gamble, PL Pres. Madras 1575* (1931). Descriptive ampliat.

*Herba* aquatica, dense caespitosa. *Folia* dimorpha, emersa et submersa; emersa viridia, anguste lanceolata, utrinque acuminata, 16-20 cm. longa, 1.5-2.5 cm. lata, nervis primariis 4-6 e costa prominente acute ascendentibus, petiolis 10-18 cm. longis basi 7-8 cm. vaginantibus deinde teretibus supra leviter canaliculatis; folia submersa purpureo-viridia, anguste linearia, acute acuminata, in petiolum vix angustata, usque ad 40 cm. longa, 4-7 mm. lata, marginibus crispatis undulatis, petiolis 10-20 cm. longis infra vaginantibus. *Pedunculi* 1-2 cm. longi, sub fructu elongati. *Spatha* 15-25 cm. longa; pars basalis 3-4 cm. longa, inflata, a lateribus leviter compressa, 6-10 mm. diametro, cameram apice foramine angusto apertam efformans; marginibus supra hanc involuti, tubum leviter contortum circiter 10 cm. longum et 3-4 mm. diametro formantes; limbus planus, praeter aream basalem feevem carnosam ovatam verrucis elongatis praeditus, lanceolatus, longe caudatus, 3-6 cm. longus, cauda contorta, marginibus leviter involutis verrucosis. *Spadix* 2-2-2-5 cm. longus, tenuis, laevis. *Ovaria* 5-8, nonnullis abortivis etiam supra praesentibus; ovula usque ad 14. *Stamina* in cylindrum 4 mm. longum condensata; antherae connectivo apicali acute conico instructae. *Appendix* brevissima - *Syncarpium* ovoideum, 1.4-1.8 cm. longum, 8-10 mm. diametro, 8-valvatum. *Semina* forma varia, saepe oblonga, acute angulata, perumque acuta saltern extremitate altera, 3-5-5 mm. longa, minute unculata.

INDU. Nilgiri Hills, *Law* (type in Kew Herb, incorrectly quoted as from Mysore and Carnatic); "Mysore and Carnatic", *G. Thomson*; Kanan, *Law*; Cochin: Parapara and Perambicolam Rivers, flowers and fruit, *E. Barnes* 962.

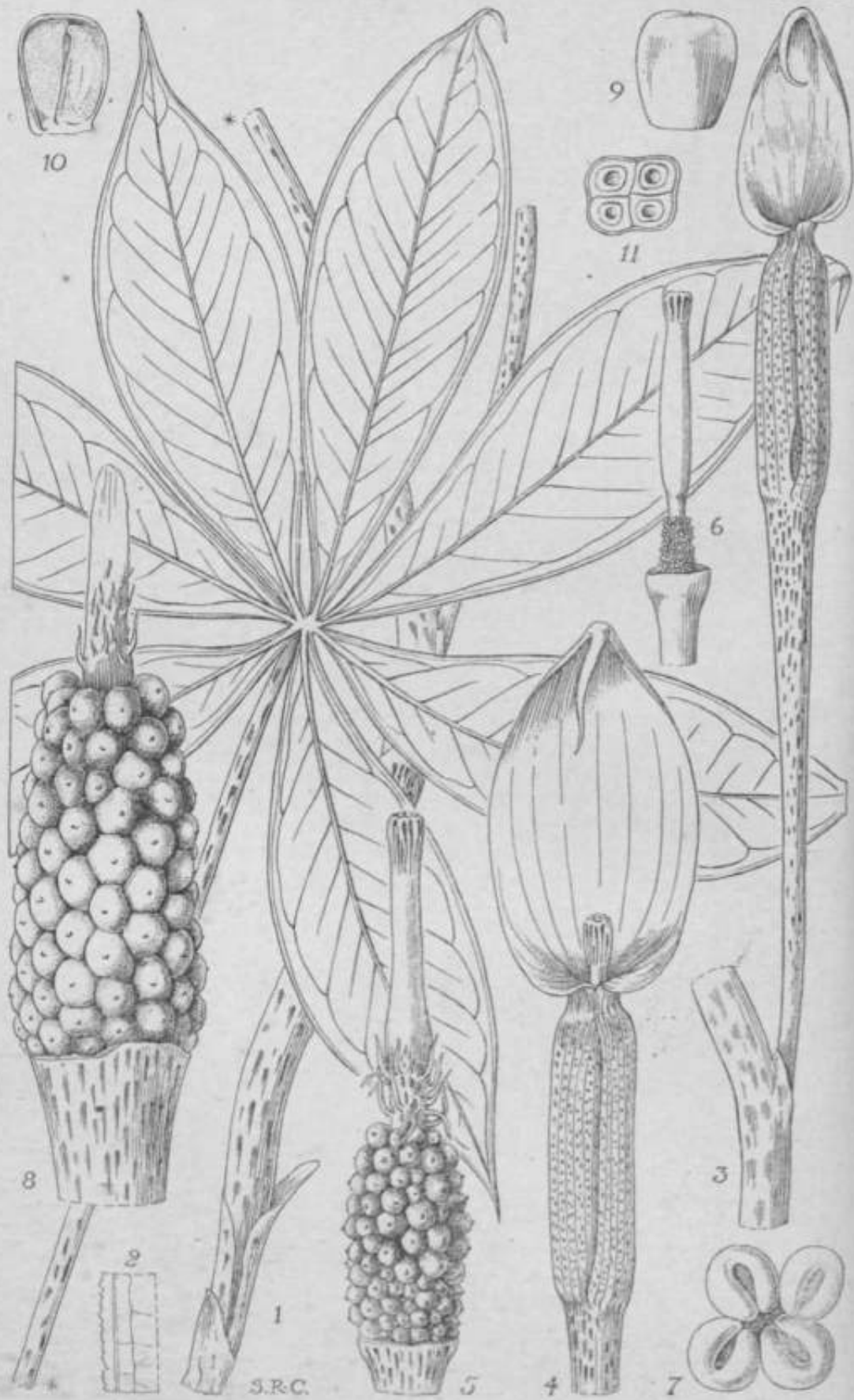
the ovate dark-purple-blotched on a light ground, marginal warts are purple; the spadix is purplish, based on descriptions of this plant being very meagre, a fresh one, Prof. E. Barnes's specimens and notes, is supplied. The fleshy plate and the warts on the limb of the spathe have not been mentioned hitherto, nor has the dimorphism of the spathe. Very few specimens were available before those of Prof. Barnes

were collected and their condition is not very satisfactory. These remarks apply with even greater force to *Cryptocoryne Wightii* Schott, which so closely resembles the present species that I strongly suspect them to be identical, the latter being described from specimens bearing the emergent leaves only and *C. Wightii* from submerged leaves. Prof. Barnes has now shown that both types of leaves are to be found on the same plant. The only other difference that I can trace on the single sheet of *C. Wightii* seen, is in the length of the peduncle, which is 6-7 cm. long.

In Bonplandia (I.e.), Schott has stated " Mysore and Carnatic " to be the habitat of *C. consobrina*, but this locality is to be found only on the general printed label used for the Hook, f. & T.T. collections. A manuscript label on the sheet reads: " Madras Coll. No. 34 Nilgherries ", and from Hooker's Herb. Ind. Or. Distribution list it is seen that this specimen was communicated by Law. In the Kew Herbarium there are only two sheets identified as *C. Wightii* Schott: the type sheet with leaves and spathe collected by Wight in Mysore, and another, bearing fruit only, obtained in Calicut (Malabar), dated " x. 1888 " without collector's name, the inscription being, however, in the hand of M. A. Lawson ; the specimen was ascribed by him to *C. spiralis* Fisch.

C. E. C. FISCHER.

FIG. 1, whole plant showing submerged leaves, x 8 ; 2, whole plant showing emergent leaves, x 1 ; 3, limb of spathe, x 2 ; 4, chamber of spathe partly cut away to show inflorescence, x 2 ; 5, side view of two stamens, x 16 ; 6, stamens viewed from above, x 16 ; 7, vertical section through ovaries, showing minute abortive ovaries above, x 4 ; 8, syncarpium, *natural size* ; 9, syncarpium after dehiscence, showing dissepiments and seeds, *natural size* ; 10, two seeds, x 3.



S.R.C.

TABULA 3306.

ARISAEMA CONSTRICTUM *E. Barnes.*

ARACEAE. Tribus AREAE.

**A. constrictum** *E. Barnes* ; species nova, affinis *A. Leschenaultii* Bl., sed spathae tubo angustiore apice constricto, limbo late ovato erecto, spadiceis appendicis apice striato coronato differt.

*Herba* carnosae, dioica. *Tuber* subglobosum, usque ad 5 cm. diametro, carne alba. *Cataphylla* 3, membranacea, obtusa, maculata. *Folium* solitarium, cum inflorescentia coetaneum ; petiolus in planta feminea, usque ad 1-22 m. longus, in planta masculina brevior, parte tertia basali pedunculum invaginante, superne teres ; foliola 7-9, palmatim radiata, elliptico-oblongata, abruptius acuminata, in basin angustata, interdum fere petiolulata ; costa subtus valde prominens, maculata ; nervi primarii in foliis longissimis usque ad 40, e costa angulo 45° ascendentes, in nervum intramarginalem conjuncti, nervis secundariis minus distinctis. *Pedunculus* cylindricus, laevis, petioli duas partes aequans et eo ultra medium vaginatus. *Spathae* tubus angustus, We constrictus et marginibus eversis ; limbus late ovatus, erectus, apicem caudato-acuminatum deflexum angustatus. *Spadix femineus* erectus, usque ad 6-5 cm. longus ; ovaria globosa, usque ad 140 in involucrio vel parte tertia basali spadiceis dense aggregata ; ovula usque ad 9 ; stigmata parva, dense papillata ; flores neutri 12-15, supra et juxta ovaria siti, tenues, subulati, plerumque ascendentes ; spadix supra flores neutros paullo dilatatus deinde angustatus et demum in coronam longitudinaliter sulcatam iterum dilatatus. *Spadix masculinus* erectus, parte tertia basali gregibus staminum 2-5-staminatis breviter obtectus ; antherae sessiles ; flores neutri 0. *Baccae* usque subglobosae. *Semina* 1-5, plerumque 3-4.

Ramboda - Central Provinces : Ramboda Pass about 2 miles above Ramboda, 1250 m., in the shade of trees and bushes, inflorescence *B. Barnes* 836, 837, 838, 839, 840, 841, 842, 843 ; type in Kew Herb. inspirit.

Some of the species of *Arisaema* are very closely allied, differing mainly in the structure of the spadix. In some cases the species is confined to a strictly limited area. The differences may be important, possibly connected with the particular insects that the plants are infested with, and until this aspect has been more fully studied the significance of small differences will not be understood.

In the present species new tubers are found growing out of the side of the petioles. The petioles vary in colour from uniform light green to almost blackish brown ; the leaflets of the same leaf may vary slightly in size, they are darkish green and somewhat glossy above,

light green and glossy below, the margins are minutely fringed. " The tube of the spathe is longitudinally striated green and white and dotted with numerous purple spots and patches ; the limb is light green with prominent nerves, brownish or purplish towards the tip. The appendage of the spadix has brown markings below, its crown purple-cored. The ovaries are green and the anthers purple. The ovules are round, light pink, with a tube-like process at the top. They were accompanied by several small round colourless bodies attached to the apex of the cell, which may be vestigial ovaries. Up to 125 ripe berries were found on one spadix ; the seeds are basifixed. At the base of the tube of the male spathes there is a definite aperture formed by the arching away from each other of the edges of the spathe : this aperture is not present in the female. The fluted crown of the appendage is on a level with the constrictions of the tube and so plugs the mouth. It appears probable that the purpose served by the arrangement is the exclusion of large insects, access being given only to those small enough to pass through the spaces left by the grooves. Such insects could escape by the aperture at the base of the male spathe, carrying pollen with them. They might then enter a female inflorescence and probably then get caught between the ovaries and the side of the spathe (see Journ. Bomb. Nat. Hist. Soc. xxxvii. 630: 1934). The leaf and the inflorescence expand at the same time. Before expanding, the leaf has three leaflets folded together at the end of the petiole and in a line with it, and three on one side and four on the other folded along the petiole ; the edges of the leaflets being rolled inwards.—E. BARNES.

FIG. 1, leaf and part of peduncle, x f ; 2, margin of leaf, x 4 ; 3, <J spathe, x f ; 4, \$ spathe, x § ; 5, \$ spadix after fertilization, *natural size* ; 6, <J spadix, *natural size* ; 7, \$ flower with 4 stamens, x 20 ; 8, fruiting spadix, *natural size* ; 9, berry, x 2 ; 10, vertical section through berry, x 2 ; 11, transverse section through berry, x 2.



SR-C.

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TABULA 3307.

ARISAEMA SARRACENIOIDES *E. Barnes et G. E. C. Fischer.*

ARACEAE. Tribus AREAE.

*A. sarracenioides* *E. Barnes et G. E. C. Fischer*; species nova, -4. *galeato* N. E. Br. et *A. purpureogaleato* Engl. affinis, ab utroque folio radiato 5-9-foliolato, ab illo spadice cauda longa filiformi haud praedito appendicis basi haud truncata, ab hoc spathae limbo late ovato et noribus neutris subulatis supra ovaria praesentibus differt.

*Herba* dioica, succulenta, glabra. *Tuber* hornotinum oblatum, 1.5-? cm\* diametro, in annotino insidens, carne flavescente basi saturate vindi. *Cataphylla* 2-3 vel plura, membranacea, intima longissima, Usque 15 cm. longa. *Folium* solitarium, cum inflorescentia coetaneum; petiolus teres, usque 50 cm. longus, pedunculum basi invaginans et supra basin sulcata vel applanata; foliola radiantia, 5-9 in plantis (? 7-9 in plantis \$, oblanceolata, caudato-acuminata, basi attenuata, 16-30 cm. longa, 5-9 cm. lata, costa subtus prominula, nervis primariis A<sup>15</sup> a costa angulo 45° ascendentes leviter arcuatis venae intra-arginali a margine 3-5 mm. distantia conjunctis, nervis secundariis vix minus prominentibus, vena paullo graciliore juxta marginem minute conspatum percurrens; petioluli 1-3 cm. longi. *Pedunculus* gracilis, petioh partem quartam vel dimidium aequans et dimidio vel tribus partibus basalibus eo vaginatus. *Spatha* cucullata, tubo 10-15 cm. longo prorsus curvata vertice hemisphaerica, ore cordiformi marginibus revolutis limbo cordiformi usque 5 cm. longo et 4 cm. lato in caudam normem vel caudato-acuminatam 3-6 cm. longam, ante os pendulam, agustato. *Spadix* utriusque sexus similis, sed \$ paullo major et usque 13 cm. longus; inflorescentia \$ 2-2-2 cm. longa, ovariiis const. <sup>st.</sup> oglobosis, stylo brevi columnari, stigmate papilloso; appendix <sup>l.</sup> pite 1-15 cm. longo floras neutros usque 16 subulatos acutos arcuatos ascendentes usque 1-3 cm. longos gerente praeditus, supra <sup>l.</sup> ruptus (sed haud truncate) dilatatus et leviter sulcatus, dein angust <sup>US eΛ In caucΛ ain</sup> horizontalem gracilem acuminatam limbum versus <sup>o</sup> trusam arcuatus, apice minute verrucoso; inflorescentia <sup>4</sup> \$ aequilonga, flo <sup>ell.</sup> Tibus sparsis vel basin versus confertis, antheris <sup>le</sup> o in columno 0.5-2 mm. longo dispositis poro apicali orbiculari vel <sup>le</sup> iptico dehiscentibus basalibus prius apertis, polline sphaerico leviter <sup>le</sup> ctunato 0.015-0.02 mm. diametro, floribus neutris nullis. *Bacca* <sup>le</sup> pre sphaerica, saturate viridis, nitidissima, rubescens. *Semina* 1-4 <sup>le</sup> Perumque 2, laevia, cotyledone interne albo externe saturate purpureo <sup>le</sup> Per testam pellucidam translucente semini speciem griseam impertiente.

<sup>le</sup> in <sup>le</sup> <sup>le</sup> Travancore: High Range, plentiful in evergreen forest <sup>an</sup> <sup>le</sup> Gap, 1950 m., fl. May, *E. Barnes* 1092 (type sheet and specimen in spirit in Kew Herb.), 1157, 1158, 1177; Munar-Devicolam <sup>le</sup> patn, <sup>le</sup> evergreen forest, 1650 m., fr. Sept., *E. Barnes* 1094, 1156.

This species differs strikingly from all others known from S. India by the\* recurved spathe with its vertically pendent limb presenting a marked resemblance to the pitcher leaves of many *Sarracenias*.

The cataphylls are bright green speckled with slightly raised purple patches; the petioles are green with purple patches; the leaflets are darkish green above, brighter below. The tube of the spathe is white with longitudinal purple or brownish-purple stripes, the interstices between the stripes are translucently glossy inside; the limb is green outside with fine purple veins and dull purple inside with a very sticky lustre or sometimes green and purple. The spadix up to and including the stipe is white, above the stipe it is white, pale green, bright purple or white with five purple markings, the tip is green or yellowish green. The ovaries are bright green with a purple style and white stigmatic papillae. The column and anthers of the (J flowers are crimson with sometimes the colour spreading on to the stipe around its foot.

Of 47 specimens examined 38 were male and 9 female; of the males 16 had the right side of the spathe overlapping the left and 22 left overlapping right; of the females 2 were right and 7 left.

The figures below show the number of plants having the various numbers of leaflets (number of leaflets in brackets):—

Males : 3 (5), 4 (6), 19 (7), 8 (8), 4 (9).

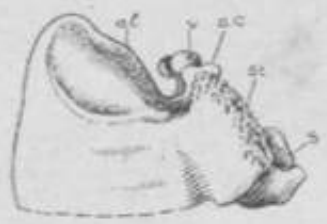
Females : 1 (7), 4 (8), 1 (9).

Three fruiting peduncles bore respectively 73, 93 and 125 berries.

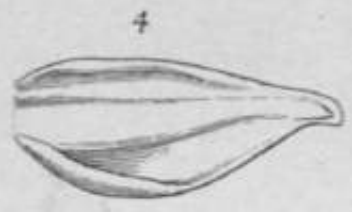
As in the other S. Indian species of *Arisaema*, there is an aperture and annular space at the base of the spathe in male inflorescences but not in females. The adaptation for cross-fertilization, therefore, appears to be generally similar to that of *A. Leschenaultii*. The convex upper end of the spathe, and the heart-shaped flap protecting the mouth of the spathe, appear to be adaptations to a wet climate. The pendent tail of the limb of the spathe probably serves as an alighting place for flies attracted to the inflorescence. The presence of translucent areas on the upper part of the spathe, and the whiteness or bright colour of the appendage suggest that, as in *A. translucens*, the attraction of flies to the spadix may be partly visual. The warty tip of the spadix is probably the source of the smell of the inflorescence.

E. BARNES and C. E. C. FISCHER.

FIG. 1, entire plant, x  $T_n^x$ ; 2, base of plant, with tuber, *natural size*; 3, leaflet, *natural size*; 4, inflorescence, *natural size*; 5, spadix of male plant, *natural size*; 6, male flower, x 12; 7, anther, x 16; 8, spadix of female plant, *natural size*.



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S.R.C.

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## TABULA 3308.

### HABENARIA FLABELLIFORMIS *Summerhayes*.

ORCHIDACEAE. Tribus OPHRYDEAE.

— H. (§ **Plectroglossa**) **flabelliformis** *Summerhayes* in Gamble, Fl. Madras, 1887 (1936).—Species affinis *H. Perrottetianae* A. Rich., a qua floribus minoribus, labello fere ad basin tripartite\* partitionibus fere aequilongis, intermedio lineari-oblongo acuto, lateralibus anguste lanceolatis, calcaris brevioris differt.

*Herba* terrestris, erecta, 28 cm. alta, omnino glabra (specimine unico tantum viso); tuber non visum; caulis teres, basi cataphyllis 3 vaginantibus acutis vel apiculatis instructus, superne 5-foliatus. *Folia* suberecta, leviter recurvata, supremum inflorescentiae basin superans, elliptico-lanceolata, apice acuta, breviter subulato-acuminata, basi ± vagmantia, 4-7 cm. longa, 1\*2-2 cm. lata, distincte trinervia, subcoriacea. *Inflorescentia* 9 cm. longa, circiter 2 cm. diametro, 9-flora; bractae foliaceae, late lanceolatae, acuminatae, flores superantes vel subaequantes, usque ad 3\*5 cm. longae, valde concavae, distincte carinatae; pedicelli cum ovarii circiter 2 cm. longi. *Flores* subrecti, colore ignoto. *Sepalum* intermedium erectum vel leviter incinatum, ovatum, subacutum, 9 mm. longum, 6 mm. latum, concavum, leviter carinatum; sepala lateralia patentia vel ± reflexa, usque lanceolata, apice ipso angustata sed obtusa, leviter canaliculata, 11 mm. longa, 4-5 mm. lata. *Petala* falcatis linearilanceolata, acuta, sepalo intermedio libera sed cum eo galeam ± formantia, circiter 8 mm. longa, 2\*5 mm. lata. *Labellum* e basi brevi lata tripartitum; partitio internervi-oblonga, subacuta, 9 mm. longa, 2 mm. lata, lateribus leviter deflexis; partitiones laterales ab intermedio angulo 45° divergentes, anguste lanceolatae, acutae vel acuminatae, 8 mm. longae, circiter 2 mm. latae; calcar dependens, e basi angusta sensim clavato-angustatum, obtusum, 1-2-1-4 cm. longum. *Columna* lata, brevissima; anthera 3-4 mm. alta, apice rotundata vel leviter retusa, loculis divergentibus, canalibus brevissimis; pollinii caudiculae 1 mm. longae, locis hemisphaericis, fere 1 mm. diametro; staminodia transverse oblonga, e antico ruguloso-crenata; rostellum lobus intermedius matricoidis, laterales breves, truncati; brachia stigmata, e antico rotundato-truncata, 2-5 mm. longa et lata.

*Loc.* <sup>Son</sup> <sup>BO</sup> INDIA. Travancore, high range, slopes of Anaimudi, 2500 m., mes 829.

<sup>cover</sup> <sup>sec</sup> <sup>ion</sup> <sup>ant</sup> adds a second species to the previously *Perrottetiana* A. Rich., the original member of the section, in general

facies and in the structure of the column and sexual organs, but possesses a completely different lip. In *H. Perrottetiana* the lip has a long claw and is only shortly trilobed in the upper half ; in addition the claw is curved upwards so that the lamina lies more or less parallel to the anther. *H. jlabelliformis* possesses the large flattened stigmatic processes, broad rostellum and very short anther-canals characteristic of *H. Perrottetiana*; the staminodes are also almost identical in the two species. On the other hand the new species also shows marked resemblances to *H. Heyneana* Lindl. and especially to the recently described *H. Barnesii* Summerhayes, although both of these have much smaller flowers. In addition the stigmas in these two species are not so much flattened as in *H. jlabelliformis*, while the anther-loculi are not so divergent and the rostellum is accordingly narrower. Nevertheless the agreement in facies and general floral structure convinces me that these other two species are near relatives of the two species in sect. *Plectroglossa*, and it therefore seems doubtful if this section is worthy of being retained as a separate entity. Pending a more thorough investigation of the species of this circle of affinity in the genus *Habenaria* it is probably advantageous to maintain the section.

V. S. SUMMERHAYES.

FIG. 1, flowering plant, *natural size*; 2, a single flower, perianth spread out, x 2 ; 3, dorsal sepal, x 3 ; 4, lateral sepal, x 3 ; 5, column, in front view, x 6 ; 6, the same, in side view, x 6 :—ac, anther-canals ; al, anther-loculi; rl, lateral lobes of rostellum ; rm, median lobe of rostellum ; s, stigmatic processes; st, staminode ; v, viscidium.



S.R.C.

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## TABULA 3309.

### SCHIMA SEBICEA *Airy-Shaw*.

THE ACE AE. Tribus GORDONIEAE.

**S. sericea** *Airy-Shaw*; species nova, secundum dispositionem specierum a cl. Melchior adhibitam in gregem *C c p* ponenda, *S. rigidae* Miq. ut videtur proxima, differt tamen foliis usque 16 cm. longis, innovationibus petiolis foliis subtus pedunculisque mollissime subargenteo-sericeo-pubescentibus; ab etiam affini *S. Mertensiana* (Sieb. et Zucc.) Koidz. (*S. boninensi* Nakai) foliis maturis multo majoribus subtus sericeo-pubescentibus, floribus minoribus, sepalis junioribus extra glabris recedit.

*Frutex* subscandens. *Gaulis* usque 3 m. longus, ramulis 5-8 mm. crassis teretibus, cortice cinereo rugoso. *Innovationes* ut videtur brevissimae, totae pulcherrime dense adpresse subargenteo-sericeae. *Folia* apicem innovationum versus conferta, vix ultra annum primum persistentia, cicatricibus delapsorum valde conspicuis, obovata vel elliptico-obovata vel oblongo-obovata, 9-16 cm. longa, 5-7\*5 cm. lata, basi cuneato-angustata subdecurrente, latiora apice plerumque rotundata et breviter cuspidata, angustiora acuta vel breviter acuminata, margine integerrima, crassiuscule coriacea, supra obscura vel rarius lucentia, sub lente brevissime subvelutino-sericeo-tomentella, siccitate pallide cinereo-viridia, subtus obscura, dense adpresse argenteo-sericea, siccitate pallide griseo-biunnea; costa satis valida, supra subplana, subtus valde prominens et longe sericea; nervi laterales utrinque 8-12, tenues, late patuli, subrecti, dein intra marginem arcuati et anastomosantee; venulae tenuissimae, subtiliter sed inconspicue reticulatae, angulum rectum cum nervis lateralibus plerumque efficientes; petioli robusti, 8-15 mm. longi, supra plani, subtus convexi, dense sericei. *Flores* axillares, solitarii, ut videtur parce editi, 1<sup>^</sup>3 e quaque innovatione. *Pedunculus* satis robustus, leviter anceps vel bicarinatus, arcuato-adscendens, 3-5-5 cm. longus, inde a basi ampliatus, apice usque 4 mm. crassus, dense sericeo-tomentosus. *Bracteolae* in specimine descripto delapsae itaque ipsae non visae, sed e cicatricibus triangularibus relictis binae, oppositae, ad angulos vel paene carinas circiter 2 mm. infra sepala sitae. *Sepala* suborbicularia, 3-4 mm. lata et fere aequilonga, extra tota et intus infra medium glaberrima, intus supra medium longe sericea, longe sericeo-ciliata, crassa, rigida, erecto-patula, imbricata, siccitate brunnea. *Corolla* expansa usque fere 3 cm. diametro, alba. *Petala* inaequalia, late obovata vel late elliptica vel suborbicularia, usque 1-7 cm. longa et 1-3 cm. lata, basi breviter (2-3 mm.) unguiculata, apice rotundata, basi extra sericea, ceterum glabra: extimum subcoriaceum, ciliatum, valde cucullatum, in alabastro interiora fere includens; interiora basi crassiuscula, apice tenuiora, basi parce brevissime ciliata; omnia plus minus inconspicue paralleloneura.

*Stamina* 60-70, usque 1 cm. longa, glabra : filamenta basi inter se et cum petalorum unguiculis connata, applanata, subfiliformia, apicem versus attenuata; antherae subquadrato-globosae, vix 1 mm. diametro. *Ovarium* ellipsoideum, circiter 3 mm. longum, sericeum. *Stylus* crassiusculus, 5-6 mm. longus, sursum incrassatus, pentagonus, glaberrimus, stigmatibus capitato 1-5 mm. diametro vix lobato glabro. *Fructus* ignotus.

SARAWAK. Moss-forest, Dulit, High Camp, 1230 m., 8 Sept. 1932, Syngé 1614 : " Tree, c. 10 m. Petals white. Leaves bluish green."

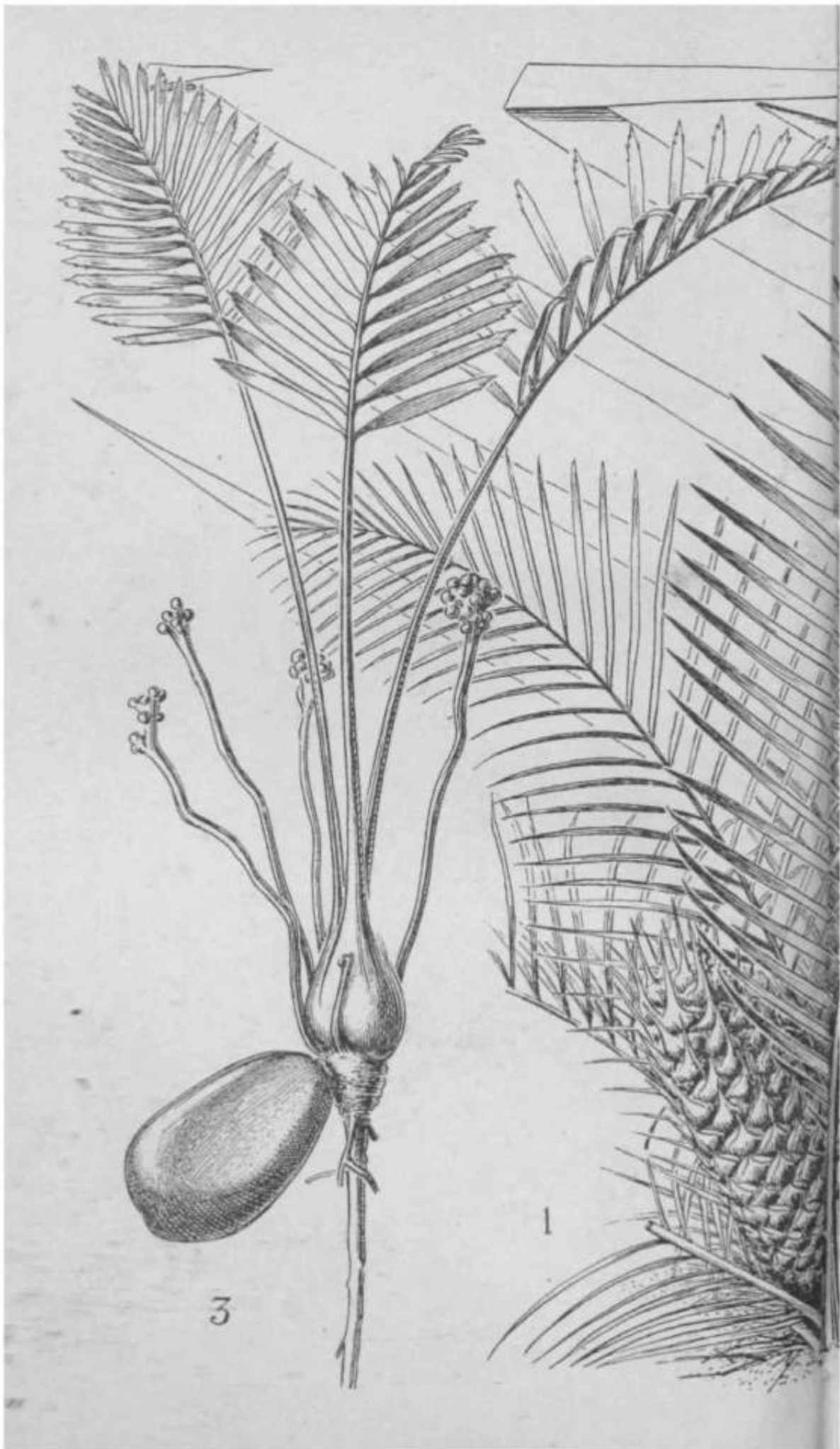
The majority of the species of *Schima* are silky on the young parts, but the one now described possesses this silky covering in a very much more marked degree than any hitherto known. The indumentum is moreover persistent. The completely glabrous condition of the backs of the sepals renders them conspicuous.

The tribe *Gordonieae* Benth. et Hook, f., to which *Schima* is here referred, is included by Melchior (in Engl. u. Prantl, Nat. Pflanzenfam. ed. 2, xxi. 127 :1925) in the tribe *Camellieae* DC. In another place (Kew Bull. 1936) the present writer has pointed out that *Gordonia Lasianthus* (L.) Ellis, the type species of the genus *Gordonia* Ellis, from which the tribe *Gordonieae* derives its name, is very distinct from all the species which have subsequently been referred to that genus, but is closely related to *Schima* and *Franhlinia*. The " false " *Gordonias* differ from *Schima*, *Franhlinia* and *Gordonia* proper, principally in the spiral arrangement of the parts of the perianth, which show a more or less gradual transition from bracts through sepals to petals, agreeing in this respect with *Laplacea*, *Pyrenaria* and the *Camellia* group. These " false " *Gordonias* are referable to the genus *Polyspora* Sweet ex G. Don, Gen. Syst. i. 574 (1831). In *Gordonia* and its allies there are two opposite deciduous bracteoles and five equal suborbicular sepals which are sharply differentiated from the five petals. The types of the tribes *Camellieae* and *Gordonieae* are thus plants with basically different floral plans, and appear abundantly to warrant the recognition of these tribes as distinct.

H. K. AIRY-SHAW.

FIG. 1, flowering branch, *natural size*; 2, bud, x 2; 3, apex of pedicel, showing bractscar and calyx, x 3; 4, the same, with two sepals removed to show ovary, x 3; 5, outermost petal, lateral view, x 3; 6, an inner petal, ventral view, x 3; 7, portion of androecium, ventral view, x 3; 8, gynoecium, longitudinal section, showing ovules, x 8.



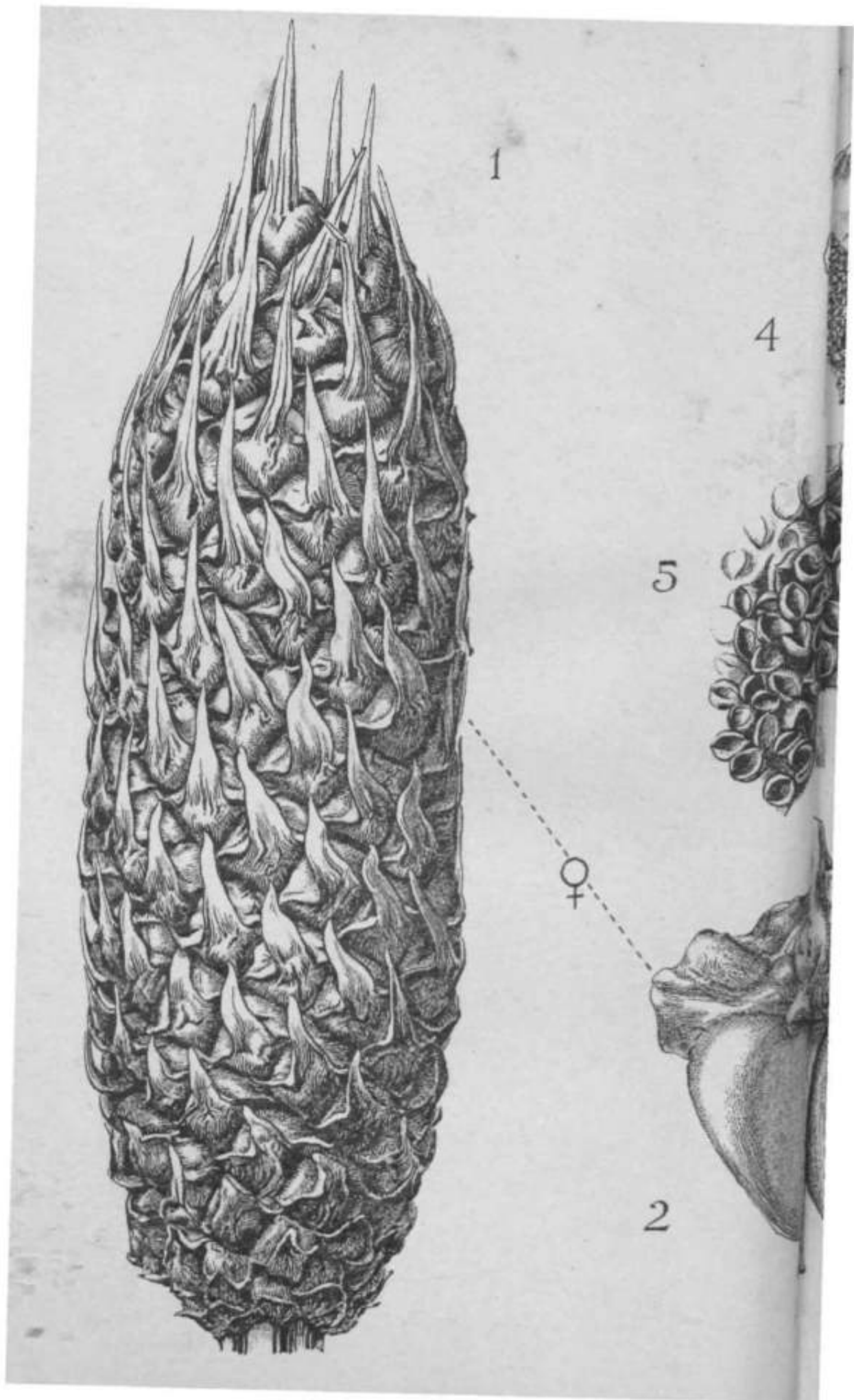


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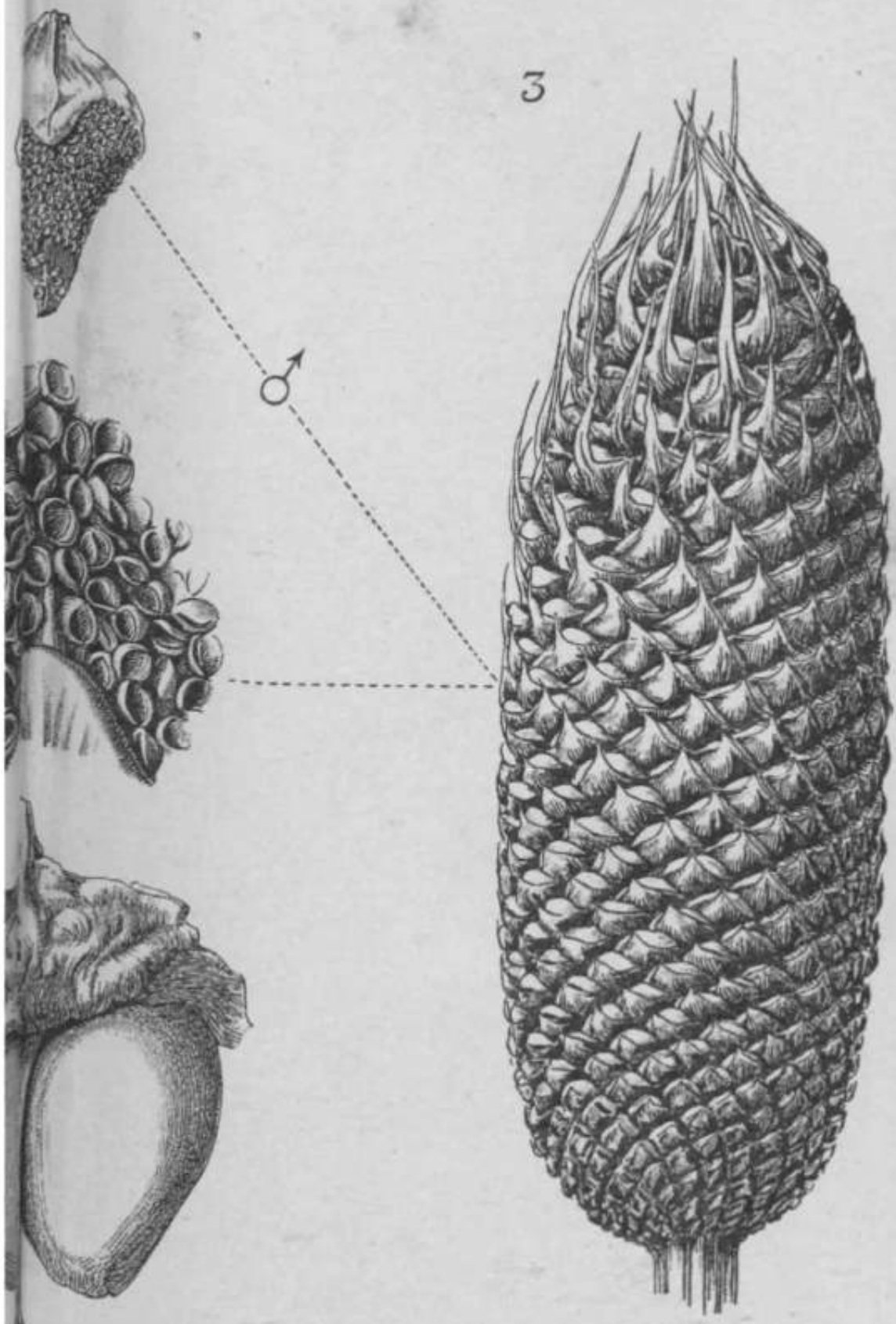


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GA



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Atkinson.

TABULAE 3310, 3311.

MACROZAMIA DOTJGLASII W. Hill ex F. M. *Bailey*.

CYCADACEAE. Tribus MACROZAMIEAE.

*M. Douglasii* W. Hill in Kep. Brisbane Bot. Gard. 1879, 9, nomen; F. M. Bailey, Syn. Queensl. Fl. 500 (1883), descr.; F. M. Bailey, Queensl. FL v. 1505 (1902), et Compreh. Cat. Queensl. PL 518 (1913). *Bncephalartos Douglasii* F. Muell. Syst. Cens. Austral. PL i. 110 (1882), nomen; et in Melbourne Chemist & Druggist 1883 (Feb.), descr.; Syst. Cens. Austral. PL i. 184 (1889). *Macrozamia tridentata* {Widd.), Regel subsp. *mountperryensis* (F. M. Bailey) Schuster var. *Douglasii* (F. M. Bailey) Schuster in Engl. Pflanzenr. Cycadac. (IV. i.) 90 (1932).—Species *M. mountperryensi* proxima, a qua strobilis masculis brevioribus crassioribus ellipsoideis, strobilis femineis majoribus et megasporophyllis latioribus differt.

*Truncus* plus minusve in sabulonibus immersus, raro eminens et usque ad 1 m. altus, usque ad 30 cm. diametro. *Folia* 50 vel ultra, usque ad 2-4 m. longa, atroviridia; petioli basi dilatati et copiose sericeo-pilosi, usque ad 60 cm. longi, obtuse trigoni, supra leviter concavi; pinnae utroque latere usque ad 80, lineares, superne attenuatae, apicibus rigidis spinescentibus, usque ad 35 cm. longae et 11 mm. latae, coriaceae, glabrae, in foliis maturis marginibus integris, in foliis juvenilibus apice et margine basis copioso apicem versus dentes spinescentes paucos gerentes. *Scapi* usque ad 45 cm. longi, plus minusve lanati, demum glabrescentes, nonnihil angulati, prophylla lanata hinc appressa pauca gerentes. *Strobilus masculus* circiter 20 cm. longus et 6-5 cm. diametro; microsporophylla ambitu oblanceolata vel obovata, inferiora (ea in tertia vel dimidia parte inferiore strobili) apice applanata et rhomboidea sine spina terminali, superiora spina terminali sursum gradatim longiore et apice strobili usque ad 2-5 mm. longa praedita. *Strobilus femineus* 22-40 cm. longus, 9-12 cm. diametro; megasporophylla ancoriformia, maturitate 4-5-5-5 cm. longa, linea transversali interdum eminente aliformi notata; spinae pugioniformes, applanatae, sigidae, nonnunquam sinuatae, infimae brevissimae, intermediae sursum gradatim longiores, summae usque ad 3-5 cm. longae. *Semen* ovoideum, aurantiacum, usque ad 3-3 cm. longum.

QUEENSLAND. Fraser Island, on tops and sides of sand-hills, also in edge of rain-forest, 60-180 m., Nov. 1930 (old male and immature fruiting cones), Hubbard 4552; 1881, W. Hill; 1882, J. Pink; 1883 (?), -4. McDowall.

The present species of *Macrozamia* has so far been recorded only from Fraser Island off the coast of Queensland. Situated a little over one hundred miles north of Brisbane, this island, about 100 miles long

and 20 miles wide, is composed almost entirely of sand containing varying amounts of humus. *M. Douglasii* is apparently very plentiful there, and Mr. C. E. Hubbard when he visited the island in 1930 was able to collect abundant material.

The taxonomic study of the Cycads is beset with difficulties for the herbarium-botanist. The large size of the plants renders it difficult to prepare herbarium sheets adequately representing the species, while the cones are often bulky and require great care in drying. The family is thus very poorly represented in most herbaria, and in consequence taxonomic criteria become difficult to fix and much incorrect work is the inevitable result. Prof. C. J. Chamberlain in fact says: "One who has studied cycads in the field would hesitate to determine most of the species from herbarium specimens" (Gymnosperms, p. 162).

J. Schuster in his recent monograph of the Cycadaceae (Engl. Pflanzenr. IV. i. 99) has reduced the number of species of *Macrozamia* to nine. Chamberlain, on the other hand, who has conducted field-studies on the Cycadaceae over a period of more than thirty years, maintains that this number is too small. In Schuster's scheme, *M. Douglasii* has been subordinated, as a variety, to *M. moutperryensis*, which in its turn is reduced to a subspecies of *M. tridentata*. It seems preferable, however, to maintain the specific status of the Fraser Island plant.

*Macrozamia* is entirely confined to Australia, and is distinguished from the African genus *Encephalartos* principally by the spinous sporophylls and by the presence in many of the species of a gland at the base of each pinna. Many of the sporophylls on the male cone of the present and of certain other species are spineless, and for that reason F. Mueller proposed the inclusion of *Macrozamia* in *Encephalartos*. Mueller's suggestion, however, remained unsupported by his contemporaries nor indeed has it received any encouragement since. Recent cytological work, in fact, has demonstrated conclusively the generic status of *Macrozamia*. Sax and Beal in 1934 (Journ. Am. Arb. xv. 255) investigated cytologically every genus of the *Cycadaceae* and obtained chromosome counts for all of them. It was found that the basic haploid number for *Macrozamia* was nine, whereas for *Encephalartos* the number was eight.

*M. Douglasii* is probably closely allied to *M. inountperryensis* and *M. tridentata* as indicated by Schuster, but without ample material for study and a knowledge of the plants in the field an exact assessment of their relationships is difficult to make. Unfortunately there is no herbarium material of *M. moutperryensis* at Kew, although Bailey has published excellent photographs of male and female plants, while Schuster has figured the male cones. In *M. tridentata* and *M. moutperryensis* the male cones are more cylindrical than ellipsoid and are narrower than in *M. Douglasii*. The female cone of our species is bigger on the whole than those of the other two, while the cone scales are definitely broader.

The seedling of *M. Douglasii* shows some points of interest. The

young pinnae are seen to possess teeth at the apex and along the forward end of the basiscopic margin, whereas the adult pinnae are quite entire. This juvenile condition has been recorded also for *Dioon edule* and various species of *Encephalartos*.

As in all cycads, apogeotropic roots are developed at a very early stage, producing the familiar coralloid clusters at the surface of the soil. *M. Douglasii* grows in almost pure sand, and the seeds and young plants tend to become buried somewhat deeply as the result of surface movements. This causes the production of rather long negatively geotropic roots which often travel upwards several inches before they reach the surface. Two well-known nitrogen-fixing bacteria have been found in the roots of other species of *Macrozamia*, namely, *Azotobacter* and *Bacillus radicola*. As a source of nitrogen these organisms must be of great importance to the plant since the present species grows in a sandy habitat with a consequent deficiency of nitrates.

The aboriginal name of *M. Douglasii* is variously transcribed as "Coobine", "Coobyn", or "Goulbine". The "nuts" as in several other species are edible after maceration and baking, and were formerly eaten by the Fraser Island natives.

Mr. Hubbard states that the species is very common on Fraser Island, growing on the tops and sides of sand-hills in *Eucalyptus* forest and even finding its way into the fringe of rain-forest. Female plants were comparatively rare amongst a great number of male plants.

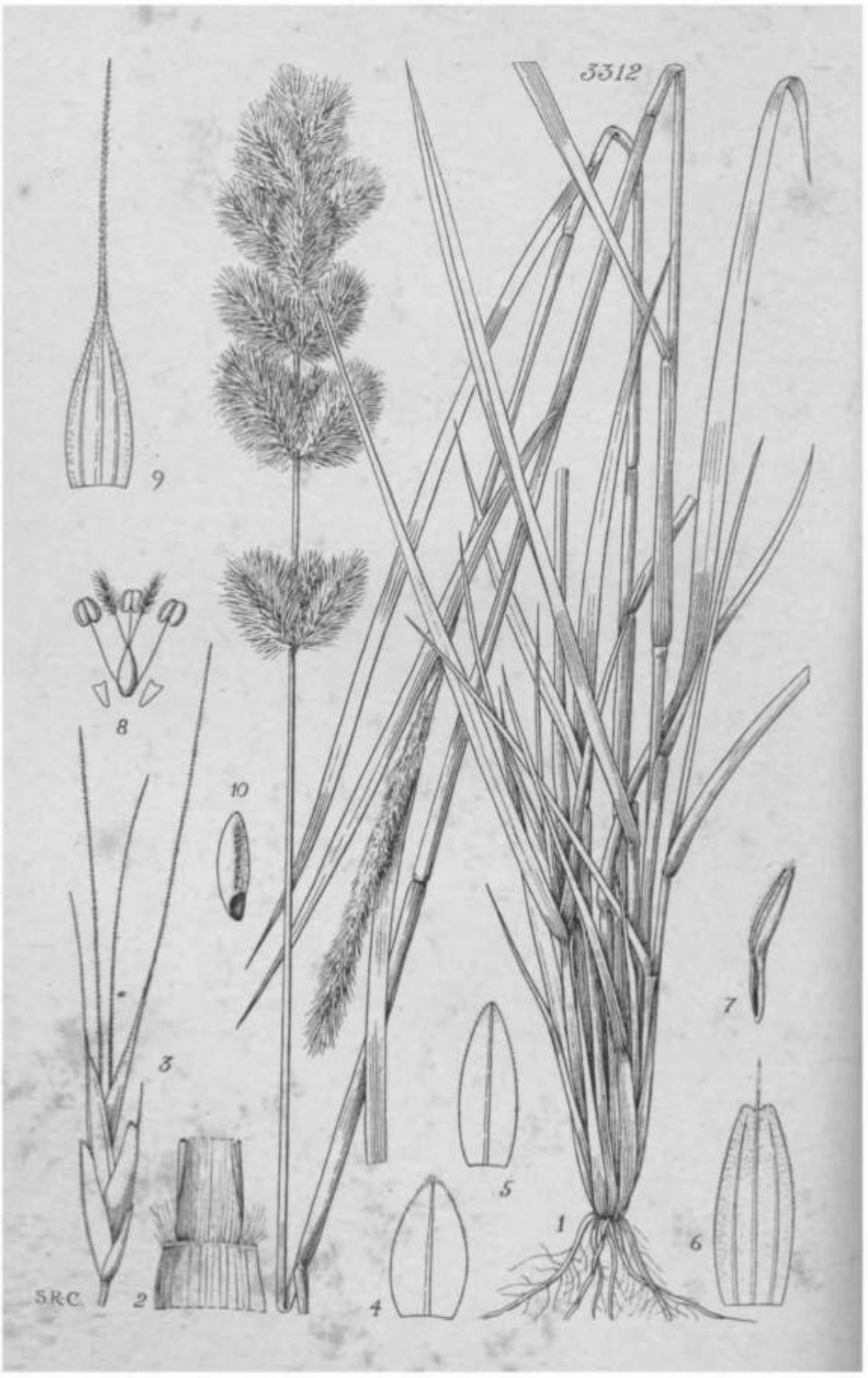
The specific epithet of the present species was given originally by Mr. W. Hill, one-time Colonial Botanist and Director of the Brisbane Botanic Garden, in honour of the Hon. John Douglas, C.M.G., a former Minister of the Lands Department of Queensland and according to Mueller one of the "earliest and ablest legislators of Queensland". The name, unaccompanied by any description, first appeared in the Annual Report of the Brisbane Botanic Garden for 1879, in which year Hill made a botanical trip to the island. It was not until 1883 that it was validated by a published description when Mueller and Bailey described the plant under *Encephalartos* and *Macrozamia* respectively.

In a recent letter Mr. C. T. White of the Brisbane Herbarium states that specimens of a *Macrozamia* resembling *M. Douglasii* have been found on the Queensland mainland at a place called Shark's Bay. This locality does not appear on any of the Kew maps nor indeed on any of the maps in the collection of the Royal Geographical Society. Specimens of this plant have not yet been received at Kew, but should it prove to be *Macrozamia Douglasii*, as it may well do, that species will join the ranks of several other plants, e.g. *Syncarpia Hillii*, whose supposed endemism on Fraser Island has been negated by later finds on the-mainland.—F. BALLARD.

Tab. 3310 : FIG. 1, entire plant, much reduced ; 2, portion of leaf, *natural size* ;  
\*, seedling, *natural size*.

FIG. 3, female cone, x 1J; 4, microsporophyll from below, x 1J; 5, portion of underside of microsporophyll, x 8.

3312





TABULA 3312.

ECTBOSIA LEPORINA R. BR.

GRAMINEAE. Tribus ERAGROSTEAE.

*Ectrosia* R. Br. Prodr. Fl. Nov. Holl. 185 (1810); Benth. Fl. Austral, vii. 633 (1878) et in Benth. et Hook. f. Gen. PL iii. 1188 (1883).—  
Descriptio hie emendata.

*Spiculae* lateraliter compressae, breviter pedicellatae vel subsessiles, in ramis paniculae densae vel laxae ortae; rhachilla glabra, scaberula vel hispidula, supra glumas disarticulans et inter anthoecia continua, rarissime inter anthoecia disarticulans vel tota persistens. *Anthoecia* laxa, vel laxe vel arete imbricata, 3-25, e glumis exserta, 1-24 inferiora?, superiora <J vel plerumque sterilia, ad lemma redacta, suprema ad setam vel ad aristam redacta. *Glumae* plus minusve persistentes, subaequales vel inaequales, inferiore brevior, anguste lanceolatae vel lanceolato-oblongae (explanatae), acutae vel obtusae, carinatae, tenuiter vel firme membranaceae, 1-3-nerves. *Lemmata fertilia* dorso recta vel plus minusve recurvata et nonnunquam apice horizontaliter patentia, sursum gradatim longiora et angustiora, raro subaequalia et similia, 3- vel 5-9-nervia et nervis lateralibus approximatis, vel lemmata superiora 1-nervia, carinata, membranacea vel coriacea, glabra, scabrida, pubescentia vel hispidula; infimum lineare, lanceolatum, ovatum vel oblongum (explanatum), ceteris plerumque brevius, acutum, obtusum, emarginatum vel minute bilobum, saepe mucronatum vel breviter aristatum; cetera anguste lanceolata vel lanceolata vel anguste ovata (explanata), acuta vel acute acuminata, integra, ex apice mucronata vel breviter vel longe aristata, arista scaberula vel rigide ciliolata recta vel leviter curvata. *Lemmata sterilia* fertilibus superioribus similia vel plerumque angustiora, suprema aristiformia vel setiformia. *Paleae* angustae, lemmatibus subaequilongae vel plerumque breviores, dorso a latere visae curvatae, bicarinatae, carinis ciliolatis vel ciliatis. *Lodiculae* 2, cuneatae, minutae. *Stamina* 3; antherae ellipticae vel oblongae. *Ovarium* glabrum; styli breves; stigmata plumosa. *Wryopsis* ambitu oblique lanceolata, ovata, anguste oblonga vel oblonga, subteres vel leviter latere compressa, inter lemma paleamque laxe inclusa, translucens; scutellum circiter tertiam partem caryopsidis aequans; hilum basale.—*Gramina* perennia vel annua; culmi graciles, simplices vel ramosi; laminae lineares, planae, convolutae vel involutae; ligulae ad seriem ciliorum redactae; paniculae terminales et nonnunquam axillares; spiculae lineares, lineari-oblongae, lineari-lanceolatae, oblongae, vel squarrosae.

Species 10, "Novae Guineae et Australiae septentrionalis incolae.  
J-ypos: *Ectrosia leporina* B. Br.

The genus *Ectrosia* has a wide area of distribution in northern Australia, extending from Western Australia eastwards to northern Queensland, and thence southwards to the interior of New South Wales. It also occurs in Dutch New Guinea and Papua. Bentham records it from south-east Queensland, but no specimens from that area have been seen by the writer. A common habitat for most species is in depressions on poor sandy soils, either in the open, or in *Eucalyptus* forest.

When describing *Ectrosia*, R. Brown stated that it was allied to *Chloris* Sw., no doubt on account of the similarity in the structure of the fertile lemma and in the presence of reduced sterile florets above it. Bentham (in Benth. et Hook, f. Gen. PL iii. 1092 : 1883) referred it to the subtribe *Eragrosteae* of the *Festuceae*, a position which appears fully justified when the structure of its spikelets is considered in relation to those of *Eragrostis* Beauv. and related genera. This classification of the genus was not followed by Hackel (in Engl. u. Prantl, Nat. Pflanzenfam. ii. Abt. 2,70: 1887). He placed it next to *Harpachne* Hochst. in the subtribe *Meliceae*, probably being influenced by the presence of sterile florets at the apex of the spikelet, a character which it possesses in common with *Melica* L. As was pointed out in the case of *Heterachne* (see under t. 3283), this grouping of the genus with the temperate genera of the *Meliceae* is very unnatural, and a more satisfactory arrangement is effected by placing it in the *Eragrosteae*. For arguments in favour of the *Eragrosteae* as a tribe distinct from the *Festuceae*, the reader is referred to the text accompanying t. 3319 of this work. Certain species of *Ectrosia*, especially *E. eragrostoides* Domin, closely approach the genus *Eragrostis*, whilst *Ectrosia anomala* C. E. Hubbard possesses characters reminiscent of *Heterachne*. It is very probable that a study of these genera in the field may reveal intergeneric hybrids. In this connection it is worthy of note that *E. eragrostoides*—a species somewhat intermediate between *Ectrosia* and *Eragrostis*—was found growing in association with *Ectrosia leporina* R. Br. and various species of *Eragrostis* at Ohudleigh Park in the Burke District of Queensland. *Ectrosia* differs from both *Eragrostis* and *Heterachne* by its awned lemmas, whilst most species may be separated from the former by the presence of a number of sterile florets at the apex of the spikelet and by the rachilla disarticulating only between the upper glume and lowest lemma.

The small size of the anthers in many species is strongly suggestive of cleistogamy, but although this phenomenon has been noted in a few species, in most cases the anthers have been exserted. In *E. Blakei* C. E. Hubbard, *E. anomala* C. E. Hubbard, *E. Danesii* Domin, and occasionally in *E. scabrida* C. E. Hubbard, the minute anthers have been found enclosed in the florets at the apex of the caryopsis.

The degree of sterility of the florets in the upper part of the spikelet is more pronounced in some species than in others. For example, in *E. eragrostoides* Domin and *E. Danesii* Domin, only a small proportion of the upper florets are sterile whilst, in *E. SchuUzii* Benth. and in

*E. leporina* R. Br., two-thirds or more of the florets are sterile. -The internodes of the rhachilla in the former two species are equal or nearly equal in length, whereas in the latter there is associated with the increasing sterility a gradual decrease in the length of the internodes from the base to the apex of the spikelet.

•KEY TO THE SPECIES OF ECTROSIA.

\* Lemmas glabrous, smooth or asperulous, rarely scabrid, 3-nerved, or the upper 1- or 5-nerved :

Lowest lemma 4-7 mm. long ; spikelets 14-30 mm. long (excluding the awns); annuals :

Lemmas closely imbricate, the lowest 6-7 mm. long, the intermediate and upper 7-11 mm. long with awns up to 18 mm. long, the uppermost with an awn up to 32 mm. long . . . . . 1. *Blakei*.

Lemmas not imbricate, the lowest 4-6 mm. long, the intermediate and upper 4-8 mm. long with awns up to 5 mm. long, the uppermost with an awn 6-12 mm. long . . . 2. *Danesii*.

Lowest lemma 1\*5-4 mm. long; spikelets 2-11 mm. long (excluding the awns), or if up to 14 mm. long, then the lemmas only 2 mm. long:

Lemmas scabrid all over; spikelets 5-11 mm. long; lowest lemma entire at the apex, 3-4 mm. long ; annual.

3. *scabrida*.

Lemmas smooth or asperulous, except for the scaberulous keels; lowest lemma entire or minutely 2-toothed at the apex :

t Spikelets linear, linear-oblong or lanceolate-oblong, 0-5-1\*5 mm. wide :

Florets dissimilar, 2-9, the lower 1-3 \$ or <£, the upper sterile, reduced to the gradually narrower lemma and awn or to an awn up to 12 mm. long ; rhachilla-internodes unequal:

Spikelets 6-10 mm. long ; lowest lemma 3-3-5 mm. long . . . . . 4. *Schultzii*.

Spikelets 2-5 (rarely 6 or 7) mm. long; lowest lemma 1-5-3 mm. long :

Panicle usually spike-like and dense; spikelets 3-7 mm. long ; lowest lemma 1-5-3 mm. long . . . . . 5. *leporina*.

Panicle usually open and loose ; spikelets 2-3 mm. long; lowest lemma 1-5-1-8 mm. long . . . . . 6. *agrostoides*.

Florets similar, 8-25, mainly \$; rhachilla-internodes subequal; lemmas 2-2-5 mm. long, with an awn 0-5-1-5 mm. long . . . . . 7. *eragrostoides*.

ft Spikelets oblong or obovate-oblong and widely gaping,  
2-3 mm. wide :

Lemmas straight or nearly straight on the back;  
panicle spike-like; lowest rhachilla-internode  
curved. . . . . 8. *anomala*.

Lemmas becoming recurved, with the tips at length  
horizontally spreading; panicle loose; lowest  
rhachilla-internode straight. . . . . 9. *confusa*.

\*\* Lemmas hairy, 5-9-nerved, with the lateral nerves close together and  
forming a conspicuous green line, becoming curved with the tips  
horizontally spreading . . . . . 10. *Gulliveri*.

#### ENUMERATION OF SPECIES OF ECTROSIA.

1. *E. Blakei* C. E. Hubbard ; species nova, affinis *E. Danesii* Domin, a qua panicula laxiore, spiculis paullo latioribus, glumis lemmatibus et aristis longioribus, lemmatibus arete imbricatis, anthoeciis fertilibus 5-6, caryopsi majore, rhachillae internodiis inaequalibus superne brevioribus distinguitur.

*Gramen* annum. *Culrni* laxe fasciculati, erecti vel geniculato-  
adscendentes, 10-45 cm. longi, graciles, 1-4-nodes, ramosi, glabri vel  
sparse pubescentes, laeves. *Foliorum vaginae* internodiis plerumque  
breviores, ore laxe pilosae, marginibus superne ciliatae, ceterum sparse  
pilosae vel glabrae, laeves; ligulae ad seriem ciliorum brevissimorum  
redactae; laminae lineares, in apicem subacutum attenuatae, usque  
ad 10 cm. longae et 2\*5 mm. latae, planae vel siccitate convolutae vel  
involutae, pone ligulam dense pilosae, ceterum sparse pubescentes vel  
sparse pilosae, vel glabrae, supra nervis asperulae, subtus laeves.  
*Panicula* laxa, erecta vel nutans, usque ad 10 cm. longa et 8 cm. lata  
(aristis inclusis); rhachis plus minusve pubescens vel pilosa; rami  
solitarii, demum horizontaliter patentes vel reflexi, 1-7-spiculati,  
simplices vel basi ramulum 2-spiculatum gerentes, pilis debilibus albis  
molliter pubescentes, inferiores usque ad 1-5 cm. longi, superiores  
gradatim breviores; pedicelli pubescentes, laterales usque ad 0\*8 mm.  
longi, terminales usque ad 2 mm. longi. *Spiculae* lineari-oblongae vel  
lineari-lanceolatae, 15-20 mm. longae (aristis exclusis), 2 mm. latae,  
purpureae vel pallide viridi- et purpureo-variegatae. *Glumae* lanceo-  
latae (explanatae), acutae, firme membranaceae, 3-nerves, glabrae;  
inferior 3\*5-4-5 mm. longa; superior 4-5-5 mm. longa. *Anthoecia*  
9-11, 5-6 inferiora \$, cetera sterilia et ad lemma vel suprema ad aristam  
redacta; rhachillae internodia continua, glabra, inferiora usque ad  
2 mm. longa, superiora gradatim breviora. *Lemmata fertilia* arete im-  
bricata, dorso recta, acute acuminata, integra, tenuiter coriacea, glabra,  
margines versus asperula, carina scaberula, prominenter 3-nervia  
vel superiora 5-nervia; I anguste ovatum (explanatum), exaristatum  
vel brevissime aristatum, 6-7 mm. longum; II-IV lanceolata (ex-  
planata); II 7-8 mm. longum, arista 1-3 mm. longa; III 8-10 mm.

longum, arista 2-5 mm. longa ; IV 10-11 mm. longum, arista 5-8 mm. longa; V-VI anguste lanceolata (explanata); V circiter 11 mm. longum, arista circiter 11 mm. longa ; VI 10 mm. longum, arista usque ad 18 mm. longa ; lemmata sterilia angustiora et breviora vel ad aristam redacta, usque ad 34 mm. longa (arista inclusa), aristis rigidiusculis strictis vel leviter curvatis. *Paleae* angustae, obtusae, 3-5-4\*5 mm. longae, carinis anguste alatis ciliolatis, dorso infra medium leviter gibbosae. *Antherae* 0• 2-0• 3 mm. longae. *Caryopsis* 1 • 5-2 mm. longa.

QUEENSLAND. Burke District: 'Oroydoa, open depressions on whitish sand, 105 m., May 1935, Blake 9104.'

A very distinct species, somewhat resembling *Bromus teetotum* L., especially in regard to its spikelets. The florets have the appearance of being cleistogamous, as in all cases where a mature caryopsis was found, the minute anthers were enclosed at its apex between the lemma and palea. Mr. S. T. Blake, after whom this species has been named, is engaged upon a botanical survey of the grazing lands of Queensland, and by his collections has added considerably to our knowledge of the genus *Ectrosia*.

<sup>2</sup> E. Danesii *Domin* in *Biblioth. Bot.* xx. Heft 85, 406, t. 15, figs. 3, 4 (1915).

*Gramen* annum. *Culmi* laxe fasciculati, erecti vel geniculato-ascendentes, 6-30 cm. longi, graciles, 2-5-nodes, e nodis ramosi, ramis hirsutibus paniculiferis, pilis debilibus albis laxe pilosi, vel glabri, laeves. *Glomerulorum vaginas* internodiis aequilongae vel plerumque breviores, laxae, ore laxe barbatae, marginibus superne nonnunquam ciliatae, ceterum glabrae, laeves ; ligulae ad seriem ciliorum brevissimorum redactae ; laminae lineares, in apicem subacutum attenuatae, usque ad 8-5 cm. longae et 3 mm. latae, planae vel siccitate convolutae, subtus glabrae et laeves, pone ligulam pilosae, supra nervis asperulae. *Panicula terminalis* demum exserta vel basi in vagina summa inclusa, oblonga, densa vel laxiuscula, 3-5 cm. longa, usque ad 4 cm. late (aristis inclusis); paniculae axillares breviores, angustiores, in vaginis inclusae vel lateraliter exsertae ; rhachis, rami et pedicelli pilis debilibus laxe pilosi; rami demum patuli, uni- vel pauci-spiculati, inferiores usque ad 1-5 cm., longi, superiores gradatim breviores; pedicelli laterales usque ad 0-5 mm. longi, terminales usque ad 2 mm. longi. *Glomerulae* oblongo-lineares, 14-30 mm. longae (aristis exclusis), 1-2 mm. latae, plus minusve purpureae, demum horizontaliter patentem. *Glumae* angustae (explanatae), obtusae vel acutae, membranaceae, carina scaberulae, 1-nervis vel superior 3-nervis ; inferior 1-7-2 mm. longa ; superior 2-5-3-5 mm. longa. *Anthoecia* 9-16, 6-13 inferiora  $\frac{1}{2}$ , cetera sterilia et ad lemma redacta; rhachillae internodia subaequalia, circiter 1-5 mm. longa, continua vel nodis disarticulantia. *Lemmata fertile* laxa, dorso recta, acute acuminata, integra, firme membranacea, glabra,

asperula, carina scaberula, prominenter 3-nervia vel superiora 5-nervia ; I lanceolato-oblongum vel lanceolatum (explanatum), plerumque mucronatum, 4-5 mm. longum; II lanceolatum (explanatum), 4-5\*5 mm. longum, mucronatum; III-V 4-5-7-5 mm. longa, arista 1-2 mm. longa; VI-VIII vel nonnunquam -XVI 5-8 mm. longa, arista 2-5 mm. longa ; lemmata sterilia angustiora, aristata, 6-12 mm. longa (arista inclusa). *Paleae* angustae, obtusae, 2-3 mm. longae, carinis anguste alatis superne ciliolatis. *Antherae* 0-2-0-4 mm. longae. *Caryopsis* 1-1-5 mm. longae.

QUEENSLAND. Burke District: Normanton, *Danes* (type in Herb. Domin.); Normanton, in open shallow sandy channels, on ridges, 3-9 m., May 1935, *Blake* 9025 ; Burketown, chiefly in recently eroded channels, in yellowish-grey clay loam, on grassland plain, June 1935, *Blake* 9243.

In this species axillary panicles develop at all nodes of the culm, even down to ground level. These panicles usually become laterally exerted from the sheaths. As in *E. Blakei*, the florets appear to be cleistogamous, at least those from the axillary panicles.

3. *E. scabrida* C. E. Hubbard, species nova. *E. Schultzii* Benth. Fl. Austral, vii. 633 (1878), partim.—Affinis *E. Schultzii* Benth., a qua habitu annuo laxe fasciculato, lemmatibus conspicue scabridis, lemmate inferiore obtuso vel subacuto differt.

*Gramen* annuum, 6-40 cm. altum. *Culmi* laxe fasciculati, erecti vel geniculati, graciles, simplices, 2-3-nodes, glabri vel prope paniculam sparse pilosi. *Foliorum vaginæ* internodiis breviores vel paullo longiores, striatae, ore pubescentes vel laxe pilosae, vel omnino glabrae, laeves ; ligulae ad seriem ciliorum brevissimorum redactae ; laminae lineares, acutae, usque ad 12 cm. longae et 3 mm. latae, planae vel siccitate convolutae, glabrae vel fere glabrae, supra nervis asperulae, subtus laeves. *Panicula* densa, spiciformis, continua vel basi interrupta, oblonga, erecta, 2-5-9 cm. longa, 1-5-3 cm. lata (aristis inclusis); rhachis glabra vel sparse pilosa ; rami erecti vel patentes, dense spiculati, ad basin divisi, sparse pubescentes vel pilosi, usque ad 1-5 cm. longi; pedicelli pubescentes vel pilosi, laterales usque ad 0-5 mm. longi. *Spiculae* lineari-oblongae, superne demum hiantes, 5-11 mm. longae (aristis exclusis), 1-1-5 mm. latae, pallide virides vel purpureae. *Glumae* lanceolatae (explanatae), acutae, membranaceae, 1-nerves vel superior 3-nervis, carina scaberula ; inferior 1-7-2-3 mm. longa ; superior 2\*4-3 mm. longa. *Anthoecia* 5-10, laxa, 2-4 inferiora  $\xi$ , cetera sterilia et ad lemma vel summa ad aristam redacta ; rhachillae internodia inter anthoecia continua, scabrida, inferiora subaequalia, usque ad 1-5 mm. longa, cetera gradatim breviora. *Lemmata fertilia* dorso recta vel apicem versus curvata, rigide membranacea, conspicue scabrida, 3-nervia, nervis lateralibus prominentibus; I oblongo-

lanceolatum (explanatum), obtusum vel subacutum, integrum, mucronatum vel breviter aristatum, 3-4 mm. longum, arista 0-5-1 mm. longa ; II-IV anguste lanceolata (explanata), acuminata, 3-5-4-5 mm. longa, arista 1-5-5 mm. longa; lemmata sterilia superne gradatim angustiora et breviora, usque ad 10 mm. longa (arista inclusa), summa aristiformia, demum curvata. *Paleae* angustae, 2-3 mm. longae, dorso leviter curvatae, carinis rigide ciliolatis. *Antherae* 0-2-0-3 mm. longae. *Caryopsis* anguste oblonga, 1-1-8 mm. longa.

NORTHERN AUSTRALIA. Between the Fitzmaurice and Victoria Rivers, Oct. 1855, *Mueller* (type); Purdie's Ponds, *Waterhouse in Herb. Hance*. 20789 (Herb. Mus. Brit.).

QUEENSLAND. Burke District: Inverleigh, between Normanton and Burketown, by creekside, May 1935, *Blake* 9193A ; Normanton, in open shallow sandy channels on ridge side, 3-10 m., May 1935, *Blake* 9026.

*Mueller's* specimen is part of a gathering which *Bentham* cited under •#. *Schultzi*.

4. *E. Schultzi* *Berth.* PL Austral, vii. 633 (1878), partim ; *Ewart and Davies*, Fl. North. Territ. 51 (1917), partim; *Gardner*, Enum. PL Austral. Occid. 10 (1930).

*Gramen* perenne, dense caespitosum, 25-60 cm. altum. *Culmi* erecti vel leviter geniculati, graciles, simplices, 2-3-nodes, glabri, laeves. *Aoliorum vaginae* internodiis plerumque brevioras, ore pilosae, vel omnino glabrae, laeves; ligulae ad seriem ciliorum minorum redactae; laminae lineares, in acumen tenue attenuatae, usque ad 23 cm. longae et 3-5 mm. latae, planae vel siccitate convolutae vel involutae, erectae, rigidiusculae, pone ligulam pilosae, ceterum glabrae, supra nervis asperulae, subtus laeves. *Panicula* densiuscula vel basin versus interrupta, oblonga, erecta, 5-17 cm. longa, 1-2 cm. lata ; rhachis glabra vel pilis paucis adspersa ; rami solitarii, erecti vel patentes, divisi, inferiores usque ad 3 cm. longi et ad 4 cm. distantes, superiores gradatim breviores ; pedicelli glabri vel pilosi, laterales brevissimi. *Spiculae* lineari-oblongae, superne hiantes, 7-9 mm. longae (aristis exclusis), 1-1.5 mm. latae, virides vel purpureo-suffusae. *Glumae* lanceolatae (explanatae), acutae, tenuiter membranaceae, 1-nerves vel superior 0-nervis ^inferior 1-3-2 mm. longa ; superior 2-3 mm. longa. *Anilwechia* ^•9; 1-3 inferiora vel \$ vel <J, cetera sterilia, summa ad aristam redacta; rachillae internodia continua, glabra, infimum 1-3-2 mm. longum, cetera gradatim breviora. *Lemmata fertilia* dorso recta vel fere recta, glabra, <sup>as</sup>perula, carina scaberula, membranacea, 3-nervia; I lanceolato-oblongum (explanatum), apice plerumque minute bilobum, 3-3-3 mm. longum, mucronatum vel breviter aristatum, arista 0-3-1 mm. longa ; Al lanceolatum (explanatum), 3-5-4 mm. longum, arista usque ad 6 mm - tonga ; III-IV acuminata, 4 mm. longa, arista 1-6 mm. longa ;

lemmata sterilia angustiora et breviora, usque ad 12 mm. longa (arista inclusa). *Paleae* 2-2\*5 mm. longae, dorso leviter curvatae, carinis rigide ciliolatis. *Antherae* 0-3-0\*5 mm. longae. *Caryopsis* 1 mm. longa.

NORTHERN AUSTRALIA. Between the Fitzmaurice and Victoria Rivers, Oct. 1855, *Mueller* ; Port Darwin, *Schultz* 287 (type).

Also in Western Australia, according to Gardner (l.e.).

var. *annua* *C. E. Hubbard*, varietas nova. *Gramen* annuum, laxe caespitosum, 25-35 cm. altum. *Culmi* geniculato-ascendinges, ramosi, 3-5-nodes. *Foliorum vaginae* laxae ; laminae planae vel siccitate convolutae, usque ad 12 cm. longae et 4\*5 mm. latae. *Panicula* oblonga, densa, 5-10 cm. longa, 2-3-5 cm. lata (aristis inclusis). *Spiculae* 6-10 mm. longae, circiter 1 mm. latae, demum horizontaliter patentibus vel deflexae. *Anthoeda* 6-9, 1-3 inferiora vel <J vel <J. *Lemma infimum* obtusum vel acutum, 3-3\*5 mm. longum, mucronulatum vel emucronulatum ; lemma secundum acute acuminatum, usque ad 4\*5 mm. longum ; lemma tertium usque ad 4 mm. longum, aristatum, arista usque ad 3-5 mm. longa ; lemma supremum aristiforme, usque ad 9 mm. longa (arista inclusa).

NORTHERN AUSTRALIA. Arnhem Land, April-June 1928, *Basedow* 3.

QUEENSLAND. Burke District: Settlement Creek, May 1923, *Brass* 372 (type).

This variety may be distinguished from the type by its annual duration, geniculately ascending 3-5-noded branched culms, and obtuse or acute mucronulate or mucicous lowest lemma.

5. *E. leporina* *R. Br.* Prodr. PL Nov. Holl. 186 (1810); *Kunth*, Rév. Gram. i. 315, t. 69 (1829); *F. Muell.* Fragm. viii. 109 (1873) et Sec. Syst. Census Austral. PL 227 (1889); *Benth.* PL Austral, vii. 633 (1878); *F. M. Bailey*, Syn. Queensl. Fl. 667 (1883) et Queensl. PL vi. 1908 (1902) et Compreh. Cat. Queensl. PL 632 (1912); *Woolls*, PL N.S. Wales, 104 (1885); *Moore*, Handb. Fl. N.S. Wales, 495 (1893); *Maiden*, Man. Grass. N.S. Wales, 167 (1898) et in Agric. Gaz. N.S. Wales, xiii. 1008, tab., fig. 3 (1902); *Domin* in Biblioth. Bot. xx. Heft 85, 408 (1915); *Ewart and Davies*, PL North. Territ. 51 (1917) ; *Gardner*, Enum. PL Austral. Occid. 10 (1930); *Hitchc.* in Brittonia, ii. 114 (1936). *E. leporina* var. *micrantha* *Benth.* Fl. Austral, vii. 634 (1878), partim.

*Gramen* perenne, caespitosum, 10-90 cm. altum. *Culmi* erecti vel leviter geniculati, graciles, simplices vel raro ramosi, 2-4-nodes, glabri, laeves. *Foliorum vaginae* internodiis plerumque breviores, glabrae vel ore barbatae et marginibus ciliatae, laeves, basales latiusculae, superiores angustae ; ligulae ad seriem ciliorum minorum redactae ; laminae anguste lineares vel filiformes, in acumen tenue attenuatae, 5-35 cm.



longae, usque ad 4 mm. latae, convolutae vel planae, rigidiusculae, erectae, glabrae vel supra laxe pilosae et nervis asperulae, suhtus laeves. *Panicula* lineari-oblonga, oblonga vel lanceolata, ere eta, 3-18 cm. longa, 0\*8-3-5 cm. lata, densa, spiciformis, continua vel mferne interrupta, pallida vel purpurea ; rhachis minute scaberula vel laevis, glabra vel laxe pilosa ; rami gracillimi, dense spiculati, erecti vel leviter patentis, glabri vel pilosi, inferiores usque ad 4 cm. longi: pedicelli 0-2-1 mm. longi, glabri vel pilosi. *Spiculae* lineari-oblongae vel lanceolato-oblongae, plerumque 3-5 mm. longae, 0-7-1 mm. latae. *blumae* lanceolatae vel lanceolato-oblongae vel ovato-oblongae (explanatae), acutae vel obtusae, membranaceae, carina scaberulae, 1 -nerves; inferior 1-2 mm. longa; superior 1\*5-2-5 mm. longa. *Anthoecia* 4-9, laxa, 1-2 (raro 3) inferiora £, cetera sterilia et ad lemma redacta, summa aristiformia vel ad aristam redacta ; rhachillae interaodia continua, glabra, infimum circiter 1 mm. longum, superiora gradatim breviora. *Lemmata fertilia* dorso recta, membranacea, 3-nervia vel superiora 1-nervia, glabra, carina scaberula ; I lineari-oblongum vel oblongum vel lanceolato-oblongum (explanatum), plerumque emarginatum vel minute 2-lobum, 1-5-2\*5 mm. longum, Jfcucronatum vel aristatum, arista 0-8-2 mm. longa ; II—III lanceolata (explanata), acute acuminata, 1-5-2-5 mm. longa, aristata, arista tenuissima 3-10 mm. longa ; lemmata sterilia • gradatim angustiora † breviora, summa ad aristam usque ad 9 mm. longam redacta. ttweae 1-5-2 mm. longae, carinis rigide ciliolatis. *Antherae* circiter 0.3<sup>mm</sup> - longae. *Caryopsis* 0.8-1 mm. longa.

DUTCH NEW GUINEA. Without precise locality, 1903, *Djibdja dt*  
~~At~~ ~~wr~~ # ~~p~~ ~~C~~ ~~C~~ ~~5~~ ~~3~~.

PAPUA. Western Division ; Wuro, Oriomo River, 30 m. alt., on savannah ridges, *Brass* 1015 (ex Hitchc. l.e.).

NORTHERN AUSTRALIA. Victoria River, *Mueller*; Point Pearce, *Mueller*; Port Darwin, *SchuUz* 281, *Herb. Brisbane* 52 ; Palmerston, June 1886, *Lea* (*Herb. Mus. Brit.*); Pine Creek, June 1886, *Lea* (*Herb. Mus. Brit.*); Port Essington, May 1840, *Armstrong* 532 ; Arnhem Land, April-June 1928, *Basedow* 124.

QUEENSLAND. Cook District: Thursday Island, August 1886, *Lea* (*Herb. Mus. Brit.*), June 1897, *Bailey*, April 1931, *Hockings*; Badu Island, May 1911, *Bick* 90, 101 ; Torres Strait, Feb. 1882, *Cojypinger*; ~~at~~ ~~Yor~~ ~~Oct~~, 1848, ~~Ma~~ ~~o~~ ~~GW~~ ~~wr~~ \* ~~y~~ <sup>4</sup> <sup>1</sup> <sup>2</sup> *J^aemel*; Mapoon, May 1911, *wok* 113; Coen River, *Brown* 6246 (type); Cape Flinders, *Cunningham* ; ~~Endeav~~ ~~o~~ ~~Ur~~ ~~River~~, 1770, *Banks & blander* ; Mt. Molloy, on sandy soil, JW m., March 1932, *Brass* 2446 ; Mareeba, in savannah woodland, Feb. 1910, *Domin* ; between Parada and Mareeba, in open *Eucalyptus* forest, 450 m., Jan. 1931, *Hubbard & Winders* 6843 ; Dimbulah, in *Eucalyptus* forest, light sandy soil, 450 m., Jan. 1931, *Hubbard & Winders* 6854 ; Stannary Hills, 1908, *Bancroft*; Watsonville, *Gallogly* ; 56 ~~at~~ ~~Well~~ ~~River~~, about springs or moist ground, sandy soil, *Gulliver* ; between Mitchell and Flinders Rivers, in sandy country, in poor

wet sandy soils, *Gulliver* 79 ; Gilbert River, on ridges, Feb. 1922, *White* 1499 ; Forest Home Station, bed of Gilbert River, April 1931, *Brass* 1870. Burke District: Normanton, open ridges on light grey gravelly sand, May 1935, *Blake* 8957 ; Blackbull, between Normanton and Croydon, on sand, in cleared patch in *Melaleuca* forest, May 1935, *Blake* 9138 ; Chudleigh Park, 110 miles N. of Hughenden, amongst grasses in *Eucalyptus* forest, loose sandy soil, 810 m., Feb. 1931, *Hubbard & Winders* 7673 ; near source of Poison Creek, about 90 miles N. of Hughenden, in *Eucalyptus* forest, on compact sand, April 1935, *Blake* 8573. North Kennedy District: Proserpine, *Michael* 1440, 1451 ; near Pentland, on sandy hill, March 1910, *Domin* ; Warrigal, on Great Dividing Range, weed on railway track, in reddish-brown sandy soil, 420-450 m., Feb. 1931, *Hubbard & Winders* 7105.

NEW SOUTH WALES. Without precise locality, *Mueller* (Herb. Mus. Brit.).

In addition to the localities in Northern Australia and northern Queensland given above, this species has been recorded by Bentham (I.e.) from two localities in southern Queensland (Brisbane River, *Mueller*, and Darling Downs, *Law*), whilst *Mueller* (I.e.), *Woolfs* (I.e.), *Moore* (I.e.), *Maiden* (I.e.) and *Turner* (in Proc. Linn. Soc. N.S. Wales, xxviii. 442, 1903 ; xxix. 180, 1904 ; xxx. 88, 1905) state that it occurs in the interior districts of New South Wales, and *Gardner* (I.e.) records it from Western Australia.

*Ectrosia leporina* R. Br. occurs throughout the area of distribution of the genus, and, although on the whole fairly uniform in habit and structure, several well-marked variations have been noted and are described below. As these require further study in the field, and also in the herbarium when additional material is available, the classification adopted is to be regarded as purely provisional.

#### KEY TO THE VARIETIES OF ECTROSIA LEPORINA.

Perennials, with compactly tufted culms and innovations :

Spikelets with 4-10 florets ; culms 2-4-noded :

Lower lemmas mostly 1-5-2-2 (rarely -2-5) mm. long ; spikelets mostly 3-5 mm. long, with 1-2 (rarely 3) hermaphrodite florets ; panicles usually densely spiciform. . . . . i. *leporina*.

Lower lemmas 2-4-3 mm. long ; spikelets 4-7 mm. long, with 2-4 hermaphrodite florets; panicles somewhat loose . . . ii. *spadicea*.

Spikelets with 2-3 florets, only the lowest hermaphrodite ; lowest lemma 2\*7-3 mm. long ; culms 6-noded. . . . . iii. *pauciflora*.

Annuals ; lowest lemma 2-2 • 5 mm. long :

Glumes narrowly lanceolate, finely acute, the lower 2-3 mm. long, the upper 2-5-3 mm. long ; lowest lemma with an awn 2-3-5 mm. long. . . . . iv. *longiglumis*.

Glumes oblong-lanceolate or lanceolate, obtuse or acute, the lower 1.5-2 mm. long, the upper 1.8-2.5 mm. long; lowest lemma with an awn 0.4-1.5 mm. long . . . . . *v. micrantha*.

i. var. *leporina* C. E. Hubbard. *E. kporina* R. Br. sensu stricto, ~~vide~~ supra.

ii. var. *spadicea* (R. Br.) Domin in Biblioth. Bot. xx. Heft 85, 409 (1915). *E. spadicea* R. Br. Prodr. Fl. Nov. Holl. 186 (1810).

QUEENSLAND. Endeavour River, Bay of Inlets and Bustard Bay, 1770, *Banks & Solander* (type in Herb. Mus. Brit.); Kelsey Creek, near Proserpine, *Michael* 914.

- A single specimen collected by Blake (9399) in June 1935 at Cairns in North Queensland, on wet sandy forest land about sea level, may be referable to this variety; it differs in having a looser panicle and spikelets with fewer florets.

ii. var. *pauciflora* C. E. Hubbard, varietas nova. *Gramen* perenne, ~~caespitulosum~~, circiter 60 cm. altum; culmi 6-nodes, basin versus ramosi; panícula spiciformis, densa, 14 cm. longa, 1.5 cm. lata; rami et pedicelli scaberuli; spiculae lineares, 3 mm. longae, 0.5 mm. latae; glumae lanceolatae, 4 mm. longae; antnoecia 2-0, inno 9; lemma tertie lanceolato-lineare (explanatum), 2.7-3 mm. longum, arista 1-2 mm.

NORTHERN AUSTRALIA : near Victoria River, *Mueller*.

25. Var. longiglume C. E. Hubbard, varietas nova. *Gramen* annuum, 0-40 cm. altum; culmi erecti, gracillimi, 4-6-nodes, ramosi; panícula spiciformis, densa, 4-8 cm. longa, 1-1.5 cm. lata; rami minute hispidi; pedicelli pilosi; spiculae oblongo-lineares, 3 mm. longae, circiter 1 mm. latae; glumae anguste lanceolatae (explanatae), tenuiter acutae, 2-3 mm. longa, superiore 2-5-3-2 mm. longa; anthoecia 7-1 infimo; lemma fertile anguste lanceolato-oblongum (explanatum), 2-3-2-5 mm. longum, arista 2-3-5 mm. longa.

QUEENSLAND. North Kennedy District: Cleveland Bay, barren soils, June 1819, *Cunningham* 350.

iii. var. *micrantha* Benth. Fl. Austral, vii. 634 (1878), partim; F. M. Bailey, Syn. Queensl. Fl. 667 (1883) et Queensl. Fl. vi. 1909 (1902).

NORTHERN AUSTRALIA. Wycliffe, *Ewart* (Herb. Mus. Brit.).

QUEENSLAND. Burke District: between Croydon and Blackbull Creek, Oct. 1891, *Burton*; Croydon, open depressions on whitish

sand, 105 m., May 1935, *Blake* 9103 ; between Norman and Gilbert Rivers, *Gulliver* s.n. (type), 21. Cook District: Mapoon, May 1911, *Bick* 174.

Bentham (l.e.) cited two specimens after var. *micrantha*. One of these (Victoria River, *Mueller*) is now referred to *Ectrosia leporina* R. Br. var. *leporina*, whilst the other (between Norman and Gilbert Rivers, *Gulliver*) is taken as the type of var. *micrantha*, since it agrees best with Bentham's description.

6. *E. agrostoides* *Benth.* Fl. Austral, vii. 634 (1878); Ewart and Davies, Fl. North. Territ. 51 (1917).

*Gramen* annuum, usque ad 40 cm. altum. *Culmi* laxe fasciculati, erecti vel geniculati, filiformes, 1-3-nodes, plerumque ramosi, glabri, laeves. *Foliorum vaginae* internodiis breviores, ore barbatae et marginibus sparse ciliatae, vel omnino glabrae, laeves; ligulae ad seriem ciliorum minorum redactae; laminae filiformes, setaceae, 1-9 cm. longae, circiter 0\*5 mm. diametro, convolutae vel explanatae et usque ad 2 mm. latae, rigidiusculae, erectae, sparse pilosae vel glabrae, supra nervis asperulae, subtus laeves. *Panicula* lineari-oblonga vel lanceolata, laxa vel plus minusve contracta, 2-12 cm. longa, 0.5-2\*2 cm. lata; rhachis gracillima, glabra, superne minute scaberula; rami erecti vel leviter patentes, capillares, minute scaberuli, inferiores usque ad 4-5 cm. longi et ad 2\*5 cm. distantes; pedicelli nonnunquam pubescentes, laterales brevissimi, terminates usque ad 1\*5 mm. longi. *Spiculae* lineares vel lanceolatae, 2-3 mm. longae, purpureae vel virides. *Glumae* subaequales vel superiore paullo longiore, lanceolatae vel lanceolato-oblongae (explanatae), acutae, 1-2 mm. longae, membranaceae, 1-nerves, carina scaberulae. *Anthoecia* 4-5, infimum £, cetera sterilia et ad lemma redacta; rhachillae internodia continua, glabra, infimum 0-8 mm. longum, cetera gradatim breviora. *Lemma fertile* dorso rectum, oblongum (explanatum), 1.5-1.8 mm. longum, minute bilobum, mucronatum vel breviter aristatum, arista usque ad 1 mm. longa, tenuiter membranaceum, 3-nerve, glabrum, carina scaberulum; lemmata sterilia lanceolata (explanata), usque ad 1.5 mm. longa, 3-1-nervia, in aristam tenuissimam usque ad 5 mm. longam attenuata, superiora (2-3) ad aristas usque ad 6 mm. longas redacta. *Paleae* circiter 1 mm. longae, carinis superne ciliolatis. *Antherae* 0.2-0\*3 mm. longae. *Caryopsis* 0\*6 mm. longa.

NORTHERN AUSTRALIA. Port Essington, May 1840, *Armstrong* 529 (type).

QUEENSLAND. Cook District: Stannary Hills, *Bancroft* 511; Watsonville, *Gallogly*.

A specimen of this species in Herb. Hook, is labelled "Swan River, *Drummond*."

7. *E. eragrostoides* *Domin* in *Biblioth. Bot.* xx. Heft 85, 407 (1915).

*Gramen* perenne et dense caespitosum vel nonnunquam annuum, usque ad 90 cm. altum. *Culmi* erecti, graciles, simplices, 3-4-nodes, glabri, laeves. *Foliorum vaginae* internodiis plerumque breviores, arete appressae, striatae, laeves, ore pilis patulis laxis plerumque pilosae, marginibus superne ciliatae, vel omnino glabrae; ligulae ad seriem ciliatorum minorum redactae; laminae anguste lineares, in acumen setaceum longe attenuatae, usque ad 25 cm. longae, siccitate convolutae vel involutae vel inferne explanatae et usque ad 2-5 mm. latae, pone ligulam pilosae, ceterum glabrae, supra nervis asperulae, subtus laeves. *Panicula* erecta, anguste oblonga vel lanceolata, densa vel laxiuscula, inferne interrupta, 3-25 cm. longa, 1-5-5 cm. lata; rhachis superne scaberula; rami solitarii, adscendentes vel demum horizontaliter patentes, spiculas approximatas gerentes, gracillimi, scaberuli, e basi divisi, inferiores usque ad 5 cm. longi et ad 8 cm. distantes, superiores gradatim breviores; pedicelli laterales brevissimi. *Spiculae* oblongo-lineares, 5-14 mm. longae, circiter 1-1-5 mm. latae, rectae vel leviter curvatae, virides, purpureae vel flavidae. *Glumae* anguste ovatae (explanatae), acutae vel obtusae, membranaceae, 1-nerves, carina scaberulae; inferior 1-1\*5 mm. longa; superior 1-3-2 mm. longa. *AntTwezia* 8-25, 5-24 inferiora plerumque \$, cetera sterilia; rhachillae internodia continua, plus minusve persistentia vel nodis disarticulantia, glabra, subaequalia, 0-5-0-8 mm. longa. *Lemmata fertilia* dorso recta vel apice leviter recurvata, membranacea, 3-nervia, glabra, carina scaberula; I lanceolatum vel anguste ovatum (explanatum), acutum, integrum, 2 mm. longum; II lanceolatum (explanatum), acute acuminatum, nonnunquam mucronatum, 2-2-5 mm. longum; III-XXIV mucronata vel breviter aristata, 2-2-5 mm. longa, arista 0-5-1\*5 mm. longa; lemmata sterilia gradatim angustiora et breviora, summa fere aristiformia. *Pakae* angustae, 1-2-2 mm. longae, carinis minute ciliolatae. *Antherae* 0-3-0-4 mm. longae. *Caryopsis* ellipsoidea, 0-7 mm. longa.

QUEENSLAND. Cook District: Thursday Island, April 1931, *Bookings*; near Mareeba, savannah-woodland, Feb. 1910, *Domin* (type in Herb. *Domin*). Burke District: Croydon, open depressions on whitish sand, 105 m., May 1935, *Blake* 9106, 9107; Chudleigh Park, 110 miles N. of Hughenden, amongst grasses in *Eucalyptus* forest, loose sandy soil, 810 m., Feb. 1931, *Hubbard & Winders* 7677; near source of Poison Creek, about 90 miles N. of Hughenden, in *Eucalyptus* forest, on compact sand, 825 m., April 1935, *Blake* 8572.

«This species is not closely related to any other species of *Ectrosia*. It differs markedly in the structure of its spikelets. The florets are mostly terlete as in *Eragrostis*, but it may be distinguished from that genus by the mucronate or short-awned lemmas.

8. *E. anomala* G. E. Hubbard; species nova, affinis *E. Gulliveri* F. Muell., a qua panícula spiciformi, spiculis majoribus oblongis, lemmatibus glabris dorso fere rectis superioribus setaceo-acuminatis differt.

*Gramen* annuum, circiter 12 cm. altum. *Culmi* laxè fasciculati, gracillimi, erecti vel leviter geniculati, simplices, 2-nodes, glabri, laeves. *Foliorum vaginae* imbricatae, laxae, laxè pilosae vel glabrescentes; ligulae ad seriem ciliorum minorum redactae; laminae anguste lineares, in apicem obtusum attenuatae, usque ad 6 cm. longae, siccitate convolutae, explanatae 2 mm. latae, erectae, rigidiusculae, pone ligulam dense pilosae, ceterum sparse pilosae vel glabrescentes. *Panicula* erecta, spiciformis, densa vel basi interrupta, 2-4 cm. longa, usque ad 1-5 cm. lata; rhachis superne scaberula; rami breves, pilosi, ad basin dense spiculati; pedicelli pilosi, brevissimi. *Spiculae* oblongae, 6-9 mm. longae (setis inclusis), 2-3 mm. latae, purpureo-suffusae. *Glumae* anguste ovatae (explanatae), acutae vel acute acuminatae, rigide membranaceae, 1-nerves vel superior 3-nervis, carina scaberula; inferior 2-5-3 mm. longa; superior 3-3-3 mm. longa. *Anthoeda* arete imbricata, 6-10, 2-4 inferiora §, superiora sterilia, ad lemma redacta; rhachillae internodia continua, glabra, infimum curvatum, superiora gradatim breviora. *Lemmata* dorso fere recta, a latere visa oblique lanceolata, sursum ad medium spiculae gradatim longiora, acute carinata, coriacea, glabra, asperula, 3-nervia, nervis prominentibus, carina scaberula; I acute acuminatum, 3-5-4 mm. longum; II setaceo-acuminatum, 5 mm. longum (seta inclusa); III-IV longe setaceo-acuminata, 5-5\*5 mm. longa (seta inclusa); lemmata sterilia subsimilia, sed gradatim angustiora et breviora, suprema setiformia. *Paleae* dorso gibbosae, 2 mm. longae, carinis anguste alatis, alis ciliolatis. *Antherae* 0\*4 mm. longae. *Caryopsis* oblique ovoidea, 1 mm. longa.

QUEENSLAND. Burke District: Normanton, in open shallow sandy channels on ridge side, 3-9 m., May 1935, *Blake* 9024.

This species resembles *Heterachne* in having a flexuous rhachilla, but differs in possessing awn-tipped lemmas. The florets are usually cleistogamous.

9. *E. confusa* C. E. Hubbard, species nova. *E. Gulliveri* Benth. Fl. Austral, vii. 634 (1878), partim, non F. Muell.—Species *E. Gulliveri* F. Muell. affinis, lemmatibus glabris 3-nervis differt.

*Gramen* annuum, usque ad 30 cm. altum. *Culmi* laxè fasciculati, erecti vel leviter geniculati, gracillimi, 2-3-nodes, simplices vel ramosi, glabri, laeves. *Foliorum vaginae* internodiis breviores, laxissime pilosae vel glabrae; ligulae ad seriem ciliorum minorum redactae; laminae anguste lineares, in apicem tenuiter acutum attenuatae, usque ad 8 cm. longae et 2 mm. latae, convolutae vel explanatae, rigidiusculae, pone ligulam dense pilosae, superne sparse pilosae vel fere glabrae. *Panicula* lanceolata, laza, 3-10 cm. longa, 1-2-5 cm. lata; rhachis pilis

patulis laxe pilosa vel glabra ; rami demum horizontaliter patentés vel deflexi, solitarii, simplices vel basin versus divisi, ramulis brevibus, gracillimi, plus minusve pilosi, inferiores usque ad 1-5 cm. longi et 1-3 cm. distantes; pedicelli pilosi, laterales brevissimi. *Spiculae* demum obovato-oblongae, 4-5 mm. longae (aristis exclusis), virides vel purpureo-suffusae. *Glumae* lanceolatae, acutae, firme membranaceae, carina et marginibus scaberulis ; inferior 2-3 mm. longa, 1-nervis ; superior 2-5-3-5 mm. longa, 3-nervis. *Anthoecia* 6-9, 2-5 inferiora &, cetera sterilia, ad lemma vel summa ad aristam redacta ; rhachillae internodia continua, asperula, infimum 1 mm. longum, cetera gradatim breviora. *Lemmata fertilia* ovata vel anguste ovata (explanata), acute acuminata, coriacea, glabra, 3-nervia, nervis viridibus, carina et marginibus superne scabrida, lateribus asperula ; I dorso rectum, acute acuminatum, plerumque breviter aristatum, 3-4 mm. longum (arista 0-7-1 mm. longa inclusa) ; II dorso demum leviter recurvatum, 4-5 mm. longum (arista 1-2 mm. longa inclusa) ; III-V secundae similia, 4\*5-6 mm. longa (arista 1-5-3 mm. longa inclusa); lemmata sterilia angustiora, usque ad 6 mm. longa (arista inclusa), summa setiformia. *Pahae* dorso gibbosae, 1-5-2 mm. longae, carinis superne scabridis. *Antherae* 0• 3-0• 4 mm. longae. *Caryopsis* oblonga, circiter 1 mm. longa.

QUEENSLAND. Normanton, on sand, in shallow channels and depressions on low barren ridge slopes, 0-15 m. alt., May 1935, *Blake* 9040 ; between Norman and Gilbert Rivers, *Gulliver* (type), *Gulliver* in *Herb. Hance* 20776 (Herb. Mus. Brit.).

Gulliver's specimens were included under *E. Gulliveri* F. Muell. by Bentham (l.e.).

.10. *E. Gulliveri* F. Muell. *Fragm.* viii. 201 (1874) ; Benth. *Fl. Austral.* vii. 634 (1878), partim ; F. M. Bailey, *Illustr. Monogr. Grass. Queensl.* \*• 16 (1878) ? ; Syn. *Queensl. Fl.* 667 (1883) ; *Queensl. Fl.* vi. 1909 (1902) ; *Compreh. Cat. Queensl. Pl.* 632 (1912) ; Ewart and Davies, *Fl. North. Territ.* 51 (1917).

*Gra?nen* annum, 15-40 cm. altum. *Culmi* laxe vel dense fasciculati, erecti vel leviter geniculati, graciles, simplices vel nonnunquam ramosi, 2-4-nodes, glabri, laeves. *Foliorum vaginae* internodiis breviores, ore barbatae, superne plus minusve pilosae vel omnino glabrae ; ligulae ad senem ciliorum brevissimorum redactae ; laminae lineares, in apicem obtusum attenuatae, 3-10 cm. longae, usque ad 3 mm. latae, planae vel convolutae, erectae, rigidiusculae, pone ligulam dense pilosae, supra superne sparse pilosae et nervis asperulae, subtus glabrae vel pilis paucis e tuberculis ortis praeditae. *Panicula* ambitu lanceolata vel anguste oblonga, modice laxa, 3-15 cm. longa, 1-4 cm. lata ; rhachis, rami et pedicelli pilis debilibus albis plus minusve pilosi ; rami demum nonzonaliter patentés vel deflexi, gracillimi, solitarii, laxe spiculati, inferiores usque ad 2 cm. longi, 2-3 cm. distantes, simplices vel basin

versus ramulos breves gerentes, superiores gradatim breviores, supremi unispiculati; pedicelli laterales usque ad 1 mm. longi, terminates usque ad 3-5 mm. longi. *Spiculae* 4-5-5 mm. longae, squarrosae, virides vel purpureo-tinctae. *Glumae* lanceolatae (explanatae), acutae vel obtusae, membranaceae, marginibus ciliolatae, carina scaberulae; inferior 1-5-2 • 5 mm. longa, 1-nervis; superior 2-3 mm. longa, 1-3-nervis. *Anthoeda* 4-7, 1-4 inferiora £, cetera sterilia, ad lemma aristatum vel ad aristam ledacta; rhachillae internodia continua, plus minusve hispidula, inferiora 1 mm. longa, superiora gradatim breviora. *Lemmata fertilia* plus minusve laxa, coriacea, 5-7-nervia, nervis lateralibus approximatis viridibus, marginibus et carina ciliata, lateribus plus minusve dense et breviter pubescentia vel hispidula; I anguste ovatum (explanatum), acutum, mucronatum, 3-5 mm. longum, dorso leviter recurvatum; II—III primo similia, sed angustiora, aristato-acuminata, paullo longiora, dorso magis recurvata, apicibus horizontaliter patentibus; IV et nonnunquam V arista rigida inclusa usque ad 7 mm. longa; lemmata sterilia plus minusve aristiformia. *Paleae* angustae, dorso curvatae, 2-2-5 mm. longae, carinis anguste alatis, alis dense breviter ciliatae. *Antherae* 0-3-0«5 mm. longae. *Caryopsis* 1 mm. longa.

QUEENSLAND. Cook District: Forest Home Station, on clay pans, March 1931, *Brass* 1837; Gilbert River, on hard ridges, Feb. 1927, *Brass* 1721. Burke District: between Norman and Gilbert Rivers, *Gulliver* (type); Croydon, open depressions on whitish sand, 105 m., May 1935, *Blake* 9105; Normanton, on sand, in shallow depressions on low barren ridge slopes, 0-15 m. alt., May 1935, *Blake* 9063.

var. *squarrulosa* (Domin) C. E. Hubbard, stat. nov. *E. squarrulosa* Domin in *Biblioth. Bot.* xx. Heft 85, 407, fig. 94 (1915), incl. f. *normalis* Domin et f. *minor* Domin, l.e. 408.

*Culmi* erecti, 25-50 cm. alti, glabri vel paniculam versus pilis paucis praediti. *Foliorum laminae* usque ad 16 cm. longae. *Panicula* 10-22 cm. longa, 1\*5-4 cm. lata. *Spiculae* 6-9 mm. longae; gluma inferior 3-4 mm. longa; gluma superior 3-5-5 mm. longa; anthoecia 6-9, 2-4 inferiora \$; lemma infimum 4-7-6 mm. longum, 5-9-nerve; antherae 0-5-0-7 mm. longae.

QUEENSLAND. Cook District: between Chillagoe and Walsh River, in *Eucalyptus* forest, Feb. 1910, *Domin* (type in Herb. Domin.); Gilbert River, on hard ridges, Feb. 1927, *Brass* 1721A.

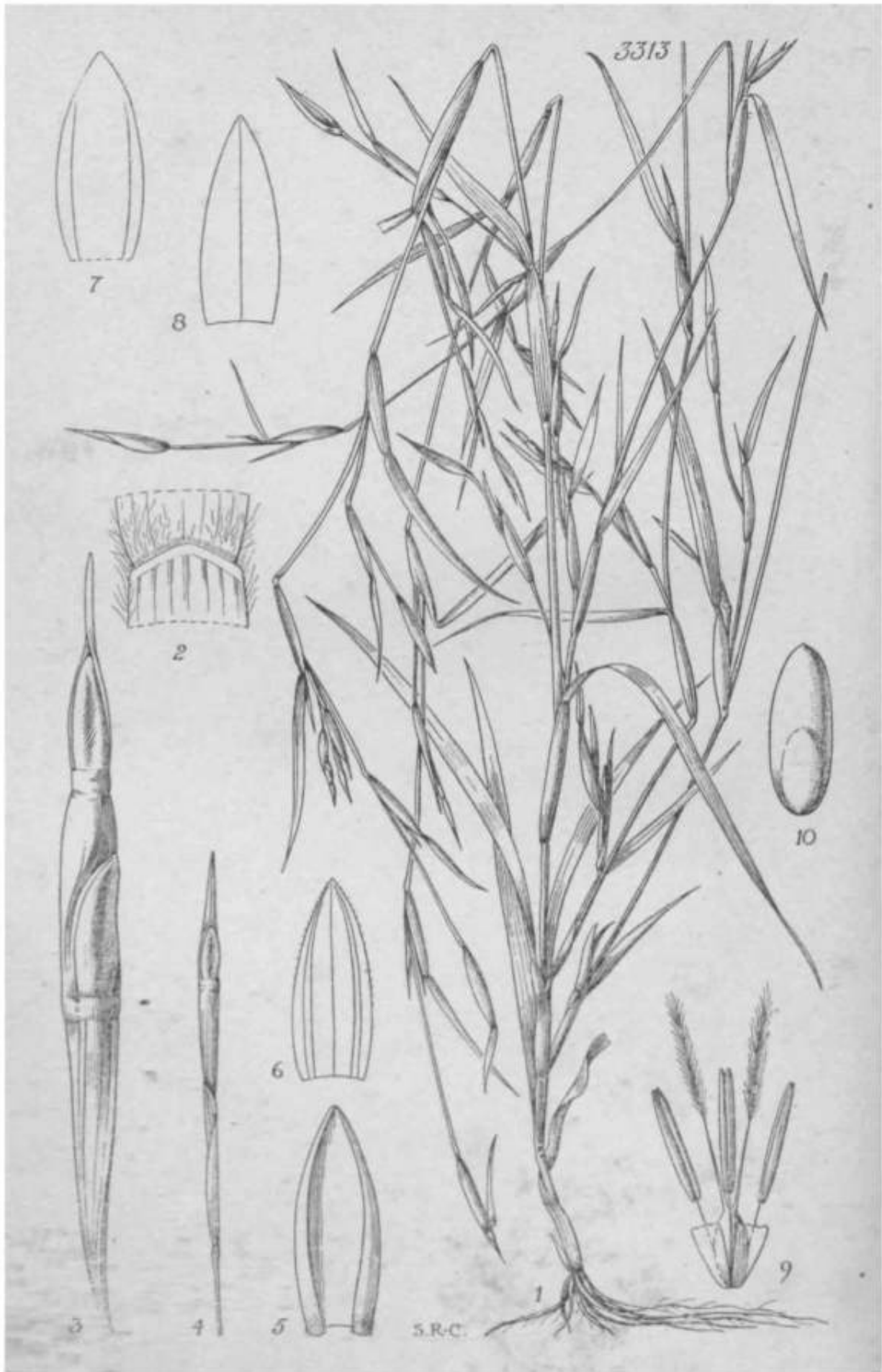
Very similar to typical *E. GuUiveri* F. Muell., differing only in its larger spikelets.—C. E. HUBBARD.

#### ECTROSIA LEPOBINA.

FIG. 1, plant, *natural size*; 2, ligulo, x 4; 3, spikelet, x 12; 4, lower glume, x 16; 5, upper glume, x 16; 6, lowest lemma, flattened, x 16; 7, palea, x 16; 8, flower, x 16; 9, sterile lemma, flattened, x 16; 10, caryopsis, x 16.



3313





10



9



8



6



7



5



4



1



3



S.R.C.

2

TABULAE 3313, 3314.

THAUMASTOCHLOA BABIFLOBA

{*F. M. Bailey*) *C. E. Hubbard*.

THAUMASTOCHLOA BBASSII *C. E. Hubbard*.

GRAMINEAE. Tribus ANDROPOGONEAE.

*Thaumastochloa* \* *C. E. Hubbard*. Genus novum *Ophiuro* Gaertn. f. emend. K. Br. affine, sed spiculas secundas in spicis spuriis dorsiventralibus plerumque plus minusve dorso compressis gerentibus, spicarum pedunculis e culmis nonnunquam disarticulantibus, anthoecio mfero ad lemma redacto, culmis gracilibus vel gracillimis divergens.

*Spiculae* solitariae, sessiles, homomorphae, lanceolato- vel ovato- vel elliptico-oblongae vel oblongae, exaristatae, rhacheos continuae vel articulatae in excavationibus spicarum spuriarum solitiarum dorsiventralium immersae; callus glaber. *Anthoeda* duo, inter glumas inclusa; inferum ad lemma redactum; superum \$. *Glumae* aequales vel subaequales; inferior obtusa vel subacuta, dorso plana vel convexa vel leviter concava, laevis vel transverse rugosa, coriacea, bicarinata, intus 9-nervis, marginibus angustis tenuioribus inflexis; superior navicularis». obtusa vel subacuta, dorso convexa, membranacea vel hyalottembranacea, 3-5-nervis. *Anthoecium inferum* sterile: lemma glumis paullo brevius, obtusum, hyalinum, margines versus tenuissime 2-nerve; palea nulla. *Anthoecium superum* £: lemma eo anthoecii inferi simile sed paullo brevius et tenuissime 1-3-nerve vel enerve; palea lemmate brevior vel aequilonga, angusta, hyalina, enervis vel tenuissime 2-nervis. *Lodiculae* duae, cuneatae, carnosulae. *Stamina* tria; antherae linean-oblongae. *Ovarium* glabrum; styli distincti; stigmata plumosa. *Caryopsis* oblonga, dorso compressa, cum lemmate et palea inter glumas laxè inclusa; scutellum circiter dimidiam partem caryopsidis aequans; hilum basale.—*Gramina* annua vel perennia; culmi graciles vel gracillimi, pauci- vel multi-nodes; laminae lineares vel lanceolato-lineares, planae vel siccitate convolutae; ligulae brevissimae, truncatae et membranaceae, vel ad seriem ciliorum redactae; spicae graciles, solitariae, 1-2- vel pluri-spiculatae, plus minusve dorso compressae vel subteretes; pedunculi solitarii vel fasciculati, inferne in acumen attenuati, superne gradatim incrassati et cum rhacheos infimo internodio continui, ad basin nonnunquam disarticulantes; rhacheos internodia dorso convexa, facie concava, apice excavata et oblique vel horizontaliter truncata, maturitate disarticulantia; pedicelli rhacheos internodiis adnati et cum eis confluentes, exspiculati vel spiculae rudimentum gerentes.

Species 4-5, Formosae, Chinae, Indiae, Siamiae, Indo-Chinae, Ins.

\* *Oavfiaoròs*, wonderful; *gAòa*, grass.

Philippinensium, Mariannae et Carolinae, Australiae septentrionalis incolae. Typus :—*T. pubescens* (Domin) C. E. Hubbard (*Ophiuros pubescens* Domin).

KEY TO THE SPECIES.

Spikes 1-5-6 cm. long, each bearing 4-20 spikelets :

Lower glume smooth or nearly smooth ; culm-nodes glabrous.

1. *cochinchinensis*.

Lower glume prominently rugose or tuberculate ; culm-nodes hairy.

2. *pubescens*.

Spikes 0-3-0-8 cm. long, each bearing 1-2 spikelets:

Lower glume prominently transversely rugose. . . . . 3. *Brassii*.

Lower glume smooth. . . . . 4. *rariflora*.

1. *T. cochinchinensis* {Lour.) C. E. Hubbard, comb. nov. *Phleum cochinchinense* Lour. Fl. Cochinch. i. 48 (1790). *Ophiuros* \* *monostachyus* J. S. Presl in C. B. Presl, Reliq. Haenk. i. 330 (1830); Hack, in DC. Monogr. Phan. vi. 318 (1889); E. G. & A. Camus in Lecomte, Fl. Indo-Chine, vii. 373 (1922); Merrill, Enum. Philipp. Fl. Pl. i. 41 (1922). *O. undatus* Nees in Hook. Kew Journ. Bot. ii. 100 (1850). *O. undulatus* (sphalmate) Miq. Fl. Ind. Bat. iii. 405 (1857). *O. cochinchinensis* (Lour.) Merrill in Trans. Amer. Phil. Soc. n.s. xxiv. pt. 2, 72 (1935).

*Distrib.* Formosa, south-east China, eastern India, Siam, Indo-China, Philippine, Marianne and Caroline Islands.

2. *T. pubescens* {Domin) C. E. Hubbard, comb. nov. *Ophiuros corymbosus* Gaertn. f. var. ? *pubescens* Benth. Fl. Austral, vii. 512 (1878); Hack, in DC. Monogr. Phan. vi. 318 (1889). *O. pubescens* Domin in Biblioth. Bot. xx. Heft 85,262 (1915). *O. Pollockii* Marquand in Kew Bull. 1925, 284.

*Gramen* annum. *Culmil&xe* fasciculati, geniculato-adscedentes vel suberecti, 15-28 cm. alti, e nodis ramosi, ramulis solitariis vel fasciculatis, gracillimi, 5-9-nodes, nodis pilis patulis laxe barbati, ceterum glabri, laeves. *Folia* dense vel laxe pubescentia, canescenti-viridia; vaginae laxae, internodiis longiores vel nonnunquam breviores, striatae, 1-3 cm. longae, minute tuberculatae; ligulae ad seriem ciliorum redactae ; laminae lineares vel lanceolato-lineares, in apicem subobtusum vel acutum attenuatae, 2-6 cm. longae, 1-5-4 mm. latae, planae, rigidiusculae, marginibus cartilagineis asperulis. *Inflorescentia* foliacea; rami solitarii vel fasciculati, spicigeri. *Spica* subcylindrica vel dorso

\* *Ophiuros* is the original spelling used by Gaertner (Fruct. iii. 3 : 1805). It was altered to *Ophiurus* by R. Brown (Prodr. Fl. Nov. Holl. 206 : 1810) and this spelling has been adopted by most authors.

leviter compressa, 1-5-3-5 cm. longa, circiter 1-3-2 mm. lata, 4-9-spiculata, recta vel leviter curvata, e vagina vel spatha exserta vel basi inclusa ; pedunculi inferne in acumen tenue longe attenuati, prope spicam gradatim incrassati, usque ad 9 cm. longi, retrorse asperuli, rhacheos internodia oblique truncata, 3-4 mm. longa, medio siccitate constricta sulcata et viridia, basi et apice laevia et albida, glabra. *Spiculae* oblongae vel ovato-oblongae vel elliptico-oblongae, subacutae vel obtusae, 2-3 mm. longae. *Gluma inferior* dorso foveolato-tuberculata vel transverse rugosa, vel ea spicularum infimarum dorso laevis, intus 7-9-nervis, basi ad margines minute pubescens, ceterum glabra ; gluma superior oblonga, subacuta vel obtusa, 3-5-nervis, marginibus superne ciliolatis. *Lemma inferius* ovato-oblongum, obtusum, 2-2 • 2 mm. longum, 2-nerve, marginibus superne ciliolatis. *Lemma superius* ovato-ellipticum, obtusum, usque ad 1-8 mm. longum, 2-nerve ; palea oblonga, obtusa, usque ad 1-8 mm. longa, enervis vel 2-nervis. *Antherae* 0\*8-1 mm. longae.

NORTHERN AUSTRALIA. Sources of Hooker's Creek, *Mueller*.

QUEENSLAND. Cook District: Cooktown, *Pollock* ; Port Douglas, coastal sand-hills, Jan. 1932, *Brass* 1904; Mareeba, *Pollock*. North Kennedy District: Townsville, *Pollock*. Mitchell District: near Torrens Creek, in sandy ground, March 1933, *White* 8674; Great Dividing Range, near Jericho, March 1910, *Domin*.

Some specimens collected by F. M. Bailey in June 1897 on Thursday Island probably represent a new species related to *T. pubescens*. They differ in possessing somewhat stouter taller culms, possibly thicker spikes and especially in the lower glume being smooth, and not tuberculate or rugose. The material is unfortunately not complete enough for description as, except in one case, the spikes have broken up and disappeared.

### 3. *T. Brassii* C. E. Hubbard ; species nova (t. 3314).

*Gramen* annuum. *Culmi* geniculato-ad scendentes, e nodis inferioribus radicanter, 7-15 cm. alti, gracillimi vel filiformes, multiramosi, ramulis superne fasciculatis, multinodes, teretes, glabri, laeves, purpurei. *Folia* pilis brevibus plerumque e tuberculis minutis ortis pubescentia, vel glabrescentia; vaginae laxae, 5-14 mm. longae, internodiis breviores; nodi pubescentes ; ligulae ad seriem ciliorum brevissimorum redactae ; laminae lineares, obtusae, usque ad 3 cm. longae et 2-5 mm. latae, planae vel siccitate convolutae, firmae, asperulae. *Inflorescentia* laxa, foliacea, multiramosa, ramulis dense fasciculatis spathigeris et spicigeris; spathae ambitulineari-lanceolatae, acutae, 6-12 mm. longae, convolutae, dorso convexae, breviter pubescentes, pallide virides, demum pallide brunneae. *Spica* dorso compressa, 3-6 mm. longa, circiter 1 mm. lata, 1-2-spiculata, viridis ; pedunculi usque ad 3-6 mm. longi, glabri, inferne capillares, superne retrorse asperuli et demum leviter arcuati, apicem versus gradatim incrassati, ad basin disarticulantes ; rhacheos

internodia 1-2, glabra, laevia, 3-4 mm. longa, dorso 3-nervia, horizontaliter disarticulata. *Spiculae* lanceolato-oblongae vel oblongae vel elliptico-oblongae, obtusae, 2-2\*7 mm. longae. *Gluma inferior* doiso prominenter transverse rugosa, fere glabra, intus tenuiter 7-8-nervis; gluma superior explanata oblonga vel ovato-oblonga, obtusa, laevis, 3-5-nervis, marginibus hyalinis superne minute ciliolatis. *Lemma inferius* elliptico-oblongum 2-2\*5 mm. longum, marginibus superne minute ciliolatis. *Lemma superius* 1\*8-2 mm. longum, 1-nerve, glabrum; palea 1\*5-1\*7 mm. longa, vel nulla. *Antherae* 0\*7 mm. longae. *Caryopsis* 1-5 mm. longa.

QUEENSLAND. Burke District: Settlement Creek, wet places, June 1923, *Brass* 370.

4. **T. rariflora** (*F. M. Bailey*) *C. E. Hubbard*, comb. nov. (t. 3313). *Rottboellia rariflora* *F. M. Bailey* in Queensland, Dept. Agric. Bot. Bull. no. 8, 86 (1893) et in Rep. Austral. Assoc. Adv. Sci. vii. 446 (1898) et Compreh. Cat. Queensl. PL 617, fig. 594 (1912).

*Gramen* annuum. *Gulmi* geniculati-adscedentes vel erecti, 6-50 cm. alti, graciles vel gracillimi, ramosi, pauci- vel pluri-nodes, glabri, laeves; nodi pubescentes vel glabri. *Folia* pilis e tuberculis minutis ortis laxae vel sparse pubescentia vel pilosa, vel fere glabra; vaginae internodiis plerumque multo breviores, laxae, striatae, 6-22 mm. longae; ligulae ad seiiem ciliorum redactae; laminae lineares, in apicem obtusum attenuatae, usque ad 10 cm. longae, 2-4 mm. latae, planae vel siccitate convolutae, firmae, marginibus scaberulis. *Inflorescentia* laxa, foliacea, plerumque multiramosa, ramulis laxae vel dense fasciculatis spathigeris et spicigeris; spathae ambitu anguste lanceolatae, 6-12 mm. longae, pubescentes vel glabrae, demum brunneae. *Spica* dorso compressa, 3-8 mm. longa, 0\*6-1 mm. lata, 1-2-spiculata, demum brunnea; pedunculi 0\*5-2\*5 cm. longi, inferne in acumen tenue attenuati, superne gradatim incrassati, demum leviter curvati, retrorse asperuli, ad basin disarticulantes; rhacheos internodia 1-2, glabra, laevia, 2-5-3 mm. longa, horizontaliter disarticulata, supra spiculam terminalem in acumen 1-6 mm. longum attenuata. *Spiculae* lanceolato-oblongae vel oblongae, subobtusae, 2-3 mm. longae. *Gluma inferior* dorso plana vel leviter concava, intus 9-nervis, granuloso-punctata, basi ad margines minute pubescens, ceterum glabra; gluma superior lanceolato-oblonga vel oblonga, acuta, 3-5-nervis, marginibus superne minute ciliolatis. *Lemma inferius* oblongum, usque ad 3 mm. longum, 2-nerve, marginibus apicem versus minute ciliolatis. *Lemma superius* oblongo-lanceolatum, usque ad 2\*6 mm. longum, 1-3-nerve vel enerve; palea angusta, usque ad 2 mm. longa, vel nulla. *Antherae* 0-8 mm. longae. *Caryopsis* circiter 2 mm. longa.

QUEENSLAND. Cook District: Somerset, June 1897, *Bailey* 15; Batavia River, *Millman*; Musgrave, May 1893, *Jacobsen* 21; Mt. Mulligan, April 1935, *Flecker* 477.

An interesting feature of the Australian species of *Thaumastochloa* is the special modification of the peduncle of the spike to assist in the dispersal of the seed. In *T. pubescens* the spikes bear from four to eight spikelets, one of which occurs on each internode of the rhachis. At maturity the rhachis disarticulates at the nodes and all the internodes fall away, with the exception of the lowest. As far as can be ascertained from herbarium material, the dispersal of the lowest internode and its accompanying spikelet is effected by the peduncle disarticulating at its base from the culm. The dispersal of the lowest spikelet of the spike in *T. pubescens* is not, however, of the same importance to the plant as it is in *T. rariflora* and *T. Brassii*, where the spikes are much reduced and bear only one or two spikelets. In these species, as in *T. pubescens*, the peduncle is more or less retrorsely asperulous and tapers to a fine basal point, but in addition it usually becomes curved and very rigid at maturity, and appears to disarticulate more readily from the culm. In *T. rariflora* and *T. Brassii* the "seed" may take one of three forms: 1, the upper internode of the rhachis with the caryopsis enclosed in the accompanying spikelet as in the case of 2-spiculate spikes; 2, the peduncle and complete spike in 1-spiculate spikes; 3, the peduncle and remains of the spike in 2-spiculate spikes from which the upper internode has disarticulated. The pointed base and retrorse asperity of the frequently rigid curved peduncle are no doubt of considerable assistance in seed-dispersal. F. M. Bailey (Rep. Austral. Assoc. Adv. Sci. vii. 446) has remarked that *T. rariflora* is a "troublesome spear grass on Thursday Island."

*Thaumastochloa* belongs to the subtribe *Rottboelliinae* of the *Andropogoneae*, the genera of which are characterized by the more or less stout pedicels and internodes of the rhachis, and by the awnless upper lemma. The pedicels and internodes are mostly contiguous, free or partly or wholly fused, and, in addition, hollowed out to form a depression for the partial reception of the sessile spikelet. Stapf subdivided the *Rottboelliinae* into two groups: *Vossiastrae* and *Rottboelliastrae* (Prain, \*1. Trop. Afr. ix. 5 : 1916); it is amongst the latter that *Thaumastochloa* has to be placed. Since *Thaumastochloa* is mainly Australian in distribution, the following key is given to assist in distinguishing it from the other genera of the group occurring there.

KEY TO THE GENERA OF THE ROTTBOELLIASTRAE IN AUSTRALIA.

\* Spikelets paired, one sessile, the other pedicelled :

Pedicels free from the internodes of the rhachis :

Racemes usually villous ; lower glume 2-toothed or 2-fid ; aromatic grasses. . . . . 1. *Elyonurus*.

Racemes glabrous; lower glume entire or emarginate; not aromatic :

Lower glume pectinate on the margins ; pedicelled spikelets rudimentary or much-reduced. . . . . 2. *Eremochloa*.

Lower glume not pectinate ; pedicelled spikelets reduced, but similar to the sessile. . . . . 3. *Coelorhachis*.

Pedicels fused to the internodes of the rhachis :

Spikelets similar in structure and sex ; racemes compressed ; rhachis tough or slowly disarticulating . . . . 4. *Hemarihria*.

Spikelets of each pair dissimilar, the pedicelled smaller, <J or neuter; rhachis readily disarticulating:

Sessile spikelets subglobose; lower glume pitted and tubercled; racemes dorsiventral; spikelets secund . . . 5. *Hackelochha*.

Sessile spikelets not as above ; lower glume smooth ; racemes cylindrical; spikelets in opposite rows . . . . 6. *Rotiboellia*.

\*\* Spikelets solitary, sessile, the pedicelled suppressed or rudimentary ; pedicels fused to the internodes of the rhachis :

Spikes dorsiventral; spikelets secund; lower floret neuter, without a palea . . . . . 7. *Thaumastochloa*.

Spikes cylindrical, with the spikelets in opposite rows ; lower floret usually <?, with a well-developed palea . . . 8. *Ophiuros*.

#### ENUMERATION OF AUSTRALIAN GENERA.

1. *Elyonurus* *Humb. et Bonpl. ex Willd. Sp. Pl. iv. pars 2, 941 (1806);* Kunth in *Mém. Mus. Hist. Nat. Paris, ii. 69 (1815) (Elyonurus);* Benth. *Fl. Austral, vii. 509 (1878) (Elyonurus) ;* Stapf in Prain, *Fl. Trop. Afr. ix. 62 (1916).*

2. *Eremochloa* *Buese in Miq. Pl. Jungh. 357 (1854);* F. M. Bailey, *Queensl. Fl. vi. 1855 (1902).* *Ischaemum* Benth. *Fl. Austral, vii. 518 (1878), partim.*

3. *Coelorhachis* *Brongn. in Duperr. Voy. Coq., Bot. 64, t. 14 (1829);* Stapf in Prain, *Fl. Trop. Afr. ix. 78 (1916).* *Rotiboellia* Benth. *Fl. Austral, vii. 512 (1878), partim.*

4. *Hemarthria* *R. Br. Prodr. Fl. Nov. Holl. 207 (1810);* Benth. *Fl. Austral, vii. 510 (1878).*

5. *Hackelochloa* *O. Kuntze, Rev. Gen. PL ii. 776 (1891).* *Manisuris* " Swartz " sec. Benth. *Fl. Austral, vii. 511 (1878), non L.*

6. *Rottboellia* *L.f. Nov. Gram. Gen. 23 (1779), partim;* Benth. *Fl. Austral, vii. 512 (1878), partim;* Stapf in Prain, *Fl. Trop. Afr. ix. 72 (1916).*

7. *Thaumastochloa* *C. E. Hubbard in Hook. Ic. PL tt. 3313-4 (1936).*

8. *Ophiuros* *Gaertn.f. Fruct. iii. 3 (1805), partim ;* R. Br. *Prodr. FL Nov. Holl. 206 (1810) (Ophiurus);* Benth. *FL Austral, vii. 512 (1878) {Ophiurus), partim.—€.* E. HUBBARD.

#### THAUMASTOCHLOA BABIFLOBA (t. 3313).

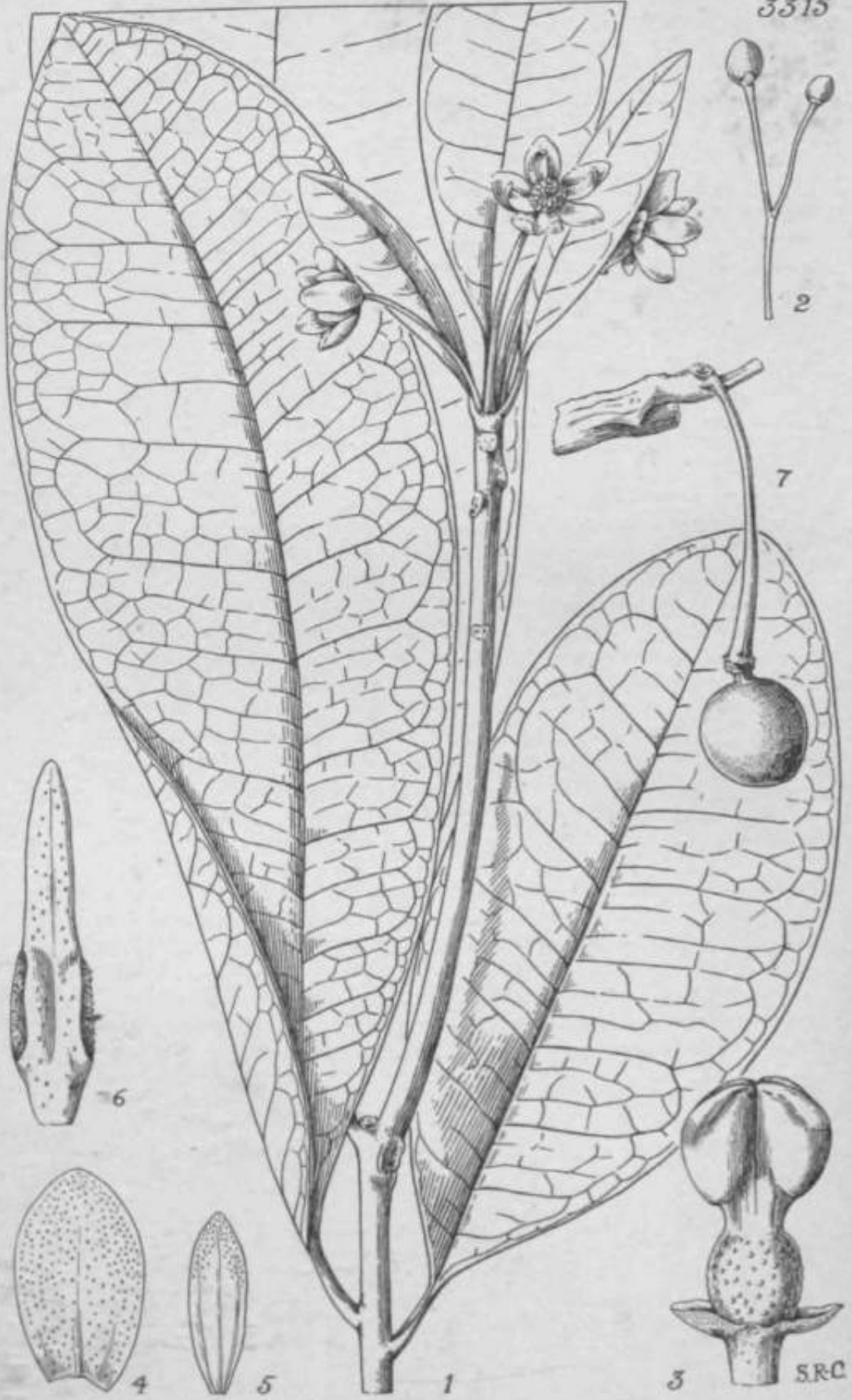
FIG. 1, plant, *natural size* ; 2, ligule, x 6 ; 3, spike and portion of peduncle, x 8 ; 4, spike, peduncle and spathe, x 3 ; 5, lower glume, from inside, x 12 ; 6, upper glume, x 12 ; 7, lemma of lower floret, x 12 ; 8, lemma of upper floret, x 12 ; 9, flower, x 20 ; 10, caryopsis, x 12.

#### THAUMASTOCHLOA BRASSII (t. 3314).

FIG. 1, plant, *natural size*; 2, portion of inflorescence with spathes, x 3 ; 3, spike, x 8 ; 4, lower glume, x 12 ; 5, upper glume, x 12 ; 6, Lemma of lower floret, x 12 ; 7, lemma of upper floret, x 12 ; 8, palea, x 12 ; 9, flower, x 20 ; 10, diagram of transverse section through spikelet and rhachis, x 18.



3515



**BUBBIA HAPLOPUS** *B. L. Burtt.*

## WINTERACEAE.

**B. haplopus** *B. L. Burtt*; species nova, *B. Pancheri* (Baill.) *B. L. Burtt* \* affinis, a qua pedunculis simplicibus (rarissime furcatis), sepalis 2, carpellis 3-4 inter alia distinguitur. *B. pauciflorae* (Bak. fil.) Dandy, quoad inflorescentiam, etiam affinis, sed ab hac foliis multo majoribus et antherarum thecis basin staminum versus positis insigniter recedit.

*Arbor* circiter 9 m. alta, ramis brunneis fere glabris sympodialiter ramosis. *Folia* alterna, petiolata; petiolus 1-1.5 cm. longus, supra leviter canaliculatus, glaber; lamina discolor, supra (siccitate) brunnea, subtus granulis cereis glauca, dense glanduloso-punctata, obovato-elliptica, 10-20 cm. longa, 5-8 cm. lata, apice obtusa, basin versus angustata, marginibus integerrimis leviter revolutis; nervi laterales circiter 12, utrinque prominuli, leviter ascendentes, margine 0.5-1.5 cm. distante furcati. *Flores* 3-5, in summis ramis axillares sed foliis delapsis pseudo-terminales, pedicellati. *Pedunculi* validi, circiter 5 cm. longi, ut sepala et petala glanduloso-pustulati. *Calyx* parvus, pisepalus, sepalis semicircularibus 1.5 mm. latis 1 mm. longis, petala in alabastro haud obtegens. *Petala* circiter 10, biseriata; exteriora oblongo-obovata, 7 mm. longa, 4 mm. lata, apice rotundata; interiora angustiora. *Stamina* numerosa, circiter 30, omnia consimilia, 3 mm. longa, petalis parvis similia, antherarum thecis duabus basin versus praedita; thecae parallelae, circiter 1 mm. longae, haud contiguae, longitudinaliter dehiscentes. *Carpella* 3-4, fere libera, 2 mm. alta, stigmate lineari radiante sessili instructa, pluriovulata. *Fructus* e carpellis baccatis, uno vel duobus saepe abortivis, breviter stipitatis spaencis ad 1.5 cm. diametro constans. *Semina* brunnea, 5 mm. longa.

SOLOMON ISLANDS. Bougainville Island, Okomo, Buin, "a small tree about 30 ft., but specimens said to occur on lower country to 60 ft.; wood's pleasant smell when freshly cut," Sept. 1902, Waterhouse B.743 (= Y.90: type); Maisua, "a small tree about 20 ft.," 10 Sept. 1931, Waterhouse B.537. San Cristoval, "tree up to 10 ft., bar use to poison fish, fruit with very hot and peppery husk," 1900, Comins 136.

Vernacular names: "paru" or "paro" (Bougainville), "mamatoto" (San Cristoval).

The maintenance of the two genera *Bubbia* Van Tieghem and *Uxolum* Van Tieghem does not appear to be justified. Van

\* *Bubbia Pancheri* (Baill.) *B. L. Burtt*, comb. nov. *Drimya Pancheri* Baill. in *Adansonia*, 5 (1872), 336. *Vro parte. Belliolum Pancheri* (Baill.) Van Tieghem in *Journ. de Bot.* xiv. 330 (1900).

Tieghem, in his paper "Sur les Dicotylédones du Groupe des Homoxylées" (in Journ. de Bot. xiv. 259-297, 330-348: 1900), proposed three new genera for species which had previously been placed in the genus *Drimys* J. R. et G. Forst. We are here concerned only with the genera *Buhhia* and *Belliolum*. Unfortunately they are very poorly represented in herbaria and Van Tieghem saw flowers of only one of the four species that he referred to *Belliolum*. From this species, *B. Pancheri* (Baill.) Van Tieghem, he drew the characters on which he based the genus; namely, that the anther-thecae are borne on the lower part of the stamen, and they are placed longitudinally: in *Buhhia*, by contrast, they are apical and placed transversely. Schlechter later collected in New Caledonia a flowering specimen (No. 15348) which matches Van Tieghem's *Belliolum crassifolium*. In this plant there is an outer whorl of larger petals, an inner whorl of narrower ones and numerous stamens. The inner petals are about 2\*5 mm. long and on one of them a single anther-theca was found halfway up one side; the outermost stamens were 2 mm. long and bore two anther-thecae about halfway up; the inner (and majority of) stamens were 1\*5 mm. long and bore two sub-apical anther-thecae: on all the stamens the thecae were longitudinally placed and dehisced longitudinally.

Only two of Van Tieghem's original species of *Buhhia* are represented by flowering specimens in the Kew Herbarium; these are *B. amplexicaulis* (Vieill. ex Parment.) Dandy (= *B. auriculata* Van Tieghem) and *B. Howeana* (F. Muell.) Van Tieghem. In *B. amplexicaulis* the anther-thecae are apical and almost touch at their tips, they then diverge downwards at an angle of 45°: that is to say they are intermediate between transverse and longitudinal. In *B. Howeana* they are as Van Tieghem described for the genus, apical and transversely placed. It is evident, therefore, that *Belliolum* cannot be retained as a genus distinct from *Buhhia*, and on comparing *Belliolum crassifolium* with the other species of *Buhhia* it has been found to be indistinguishable from *Buhhia isoneura*, over which name it has priority.\*

Van Tieghem subdivided both *Buhhia* and *Belliolum* into sections dependent on the amount of branching, if any, of the inflorescence. When the two genera are united, the problem arises whether the corresponding sections should be put together, or whether the differences between the stamens, though insufficient for generic distinction, are of sectional importance. The species of *Buhhia*, however, exhibit such a network of relationships, as regards these and other characters, that the division of the genus into sections, in the present state of our knowledge at least, is undesirable. An artificial key to the species

\* *Buhhia crassifolia* (Baill.) B. L. Burtt, comb. nov. *Drimys crassifolia* Baill. in Adansonia, viii. 199 (1868). *Belliolum crassifolium* (Baill.) Van Tieghem in Journ. de Bot. xiv. 330 (1900). *Buhhia isoneura* Van Tieghem, l.e. 294.

Van Tieghem's third species of *Belliolum* becomes *Buhhia rivularis* (Vieill. ex Parment.) B. L. Burtt, comb. nov. *Drimys rivularis* Vieill. ex Parment. in Bull. Sc. FP. & Belg. xxvii. 229 (1895). *Belliolum rivulare* Van Tieghem, l.e. 331.

could best be founded on the inflorescence characters, but such a key has not been attempted in the present paper as there are a number of species of which it has not been possible to examine specimens.

The genus shows an interesting correlation between the degree of branching in the inflorescence and the size and number of parts of the flower. For instance, in *B. haplopus* f which has simple peduncles, there are about 10 petals, 30 stamens and 3-4 carpels. In *B. Comptonii* (Bak. fil.) Dandy, a species from New Caledonia with much-branched inflorescence, there are but 4 petals, 3 stamens and usually a single carpel. Between these two extremes a number of intermediate stages are found.

*Bubbia* (inch *Belliolum*) is distinguished from *Drimys* by having a small persistent calyx which never covers the petals in bud : in *Drimys* the sepals are large and cover the petals in the bud and fall off when it opens. Diels, in his revision of the New Guinea species of *Drimys* (in Engl. Bot. Jahrb. liv. 240: 1916), has included *Bubbia* in that genus, but the species form a compact group, easily separable from *Drimys* by the characters mentioned above, and well worthy of generic rank. Several new combinations are therefore necessary.\*

The geographical range of the genus is now known to extend from New Guinea to Lord Howe Island. From New Guinea eight species have been described, two from Dutch territory, the remainder from the north-eastern part of the island ; *B. haplopus* is the first to be recorded from the Solomon Islands and there is also a single species f in northern Queensland; eleven species are known from New Caledonia and there is one, or possibly two, on Lord Howe Island.

We are indebted to Mr. J. E. Dandy of the British Museum Herbarium for advice as to the relationship of *Bubbia* and *Belliolum*, and to the Director of the Muséum d'Histoire Naturelle, Paris, for the loan of the type-specimen of *Belliolum Pancheri*.—B. L. BURTT.

FIG. 1, a flowering branch, *natural size*; 2, a branched peduncle, *natural size*; 3, gynoecium and calyx, x 8; 4, an outer petal from within, x 4; 5, an inner petal worn within, x 4; 6, a stamen, front view, x 12; 7, fruit, *natural size*.

\* The following species have been examined and are found to be referable to *Bubbia*:—

1. *Bubbia Ledermanni* (Diels) B. L. Burtt, comb. nov. *Drimys Ledermannii* Diels, l.c. 243.

2. *Bubbia oligocarpa* (Schlechter) B. L. Burtt, comb. nov. *Drimys oligocarpa* Schlechter in Engl. Bot. Jahrb. 1. 71 (1913).

3. *Bubbia parviflora* (Ridley) B. L. Burtt, comb. nov. *Drimys parviflora* Ridley in Trans. Linn. Soc. London, Bot. 2nd ser. ix. 12 (1916).

4. *Bubbia polyneura* (Diels) B. L. Burtt, comb. nov. *Drimys polyneura* Diels, l.c.

5. *Bubbia semecarpoides* (F. Muell.) B. L. Burtt, comb. nov. *Drimys semecarpoides* F. Muell. in Victorian Naturalist, viii. 15 (1891), et in Bot. Centralbl. \*lvi. 204 (1891).

3316



TABULA 3316.

SAURAFIA PURGANS *B. L. Burtt.*

SAURAUACEAE.

*S. purgans* *B. L. Burtt.*; species nova in serie *Setosarum* sectionis *PkiantJiarum* juxta *S. bifidam* Warburg ponenda; ab ea sepalis extra densissime et longe setosis, pedunculo longiore statim distingui potest; a *S. Klinkii* Lauterbach et K. Schum., etiam affini, pilis foliorum omnibus setosis recedit.

*Arbuscula* vel arbor parva, cortice purgante. *Ramuli* novelli setis appressis basibus bulbosis dense obsiti, demum glabrescentes. *Folia* alterna, petiolata; petiolus 1-1.5 cm. longus, dense et appresse setosus; lamina discolor, late oblanceolata, usque ad 17 cm. (plerumque circiter 12 cm.) longa et ad 7 cm. (plerumque circiter 5 cm.) lata, apice acuta vel breviter acute acuminata, ad basin versus angustata vel leviter rotundata, utrinque, supra sparse subtus densiuscule, appresse setosa, marginibus setoso-denticulatis; nervi laterales circiter 12, ascendentes, subtus prominentes. *Flores* cymosi, 5-10 in pedunculo axillari 3-5 cm. Jongo dense setoso editi. *Bractee* inferiores saepe foliaceae, 1-5 cm. longae et 1 cm. latae, petiolo 0-5 cm. longo, ut folia setosae; superiores lanceolatae vel lineares, circiter 7 cm. longae. *Pedicelli* 1-1.5 cm. longi, dense et patule setosi, bracteolis linearibus 2 vel 1 vel 0 instructi. *Bepala* 5, libera, imbricata, circiter 1 cm. longa et 6 mm. lata (intima saepe angustiora), extra, marginibus in alabastro obtectis exceptis, setis rufis et crispis ad 4 mm. longis densissime vestita, intus glabra. *Petala*, 5, libera, imbricata, obovata-elliptica ut sepala circiter 1 cm. longa et 6 mm. lata (intima angustiora), glabra. *Stamina* circiter 70; filamenta circiter 4 mm. longa, glabra, exteriora inter se alte lateraliter connata et tubum formantes, interiora inter se libera a tubo exteriorum orientia; antherae dorsifixae 2 mm. longae, thecis duabus apicibus leviter divergentibus rimis obliquis demum elongatis dehiscentibus. *Ovarium* glabrum, 2-3 mm. altum, quinqueloculare, ovulis in loculis numerosis. *Styli* 5, 5-5 mm. longi, glabri. *Fructus* ignotus.

SOLOMON ISLANDS. Bougainville Island, Siwai, "a shrub or small tree with star-shaped blossoms; fruit given to pigs as a tonic medicine," June 1930, *Waterhouse* B.92 (type); "a small tree usually found in damp low-lying spots, river banks, etc.; bark used in native medicine as a purgative," Feb. 1932, *Waterhouse* Y.33.

Vernacular names: "karakara" (Siwai); "tokitoki" (Teop).

In 1922 Diels (in Engl. Bot. Jahrb. lvi. 448) revised the New Guinea species of *Saurauia* and divided them into ten series, which have since been used by Gilg and Werdermann (in Engl. u. Prantl, Nat.

Pflanzenfam. ed. 2, xxi. 42 : 1925) as a basis for the classification of all the Old World species. These authors gave sectional rank to three of Diels's series (*Uniflorae*, *Ramiflorae* and *Calyptratae*) and grouped the remaining seven to form a fourth section, *Pleianthae*. According to this classification *S. purgans* is to be referred to the series *Setosae* of the section *Pleianthae*. Several of the species referred to this series by Gilg and Werdermann are evidently closely related to *S. purgans*, but there are some whose presence here results in the formation of a heterogeneous group, while the fact that other species, closely related on general grounds, actually fall into different sections suggests that the classification is largely artificial.

Two species must certainly be removed from this series. *S. Oldkami* Hemsl. is closely allied to *S. tristyla* DC. (sect. *Ramiflorae*) and has actually been reduced to a variety of that species by Finet and Gagnepain ; of the specimens in the Kew Herbarium some show inflorescences on the old wood (the character of section *Ramiflorae*), others on the leafy branches (a character of section *Pleianthae*): *S. latibractea* Choisy (wrongly spelt "*latibractea*" by Gilg and Werdermann), a native of the Philippines, has not the setose indumentum by which the group is characterized and is evidently better placed in the series *Squamulosae*. On the other hand *S. Sampad* Elmer, placed in the latter series by Gilg and Werdermann, must, on account of its indumentum, be transferred to *Setosae*, while of the two positions assigned to *S. subglabra* Merrill, section *Ramiflorae* and section *Pleianthae* series *Squamulosae*, the latter seems preferable. Another argument against the rigid use of the inflorescence characters for sectional classification is found in the wide separation of *S. singalagensis* Korth. (*Uniflorae*: wrongly spelt "*singalensis*" by Gilg and Werdermann) and *S. Reinwardtiana* Blume (*Pleianthae* series *Setosae*). In the former the flowers are solitary, occasionally 2-3-4 together, in the latter they are usually 3-5 on a peduncle, rarely but one : otherwise they are closely allied. These two species and one or two others form a small alliance which is easily distinguishable by the long, often recurved, setae of the calyx-lobes, and is evidently closely allied to the group of which *S. purgans* is a member. This latter group shows a progressive reduction of indumentum, the last phase of which (in *S. bifida* Warb.) is very close to the condition characteristic of the series *Squamulosae*. In general, *S. purgans* and its immediate allies (such as *S. bifida* Warb., *S. Lamii* Diels, *S. Klinhii* Lauterbach et K. Schum., all from New Guinea, and *S. Andreana* (F. v. Muell.) Oliv. the only Australian member of the genus) are characterized by the setose indumentum of their leaves and branchlets, axillary pedunculate cymes, setose calyx, glabrous stamens and ovary, and five free styles. *S. altissima* Zipp., *S. pihgyne* Diels and a few other species may be distinguished by the hairy ovaries.

The general impression gained in working out the affinities of *S. purgans* is that the use of the characters of the inflorescence for the delimitation of sections overstresses their importance; nor are they easily applied, as it is very difficult in this genus to decide whether some species

belong to the section *Ramiflorae* or not, for on some branches flowers are found from the leafless parts almost up to the tip. The characters drawn from the leaf indumentum are, however, more natural and will probably prove of primary importance in the classification of the Old World species of the genus. Some manuscript notes by the late Dr. O. Stapf now in the Kew Herbarium show that he had intended to subdivide the genus on these lines. In addition the indumentum of the calyx, the number of styles, size of flowers, and the presence or absence of indumentum on ovary and stamens may prove helpful in delimiting smaller groups.—B. L. BURTT.

t FIG. 1, flowering branch, *natural size* ; 2, part of stem, x 4; 3, lower surface of leaf, x 4; 4, part of calyx from outside, x 3; 5, gynoecium and part of calyx from inside, x 3 ; 6, petal, x 3 ; 7, part of outer portion of androecium, x 8; 8, inner stamen, back view, x 8.





## TABULA 3317.

### PBIOTROPIS INOPINATA *Harms.*

LEGUMINOSAE. Tribus OENISTEAE.

**P. inopinata** *Harms* in Notizbl. Bot. Gart. u. Mus. Berlin, xi. 1065 (1934); a *P. socotrana* Balf. f. ramis et petiolis conspicue ferrugineo-villosis, stipulis majoribus et persistentibus, legumine latiore, et a *P. cytisoidi* (Roxb. ex DC.) Wight et Am. legumine dispermo facile distinguenda.

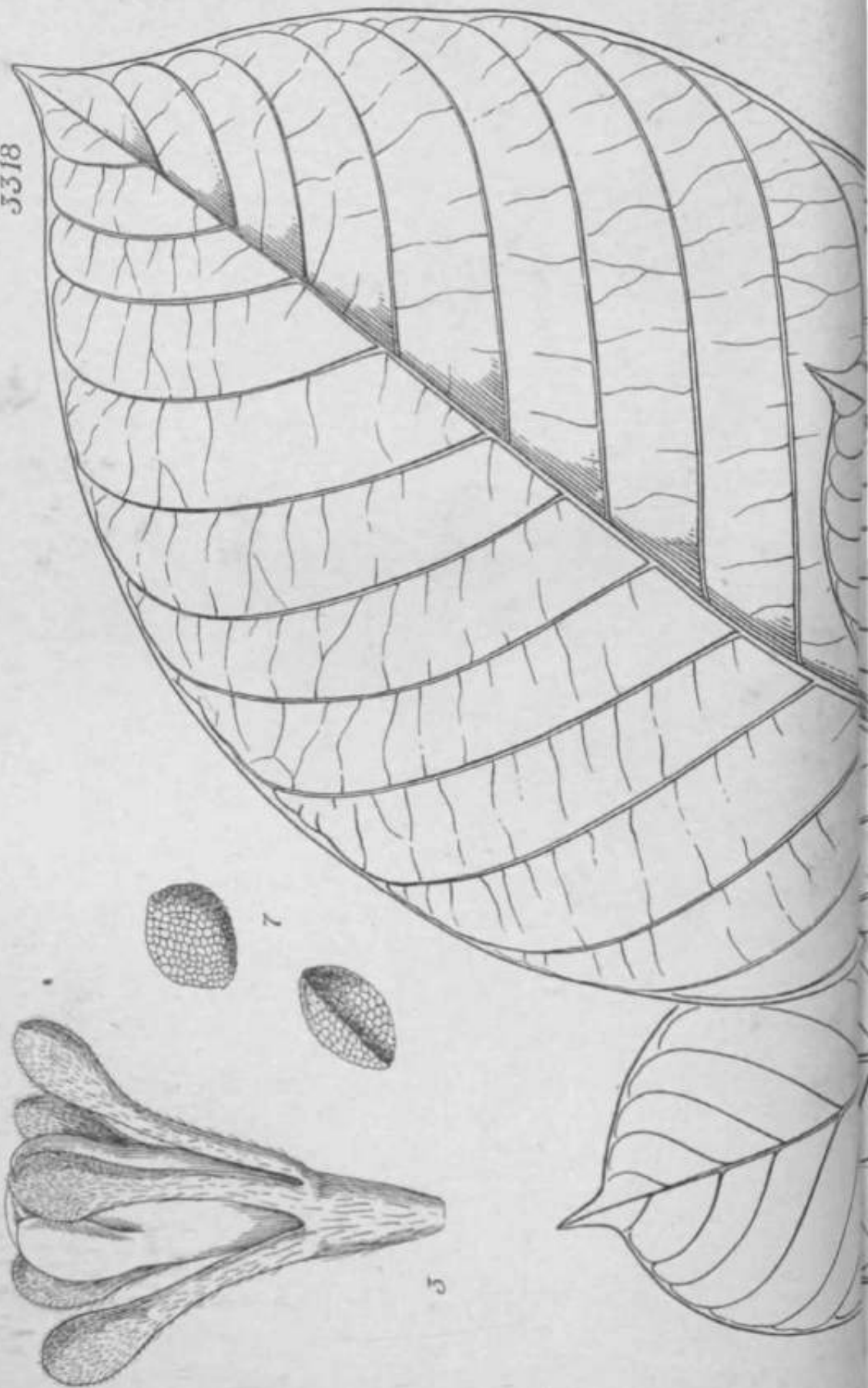
*Frutex* 2-2-5 m. altus. *Ramuli* recti, densiuscule ferrugineo-villosi, obtuse angulati, vix striati, internodiis 0-5-1-5 cm. longis. *Stipulae* subulato-lineares, leviter falcatae, circiter 5 mm. longae, pubescentes. *Folia* petiolata, trifoliolata, usque 8 cm. longa; petioli adscendentes, usque 2\*5 cm. longi, supra leviter complanati, densiuscule pubescentes; foliola oblanceolata, ex apice obtusa vel subacuta mucronata, in basin acutam plus minusve cuneata, petiolulis usque 2\*5 mm. longis dense pubescentibus instructa, terminalia usque 5\*5 cm. longa et 2 cm. lata, lateralia minora, discoloria, supra glabra, subtus molliter adpresse pubescentia, praesertim in nervis; costa supra leviter sulcata, inconspicua, subtus prominula. *Racemi* terminates et laterales, breves, apices versus ramulorum aggregati; rhachis circiter 2 cm. longae, dense ferrugineo-villosulae, floribus usque 8 instructae; bractae lineari-lanceolatae, acutae, circiter 2 mm. longae, extra hirsutae, intus glabrae; pedicelli circiter 8 mm. longi, pilosi, apicem versus bracteolis duabus linearibus 1-5 mm. longis hirsutis instructi. *Calyx* 5-dentatus, basi truncatus, circiter 6 mm. latus et longus, extra leviter pilosus, intus glaber, dentibus quam tubus paullo longioribus inaequalibus anguste deltoideis. *Vexillum* transverse late ellipticum, longitudinaliter plicatum, basin versus plus minusve auriculatum, basi ungue 3 mm. longo 2 mm. lato intus bicalloso dense tomentoso instructum, circiter 9 mm. longum (ungue excluso) et 1-2 cm. latum, luteum, extra medio parce hirsutum, ceterum glabrum; alae oblique obovato-oblongae, ungue 4 mm. longo curvato instructae, circiter 13 mm. longae et 5 mm. latae, juteae; carina dorso rotundata, apicem versus late falcato-rostrata, basi unguiculata, circiter 1-3 mm. longa et 6 mm. lata, pallide lutea, marginibus inferne ciliatis. *Stamina* macranthera usque 1-5 mm. longa, filamentis anguste ligulatis et antheris 2 mm. longis instructa; micranthera etiam usque 1-5 mm. longa, filamentis filiformibus et antheris rotundis vix 1 mm. diametro instructa. *Discus* cupularis, vix 1 mm. altus. *Ovarium* stipitatum, 3 mm. longum 1-3-ovulatum, secus suturam dense hirsutum, ceterum glabrum, stipite 2 mm. longo dense hirsuto; stylus inferne valde curvatus, compressus, superne rectus, apicem versus breviter pubescens. *Legumen* ellipticum, breviter stipitatum, usque 2 cm. longum et 1-2 cm. latum, extra densiuscule ferrugineo-velutinum, stylo persistente. *Semina* 1-2, subreniformia, circiter 4 mm. diametro.

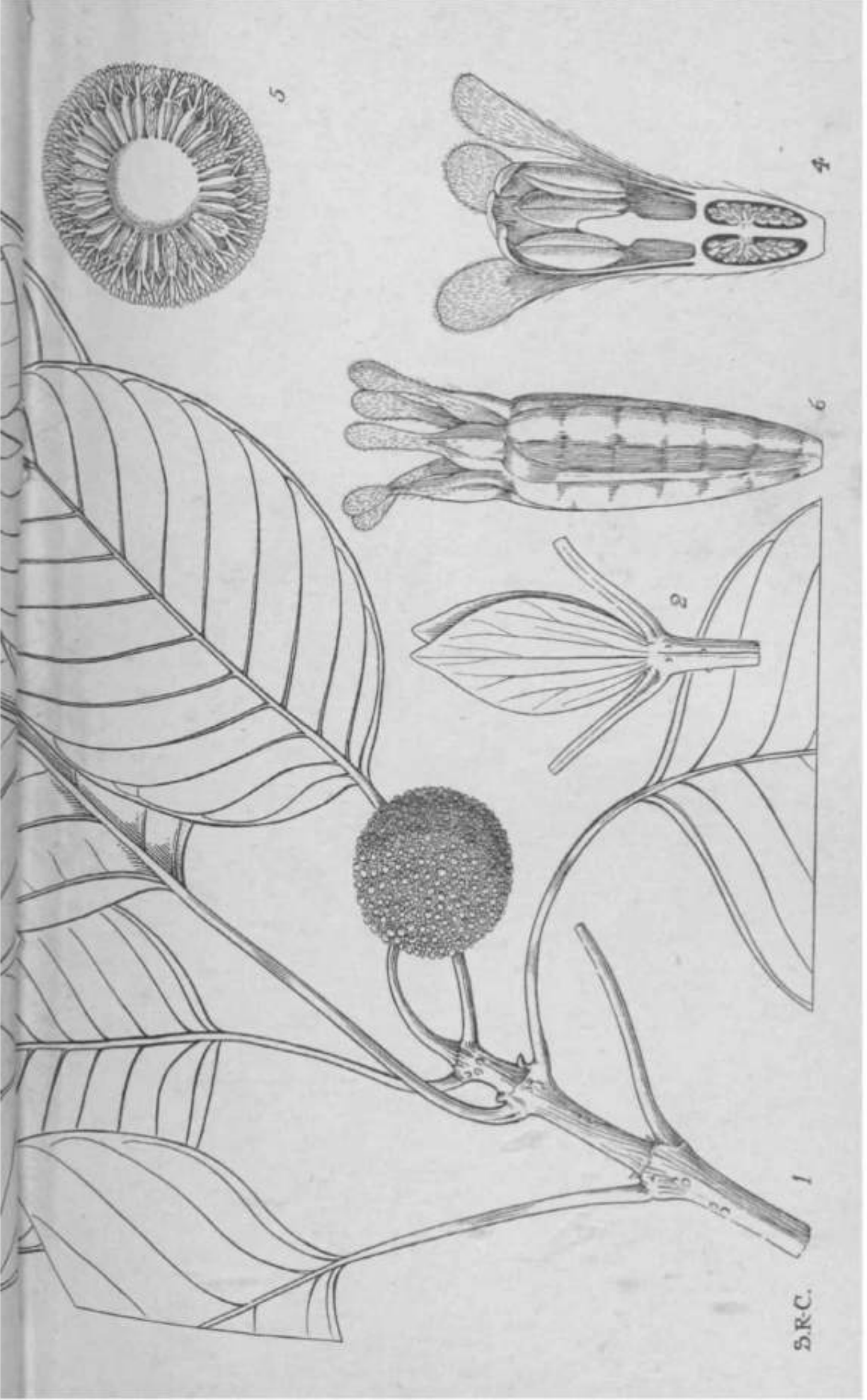
TANGANYIKA TERRITORY. Morogoro District: Uluguru Mountains, north-west side, on savannah hillock, 1200 m., 6 March 1933, *Schlieben* 3616 (type in Berlin Herb.):—" Shrub 2-3 m. high ; flowers yellow with brown stripes. Chiluguru name 'Moanganapalu' " ; Uluguru Mountains, abundant among rocks in forest near Kitundu, 1500-1600 m., Jan. 1934, *E. M. Bruce* 956 :—" Shrub 2-2-5 m. high with yellow flowers."

The recent discovery of a species of *Priotropis* on the African mainland is of great interest. Only two species were previously known, *P. cytisoides* (Roxb. ex DC.) Wight et Am., which occurs at altitudes of 1000-2500 m. from the eastern Himalayas to Burma and Siam, and *P. socotrana* Balf. f., endemic in Socotra. *P. inopinata* is, at the time of writing, known only from the Uluguru Mountains in Tanganyika Territory. Beautiful material, collected by Miss E. M. Bruce, is preserved at Kew and has been compared with a duplicate of Schlieben's gathering in the Herbarium of the Natural History Museum, South Kensington. The above description is taken from the Kew material, some of the measurements being in consequence slightly greater than those given in Dr. Harms's description.—E. MILNE-REDHEAD.

FIG. 1, flowering branch, *natural size*; 2, calyx, x 3 ; 3, vexillum, lateral view, x 3 ; 4, ala, from outside, x 3 ; 5, carina, x 3 ; 6, androecium, x 3 ; 7, longitudinal section of flower showing calyx and gynoecium, x 3 ; 8, legume, *natural size*; 9, the same, opened, showing seeds, *natural size*.

5318





S.R.C.

BURTTDAVYA NYASICA Hoyle.

RUBIACEAE. Tribus NAUCLEAE.

**Burttavya Hoyle.** Genus novum, inter *Anthocephalum* A. Rich, et *oarcocephalum* Afzel. medium; ab illo placentis superne haud bifidis, ovario superne haud 4-locellato, ab hoc calycibus inter se liberis nee arete concretis differt.

- *Flores* in capitulum globosum compacti, ebracteolati, calycibus leviter cohaerentibus nee concretescentibus. *Calycis tubus* oblongus; Pars libera brevissima vel 0; lobi 5, lineari-spathulati, persistentes. *Corolla* tubulosa, fauce glaberrima; lobi 5, imbricati. *Stamina* 5, corollae in fauce inserta, filamentis brevibus complanatis; antherae ovato-oblongae, vix apiculatae, basi sagittatae. *Discus* inconspicuus. *stadium* 2-loculare, placentis supra medium affixis, utrinque liberis; stigma submitriforme; ovula in loculis numerosa, alia erecta, alia aorizontalia, alia pendula, anatropa. *Fructus proprii* polyspermi, niembranacei, inter se liberi, receptaculo globoso carnosulo confertim adjuncti. *Semina* parva, ellipsoidea, funiculo brevi, testa submembranacea cancellata, albumine carnosulo; embryo rectus, cotyledonibus brevibus suborbicularibus, radícula obtusa.—*Arbores* subglabrae. *folia* opposita, petiolata. *Stipulae* amplae, interpetiolares, caducae. *capitula* breviter pedunculata, terminalia.

Species 1, in Africa tropica australi-orientali verisimiliter endemica.

. **B. nyasica Hoyle**, species nova. *Arbor* praeter inflorescentiam subglabra; ramuli in sicco striati, glabri, nodis complanatis. *Stipulae* amplae, 3-6 cm. longae, 1-5-3\*5 cm. latae, oblanceolatae vel latissime ovatae. *Folia* opposita, tenuiter coriacea, in sicco rufescentia, 10-20 cm. longa, 10-15 cm. lata, ovata vel late elliptica (ea jugi ternunialis multo minora), apice breviter acuminata, basi rotundata vel truncata vel latissime cuneata, supra glabra, subtus in costa minutissime puberula vel glabra; nervi laterales utrinque 12-14, patuli, subtus prominentes rubescentes; venae primariae subparallelae, venulis crebre et minute reticulatis; petiolus 3-5 cm. longus, canaliculatus, minutissime puberulus. *Capitulum* globosum, ante anthesin circiter 2 cm. diametro, pedunculo terminali 1-5 cm. longo 2-3 mm. crasso. *Flores* numerosi, densissime compacti, inter se tamen liberi, in receptaculo carnosulo ebracteolato sed sparse piloso sessiles. *Calycis tubus* oblongus, circiter 2 ram. longus, sparse pilosus, ovario adnatus et vix intra eum productus; lobi 5, lineari-spathulati, apicem versus fulvo-tomentosi, fructu accrescentes. *Corolla* extra glabra; tubus in alabastro 1-5 mm. longus, lobis 5, lineari-spathulatis, imbricatis. *Antherae* corollae lobis aequilongae, oblongo-gittatae, apice obtusae vix apiculatae, thecis basi apiculatis; filamenta brevissima, complanata, corollae fauce inserta. *Stylus* glaber;

stigma submitriforme, sulcatum, sanguineum. *Infructescentia* globosa, 2-5-3\*5 cm. diametro, calycum lobis numerosis accrescentibus omnino induta; pedunculus ad 4 cm. longus; receptaculum carnosum, 1-1 • 5 cm. diametro. *Fructus proprii* oblanceolati, rubri, inter se liberi, 5-8 mm. longi, 1-2 mm. lati, striati, membranacei, sparsissime setosopilosi, singuli calycis tubo piloso lobisque tomentosus terminati. *Semina* 20-50, circiter 1 mm. longa, ellipsoidea vel irregulariter pressu angulata, testa cancellata rubra.

SOUTH-EAST TROPICAL AFRICA. Nyasaland: near Port Herald, 900 m., *R. G. R. Townsend* 23 (type, with flowers and fruits, in Kew Herb, and Imperial Forestry Institute Herb., Oxford); Mala we Mt. Forest Reserve, near Port Herald, *J. B. dements* A64/30, fruits only, Feb. 1930, sent to complete *Burtt Davy* 22300, collected by a Forest Guard from same locality, September 1929 (leaves only); Matandwe Reserve near Port Herald, hilly country about 600 m., riparian, *P. Topham* 569 (leaves only); without locality, *P. Topham* 959.

Vernacular names : " mBvule " (chiNyanja), " mBule " (Yao).

An uncommon tree, said to make a good drum (*Topham*). Fruit edible (*Townsend*).

This genus is interesting as providing a link between *Sarcocephalus* and *Anthocephalus*, having all the characters of the former except the union of ovaries in a fleshy mass, and all those of the latter except the branching of the upper half of the placentas to occupy four indurated locelli. The species described (*Burttdavaya nyasica*) bears a remarkably close resemblance to *Sarcocephalus esculentus* Af zel., except in the stipules, which closely resemble those of *S. Diderrichii* De Wild. The spatulate calyx-lobes suggest those of the flowering stage of *S. esculentus*, but in *Burttdavaya* these are persistent in fruit, instead of being deciduous.

A. C. HOYLE.

FIG. 1, upper part of flowering branch, *natural size*; 2, node, with stipules, *natural size*; 3, flower, x 12; 4, longitudinal section of flower, x 12; 5, transverse section of infructescence, *natural size*; 6, a single fruit, x 6; 7, seeds, x 16.





AFOCHITON BURTTII *C. E. Hubbard.*

GKAMINEAE. Tribus ERAGROSTEAE.

† *Apochiton C. E. Hubbard.* Genus novum, egregium, glumis triner-  
vibus, lemmatibus apice integris aristatis infra medium pubescentibus,  
paleis biaristatis, fructus pericarpio membranaceo e semine libero  
distinctum.

*Sjñculae* inter se similes, ambitu oblongae, lateraliter compressae,  
aristatae, solitariae, alternae, subsecundae, laxè dispositae, breviter  
Pedicellatae, in ramis gracilibus paniculae laxae ortae; rhachilla supra  
glumas et inter anthoecia disarticulans, internodiis gracilibus scaberu-  
lis vel minute pubescentibus. *Anthoecia* 4-5, 3-4 £, summum sterile  
t plus minusve redactum. *Glumae* persistentes, leviter inaequales,  
superior paullo longior, lanceolatae (explanatae), tenuiter acutae,  
niucronatae vel breviter aristatae, carinatae, membranaceae, promi-  
nenter trinerves. *Lemmata* e glumis breviter exserta, ovata (explanata),  
apice acuta vel obtusa integra aristata, membranacea, trinervia, nervis  
lateralibus marginibus approximatis, infra medium pubescentia;  
arista recta, scaberula; callus brevissimus, obtusus, breviter barbatus.  
*Pajaeae* lemmate breviores, bicarinatae, inter carinas concavae, anguste  
elliptico-oblongae (explanatae), membranaceae, bifidae, lobis acutis  
arista recta vel leviter divergente scaberula terminatis, carinis interne  
cuiatis. *Lodiculae* duae, late cuneatae, retusae. *Stamina* 3; antherae  
nneari-oblongae. *Ovarium* glabrum; styli distincti, terminates,  
breves; stigmata plumosa, ex anthoeciis lateraliter exserta. *Fructus*  
ambitu elliptico-oblongus, trigonus, facie leviter concavus, inter lemma  
paleamque inclusus; pericarpium liberum, tenue, membranaceum,  
albidum; scutellum circiter dimidium caryopsidis aequans; hilum  
basale.—*Gramen* annuum; culmi graciles; ligulae brevissimae, mem-  
branaceae; laminae lineares, planae; panicula terminalis, ramis  
simplicibus vel inferne sparse divisis.

Species unica, Africae orientalis incola.

A. Burtii *C. E. Hubbard*, species nova.

*Culmi* laxè caespitosi, erecti vel basi geniculati vel geniculato-  
adscendentes et e nodis inferioribus radicanter, graciles, 0-2-1 m. alti,  
teretes, simplices vel basi ramosi, 3-5-nodes, glabri, laeves, internodio  
sunimo e vagina demum longe exserto. *Foliorum vaginae* glabrae,  
Jaeves, tenuiter striatae, inferiores carinatae, ceterae teretes; ligulae  
truncatae, circiter 0-5 mm. longae; laminae tenuiter acutae, usque  
ad 30 cm. longae et 4 mm. latae, glabrae vel supra sparsissime pilosae,  
\*aeves vel supra scaberulae. *Panicula* oblonga vel ovata, 4-20 cm.

longa, 1-8 cm. lata, laxa ; rhachis gracilis, superne scaberula, juxta nodos minute pubescens ; rami plerumque solitarii, graciles, scaberuli, laxe spiculati, simplices vel longiores inferne ramulis 2-6-spiculatis usque ad 2'5 cm. longis gerentes, inferiores 2-12 cm. longi; pedicelli 0.5-2 mm. longi. *Spiculae* 6-8 mm. longae, pallide virides vel atrovirides. *Glumae* carinis superne plus minusve scaberulae; inferior 4\*5-5\*5 mm. longa ; superior 5-6\*5 mm. longa. *Lemmata* 4-5\*5 mm. longa, supra medium carina scaberula, infra medium pilis albis sericeis appresse pubescentia ; arista 1\*5-3 mm. longa. *Paleae* 2\*5-3 mm. longae, aristis 2-3-5 mm. longis. *Antherae* 1 mm. longae. *Fructus* 2—2\*3 mm. longus, cinereus.

TANGANYIKA TERRITORY. Kwimba District, on hills and ridges, *Marshall* 46 ; Mwanza District, Ngudu, *Lloyd* 5, *Staples* 361 ; Kondoa Irangi District, near Sambala, dominating with *Harpachne Schimperii* and *Aristida* sp. in grey sandy soil, 1440 m., May 1929, *Burt* 2602 (type); Dodoma District, Dodoma, *Staples* 263, 314.

The grain in *Apochiton* is exposed at the tip between the slightly gaping lemma and palea, the thin basal portions of which frequently remain attached to the pericarp. When soaked for a short time in water, the membranous pericarp swells up and is then readily removable from the hard trigonous chestnut-brown seed. This type of grain with a free seed is comparatively uncommon in *Gramineae*, other genera in which it is known to occur being found in the tribes *Eragrosieae* (*Eragrostis* spp., *Thellungia*, *Heterocarpha*, *Sclerodactylon*, *Eleusine*, *Dactyloctenium* and *Coelachyrum*) and *Sporoboleae* (*Sporobolus*, *Crypsis* and *Heleochloa*).

In most classifications of the *Gramineae* the type of inflorescence is given as the main character distinguishing the tribes *Festuceae* (sensu lato) and *Chhrideae* (sensu lato). In the former it is mostly an open or contracted panicle, whereas in the latter it is composed of solitary, digitate or scattered secund spikes or spike-like racemes. The inflorescence of *Apochiton* is somewhat variable in its degree of branching. On small plants the branches are simple, spike-like and secund, and resemble those in some genera of the *Chlorideae*, whilst on larger plants the inflorescence is more divided and paniculate. Thus, by using inflorescence characters alone, *Apochiton* might be placed either in the *Festuceae* or in the *Chhrideae*. The genus is not unique in this respect, for *Leptochha*, *Diplachne*, *Coelachyrum*, *Trichoneura*, *Leptocarydion*, etc. have been referred by some authors to the first tribe and by others to the second. In neither case has a satisfactory solution—a natural classification—been produced, closely related genera often being widely separated. A more natural grouping is effected, however, by means of Stapf's classification (Dyer, PL Cap. vii. 10 : 1897 ; Prain, PL Trop. Afr. ix. 19 : 1917). He segregated from the *Festuceae* (sensu Bentham et Hackel) and *Chhrideae* a number of tropical and subtropical genera and placed them in a new tribe, the *Eragrosteae*. These genera agreed in

possessing 3-nerved lemmas, whereas those retained in the *Festuceae* usually had 5- or more-nerved lemmas. Further research into the anatomy and cytology of certain of the *Eragrosteae* has shown that Stapf was correct. I have somewhat extended his conception of the *Eragrosteae* by transferring to it a few genera left by him in the *Festuceae* and also a larger number from the *Chlorideae* (see also Hubbard in Hutchinson, Fam. PL Plants, ii. 210 : 1934). There is no doubt that the *Eragrosteae* and *Chlorideae* are more closely related to each other than either is to the *Festuceae*. The latter tribe in its most restricted sense is practically temperate in distribution, whilst the other two are mainly tropical. The tropical group comprising the *Eragrosteae* and *Chlorideae* is now known to be distinguished from the temperate group *Festuceae*, not only by morphological characters, but also by cytological and anatomical ones, so far as these have been investigated.<sup>1</sup> Avdulow in his work "Karyo-systematische Untersuchung der Familie Gramineen" (Bull. Appl. Bot. Leningrad, Suppl. 44, p. 294 et seq.: 1931) divides the *Gramineae* into two subfamilies, I. *Poatae* (p. 294), II. *Sacchariferae* (p. 309). The *Poatae* is subdivided into two series, *Phragmitiformes* (p. 294) and *Festuciformes* (p. 295). In the latter series, which includes the *Festuceae* (sensu meo), the chromosomes are large and their basic number is 7, whilst in the leaf-blades the chlorenchyma is uniformly distributed throughout the leaf and not restricted to a definite zone. The second subfamily, *Sacchariferae*, contains *Eragrostis*, *Leptochloa*, *Dinebra*, *Ehusine*, *Dactyloctenium*, *Sporobolus*,<sup>a</sup> and the tribes *Chlorideae*, *Paniceae*, *Andropogoneae*, etc. Here the chromosomes are small, their basic number is 9 or 10, and the chlorenchyma in the leaf-blade is localized in layers of cells around the vascular bundles.

The arrangement of the chlorenchyma in *Apochiton* is similar to that of *Eragrostis*. The cytology of *Apochiton* is being investigated by Mr. Amanujam, who informs me that the chromosomes are of the small type as in *Eragrostis*, and from a preliminary count, probably 40 (2n) number. Thus the inclusion of *Apochiton* in the *Eragrosteae* is supported by anatomical and cytological characters as well as by the structure of the spikelets.

#### KEY TO THE GENERA OF THE ERAGROSTEAE.

\*Spikelets bisexual, or if unisexual, then similar in appearance (*Eragrostis* sp.):

flLemmas usually entire at the apex, obtuse, acute or acuminate, sometimes mucronate, or if 2-toothed (*Acrachne*, *Ectrosia*) or awned from the entire tip (*Harpachne*, *Ectrosia*, *Elytrophorus*, *Pogonarthria* spp.),

in 'A<sup>866</sup> £<sup>vdul</sup><>w in Bull. Appl. Bot. I\*ningrad, Suppl. 44, pp. 1-428 (1931). Prat hnr<sup>TM1</sup> Soi. Nat. sér. 10, Bot. xiv. pp. 117-324 (1932), et in Bull. Soo. Bot. France, 2 ? ; PP. 357-367 (1933); lxxxii. ppf 475-491 (1934); lxxxii. pp. 498-506 (1936). hunter in Canad. Journ. Res. xi. pp. 213-241 (1934).

then glabrous near the margins and along the side-nerves ; cleistogamous spikelets not developed in the axils of the leaf-sheaths :

Glumes aristate or aristate-acuminate :

Spikelets pedicelled on the short angular branches of a narrow elongated panicle, many-flowered. . . . . 1. *Myriostachya*.

Spikelets sessile on the flattened branches of a narrow panicle, 2-3-flowered. . . . . 2. *Dinebra*.

Glumes obtuse, acute, or acuminate, rarely the upper awned and the spikelets then in digitate spikes (*Dactyloctenium*) :

Internodes of the rhachilla bearded at the tip with long hairs up to half the length of the lemma ; spikelets subsessile or short-pedicelled on the erect branches of a contracted elongated panicle. . . . . 3. *Halopyrum*.

Internodes of the rhachilla glabrous or only shortly hairy :

{Spikelets in open, contracted or spike-like panicles, or symmetrical racemes (*Harpachne*), rarely in solitary secund spikes (*Eragrostis* spp.) :

Spikelets in solitary racemes, falling entire with their pedicels ; lemmas acuminate or aristate-acuminate, increasing in length upwards. . . . . 4. *Harpachne*.

Spikelets in open, contracted, or spike-like panicles :

Spikelets awnless :

Lemmas not winged on the keel ; few or no sterile florets at the apex of the spikelets :

Glumes and lemmas usually glabrous, rarely the latter hairy near the margins or at the base (*Eragrostis* spp.):

Lemmas 3-nerved ; spikelets variously arranged :

Axis and branches of the inflorescence slender, terminating in a spikelet. . . . . 5. *Eragrostis*.

Axis and branches of the inflorescence terminating in a rigid spine ; branches more or less flattened . . . . . 6. *Cladoraphis*.

Lemmas 1-nerved ; spikelets in more or less spike-like panicles. . . . . 7. *Thellungia*.

Glumes and lemmas loosely hairy all over ; spikelets in dense spike-like panicles. . . . . 8. *Stiburus*.

Lemmas winged on the keel, strongly compressed ; several sterile florets without paleas at the apex of the spikelets ; spikelets in dense panicles. . . . . 9. *Heterachne*.

Spikelets usually awned :

Spikelets with several awned or acuminate sterile florets at the apex ; paleas not or only narrowly winged on the keels ; spikelets usually in dense or contracted panicles 10. *Ectrosia*-

Spikelets with the uppermost floret sterile ; paleas broadly winged on the keels ; spikelets in spike-like panicles or dense globose clusters. . . . . 11. *Elytrophorus*.

JJSpikelets sessile or very short-pedicelled, loosely to densely imbricate in digitate or racemosely arranged spikes or spike-like racemes, very rarely in solitary spikes (*Eleusine* sp.) :

§ Lemmas glabrous, or shortly hairy in, the lower part or on the nerves ; spikelets closely to densely imbricate, biseriate :

|| Axis and branches of the inflorescence ending in a spikelet:

Lemmas more or less rounded on the back, or only slightly keeled above the middle :

Racemes distant, in a narrow inflorescence ; glumes 1-nerved ; lemmas pubescent in the lower part with clavate-tipped hairs ; grain smooth, plano-convex . . . .12. *Cypholepis*.

Racemes close together at the apex of the culm ; glumes 3-5-nerved; lemmas pubescent with fine hairs; grain coarsely wrinkled, subglobose, deeply hollowed out on the face. . . . .13. *Coelachyrum*.

Lemmas acutely keeled :

Internodes of the rhachilla ciliate at the tips ; spikelets in numerous curved or straight spikes or spike-like racemes, in a narrow elongated inflorescence . . .14. *Pogonarthria*.

Internodes of the rhachilla not ciliate at the tips :

Spikelets falling entire at maturity from the axis of straight spikes, the latter numerous and crowded into a long narrow dense panicle ; glumes 1-nerved . . . 15. *Desmostachya*.

Spikelets breaking up at maturity ; spikes few to several:

Upper glume 6-8-nerved ; spikes bare at the base, arranged in a narrow panicle. . . . .16. *Heterocarpha*.

Upper glume 1-5-nerved ; spikes digitate or racemosely arranged, with spikelets right to the base :

Spikes digitate or subdigitate ; lemmas entire :

Spikelets 7-20-flowered ; glumes 1-nerved ; grain sub-triquetrous, smooth, with a very thin pericarp.

17. *Sclerodactylon*.

Spikelets 3-6-flowered; glumes 1-5-nerved; grain oblong to globose, grooved, with a loose conspicuous pericarp. . . . .18. *Eleusine*.

Spikes usually in pseudowhorls or scattered ; lemmas with the lateral nerves running out into minute teeth and the middle nerve into a mucro or short awn ; spikelets 8-20-flowered ; glumes 1-nerved ; grain coarsely rugose, grooved or hollowed out on the face, with an early deciduous pericarp. . . . .19. *Acrachne*.

II || Axis of spikes terminating with a sharp point; upper glume mucronate or awned ; spikes digitate . . 20. *Dactyloctenium*.

§§ Lemmas softly villous all over; spikelets loosely imbricate, in loosely paniced racemes. . . . .21. *Orinus*.

II-Lemmas usually emarginate or 2-4-lobed or -toothed at the apex, rarely entire and then hairy along the nerves, frequently mucronate or awned:

II Spikelets in panicles, or in digitate or racemosely arranged spikes or spike-like racemes :

Cleistogamous spikelets developed in the axils of most leaf-sheaths of the culms ; florets exerted from the glumes ; spikelets in lax panicles :

Lemmas deeply 2-lobed ; paleas densely ciliate on the upper part of the keels. . . . . 22. *Triplasis*.

Lemmas minutely 2-toothed or entire ; paleas glabrous or scaberulous on the keels. . . . . 23. *Cleistogenes*.

Cleistogamous spikelets not developed in the axils of the leaf-sheaths of the culm, or if so, then the glumes longer than the remainder of the spikelet:

Leaf-blades short, rigid, pungent, conspicuously distichous and evenly spaced throughout the much-branched culms ; spikelets in small contracted panicles ; lemmas and paleas hairy on the nerves. . . . . 24. *Odyssea*.

Leaf-blades not short and pungent and at the same time evenly spaced :

Paleas 2-awned ; grain with a free pericarp ; lemmas entire, awned from the tip ; spikelets usually in loose panicles.

25. *Apochiton*.

Paleas usually awnless, or if 2-awned then the grain with an adhering pericarp :

•0-Lemma usually mucronate or 1-awned :

ooUppermost lemma usually sterile, awned or awnless, the remainder hermaphrodite ; spikelets not in digitate spikes :

Spikelets in slender, more or less secund, racemosely arranged racemes :

Glumes usually exceeding the florets or extending to the tip of the uppermost floret; lemma usually mucronate or short-awned. . . . . 26. *Trichoneura*.

Glumes shorter than the spikelet:

Racemes loosely scattered :

Uppermost lemma awned. . . . . 27. *Gouinia*.

Uppermost lemma awnless :

Racemes loosely spiculate ; spikelets linear-oblong, subterete ; lemmas more or less rounded on the back.

28. *Diplachne*.

Racemes mostly densely spiculate, conspicuously secund ; spikelets oblong, laterally compressed ; lemmas keeled.

29. *Leptochloa*.

Racemes dense, very numerous, in spike-like inflorescences ; lemmas awned; leaf-blades lanceolate to lanceolate-oblong, rounded at the base . . . . 30. *Leptocarychon*.

Spikelets in loose or contracted panicles :

Low or moderately tall grasses, up to 1 • 5 m. high :

Lemmas rounded on the back, at least in the lower part, awnless, mucronate or short-awned . . . . 31. *Tridens*.

Lemmas keeled, usually long-awned . . . . 32. *Crinipes*.

Tall stout reed-like grasses, with large plume-like panicles;  
 lemmas with curved tips and awns, <sup>^ng-o^Ujnj^</sup>  
 marginal nerves. . . . . \*o^ ^>  
 Upper 2-5 lemmas sterile, forming a tuft of awns; florets  
 exceeded by the glumes; spikelets in <sup>^dig.tote^kpsme.</sup>  
<sup>^</sup>Lemmas 3-awned; spikelets in loose or <sup>panicles.</sup> <sup>triphis.</sup>

Spikelets in solitary terminal secund spikes . . . 36. <sup>f^pogon.</sup>  
 \*Spikelets unisexual, the sexes in different inflorescences and of different  
 appearance:  
 Female spikelets in a terminal raceme, long-awned <sup>spikelets</sup> <sup>eropogon.</sup>  
 awned or awnless. . . . . ; male  
 Female spikelets in the axils of the leaf-sheaths, awnless <sup>Jouvea.</sup>  
 spikelets in a terminal spike, awnless . . . . .

ENUMERATION OF THE GENERA OF BRAGROSTEALE.

1. <sup>M^iostachya</sup> <sup>f</sup> <sup>Fl. Brit. Ind. vii 327 (1896).</sup> Species 1 or 2:

Species 1. Tropical

<sup>Afri</sup>  
 3. <sup>Egypt, eastward to</sup> <sup>f in Hook. Ic. Pl. xxv. 2448 (1896); Hook. f. Fl.</sup>  
 Brit. Ind. vii. 328 (1896). Species 1. On the coasts of Tropical east  
 Africa, Tropical Arabia and India.

4- <sup>Harpachne Hochst. ex A. Rich. Tent Fl. Abyss u. «MJ 86 ^</sup>  
 Species 1. Tropical east Africa, from Eritrea and Abyssinia to

Species over 250. Throughout the tropics, extending into warm

<sup>Franch. in Bull. Soc. Linn. Paris 1895</sup>  
 Species 1. Tropical south-west Africa and South Africa.  
 7. <sup>Thellungia Stapf in Kew Bull. 1920, 98, fig. p. 99; C. E. Hubbard</sup>  
 in Hook. Ic. Pl. xxxii. t. 3184 (1933). Species 1. Queensland and  
 New South Wales.

8. <sup>Stiburus Stapf in Dyer, Fl. Cap. vii. 696 (1900). Triphlebia Stapf</sup>  
 i.c 318 (1898), et in Hook. Ic. PL xxvu- \*o^ £^ \*\_\_\_\_\_ non Baker.

Species 2. South Tropical Africa and South-Africa. et Fl.

9. <sup>Heterachne BmA. in Hook. Ic. PL \*m. »\*\* ^S t. s\* »t</sup>  
 Austral, vii. 634 (1878); C. E. Hubbard in Hook. Ic PL KXIU.  
 (1935). Species 3. Northern Australia and Queensland.

10. <sup>Ectrosia R. Br. Prodr. Fl. Nov Holl 185 (1810) rjgf^</sup>  
 Austral, vii. 633 (1878); C. E. Hubbard in Hook Ic. PL <sup>TM ^ £ d</sup>  
 (1936). Species 10. New Guinea, Northern Australia and Queensland

11. **Elytrophorus** *Beauv.* Agrost. 67, t. 14, fig. 2 (1812). Species 2. Tropical Africa, India, Malayan Region and Northern and Central Australia.
12. **Cypholepis** *Chiov.* in Ann. Istit. Bot. Roma, viii. 357 (1908). Species 1. Tropical Arabia, Eritrea, Somali land, Tanganyika Territory and South Africa.
13. **Coelachyrum** *Hochst. et Nees* in Linnaea, xvi. 221 (1842). Species 3. North Tropical Africa, Tropical Arabia.
14. **Pogonarthria** *Stapf* in Dyer, Fl. Cap. vii. 316 (1898), 589 (1900), et in Hook. Ic. Pl. xxvii. t. 2610 (1899). Species 3-4. Tropical east Africa and South Africa.
15. **Desmostachya** *Stapf* in Dyer, Fl. Cap. vii. 316 (1898), 632 (1900). *Stapfiola* O. Kuntze in Post & O. Kuntze, Lexic. Gen. Phan. 532 (1903). Species 1. North Tropical Africa to India, Indo-China and Siam.
16. **Heterocarpha** *Stapf et C. E. Hubbard* in Kew Bull. 1929, 263, fig. p. 264. Species 1. Tanganyika Territory.
17. **Sclerodactylon** *Stapf* in Kew Bull. 1911, 318, et in Hook. Ic. Pl. xxxi. t. 3014 (1915). Species 1. Mascarene Islands.
18. **Eleusine** *Gaertn.* Fruct. i. 7, t. 1 (1788). Species 7-8. Throughout the tropics, extending into warm temperate regions.
19. **Acrachne** *Wight et Am. ex Chiov.* in Ann. Istit. Bot. Roma, viii. 361 (1908). Species 1. Tropical Africa and Asia, Northern Australia.
20. **Dactyloctenium** *Willd.* Enum. Hort. Berol. 1029 (1809). Species 9. Throughout the tropics, extending into warm temperate regions.
21. **Orinus** *Hitchc.* in Journ. Acad. Sci. Wash, xxiii. 136, fig. 2 (1933). Species 1. Kashmir and Western Tibet.
22. **Triplasis** *Beauv.* Agrost. 81, t. 16, fig. 10 (1812). Species 3. North America.
23. **Cleistogenes** *Keng* in Sinensia, v. 147 (1934). Species 6. South Europe, Northern, Central and Eastern Asia.
24. **Odyssea** *Stapf* in Hook. Ic. Pl. xxxi. t. 3100 (1922). Species 2. Tropical Arabia, Socotra, Somaliland, South Africa.
25. **Apochiton** *C. E. Hubbard* in Hook. Ic. Pl. xxxiv. t. 3319 (1936). Species 1. Tanganyika Territory.
26. **Trichoneura** *Anderss.* in Vet.-Akad. Handl. Stockh. 1853, 148 (1855); Ekman in Arkiv. Bot. Stockh. xi. no. 9 (1912). *Crossotropis* *Stapf* in Dyer, Fl. Cap. vii. 317 (1898), 649 (1900), et in Hook. Ic. Pl. xxvii. t. 2609 (1899). Species 7-8. Tropical and South Africa, Tropical Arabia, Texas and the Galapagos Islands.
27. **Gouinia** *Fourn.* ex Benth. in Benth. et Hook. f. Gen. Pl. iii. H<sup>78</sup> (1883); Fourn. Mex. Pl. ii. 103 (1886); Swallen in Amer. Journ. Bot. xxii. 31 (1935). *Pogochloa* S. Moore in Trans. Linn. Soc. ser. 2, iv. 509, t. 37, figs. 9-23 (1895). Species 13. Mexico, West Indies to Argentine.
28. **Diplachne** *Beauv.* Agrost. 80, 1.16, fig. 9 (1812). Species about 14. Throughout the tropics, extending into warm temperate regions.
29. **Leptochloa** *Beauv.* Agrost. 71, 1.15, fig. 1 (1812). Species 17-18. Throughout the tropics.



30. **Leptocarydion** Hochst. ex Stapf in Dyer, Fl. Cap. vii. 316 (1898), 648 (1900). Species 1. Tropical east and South Africa.

31. **Tridens** Roem. et Schult. Syst. Veg. ii. 34, 599 (1817). Species 18-20. North and South America. This genus includes a number of species usually referred to *Triodia* R. Br. by American botanists. It may have to be subdivided eventually into a number of smaller genera, certain of which appear to be related to *Munroa* Torr. (see Parodi in Revista Mus. La Plata, xxxiv. 176-177 : 1934).

32. **Crinipes** Hochst. in Flora, xxxviii. 279 (1855). Species 5. Tropical east Africa, Angola and South Africa.

33. **Neyraudia** Hook. f. Fl. Brit. Ind. vii. 305 (1897). Species 2. Tropical east Africa, Madagascar, Tropical Asia.

34. **Lophacme** Stapf in Dyer, Fl. Cap. vii. 316 (1898), 647 (1900), et in Hook. Ic. Pl. xxvii. t. 2611 (1899). Species 1. South Tropical Africa and South Africa.

35. **Triraphis** R. Br. Prodr. Fl. Nov. Holl. 185 (1810), p.p.; Stapf in Dyer, Fl. Cap. vii. 650 (1900). Species about 8. Tropical and South Africa, Australia.

36. **Tripogon** Roth ex Roem. et Schult. Syst. Veg. n. 34, 600 (1817). Species about 20. Throughout the tropics.

37. **Sderopogon** Phil. Anal. Univ. Chile, xxxvi. 205 (1870); Bert. Mend. Alt. 47 (1871); Hitchc. in U.S. Dept. Agnc. Bull. no. 77, Hi (1920). Species 1. Southern United States to Chile.

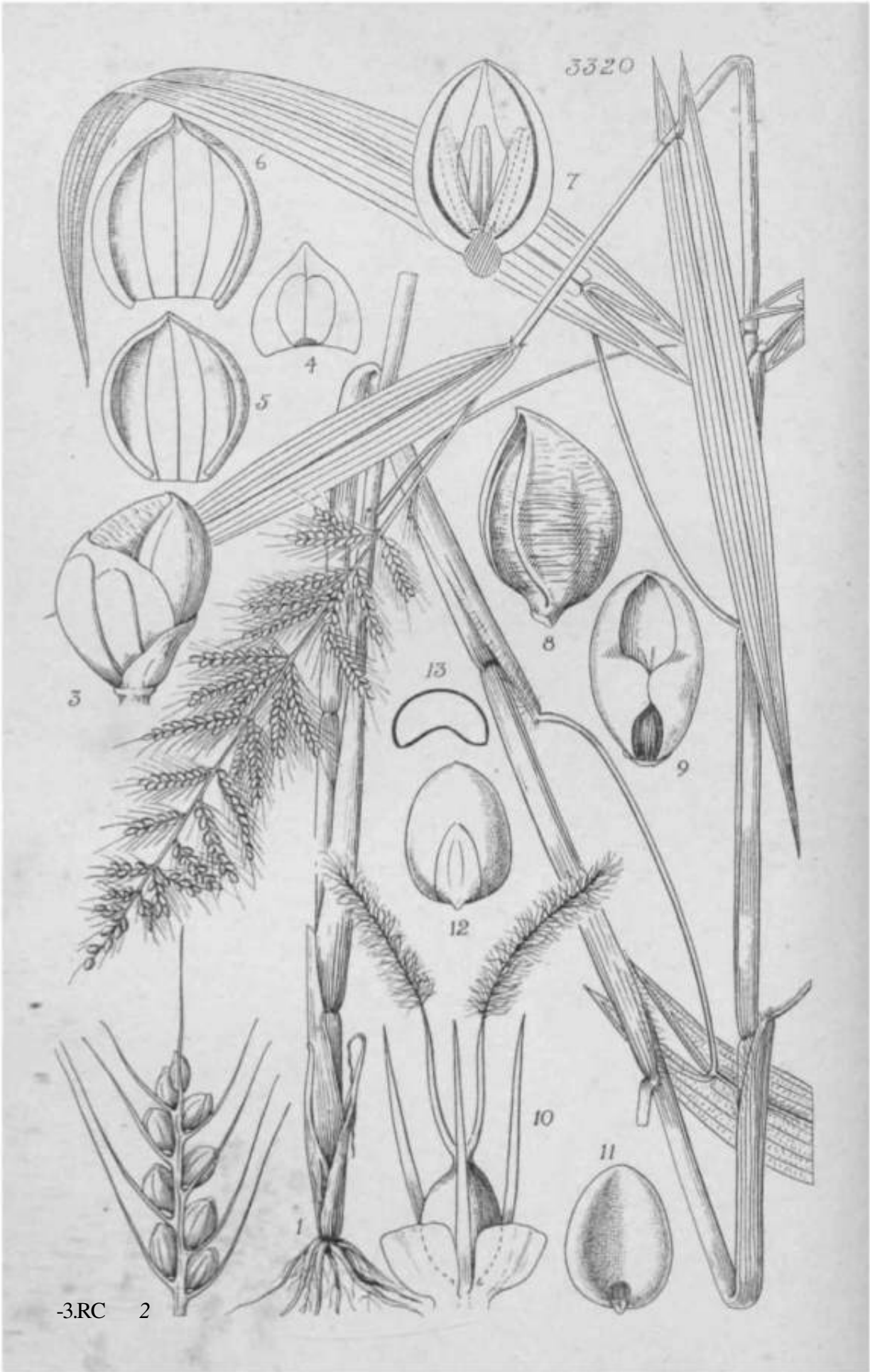
38. **Jouvea** Fourn. in Bull. Soc. Bot. Belg. xv. 475 (1876); Prat in Bull. Soc. Bot. France, lxxx. 357 (1933). Species 2. Central America.

C. E. HUBBARD.

#### APOGONITON BURTTII.

Fig. 1, plant, natural size; 2, spikelet; 3, lower glume; 4, upper glume; 5, floret; 6, lemma, opened out; 7, palea; 8, lodicules; 9, stamens and pistil; 10, grain; 11, transverse section of grain; 12 and 13, grain with pericarp removed. \*figs. 3-8, 10-13, x 8; fig. 2, x 6; fig. 9, x 12.

3320



TABULA 3320.

CYMBOSETAHIA SAQITTIPOLIA (A. Rich.) Schweickerdt

GRAMINEAE. Tribus PANICEAE.

**Cymbosetahia Schweickerdt.** Genus novum, *Setariae* Beauv. affine, sed spiculis concave trigonis cymbiformibus leviter oblique semi-orbicularibus subapiculatisque in racemis lateralibus laxe biseriatis secundisque dispositis, lemmate cymbiformi trigono obtuse carinato, caryopside ovata ventre concava dorso valde convexa differt.

*Spiculae* similes, abaxiales, solitariae, breviter pedicellatae, demum totae a pedicellis persistentibus disarticulatae, a latere visae cymbiformes, leviter oblique semi-orbiculares, concave trigonae, subapiculatae, in racemis spiciformibus biseriatis secundis dispositae. *Anthoecia* duo; inferum vel masculinum vel sterile et ad lemma paleamque redactum; superum \$, infero paullo longius. *Rhachilla* haud producta. *Glumae* dissimiles, fere membranaceae; gluma inferior minuta, late ovata, 3-nervis; gluma superior elliptica, obtuse apiculata, valde concava, 5-7-nervis, spicula multo brevior. *Anthoecium inferum*: lemma spiculae aequilongum vel paullo brevius, glumae superiori simile sed minus concavum; palea tenuissima, hyalina, plana, subapiculata, lemmati aequilonga, 2-nervis, marginibus inflexis, carinis valde alatis. *Lemma* tria; antherae lineares. *Anthoecium superum* cum spicula conforme et earn aequans; lemma cymbiforme, subapiculatum, trigonum, dorso obtuse sed valde carinatum, crustaceum; palea lemmati aequilonga, elliptica, dorso plana, 2-nervis, Crustacea, marginibus inflexis. *Lodiculae* duae, tenuissimae. *Stamina* tria; antherae lineares. *Ovarium* glabrum; styli distincti, terminates; stigmata plumosa, ex apice anthoecii exserta. *Caryopsis* ovata, apice rotundata, facie concava, dorso valde convexa; scutellum circiter duas partes caryopsidis aequans.—*Gramen* annum, simplex vel laxe caespitosum; culmi multinodes; laminae lanceolatae, planae, ligula tenuiter membranacea; panicula laxe composita, ramis circiter 12-spiculatis, pedicellis solitariis; spiculae totae glabrae.

Species unica, Africae tropicae subtropicaeque necnon Arabiae australis incola.

\* ***C. sagittifolia* (A. Rich.) Schweickerdt, comb. nov.** *Panicum sagittifolium* Hochst. ex A. Rich. Tent. Fl. Abyss, ii. 379 (1851), in syn., nomen tantum; Steud. Syn. PL Glum. i. 54 (1854); Schweinfurth in litt. Herb. Boiss. sér. 1, ii. App. 2, 21 (1894); Dur. et Schinz, Consp. Fl. Afr. v. 761 (1894); Hack, in Bull. Herb. Boiss. sér. 1, iv. App. 3, 14 (1896); Pilger in Engl. Bot. Jahrb. xxxiii. 44 (1902); Dinter in Fedde, Repert. xxii. 111 (1925). *Pennisetum sagittifolium* A. Rich. Tent. Fl. Abyss, ii. 379 (1851). *Setaria sagittifolia* (A. Rich.) Walp. Ann. Bot.

of *Setaria*, namely, *S. viridis* (L.) Beauv., that the creation of a separate genus seems fully justified.

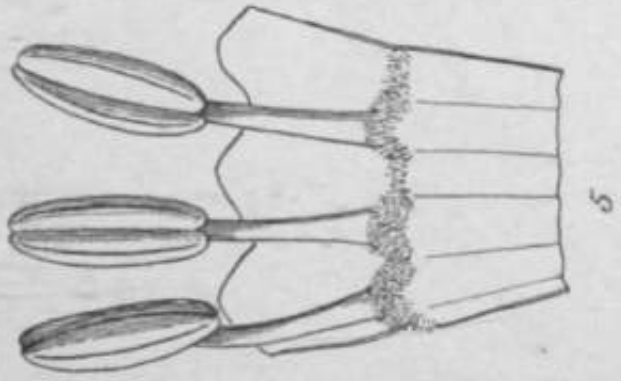
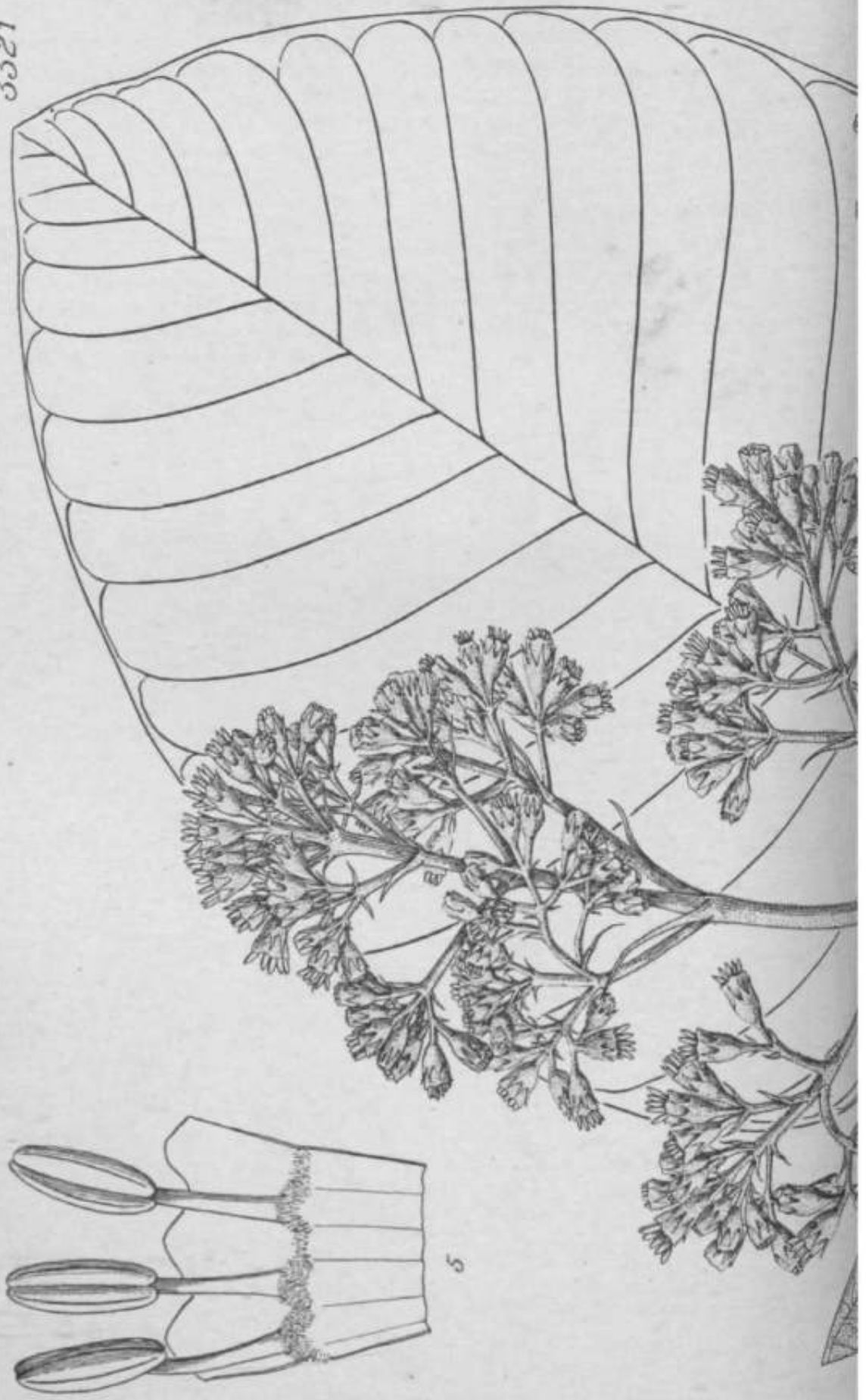
Judging from an illustration of *Setaria barbiger* (Bertol.) Stapf in the Kew Herbarium, it is not improbable that that species should be transferred to *Cymbosetaria*, but it seems inadvisable to make the transfer without having seen the type.

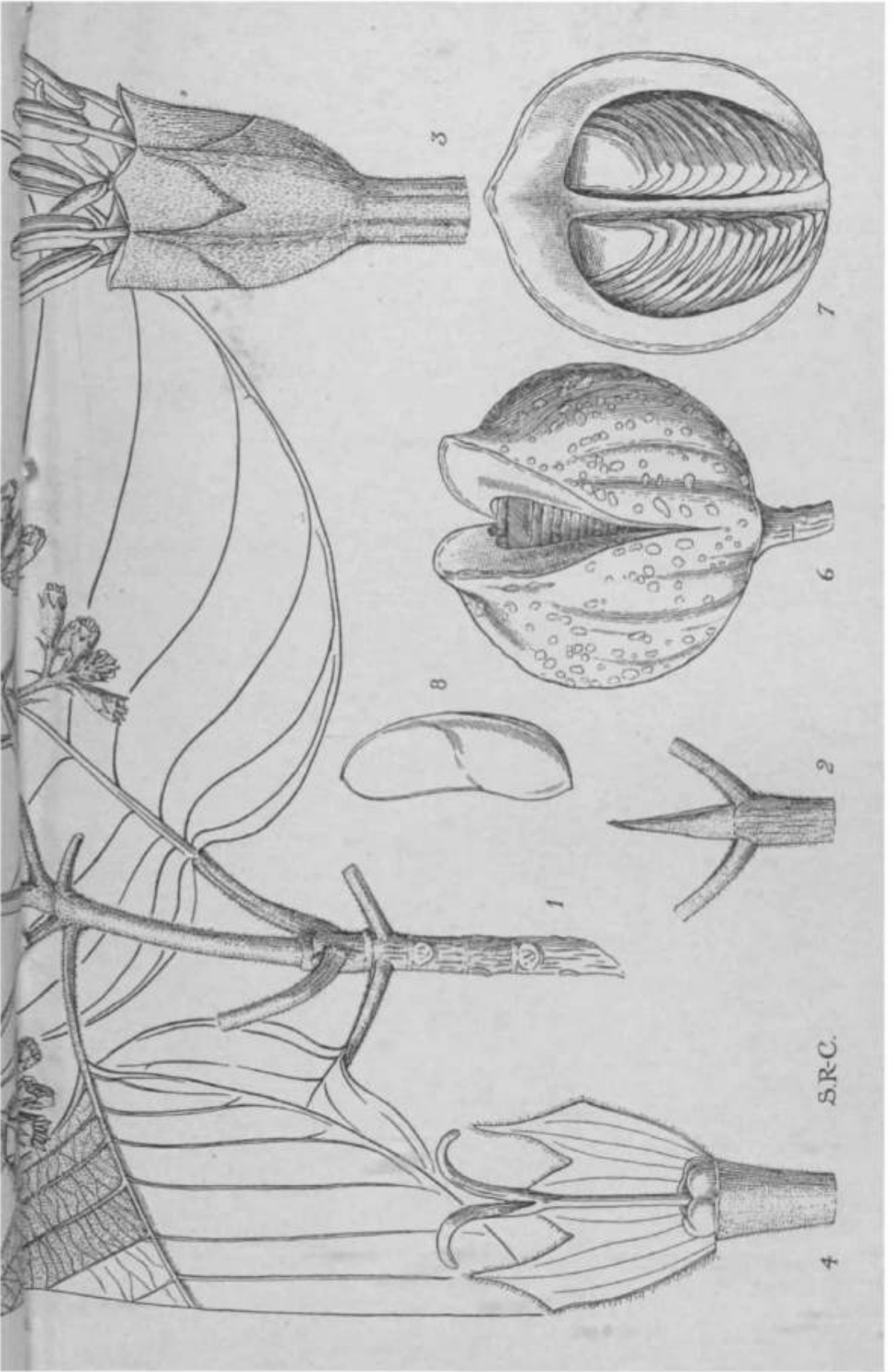
A study of the geographical distribution of *Cymbosetaria sagittifolia* (A. Rich.) Schweickerdt shows that it is a southern Arabian and almost pan-African species growing in regions of seasonal rainfall. The specimens in the Kew Herbarium exhibit a great range in size. The species is an annual, which develops during or after the seasonal rains, preferring relatively damp localities such as river-banks (fide Trapnell) or the shade of trees (fide Schweickerdt et Verdoorn) and is thus hygrophytic or even hydrophytic (fide Schweinfurth) in habitat.

H. 6. SCHWEICKERDT.

FIG. 1, plant, showing habit, *natural size*; 2, branch of the inflorescence, seen from above, x 4; 3, spikelet, x 16; 4, lower glume, flattened, anterior view, x 16; 5, upper glume, anterior view, x 16; 6, valve of lower floret, anterior view, x 16; 7, pale of lower floret, anterior view, showing anthers, x 16; 8, upper floret, lateral view, showing valve and pale, x 16; 9, pale, anterior view, showing young ovary (with anthers removed), x 16; 10, lodicules, filaments and pistil of upper floret, x 30; 11, caryopsis, anterior view, x 16; 12, caryopsis, dorsal view, x 16; 13, caryopsis, transverse section, x 16.

3321





S.R.C.

TABULA 3321.

SICKINGIA MEXICANA *Bullock*.

RUBIACEAE. Tribus CINCHONEAE.

.. *S. mexicana* *Bullock*; species nova, distinctissima, affinis *S. Glaziovii* K. Schum. (*S. Erythroxyhn* Oliv., non Willd.), sed ramulis novellis inflorescentiisque tomentellis, foliis longius petiolatis rotundatis vel Jate ellipticis vel ovatis (haud obovatis) basi truncatis usque profunde cordatis (haud angustato-truncatis) apice obtusis vel cuspidatis, floribus minoribus extra pubescentibus, capsulis seminibusque multo majoribus facile distinguenda.

. *Fruiex* erectus vel *arbor* parva, 2-6 m. alta; caules teretes, recti, internodiis 3-6 cm. longis, cortice pallide brunneo demum cinereo striato glabrato, ligno rubello; ramuli novelli (ut petioli et inflorescentiae) fulvo-tomentelli. *Folia* magna, ambitu rotundata vel late elliptica vel late ovata, usque ad 18 cm. diametro, basi truncata usque satis profunde cordata, nee basin versus angustata, apice obtusa vel breviter obtuse vel acute cuspidata, nervis lateralibus utrinsecus usque 20, supra puberula costa pubescente, subtus costa tomentella ceterum vuloso-pubescentia praesertim in nervis; petioli 1-3 cm. longi, subteretes, 2 • 5 mm. diametro vel ultra; stipulae mox deciduae, triangulari-subulatae, 2 • 5 cm. longae. *Flores* pallide rosei, in thyrsos pyramidales tomentellos multifloros dispositi, breviter pedicellati; bractee lineares vel lineari-subulatae, usque ad 1-5 cm. longae. Cto tyaaequaliter vel maequaliter 4-6-dentata, interdum profunde unilateraliter fissus, ambitu (ovario incluso) anguste turbinatus, totus circiter 8 mm. longus, breviter pubescens. *Corolla* cupularis, vix 5 mm. longa et 3 mm. diametro, extra strigoso-pubescentis, intus glabra, limbo levissime 5-6-(plerumque 5-)undulato, aestivatione ab initio aperta. *Stamina* 5-6, infra medium corollae tubo inserta; filamenta robusta, 3 mm. longa, insertione leviter strigoso-pubescentes, fere in anulum conniventes; antherae exsertae, dorsifixae, rubrae, oblongae, 2-5 mm. longae, introrsum longitudinaliter dehiscentes, thecis utrinque obtusis. *Thscus* carnosus, annularis, crenatus. *Stylus* carnosulus, 5-5 mm. longus, basin versus leviter angustatus, apice stigmatico-biramosus, ramis lineari-oblongis tandem recurvis circiter 2 mm. longis. *Ovarium* circiter 4 mm. longum, biloculare; placentae quoque loculo geminae, parallelae, carnosae, septo longitudinaliter affixae; ovula numerosa, uniseriata, horizontalia, subimmersa. *Capsuh* lignosa, subglobosa, 4-5-0 cm. diametro, loculicide dehiscentis, secus suturam (apice praesertim) carinata valvis ab apice ad instar labiorum apertis leviter recurvis; septum tenuiter lignosum, persistens; placentae membranaceae, aliformes, versus marginem exteriorem septorum ortae. *Semina* numerosa, magna, plana, horizontalia, imbricata, in alas aequilongas producta, tota 3-3 cm. longa et 1 cm. lata, oblongo-reniformes, plus minusve rubella; testa molliter coriacea; albumen copiosum; embryo

rectus, totus 6 mm. longus, cotyledonibus rotundatis 3 mm. diametro, radícula brevissima.

MEXICO. District of Temascaltepee, State of Mexico: Luvianos, 26 Sept. 1933 (fl.), *Hinton* 4818 (type) ; Luvianos, 26 Nov. 1934 (fr.) (same tree as No. 4818), *Hinton* 7043; Acatitlan, 27 Dec. 1934 (fr.), *Hinton* 7173. District of Coyuca, State of Guerrero : Placeres, 4 June 1934 (fl.), *Hinton* 6108 ; Jaripo, 3 Nov. 1934 (fr.), *Hinton* 6917.

Vernacular name : " Cucharillo."

*Sickingia mexicana* constitutes a new generic record for Mexico. The majority of the known species are South American, but one has been found in Honduras. Two species have been previously figured in this work, namely, as *S. Erythroxyton* Willd. (t. 1497) and *S. longifolia* Willd. (t. 1498). Oliver's identifications of the plants figured were challenged by K. Schumann in Engl. Bot. Jahrb. x. 327-8 (1888) and in Mart. Fl. Bras. vi. VI. 227 et 232 (1889), and he renamed them *S. Glaziovii* K. Schum. and *S. Oliveri* K. Schum. respectively. The material at Kew is insufficient for criticism of K. Schumann's work, but the characters given in his key to the species in the Flora Brasiliensis suggest that he was correct.

Mr. Hinton's plant is a shrub or small tree up to about 20 feet high, bearing large rounded leaves and terminal thyrses of pink flowers. The pink coloration is probably due almost entirely to the exerted stamens.

The genus falls into two sharply defined groups of species, characterized respectively by the open or closed aestivation of the corolla. In the former, to which *S. mexicana* and *S. Glaziovii* belong, the aestivation is open from the earliest stages, and the stamens can be seen quite distinctly when the corolla as yet consists of a mere rim and they themselves are no more than humps projecting from the terminal meristem.

As in other species, the wood of *S. mexicana* is reddish owing to the presence of a pigment; this seems to be distributed throughout the plant, and it affords an easy means of distinguishing the vascular strands in the unligified tissue of the ovary. *Sickingia mexicana*, as indicated in the diagnosis, is readily distinguishable from its nearest ally by the indumentum, leaf-shape, and size of the capsule. The capsule is very woody, globose, and somewhat less than two inches in diameter; in all the specimens seen, the epicarp is very strongly lenticellate.

The line of dehiscence is marked by a ridge, more pronounced at the apex, forming a great circle in a plane at right-angles to the septum. In the first stages of dehiscence the apical part of the ridge becomes recurved, giving the valves the appearance of two lips.

In the enumeration of the specimens seen, it will be noted that the type-specimen came from a marked tree, and that fruiting material was collected from it in the following year.—A. A. BULLOCK.

FIO. 1, flowering branch, *natural size*; 2, stipules, at end of vegetative shoot, *natural size*; 3, flower, x 6 ; 4, gynoeceium and part of calyx laid open, x 6 ; 5, part of corolla and androeceium, x 6 ; 6, capsule, *natural size* ; 7, half of capsule, seen slightly from above, showing two rows of seeds, *natural size*; 8, seed, *natural size*.





## TABULA 3322.

### RONDELETIA JURGENSENII *Hemsl.*

RUBIACEAE. Tribus RONDELETIEAE.

*R.* (§ Calycosae) *Jurgensenii Hemsl.* Diagn. Pl. Nov. pars altera, 29 (1879), et Biol. Centr.-Amer., Bot. ii. 11 (1881-32); Standl. in N. Amer. J]. xxii. 60 (1918), et in Contrib. U.S. Nat. Herb, xxiii. 1356 (1926).—Species minus cognita, inter species hujus sectionis corolla extra glabra et stipulis parvis haud foliaceis distincta ; a *R. Gakottii* Standl. foliis stipulisque multo minoribus necnon floribus majoribus recedit.

. *Frutex* ramosus, usque ad 4 m. altus, foliis ramulis hornotinis necnon mlflorescentiis glabris vel leviter pilosis usque densiuscule villosopubescentibus. *Folia* anguste ovata usque elliptico-lanceolata vel oblanceolata, apice acuta vel acute acuminata, basi acuta vel cuneata, usque ad 9 • 5 cm. longa et 3 • 5 cm. lata, utraque pagina glabrescentia vel parce villosa, marginibus saepe ciliata, nervis lateralibus utrinsecus circiter 5, subtus venulis reticulatis manifestis leviter impressis ; petioli pilosi, 4-6 mm. longi; stipulae parvae, plus minusve deltoideae, acutae. *Fhres* heterostyli, rosei, tetrameri, in thyrsos terminales multifloros dispositi; pedicelli 3-5 mm. longi; bracteae parvae, oppositae, subulatae ; bracteolae solitariae, similes. *Calyx* urceolato-turbinatus; tubus (receptaculo incluso) 2 mm. longus, longe pilosus; lobi ascendentes, subulati, 2-4 mm. longi, pilosi, saepe inaequales. *Corolla* 1\*5 cm. longa, extra glabra ; tubus anguste cylindricus, intus dimidio mferiore leviter retrorsum pubescens ; lobi patentes, late elliptici vel subrotundati, 2-5 mm. diametro, margine crispatis. *Stamina* in floribus brevistylis corollae fauce inserta, filamentis brevissimis vel subobsoletis, antheris prope medium dorsifixis lineari-oblongis 2 mm. longis basi breviter bifidis semi-exsertis ; ea in floribus longistylis infra fauce ^erta, filamentis filiformibus vix 1 mm. longis, antheris basi longius bifidis inclusis. *Stylus* filiformis, in floribus brevistylis 1 cm. longus, ramis stigmaticis linearibus 1-5 mm. longis; in floribus longistylis 1\*6 cm. longus, ramis stigmaticis oblongis 1 mm. longis exsertis. *barium* 1-5 mm. longum, biloculare; placentae peltatae, breviter stipitatae; ovula valde numerosa. *Capsula* glabra, laevis, ovoidea vel compresso-globosa, subdidyma, 4-5-6 mm. lata, et septicide et loculicide dehiscens, calyce persistente coronata. *Semina* numerosa, a Placentis patentia, prismatica, placentis lignescentibus lineari-oblongis 6<sup>m m</sup> - longis valde foveolatis.

i3<sup>EXICO</sup> - district of Temascaltepec, State of Mexico: Chorrera, ^2?0 m., Aug. 1932 (fl.), *Hinton* 1280; Temascaltepec, 1730 m. (fl.), *Qtton* 1420; Cumbre de Tejupilco, 2000 m., Nov. 1932 (fr.), *Hinton* ^05; Nanchititla, Aug. 1933 (fl.), *Hinton* 4517 ; Peñón, 1700 m., Aug. 1933 (fl.), *Hinton* 4408 ; Las Mesas, Aug. 1934 (fl.), *Hinton* 6394 ;

Cumbre de Tejupilco, Nov. 1934 (fr.), *Hinton* 7016 ; Luvianos, Nov. 1934 (fr.), *Hinton* 7042 ; Nanchititla, June 1935 (fl.), *Hinton* 7895 ; Ypericones, July 1935 (fl.), *Hinton* 8082. State of Oaxaca : Sierra de San Pedro Nolasco (fl. & fr.), *Jurgensen* 248 (type).

*Rondeletia Jurgensenii* was previously known only from the rather poor material collected by Jurgensen nearly a hundred years ago. Hemsley described the plant as being glabrous, but careful examination of the type-specimen reveals a few hairs, particularly in the younger parts, of similar character to those more easily seen on the excellent series of specimens sent to Kew by Mr. G. B. Hinton. There is sufficient variation in the amount of indumentum to leave no doubt that these new specimens are conspecific with the type. All the drawings are taken from Mr. Hinton's specimens.

It will be of interest to botanists to learn that Mr. Hinton has rediscovered in the district of Temascaltepec a number of plants previously found only by such early collectors as Ehrenberg, Jurgensen, and Sessé and Mociño.—A. A. BULLOCK.

FIG. 1, flowering branch, *natural size* ; 2, node, showing a stipule, x 8 ; 3, corolla of a long-styled flower, laid open to show the androecium and retrorse hairs in the lower half of the tube, x 4 ; 4, calyx, x 6 ; 5, the same with two lobes laid back to show the disk, x 6 ; 6, anther from a long-styled flower, x 8 ; 7, anther from a short-styled flower, x 8 ; 8, style and stigma from a long-styled flower, x 4 ; 9, infructescence, *natural size* ; 10, one loculus of a capsule in longitudinal section, x 6 ; 11, seed, x 8.



## TABULA 3323.

### BOUVARDIA CORDIFOLIA DC.

RUBIACEAE. Tribus CINCHONEAE.

**B. cordifolia** DC. in DC. Prodr. iv. 366 (1827); Schlecht. in Linnaea, xxvi. 66 (1853); Alph. DC. Calq. Dess. t. 487 (1874); Standl. in N. Amer. PL xxxii. I11 (1921), et in Contrib. U.S. Nat. Herb, xxiii. 1365 (1926), sub spp. dub.—*Hedyotis lutea* Sesse et Moc. PI. Mex. ed. 2, 20 (1893); Standl. in N. Amer. PL xxxii. I11 (1921), sub spp. dub.—*Ixora cordifolia* Sesse et Moc. ex DC. in D(f. Prodr. iv. 366 (1827), in syn.; Schlecht. in Linnaea, xxvi. 66 (1853), in syn.—Species hactenus imperfecte cognita, foliis lanceolatis vel saepius late ovatis basi late rotundatis vel saepe subcordatis, corollae tubo extra minutissime papilloso-puberulo distincta.

*Suffrutex* ramosus, usque ad 1 m. altus; rami annotini graciles, glabri, laeves; ramuli hornotini plus minusve pubescentes vel puberuli, rarus subglabri; laterales plerumque apice floriferi, superne foliosi, interne foliis redactis basi cataphyllaribus praediti. *Folia* opposita, lanceolata vel saepius ovata vel late ovata, usque ad 5 cm. longa et 3\*5 cm. lata (sed saepissime multo minora et inferiora cataphyllaria), apice acuta vel acute acuminata, basi late rotundata vel subcordata vel rarus manifeste cordata, utrinque et margine praesertim plus minusve asperusculo-pubescentia, subtus costa et nervis lateralibus utrinsecus <\*5 valde adscendentibus manifestis; petioli usque ad 3 mm. longi sed saepe breviores vel subobsoleti; stipulae subulatae, usque ad 3-5 mm. longae, basi cum petiolis vaginato-connatae. *Flores* aurantiaco-rubri vel aurantiaci, in thyrsos terminales contractos usque ad 20-floros dense dispositi, nonnunquam ex axillis foliorum superiorum in cymis paucifloris etiam orti; rami inflorescentiarum plus minusve asperiusculo-pubescentes, usque ad 9 mm. longi sed saepe minores; pedicelli brevissimi vel usque ad 3 mm. longi; bractea oppositae vel solitariae, foliaceae vel interiorem versus valde redactae, interdum 2-5-laciniatae; bracteolae nullae. *Calyx* (receptaculo 1 mm. longo incluso) elongato-turbatus; tubus 2'5 mm. longus, extra plus minusve (parte adnata praesertim) pubescens, saepe ad ovarium unilateraliter fissus; lobi 4, lineari-subulati, acuti, saepe inaequales, usque ad 3-5 mm. longi, plus minusve pubescentes et semper parce ciliati. *Corolla* anguste infundibuliformis, usque ad 2•2 cm. longa, extra minutissime papilloso-puberula, intus basin versus parce villosa; lobi 4, erecti, ovati, vix 2 mm. longi, obtusi vel subacuti. *Stamina* 4, in floribus longistylis circiter 2 mm. longis, filamentis filiformibus 0•5 mm. longis, antheris oblongis 2 mm. longis basin versus dorsifixis inclusis; in floribus brevistylis filamentis filiformibus 1 mm. longis, antheris oblongis 3 mm. longis inclusis. *Stylus* filiformis, apice biramosus, in floribus longistylis usque ad 2\*3 cm. longus, exsertus, ramis linearibus 0-5 mm. longis; in floribus brevistylis 1•7 mm. longus, inclusus, ramis linearibus

3 mm. longis cohaerentibus. *Ovarium* turbinatum, 1 mm. longum ; ovula in loculis numerosa. *Capsula* compresso-ovoidea vel compresso-subglobosa, circiter 5 mm. alta et 6 mm. lata, subdidyma, apicem versus calyce persistente vel calyce delapso cicatrice coronata. *Semina* nigra, disco idea, alata, 2 mm. diametro.

MEXICO. District of Temascal tepee, State of Mexico: Pantoja, June 1933, *Hinton* 4078 ; Nanchititla, June 1935, *Hinton* 7893 ; Temascaltepec, *Sessé and Mociño* (Herb. Mus. Brit.); Temascaltepec, July 1935, *Hinton* 7950. Vicinity of Morelia, State of Michoacan : Loma Santa Maria, 1970 m., June 1909, *Arsène* 2753 (distributed as "*B. Houtteana* Schlecht.") ; without exact locality, 1910, coll. *Arsène* 6627 (named "*B. multijora* Schult., var." by Standley in Kew Herb.).

Standley's suggestion that *Hedyotis lutea* Sessé et Mociño (Temascaltepec) is conspecific with *Bouvardia cordifolia* DC. (Mexico) is borne out by comparison of the original descriptions and figure with the syntype cited above and with the material collected during the last few years in Temascaltepec by Mr. Hinton. No features definitely opposed to this conclusion are shown in the rather poor drawing by Sessé and Mociño. Particular points of resemblance are found in the habit of the plant, the leaf-shape, the form of inflorescence, and the capsule, which is much broader than long, and is marked by a large and characteristic scar left by the fallen calyx. The rather shorter corolla, shown in Sessé and Mociño's figure, in some cases with widely spreading lobes, is not regarded by the present writer as significant.

*Bouvardia cordifolia* is evidently quite closely allied to the lost species, *B. Houtteana* Schlecht., a plant raised from seed (from "Central America") by Van Houtte about the middle of last century, and figured in *Flore des Serres*, Sér. 1, x. 149, 1.1024 (1854-55). This differs in its laxer inflorescence, with quite long peduncles and pedicels, and in the leaves, which are shown to have the base acute or cuneate, and are stated to be "foliis . . . glabris . . . supra saturate viridibus asperiusculis . . ." It may be added that *B. Houtteana* was omitted from Standley's monograph of the genus in *N. Amer. Fl.* xxxii. 100-111 (1921).

A. A. BULLOCK.

FIG. 1, upper part of plant, *natural size* ; 2, flower, x 3 ; 3, calyx and lacinate bract, x 6 ; 4, corolla opened out, x 3 ; 5, hypanthium and disk, x 12 ; 6, stigma from a long-styled flower, x 8 ; 7, stigma from a short-styled flower, x 8 ; 8, part of an infructescence, *natural size* ; 9, capsule, x 4 ; 10, seed, x 8.



SRC

TABULA 3324.

EUPHORBIA FULVA *Stapf.*

EUPHORBACEAE. Tn'buS EUPHORBIEAE.

*E. fulva* *Stapf* in Kew Bull. 1907, 294; Hillier in Kew Bull. 1909, 392; btandl. in Contrib. U.S. Nat. Herb, xxiii. 599 (1923). *E. elastica* M. et Rose, El Palo Amarillo, 1, tt. 1-3 (July 1905); non Jumelle in Comptes Rend. Acad. Sq<sup>^</sup>Paris, cxl. 1047-9 (April 1905); neo Marloth in Trans. Roy. Soc. V. Afr. ii. 37 (1910). *Euphorbiadendron fulvum* (Stapf) Millsp. in Publ. Field Colum. Mus., Bot. Ser. ii. 305 (1906). Species valde distincta, arborescens, cortice flavido vel flavido-rubro exfoliante, foliis alternis junioribus necnon ramulis hornotinis dense pubescentibus, glandulis involucrorum subcupulatis haud petaloideo-appendiculatis, seminibus ecarunculatis.

Arbor laticifera, circiter 10 m. alta; truncus (1 m. supra basin) circiter 30 cm. diametro, cortice flavo vel rubro-flavo (testaceo sectoribus) exfoliante semper indutus; rami divergentes, ramosi; ramuli hornotini primum dense pubescentes vel tomentosi, demum glabrescentes, foliis alternis approximatis praediti. *Folia* breviter ovata, alterna, lanceolata vel oblongo-lanceolata vel oblanceolata, obtusiuscula vel truncata, mucronata, basi acuta vel subcuneata, marginibus integris, nervis lateralibus numerosis approximatis, manifestos, subtus primum densissime pubescentes, demum glabrescentia. *Rami floriferi* breves, crassi, delapsorum orti, aphylli, plus minusve pubescentes, deciduis puberulis praediti, infra apicem ramis 1-2 exsertis bractearum ortis praediti, apice umbellatim 3-5-ramosi, ramis axillaribus bractearum deciduarum involucriformium ortis glabris cymoso-ramosis vel simplicibus; bracteae ovatae vel obovatae, apice emarginatae, longae ad 2-5 cm. longae et 1 cm. latae, inferiores pedunculatae. *Cymae* plerumque cyathiis 3 praeditae, sed intermediae et cyathiis numerosioribus. *Cyatki* bracteis oppositis pedunculatis, pedunculis 5-10 mm. longis; involucra glabra, cupuliformia, diametris 5, orbiculares, 2 mm. diametro, peltatae, sessiles, primum adpressae, demum patentes; lobis 5, ovatis, mucronatis, truncatis usque retusi, fimbriati et ciliati. *Flores* unisporae, in phalanges 5 glandulis oppositos dispositi, organis ciliatis, filiformibus aequilongis fimbriatis intermixti; pedicellis 2, longis, sursum ampliatis; filamenta satis crassa, filamenta ambitus orbiculares vel ellipticae, 0-75 mm. longae, fixae. *Flores feminei* solitarii, exserti, pedicellis 1, satis crassis apice cupuliformibus undulatis; ovarium ovatum, 2 mm. longum, longitudinaliter leviter 3-lobatum,



inter lobos costis 3 praeditum. *Styli* 3, vix 0-5 mm. long], apice leviter bilobati. *Fructus* primum carnosi, demum capsulares, ambitu ovati, 3 cm. alti, 2-5 cm. lati, triloculares, carpellis e columella sursum secedentibus et demum e basi loculicide dehiscentibus. *Semina* lateraliter compressa, subglobosa, fere 1 cm. diametro, adaxialiter nigro-lineata, ecarunculata ; testa brunnea, minutissime papillosa.

MEXICO. District of Temascaltepec, State of Mexico: Las Vigas, 1080 m., in rocky ground, June 1932 (<sup>^</sup>, *Hinton* 731 :—a tree 10 m. high ; the sap is milky, and is used as <sup>^^</sup> adhesive on the bandages with which broken bones are tied ; Ypericones, 1500 m., in very dry oak woods, April 1933 (fl.), *Hinton* 3822 :—the very copious milky sap is used for setting bones by saturating the bandage in the sap ; Plaza de Gallos, April 1934 (fl.), *Hinton* 7731 ; Ypericones, July 1935 (young fr.), *Hinton* 8087 ; Luvianos, Aug. 1935 (fr.), *Hinton* 8237 ; Ypericones, Oct. 1935 (fr.), *Hinton* 8599. Barranca of Guadalajara, State of Jalisco, 1500 m., Aug. 1902 (fr.), *Pringle* 8736. District of Cuicatlan, State of Oaxaca : Cuesta de Coyula, 1000 m., June 1909, *Conzatti* 2400; *ibid.*, April 1919 (fl., young fr.), *Conzatti* 3555 ; *ibid.*, 1300 m., May 1921 (young fr.), *Conzatti* 4138.

Vernacular names : " Palo Amarillo " (*AUamirano and Rose, Conzatti*); " Cuajote Blanco " (*Conzatti*) ; " Pega Hueso " (*Hinton*).

The excellent material of this species, once believed to be a potential source of rubber, sent to Kew by Mr. Hinton, makes it possible to provide a figure and a more complete description than has hitherto appeared. For other information, the writer desires to thank Prof. Conzatti and Dr. Rusby, letters from whom are deposited with the specimens in the Kew Herbarium.

No type-specimen is indicated in the original description, but it may be noted that *Euphorbia fulva* was first collected by Pringle in 1902. The description drawn up by Altamirano and Rose was, presumably\* based on their own specimens, but these I have not seen.

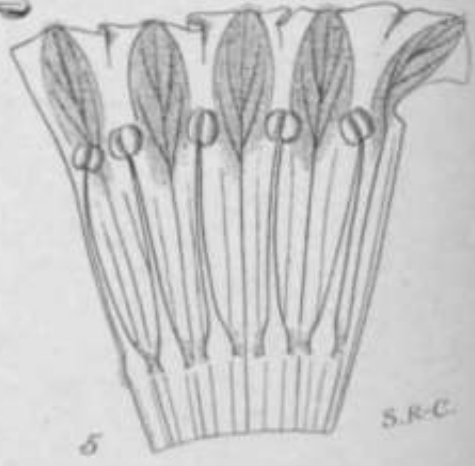
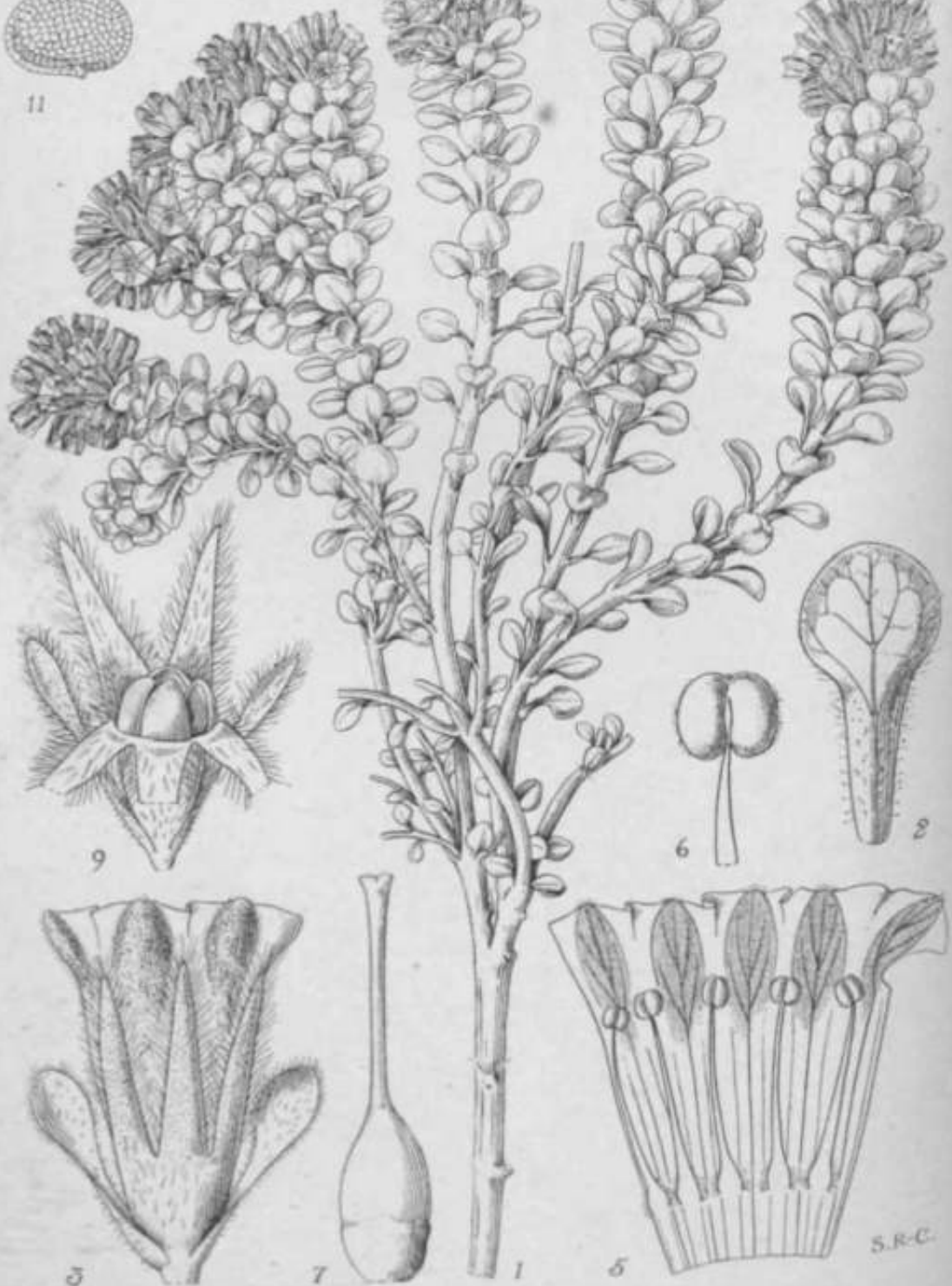
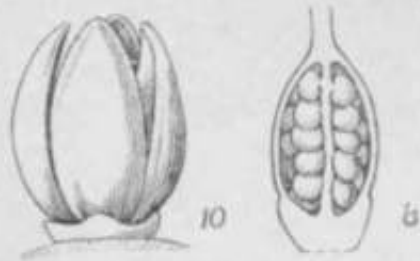
Perhaps the most striking morphological feature of *Euphorbia Jt/oa* is to be found in the growths referred to as paraphyses in the description. As shown in figures 7 and 8, these consist of flat plates of tissue divided, at least in the upper half, into more or less laciniate segments. These are sometimes divided to the base, and are then hair-like in appearance, but the innermost are as broad as the phalanges of male flowers, and form a 5-partite inner sheath completely separating the male flowers from the solitary central female flower. Apparently the paraj>hysai growths are in rows, alternating with rows of male flowers ; <sup>t ^ t</sup> <sup>r</sup> morphological nature is uncertain. The internal position tends to negative the view, expressed by Altamirano and Rose, that they are of the nature of bracts, whilst the alternative view, that they are modineo male pedicels, is not readily susceptible of proof. They are not aJS- cussed in the latest edition of Engl. u. Prantl, Nat. Pflanzenfam.,

are they mentioned by Millspaugh, who included the plant in his genus *Euphorbia dendron*. Their exact nature must remain, for the time

of f. S. S. who has on three occasions collected it. He states that the latex contains 20 per cent. of rubber, mixed with very difficult. The yellow on exposure to the air, coagulating into a hard blackish mass in a watery liquid. The resin forms a good varnish which has been used successfully for machine belts. A good drying oil which can be used as a varnish is extracted from the seeds.

It may be added that several seedlings of *Euphorbia*, and promise from seed collected by Mr. Hinton, are thriving at Aew, BULLOCK. to prove amenable to culture in a cool greenhouse.—A. A

FIG. 1, upper part of a leafy stem, natural size; 2, portion of a flowering branch and a young leafy shoot, natural size; 3, lower surface of a young leaf, x 4; 4, young cyathium, x 4; 5, male flower, x 4; 6, part of an involucre, opened to show the inner surface, x 4; 7, female flower with paraphysal growths, x 6; 8, upper part of a segment of a petiole, x 20; 9, female flower, x 8; 10, young fruit, natural size; 11, dehiscent fruit, natural size; 12, seed, natural size.



S.R.C.

## TABULA 3325.

### COMBEBA PABADOXA *Sandwith.*

SOLANACEAE. Subtribus NIOOTIANINAE.

**Combera** *Sandwith.* Genus novum, a *Benthamia* Oa Speg. (§ *Adenantho* Skotts.) habitu graciliter columnari neque compacto caespitoso-pulvinato, foliis haud vaginantibus, forma lanunae, corolla prostrata brevi lataque, plicis membranaceis a lobis ipsis valde distinctis primo visu recedens; a *Fabiana* R. et P., *Pantacantha* Speg., *NuxXmwh* *Petunia* Juss., habitu, floribus axillaribus, forma limbi corollae longe abhorrens.

*Calyx* profunde infra medium in lobos 5 divisus, tubo brevi subturbinato. *Corolla* tubulosa, prope medium sub pressione saltern subampliata, lobis 5 tubo brevioribus induplicato-valvatis extra conspicue glanduloso-pubescentibus siccitate nigrescentibus demum ut videtur patentibus, inter se plicis latis glabris membranaceis albis haud sinuatis alabastro involutis inconspicuis atque turn lobis ipsis saepius multo brevioribus serius tamen limbo expanso lobis ipsi fere aequilongis atque distincte latioribus sed semper ob colorem texturamque valde dissimilibus connexis. *Stamina* 5 perfecta, inclusa, filamentis subaequiloneis longe infra medium corollae tubum basin versus aequaliter inserta; antherae alte 2-lobae, haud vel vix apiculatae, thecis dorso appositis demum applanatis nima longitudinarii centrali extrorsum dehiscentibus. *Discus* carnosus, magnus, pedimentiformis, integer vel subinteger. *Ovarium* 2-loculare; ovula anatropa vel fere anatropa, in quoque loculo 8-10; placentae magnae, septo affixae; stylus rectus, brevis, stigmatibus paulum dilatato subtruncato obscure bilobulato. *Capsula* septicida bivalvis, valvis post dehiscentiam profunde fere usque basin bifidis, basi calycis tubo persistente cinctis atque disco insidentibus; placentae persistentes; semina immatura compressa, crebre foveolato-reticulata; embryo non visus.

*Herba* perennis, caulibus supraterraneis carnosis sub Pione membranaceo-alatis gracilibus inconspicue glanduloso-pubescentibus foliis patulis dense imbricatis obtectis. *Folia* carnosa vaginantia, lamina late ovata nunc deltoidea nunc rhombiformi integerrima illam specierum *VMae* andinarum revocante saepe velut bracteolis lobisque calycinis pilis albis debilibus more familiae pinnatim ramosis ciliata. *Flares* parvi, apice caulium inter folia summa magis spathuliformia axillares crebri congesti, in quaque axilla solitarii subsessiles brevissime pedicellati, erecti vel adscendentes, bracteolis 2 subtenti, alabastro species *Gentianae* quasdam revocantes limbo tamen explanato ob plicas esinuatatas ilium *Evolvidi* vel *Iponweae* potius simulante; corolla teste lectore intus alba, suaveolens.

Species unica, andium Argentinae incola.

*C. paradoxa Sandtmth*, species nova.

*Herba* perennis, radice 2-5-4 mm. lata ramosa fibrosa que apice caules multos inferne plus minusve subterraneos atque nonnunquam ramosos emittente. *Caules* supraterranei (vel inter lapides repentes) 2-18 cm. longi, ubique dense foliati, graciles, flexuosi, statu vivo teste lectore purpurascens, succulenti, siccitate igitur conspicue membranaceo-alati, alis inclusis superne ad 3 mm. lati, aliquantum viscoso-pubescentes. *Folia* alterna, infima sparsa fere squamiformia, ceterum dense imbricata patentia usque patulo-adscendentia; petiolus 2-5-5-5 mm. longus, vulgo 1-5-2 mm. latus, sparse glanduloso-pubescent nonnunquam etiam pilis ramosis ciliatus, costa subtus nonnunquam conspicua; lamina deltoideo-ovata vel rhomboideo-ovata vel fere cordiformia, apice obtusissima, nonnunquam etiam breviter late obtuse cuspidatula, basi late rotundata fere subtruncata vel in foliis rhomboideis in petiolum attenuata, 3-6 mm. longa, 4-7 mm. lata, carnosa satis crassa, glabra vel in foliis superioribus pilis pinnatim ramosis ciliata, supra enervia rugulosa, subtus costa saepe distincta nervisque primariis utroque costae latere 3 adscendentibus atque longe a margine anastomosantibus turn venulis marginem versus procurrentibus. *Flores* apice caulium inter folia densissime congesti, corymbum igitur vulgo 2 cm. latum efformantes; folia summa inferioribus similia sed minora spathuliformia, floribus multo breviora, pilis dendroideo-ramosis conspicue ciliata necnon aliis simplicibus glanduliferis immixtis; pedicelli brevissimi vel fere nulli; bracteolae 2 sub calycibus apice pedicellorum positae, basi vaginantes, lineari-spathulatae, concavo-cymbiformes, 5-8\*5 mm. longae, lamina circiter 1-1\*25 mm. lata, glanduloso-puberulae, saepe etiam pilis pinnatim ramosis ciliatae. *Calycis* tubus circiter 2 mm. longus, apice ad 4-5 mm. latus; lobi lanceolati, obtusi, inaequales, 4-5 mm. longi, 1-5-2\*25 mm. lati, utrinque dense breviter simpliciter glanduloso-puberuli, praeterea pilis albis debilibus pinnatim ramosis ciliati. *Corollae* tubus extra inferne glaber superne sparse glanduloso-puberulus, intus glaber, usque 6 mm. longus, usque 4\*5 mm. latus; lobi oblongo-lanceolati, obtusi, 2-5 mm. longi, 1\*5 mm. lati, extra dense glanduloso-puberuli, intus apice excepto glabri, tenuissime pinnatim venosi, siccitate nigrescenti-caerulei, alabastro erecti, plicis conspicuis glabris membranaceis albis lobis ipsis latioribus atque fere aequilongis haud sinuatis connexi ita ut limbus totus expansus applanatus formam circularem album late nigrescenti-vittatam praebeat et florem *Ipomoeae* speciei cujuslibet simulet. *Stamina* filamentis subaequilongis 4 mm. longis basi prope insertionem dilatatis atque pubescentibus; antherae saepe fauce corollae expansae manifestae, 1-1-1\*3 mm. longae, 0\*8-1 mm. latae. *Discus* castaneus, glaber, nonnunquam glandula sessili patelliformi nigrescente praeditus, 0\*6-0\*8 mm. longus, ovario subaequilatus. *Ovarium* disco pallidius, glabrum, ovoideo-subglobosum, circiter 1-2 mm. altum atque diametro; stylus glaber, 2-2\*75 mm. longus, stigmatibus leviter dilatato capitato-subtruncato obscure bioboluto. *Capsula* valvis (post dehiscentiam

tantum visis) corneis sordide albo-stramineis circiter 3-3\*5 mm. longis ; semina immatura circiter 0\*3 mm. longa, brunnea.

ARGENTINA. Gob. Neuquen: Cerro Colohuincul, near San Martin de los Andes (between Lago Lacar and Lago Huechulafquen), among stones on exposed mountain top, 2200 m., Dec. 17, 1926, *H. F. Comber* 888 (type):—\*' Perennial. Leaves and stems purplish. Flowers white inside, sweet-scented.' Without locality, probably in the mountains north of Palau Mahuida and east of Alumine, 1926-1927, *Ernesto Opazo* in coll. *Comber* 1232.

This remarkable plant, native of the exposed stony summits of the eastern side of the Cordillera de los Andes at about 40° S., has a life-form which is characteristic of many species of this region and has been described by Skottsberg as " Stauden mit imbrikatlaubigen Stengeln (Columellen, Turritellen)." The densely imbricate leaves on the flexuous stems of *Combera*, and the shape of their lamina, bear a striking resemblance to those of several Andine species of *Viola*; for example, *V. sacculus*, *V. squamulosa*, *V. petraea*, *V. Cotyledon* and *F. atropurpurea*. The flowers are similarly clustered among the uppermost leaves at the apex of the stems and these flowers, when pressed in such a way that the flattened expanded limb of the corolla is not visible, are exactly like those of a *Gentiana*. The plaits between the corolla-lobes are also curiously reminiscent of those of *Gentians*. There is, however, no doubt of the family, or even of the section of that family, to which *Combera* belongs, this being clearly indicated by such characters as the alternate leaves, the branched hairs present on many parts of the plant, the anthers, 2-locular superior ovary, the placentation, and fruit. It is evident that in *Combera* we have a life-form of which numerous analogous instances can be cited from species of other families, growing in a similar habitat at such an altitude, but which is apparently unparalleled in the South American *Solanaceae*.

In investigating the affinity of this plant the very extensive botanical literature of Argentina and Chile has been carefully studied, especially the papers of Spegazzini and Skottsberg, Reiche's *Flora of Chile*, Millán's recent account of *Nicotiana* in Argentina and his valuable key to the Argentine *Solanaceae* (see *Bol. Ministr. Agric. Nac. Buenos Aires*, xxx. no. 1, 1931). No description reading even remotely like that of *Combera* has been discovered, with the exception of that of the little known species "*Nicotiana ? minima*" Phil, in *Linnaea*, xxxiii. 198 (1864). This was not mentioned by Comes in his monograph of *Nicotiana* (1899), but the specimen was carefully examined by Reiche, who placed the species in the genus *Petunia* (*Fl. Chile*, v. 393-394, 1910), remarking that it was apparently related to *Nicotiana acaulis* Æpeg., *N. Ameghinoi* Speg., etc., of Argentine Patagonia. Since then R. E. Fries (*Mon. Petunia* in *Svensk. Vet. Akad. Handl. Band 46*, no. 5, P- 68, 1911) has rejected it from *Petunia* on the evidence of the descriptions of Philippi and Reiche, and it is not mentioned in recent papers on *Nicotiana*.

*Nicotiana ? minima* Phil, was collected by Pearce on the high Cordilleras de Ranco, in fissures of rocks at about 5500 ft. This locality lies in Valdivia, on the western (Chilean) side of the Central Cordillera of the Andes, and is approximately in the same latitude as the type locality of *Combera* on the eastern side. No specimens have been found at Kew or the British Museum, but a photograph\* of the type-specimen, kindly presented by the Museo Nacional de Historia Natural, Santiago de Chile, shows that *N. minima* Phil., though possessing rosulate leaves of a strikingly similar shape, is obviously not conspecific and very doubtfully congeneric with *Combera*. Among the diagnostic characters of *N. minima* are the reticulate-nerved calyx-lobes, the much longer (10-12 mm.) corolla-tube and the form of the corolla-limb. The latter was described by Philippi as possessing violet plaits, and by Reiche as divided into 5 short, plaited, triangular-semiorbicular divisions which are hairy on the median outer surface. The photograph of the corolla-limb of the type, and of an opened flower of another specimen of *N. minima*, shows a structure resembling that of *Nicotiana* rather than that of *Combera*; at any rate, the striking contrast between the lobes and the plaits, which is so characteristic of *Combera*, is not evident. Philippi's plant should probably be retained in *Nicotiana*, but the name *Nicotiana minima* Phil, is illegitimate, being a later homonym of *N. minima* Molina (1782), which has been transferred to *Nierembergia* by I. M. Johnston (Contrib. Gray Herb. n.s. lxx. 92 : 1924). Philippi himself was aware of this, but proceeded to identify his own *Nicotiana minima* with Molina's (see Pl. Vase. Chilens. 225); this, however, as pointed out by Reiche, was a blunder.

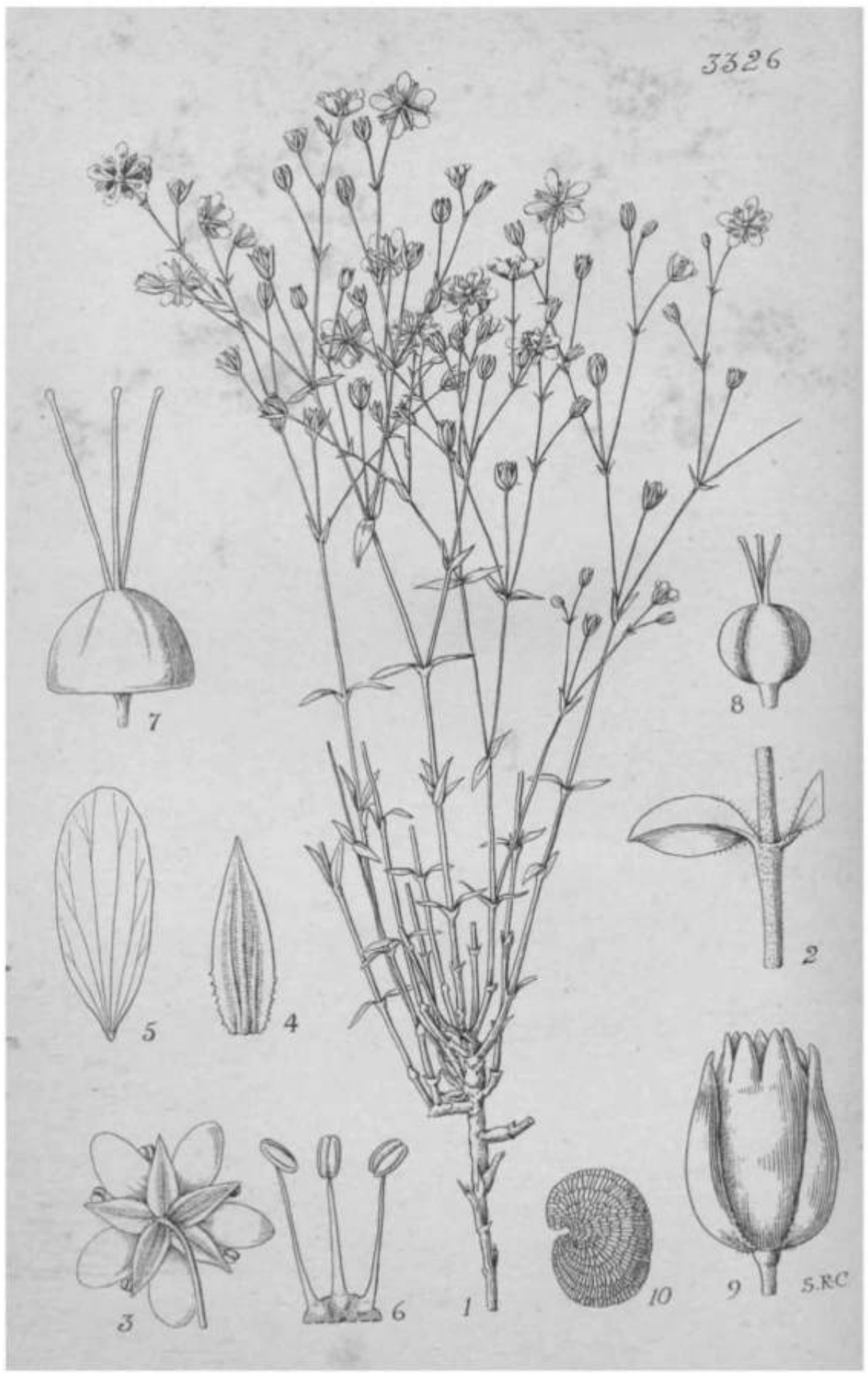
The genus *Combera* may be said to lie somewhere between *Benthamiella* and *Saccardophytum* on the one hand, and *Fabiana* and *Nicotiana* on the other. In habit and the form of the inflorescence it approaches *Benthamiella* and *Saccardophytum*, which are dwarf cushion-plants inhabiting the steppes and bare mountains of Patagonia. Their short, thick branches are very densely clothed with thick, linear leaves which widen at the base into a sheath, and their flowers are sessile and axillary amongst the uppermost leaves. These two genera have been fully discussed by Skottsberg in a valuable paper in Engl. Bot. Jahrb. liv. 44-50 (1917). *Saccardophytum* possesses the low inserted filaments and the branched hairs which are characteristic of *Combera*, but is far removed from it on account of the 2 (only) exerted stamens, the style being as long as the corolla, the inconspicuous disk, and the few (2) ovules in each loculus. *Benthamiella* is much nearer, and especially *B. graminifolia*, which constitutes Skottsberg's section *Adenanthus*. Five characters are common to this species and to *Combera* which either do not occur or are not found in combination in any other species of *Benthamiella*; they are the presence of branched hairs on the leaf-margins (shared by *B. pycnophylloides*), the glandular corolla (unique in *B. graminifolia*), the deeply divided calyx, the stamens inserted at the same level within the corolla-tube (shared by *B. Nordenskjoeldii*), and below the middle of the tube (shared by *B. azorelloides*). Two other

characters of *Combera*, the relatively short and broad corolla, and (to judge from descriptions) the indumentum of the basal part of the filaments, are found in no *Benthamiella* except in *B. azorelloides* Speg. which is regarded by Skottsberg as an aberrant or doubtful member of this genus owing, in addition to these characters, to the long-exserted stamens. The plaited limb of the corolla of *Combera*, and the difference in colour, indumentum, texture and width, between the clearly marked lobes and the plaits, seem to be wholly dissimilar from those of species of *Benthamiella* and *Saccardophytum*.

This characteristic limb of the corolla shows a closer affinity with the genera *Fabiana* and *Nicotiana*. The glandular corollas of these genera frequently present a plaited limb which approaches the form of that of *Combera* (cf. *Fabiana densa*, *Nicotiana corymbosa* and *N. Ameghinoi*), but in such instances the true lobe is reduced to a narrow linear nerve-like form which combines with the adjacent, usually more or less sinused, plait on each side to produce a more or less distinguishable, broadly triangular false "lobe". In *Combera*, as is seen from the description, the broad conspicuous true lobes are always clearly differentiated from the connecting plaits, which have no sinus, so that the flat expanded limb presents a circular appearance like that of a *Convolvulus*. *Nicotiana* and *Fabiana* differ widely from *Combera*, not only in habit and general appearance, but also in the terminal or leaf-opposed character of their flowers, attention to which was called by R. E. Fries in Svensk. Vet. Akad. Handl. xlv. no. 5, pp. 10-14 (1911). The same is true of the strange, spinescent, monotypic genus *Pantacantha* Speg., which evidently lies between *Benthamiella* and *Fabiana*. Material of this, apparently referable to *P. Ameghinoi*, was collected by Mr. H. F. Comber (no. 248) at Valle Escondida, Gob. Neuquen, Dec. 12, 1925, in a habitat and at an altitude very similar to those occupied by the remarkable plant which is now named in-his honour.—N. Y. SAND WITH.

. FIG. 1, part of plant, *natural size* ; 2, a leaf, x 4 ; 3, flower, with bracteoles, x 4 ; \*t branched hairs on calyx, x 16 ; 5, corolla, opened out, x 4 ; 6, upper part of stamen, x 12 ; 7, gynoecium and disk, x 8 ; 8, longitudinal section of ovary and aistle, x 8 ; 9, capsule, with calyx and bracteoles, x 4 ; 10, capsule and disk, x 6 ; \*\*» immature seed, x 16.





## TABULA 3326.

### ARENARIA SERFENTINI A. K. Jackson.

CARYOPHYLLACEAE. Tribus ALSINEAE.

*A. serpentini* A. K. Jackson; species nova, *A. confertae* Boiss. affinis, ramulis foliisque sparse puberulis vel glabris, inflorescentia laxa, calyce subglabro facile distinguenda.

*Herba* annua (1), multicaulis, diffusa. *Caulis* numerosi, erecti vel patuli, 1\*6-2-2 dm. longi, inferne raro ramosi, purpurei, sparse puberuli, superne ramosi, virides, glabri vel fere glabri, internodiis superioribus 2-5 cm. longis, inferioribus gradatim brevioribus. *Folia* infima late ovata, obtusa, basi cuneata, usque ad 5 mm. longa, 3 mm. lata, glabra vel sparse hirta, in petiolum 3 mm. longum angustata; caulina sessilia, ovata, lanceolata vel lineari-lanceolata, 3-7 mm. longa, 1-5-3 mm. lata, acuta, in vaginam leviter connata, inferne sicut vagina ciliata, ceterum glabra, nervo medio utrinque subprominente. *Cymae* dichasiales, in monochasiales desinentes, laxae, glabrae; pedicelli 0-5-2 cm. longi; bractee foliis subsimiles sed minores. *Sepala* lanceolata, acuta, conspicue trinervia, 3-5 mm. longa, circiter 1-5 mm. lata, sub anthesi patula, deinde erecta, exteriora glabra marginibus angustis membranaceis inferne minutissime ciliatis, interiora glabra marginibus late membranaceis haud ciliatis. *Petala* alba, oblonga vel elliptico-oblonga, apice rotundata, basi cuneata, 4«5 mm. longa, 2 mm. lata, calyce longiora. *Filamenta* 3 mm. longa, glabra; antherae ellipsoideae, 0\*5 mm. longae. *Ovarium* juvenile fere globosum, deinde subhemisphaericum, circiter 0.5 mm. diametro, glabrum, basi truncatum; stipes fere 1 mm. longus. *Styli* 3,1 \*5 mm. longi, plus minusve puberuli. *Capsula* matura ventricoso-ovoidea, calyci aequilonga vel paullo longior, 3 mm. lata. *Semina* nigra, vix 1 mm. diametro, laminis planis obtecta.

SOUTH ALBANIA. District of Moskopolë, W. of Korçë: near Gjegevicë, about 1200 m., bare rubbly slopes of serpentine gorge, July 1933, flowers white, *Alston and Sandwith* 2136.

Our plant is undoubtedly closely related to *A. conferta* Boiss., which was originally described from Mt. Olympus, Thessaly, but has since been collected in Epirus (Mt. Smolika), the Pindus, and in the Scutari district of Albania by Baldacci and others. Another specimen, however, provisionally named *A. conferta*, collected in Albania by ~~JV~~ Alston and Sandwith (no. 1834) on the Nemerçka Range, above Biovishdë, about 20 miles west of Mt. Smolika, is morphologically nearer *A. serpentini* than is the typical *A. conferta* as represented in the Kew Herbarium. This plant is less hairy and more robust than the true *A. conferta*, and the petals are slightly longer than the sepals

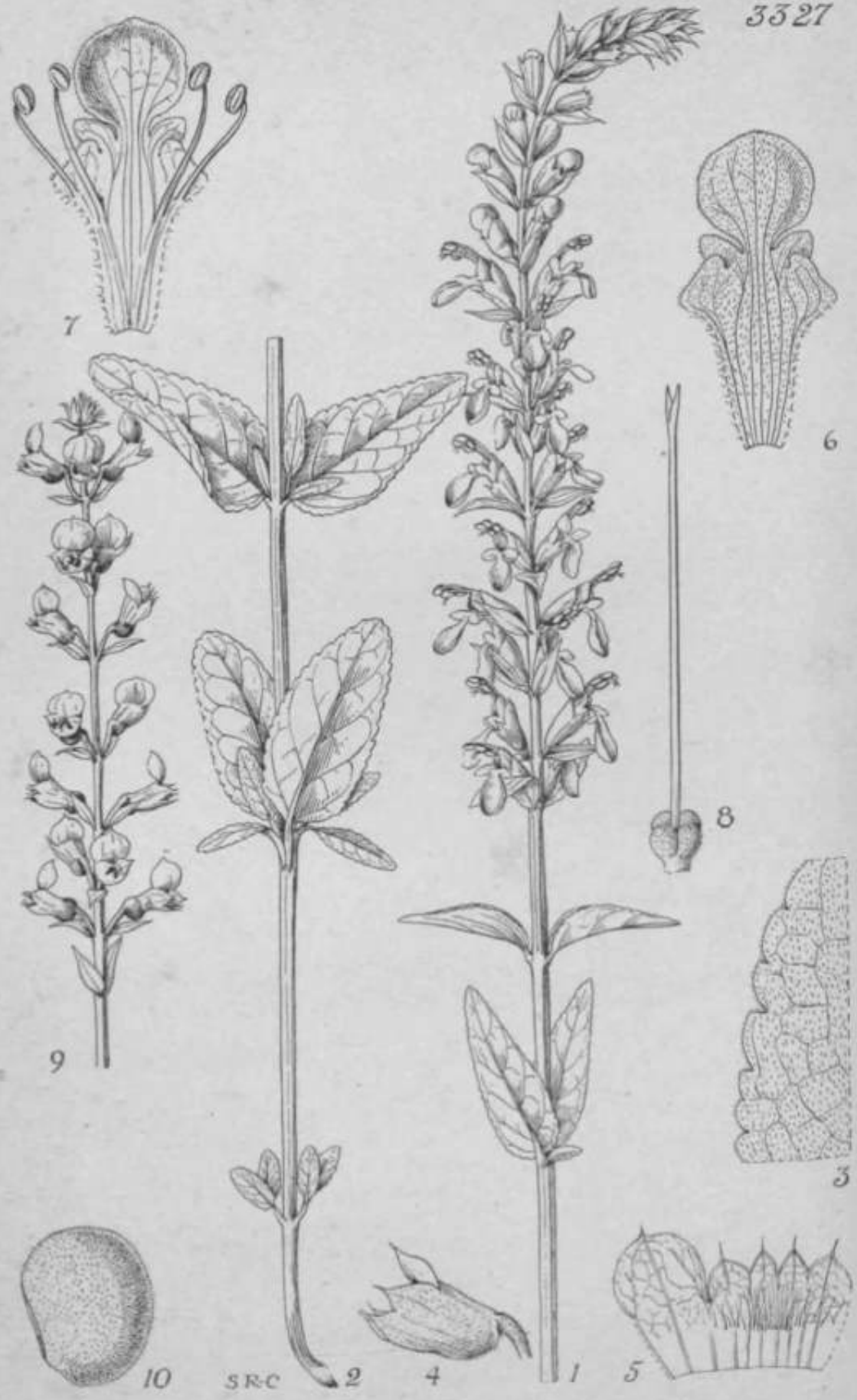
instead of equalling them. Although these variations appear to bring *A. serpentini* into closer relationship with *A. conferta*, it should not be forgotten that the district of Moskopole possesses a serpentine flora very distinct from that of the Nemercka Eange and the other limestone areas where *A. conferta* and its forms occur.

It has not been found possible to determine whether *A. serpentini* is an annual, but the absence of old flowering stems and perennial buds suggests that it may be. Autumn germination probably takes place, and this may account for the slightly woody appearance of the stem bases.

The following note on the habitat of this plant is contributed by the collectors :—" The gorge east of Gjergjevicē is at least 1000 feet deep, the slopes consisting of bare serpentine rock and detritus clothed with innumerable, rather scattered, trees and bushes of Box, Juniper and Pine. This arid, stony habitat supports a small but interesting flora of serpentine species. The untouched rock, both high up on the slopes and on the borders of the stream which runs along the bottom of the gorge, is inhabited by the recently described species, *Brachypodium serpentini* C. E. Hubbard (see Hook. Ic. PL t. 3280); while the open rubbly ground between the bushes produces the new *Arenaria*, *Silene Schwarzenbergeri* Halacsy, *S. multicaulis* Guss. var. *serbica* (Adam, et Vierh.) Hayek, a yellow *Linum*, *Campanula Hawkinsiana* Heldr. et Hausskn., *Stachys anisochila* Vis. et Pan6., *Betonica scardica* Griseb., *Polygonum* (cf. *albanicum* Jávorka), *Ornithogalum comosum* L. and *Notholaena Marantae* (L.) E. Br. The border of the stream and a few boggy spring-heads provide a home for moisture-loving species such as *Veronica scardica* Griseb., *Pinguicula hirtiflora* Ten., *Parnassia palustris* L., *Cirsium appendiculatum* Griseb. and *Cyperus fuscus* L."

A. K. JACKSON.

FIG. 1, plant, *natural size*; 2, node with pair of leaves, x 3; 3, flower from below, x 4; 4, outer sepal, lower surface, x 8; 5, petal, x 8; 6, part of androecium and disk, x 8; 7, ovary, x 20; 8, very young ovary, x 20; 9, capsule, with part of calyx cut away, x 8; 10, seed, x 20.



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## TABULA 3327.

### TBUCRIUM KOTSCHYANUM *Poech.*

LABIATAE. Tribus AJUGAEAE.

**T. Kotschyanum** *Poech.*, Enum. Pl. Ins. Cypr. 24 (1842), et in Flora, xxvii. 454 (1844); Benth. in DC. Prodr. xii. 585 (1848); Boiss. Fl. Or. iv. 812 (1879); Holmboe, Stud. Veg. Cypr. 151 (1914). *T. smyrnaeum* Boiss. Diagn. Ser. 2, v. 42 (1844), teste Boiss. Fl. Or. iv. 812 (1879); Benth. in DC. Prodr. xii. 584 (1848); Tchihatch. As. Min. ii. 185 (1860); Unger u. Kotschy, Ins. Cyp. 276 (1865).—A *T. Scorodonia* L. foliis lanceolatis vel ovato-oblongis basi cuneatis utrinque tomentosis distinguitur.

*Herba* perennis, usque ad 8-8 dm. alta. *Caulis* erectus, simplex vel sparse ramosus, superne adpresse reflexo-hirsutus, basi patule hirsutus, internodiis 2-8 cm. longis. *Folia* lanceolata vel ovato-oblonga, obtusa, basi cuneata vel truncata, 3-5 cm. longa, 1-2 cm. lata, crenata, utrinque tomentosa, rugosa, nervis supra depressis infra prominentibus; petioli usque ad 9 mm. longi. *Racemi* simplices vel basi ramosi, 0\*8-3\*3 dm. longi; folia floralia ovato-lanceolata, acuminata, inferiora 0-8-1\*5 cm. longa, superiora gradatim breviora; pedicelli erecti, 1\*5-3 mm. longi, post anthesin patulo-reflexi, 5 mm. longi. *Calyx* late campanulatus, bilabiatus, breviter hirsutus, 6 mm. longus, fructifer membranaceus, labio superiore patente; labium superius late ovato-orbiculare, 3 mm. longum, 4 mm. latum, concavum, apice breviter mucronatum; labium inferius dentibus quatuor subaequalibus ovatis acuminatis circiter 1\*5 mm. longis instructum. *Corolla* ochroleuca (ex Boissier), 1\*1 cm. longa, extra puberula, tubo gibboso 6 mm. longo; labii lobus medius orbicularis, 4 mm. diametro) lobi laterales superiores ovati, 1 • 5 mm. longi, inferiores oblongi, circiter 1 mm. longi. *Filamenta* 1 cm. et 1 • 1 cm. longa, sparse puberula, tubo leviter adnata. *Stylus* 1 cm. longus. *Nuculae* trigono-ovatae, 1-5 mm. longae, 1 mm. diametro, pallide fuscae.

- ASIA MINOR. Bords du Guzel-Déré, près du village de Kechlik, au N. de Mersina (Cilicie), June 1855, *Balansa* 527.

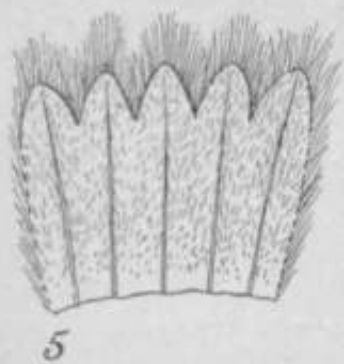
- CYPRUS. In fruticosis ad pedes Troodi in Galata supra pagum •Eyrico, Maio 1862, *Kotschy* 921; in vineis ad Galata, Junio 1880, *bmtenis et Rigo* 725; below Kanipos, Aug. 1898, *Postl* Cyprus, 1900-03, *A. G. and M. E. Lascelles*; Cyprus, various altitudes from sea-level, July 1914, colour greenish-white, *St. C. Feilden*; Platani forest Station above Kalkopetrika, 1100 m., July 1935, among bushes, *wtus*, pines, etc., *Syngrassides* 737.

th **T.** *Kotschyanum* is closely allied morphologically to *T. Scorodonia* L.; the areas of distribution of the two species, however, are apparently

separate. *T. Scorodonia* is mainly a north and west European species, but it has been recorded from Greece by Sibthorp and Smith (Prodr. Fl. Graec. 392 : 1806) and from Naxos in the Cyclades by Chaubard and Bory (Exped. Sc. Morée, iii. 161: 1832). Boissier in Diagn. Ser. 2, v. 42 (1844) described under the name *T. smyrnaeum* a plant collected by himself "in vallibus montis Coracis ad occasum Smyrnae." Later (Fl. Or. iv. 812 : 1879) he sinks this species under *T. Kotschyannum* and also quotes the Greek *T. Scorodonia* of Sibthorp and Smith as a synonym. Although these specimens from Greece and the Cyclades have not been seen, it is very unlikely that they belong to *T. Scorodonia*, a species not since collected further south-east in the Balkan Peninsula than Croatia. From the distributional evidence it is suggested that the Greek and Naxos specimens belong to *T. Kotschyannum*, representing only a slight increase in the range of that species.

Our plate was prepared from material collected by Mr. A. Syngrassides at Platani, a Forest Station in the Northern range, Cyprus. This is the first record from this area, the plant having previously been collected in the island only in the Troodos range.—A. K. JACKSON.

FIG. 1, upper part of plant, *natural size*; 2, lower part of plant, *natural size*; 3, portion of leaf, upper surface, x 4; 4, calyx, x 3; 5, calyx opened out, inner surface, x 3; 6, corolla opened out, external view, x 3; 7, corolla opened out, internal view, x 3; 8, gynoecium, x 6; 9, fruiting inflorescence, *natural size*; 10, nutlet, x 12.



## TABULA 3328.

### TEUCRIUM CYPBIUM Boiss.

LABIATAE. Tribus AJUGEAE.

**T. cyprium** Boiss. Diagn. Ser. 1, v. 43 (1844); Benth. in DC. Prodr. xii. 590 (1848); Unger u. Kotschy, Ins. Cyp. 276 (1865); Boiss. Fl. Or. iv. 820 (1879); Durand et Barratte, Fl. Lib. Prodr. 192, t. 15 (1910); Holmboe, Stud. Veg. Cypr. 151 (1914). *T. cypricum* Post in Bull. Herb. Boiss. v. 759 (1897), et vii. 161 (1899).—A *T. alpestri* Sibth. et Sm. foliis integris vel apice crenulatis differt.

*Herba* perennis, suffruticosa, usque ad 12 cm. alta, ramis numerosis decumbentibus patule villosis. *Folia* sessilia, oblonga vel obovato-oblonga, obtusa, basi cuneata, 4-9 mm. longa, 1-5-4 mm. lata, integra vel plus minusve lobato-crenulata praecipue in parte superiore, revoluta vel rarius plana, utrinque griseo-lanata, glanduloso-punctata. *Capitula* subrotunda, pauciflora, 1 cm. diametro; folia floralia elliptica, quam flores vix breviora. *Calyx* tubuloso-campanulatus, extra griseo-lanatus, sparse glanduloso-punctatus, intus pubescens, 4-5 mm. longus, 1\*5 mm. diametro, dentibus 3 superioribus ovatis subobtusis 1 mm. longis, 2 inferioribus ovato-lanceolatis, acutis, fere 1-5 mm. longis. *Corolla* albida (ex Boissier), 8-9 mm. longa, extra sparse hirta, inferne glabra, tubo cylindrico 3 mm. longo 1 mm. diametro fauce breviter pubescente; labii lobus medius ovatus, 2 mm. longus, 1-5 mm. latus, concavus, apice obtusus vel subacutus; lobi laterales superiores elliptici, fere 1-5 mm. longi, marginibus revolutis, inferiores oblongo-unciales, apice rotundi, 3 mm. longi, 1-5 mm. lati. *Filamenta* 3 mm. \* mm. longa, inferne pubescentia. *Stylus* 1-1 cm. longus, glaber. *Muculae* compresso-ovatae, 1-5 mm. longae.

CYPRUS. In Insula Cypri, *Aucher-Ehy* 1595; in sylvis montis Troodos, Julio 1880 » *Sinten et Rigo* 724; common on Troodos, July \*00, *A. G. and M. E. Lascelles*; Chionistra, 2100 m., 1928, *Druce*; Troodos, 1929, *C. B. Ussher* 28; on the top of Chionistra, 2000 m., ea rocky soil, July 1935, *Syngrassides* 719.

**T.**  
*T. J. cyprium* Boiss., as far as we know, occurs only in the Troodos Mountains of Cyprus. Cosson, however, has described a plant from Syria, under the name *T. Davaeantum* (in Bull. Soc. Bot. France, all the \* ^ ' \* ^ ) » w ^ c ^ » if not the same as our species, is very closely Fl. Lib. Prodr. 192, t. 15 (1910), also very closely resembles *T. cyprium*. In the special description of *T. Davaeantum* it is stated that this lanceolate leaves, distinguished from *T. cyprium* in having sessile oblong-revolute leaves, attenuate at the base, strongly bullate, with strongly margins; the median lobe of the lower lip of the corolla is

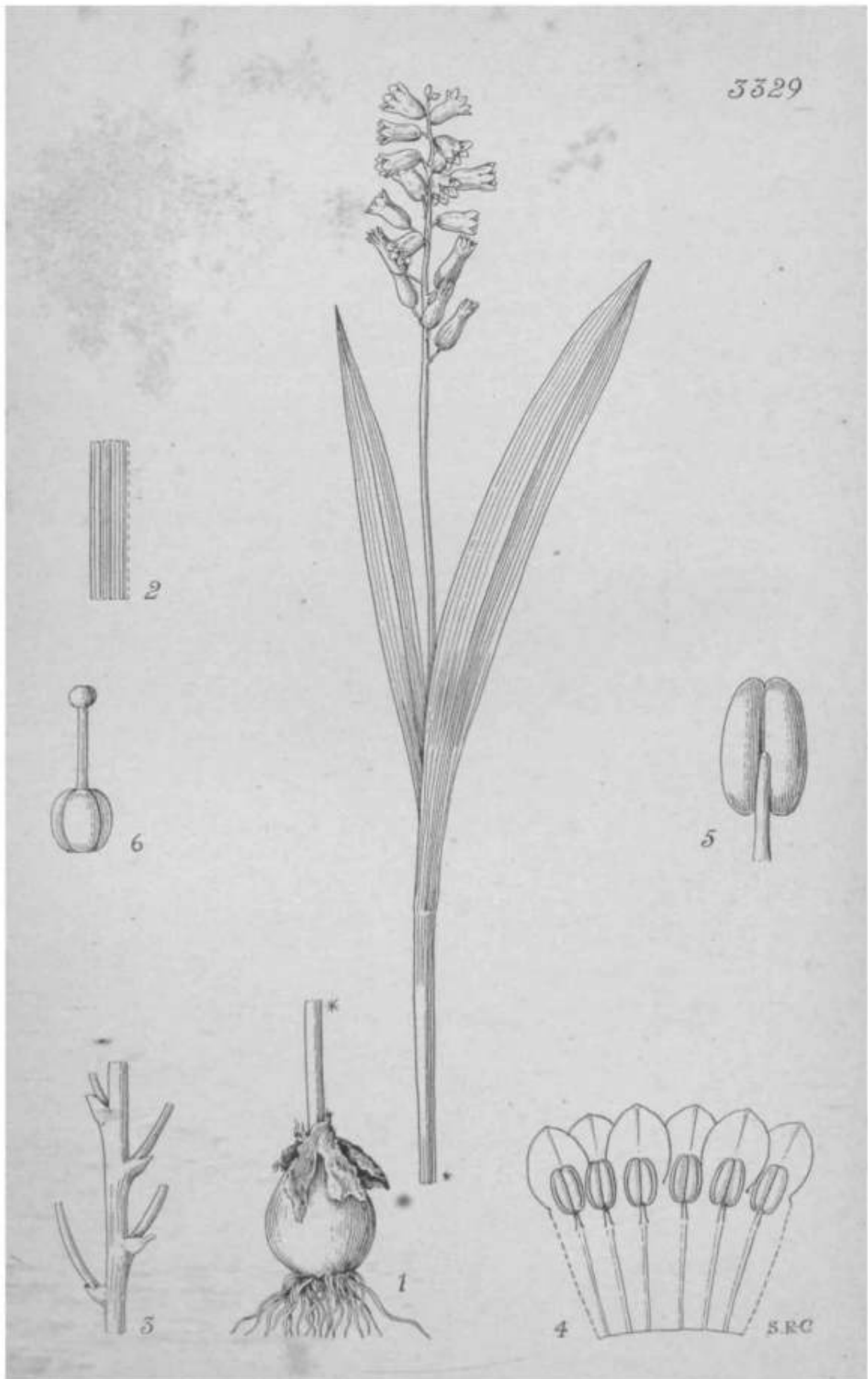


said to be oblong, concave, while that of *T. cyprium* is described as broadly obovate, scarcely concave. In the Aucher-Eloy specimen of *T. cyprium*, and to a lesser extent in the Sintenis specimens, the leaves are more or less flat and obovate, only rarely having a very short petiole. In the Druce and Syngrossides specimens, however, the leaves are narrower, convex and strongly revolute, and do not differ from the description of *T. Davae anum* in any way. In all specimens of *T. cyprium* the median lobe of the lower lip of the corolla is strongly concave. The absence of the revolute leaf margin in the earlier Cyprus specimens may be attributed to the differences in habitat. The Sintenis specimens were collected in woods on Mt. Troodos; Syngrossides collected his specimens on the summit of Chionistra. We may therefore assume that the former specimens were growing at a lower altitude and in a more shaded situation than the latter, since the summit of Chionistra is above the tree line.

It seems probable that *T. Davae anum* may not be specifically distinct from *T. cyprium*, but, as authenticated specimens of *T. Davae anum* have not been seen, it has not been included above in the synonymy of our plant.

There may be other characters not brought out in the description of *T. Davae anum* which would separate it morphologically from the Cyprus plant: if so, it would be preferable, from the phytogeographical standpoint, to keep the plants under different specific names. Although common Mediterranean species occur in both Cyprus and Cyrenaica there are few other connecting links between the floras of the two areas. ^A. K. JACKSON.

FIG. 1, whole plant, *natural size* ; 2, inflorescence, x 3 ; 3, leaf, lower surface\* x 6 ; 4, part of upper surface of leaf, margin flattened out, x 6 ; 5, calyx opened out, interior view, x 6 ; 6, corolla, external view, x 6 ; 7, corolla opened out, internal view, x 6 ; 8, gynoecium, x 6 ; 9, nutlet, x 12.



4 SRC

TABULA 3329.

**BELLEVALIA ATCHLEYI** A. K. Jackson et Turrill.

LILIACEAE. Tribus SCILLEAE.

*B. Atchleyi* A. K. Jackson et Turrill; species nova, affinis *B. lineatae* (Steud.) Kunth, a qua foliis longioribus glaberrimis haud pectinatim ciliatis recedit.

*Bulbus* ovoideus, usque ad 2 • 2 cm. longus et 1 • 4 cm. crassus. *Caulis* solitarius, erectus, 11-5-20 cm. altus, nudus, glaber, gracilis. *Folia* 2, basalia, usque ad 17 cm. longa et 0 • 9 cm. lata, coriacea, glaberrima; pseudo-lamina linearis, apice leviter acuminata et cucullata, inferne in pseudo-petiolum caulem usque ad vel infra medium amplectentem angustata, lineato-nervosa, nervis longitudinalibus usque circiter 30-35, nervis primariis plus minusve 9 instructa. *Inflorescentia* 5-18-flora, l<sup>#</sup> 5-4 cm. longa; bractee caducae vel obsoletae; pedicelli floriferi 2\*5-4 mm. longi, erecto-patentes. *Perianthium* campanulato-cylindricum, 4\*5—6 mm. longum, intense caeruleum, lobis oblongo-ovatis subobtusis 2\*5 mm. longis 1-5 mm. latis uninerviis. *Stamina* in tubi parte superiore posita, filamentis 0\*75 mm. longis, antheris dehiscentibus 1 • 25 mm. longis. *Ovarium* fere sphaeroideum, biovulatum, 1 • 5 mm. diametro, minutissime papillosum; stylus 2 mm. longus.

GREECE. Mt. Kithaeron, 620 m., dry hillsides, April 1934, S. C. Atchley 1852, and April 1936, *sine numero*.

The genera of *Scilleae* related to *Muscari* and *Hyadnthus* have been very variously delimited by different authors. Linnaeus had the one genus *Hyadnthus* for the plants known to him and now often assigned to the genera named below. Bentham and Hooker (Gen. PL iii. 811-812 : 1883) and Baker (Journ. Linn. Soc, Bot. xi. 411, 423 : 1870) retain the two genera *Muscari* Mill, and *Hyadnthus* L. Boissier (Fl. Or. v. 287 et seq. : 1884) keeps *Muscari*, *Bellevalia* Lapeyr., *Strangweia* Pertol., and *Hyadnthus* as distinct genera. Halácsy (Consp. Flor. Graec. iii. 263 et seq. : 1904) has *Strangweia*, *Hyadnthus*, *Bellevalia*, *Leopoldia* Parl., and *Muscari*, for the Greek flora. Hayek (Prodr. Fl. Penins. Balcan. iii. 83 et seq. : 1932) accepts the genera *Hyadnthus*, *Strangweia*, *Hyadnthella* Schur, *Bellevalia*, and *Muscari*. Chouard (On Bull. Mus. Nat. Hist. Nat. ser. 2, iii. 176-180: 1931) proposes the following sequence : *Brimeura* Salisb., *Hyadnthella*, *Strangweja*, *Penboea* Kunth, *Bellevalia*, *Muscari*.

There is no doubt that our plant comes within the genus *Hyadnthella* Schur sensu Chouard. The generic characters enumerated by Schur (in Oesterr. Bot. Zeitschr. vi. 225-226 : 18&6) can be reduced, so far as differentiating the species from those of *Bellevalia* sensu stricto is concerned, to the statement of Chouard " *Stamina tubo adhaerentia* "

as contrasted with "Stamina in fauce adhaerentia." Even this character is scarcely distinguishable, or shows degrees of fluctuation between the two extremes, in some of the species. We prefer, therefore, to follow the arrangement of Boissier in uniting *Bellevalia* and *Hyacinthella* under the former name.

The only species of *Bellevalia* closely related morphologically to *B. Atchleyi* and recorded from the Balkan Peninsula are *B. dalmatica* (Baker) A. K. Jackson et Turrill,\* and *B. leucophaea* (Stev.) Boiss. The darker-coloured flowers at once distinguish *B. Atchleyi* from these. *B. dalmatica* also has a relatively shorter perianth tube and *B. leucophaea* smaller flowers. *B. lineata*, with which *B. Atchleyi* has been especially compared, is a native of western and southern Asia Minor.

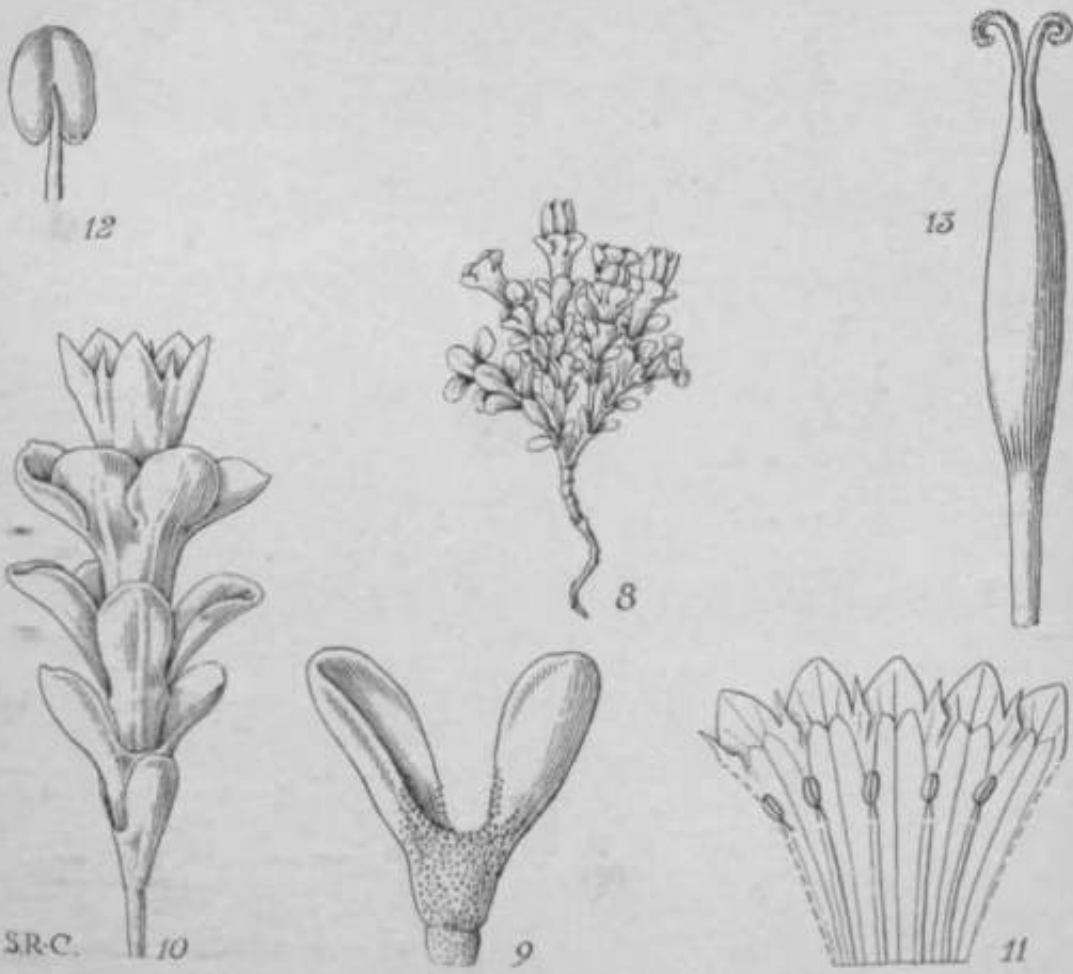
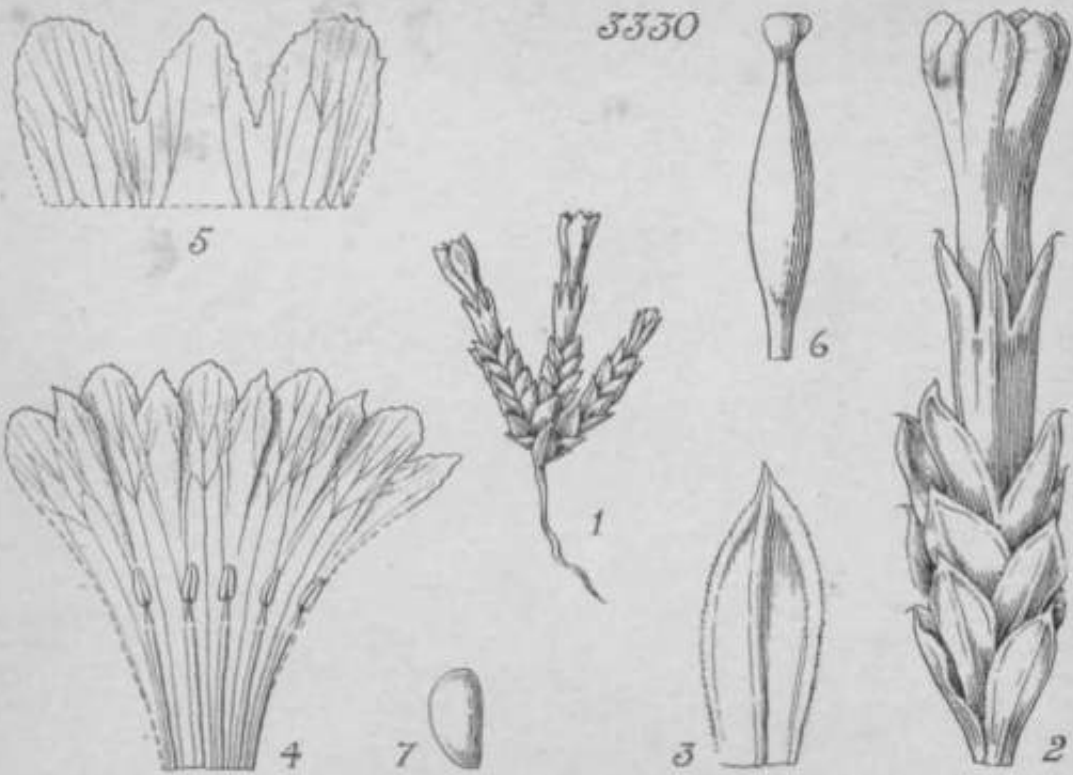
A. K. JACKSON AND W. B. TURRILL.

FIG. 1, whole plant, *natural size*; 2, portion of leaf margin, x 2; 3, part of inflorescence, showing bracts, x 6; 4, perianth opened out, showing stamens, x 6; 5, stamen, dorsal view, x 16; 6, gynoeceium, x 6.

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\* *Bellevalia dalmatica* (Baker) A. K. Jackson et Turrill, comb. nov.—*Hyacinthus dalmaticus* Baker in Journ. Linn. Soc, Bot. xi. 428 (1870).

3330



S.R.C.

## TABULA 3330.

Figs. 1-7 : GENTIANA TETBASTICHA *Marquand*.

Figs. 8-13 : GENTIANA VERNAYI *Marquand*.

GENTIANACEAE. Tribus SWERTIEAE.

**G. (Chondrophylla) tetrasticha** *Marquand* ; species nova, *G. prostratae* Haenke affinis, a qua foliis ovatis acutis dense imbricatis itaque conspicue quadriseriatis differt.

*Herba* annua, radice simplici. *Caudex* 3-4, floribus singulis terminati, usque ad 1 cm. longi, adscendentes, folia dense imbricata conspicue quadriseriata gerentes. *Folia* basalia caulinis similia, rosulam haud efformantia ; caulina ovata, acuta, apice mucronulata, 4 mm. longa, 2 mm. lata, subchartacea, margine anguste incrassata minute papilloso-denticulata. *Flores* solitarii, terminales, sessiles, parvi. *Calycis tubus* 6 mm. longus, 1 • 5-2 mm. diametro ; lobi lineari-lanceolati, subacuminati, 2-5 mm. longi, 0.6-0.8 mm. lati, marginibus scariosis. *Corolla* tubulari-infundibuliformis, fauce leviter angustata, caerulea, extrinsecus viridi-tincta ; tubus 1 cm. longus, 1-5 mm. latus ; lobi 5, ovati, subobtusii, 2-5 mm. longi, vix 2 mm. lati, 7-nerves, nervis gracilibus ; plicae subdeltoideae, erosae vel indistincte 3-dentatae, lobis paullo breviores. *Stamina* 5, tota 6-7 mm. longa ; filamenta 1-5-2 mm. libera ; antherae oblongae, 1 • 5 mm. longae. *Ovarium* breviter stipitatum ; stylus 1 mm. longus ; stigma expansum. *Semina* ellipsoidea, glabra, brunnea.

TIBET. Kuma, 4200 m., C. S. Cutting and A. S. Vernay 115 C.

The characteristic facies of this little plant is due to the remarkably regular densely imbricate tetrastichous arrangement of the leaves. It is known only from two specimens of this collecting, and does not appear to have been found on any of the previous expeditions to Tibet. The series *Humiles* of Section *Chondrophylla*, to which it belongs, includes a large number of species. Many are narrow endemics, but some have a wide geographical range and are highly polymorphic. *G. prostrata*, to which the present species is allied, falls in the latter category.

**G. (Chondrophylla) Vernayi** *Marquand* ; species nova, *G. crassuloidi* Bur. et Franch. affinis, a qua calycis lobis orbicularibus, foliorum margine incrassata nulla insigniter differt.

*Herba* annua, radice simplici. *Caulis* solitarius, erectus, glaber, caberulus, fusco-brunneus, 1 cm. longus, apice ramosus. *Rami* 5, adscendentes vel suberecti, usque ad 2 cm. longi, floribus singulis

terminati. *Folia radicalia* desunt. *Folia caulina* subsessilia, ^pathulata, subobtusata, infima minuta, cetera sursum gradatim majora. *Calyx* corollam investiens; tubus infundibularis, 5-6 mm. longus, 1 \*5-2 mm. diametro; lobi 5, suborbiculares, 1 \*5 mm. longi, 1 -5-2 mm. lati. *Corolla* caerulea, vix expansa, 6 mm. longa, vix 2 mm. diametro; lobi 5, ovati, 1 • 5-2 mm. lati; plicae triangulares, acutae, lobis multo breviores. *Stamina* 5, tota 4-5 mm. longa; filamenta per 0 • 75 mm. libera; antherae oblongae, 0\*75 mm. longae. *Ovarium* sessile, eiliptico-oblongum, 4 mm. longum, 1 mm. latum; stylus 0\*8 mm. longus; stigma inconspicuum. *Semina* matura non visa.

TIBET. Kuma, 4200 m., C. S. Cutting and A. S. Vernay 115 D.

Only a single specimen of this remarkable little plant is known. It was collected under the same number as *Gentiana tetrasticha* on an expedition into Southern Tibet in 1935.—C. V. B. MARQUAND.

GENTIANA TBTBASTICHA.

FIG. 1, plant, *natural size*; 2, upper part of branchlet, with terminal flower, x 4; 3, leaf, lower surface, x 6; 4, corolla, opened out to show stamens, x 3; 5, corolla-lobes and plicae, from within, x 6; 6, gynoecium, x 6; 7, seed, x 20.

GENTIANA VEBNAYI.

FIG. 8, plant, *natural size*; 9, node with pair of leaves, x 8; 10, upper part of branchlet, with terminal flower, x 4; 11, corolla, opened out to show stamens, x 4; 12, anther, x 16; 13, gynoecium, x 8.

5331





TABULA 3331.

DANTHONIDIUM QAMMIEI (*Bhide*) C. E. Hubbard.

GRAMINEAE. Tribus AVENEAE.

**Danthonidium** C. E. Hubbard. Genus novum, *Danthoniae* DC. affine, sed spiculis unifloris, glumis inaequalibus, gluma inferiore superiore longiore, anthoecio tereti, lemmatis marginibus involutis, rhachilla applanata supra anthoecium producta inter carinas paleae arcte appressa et rudimento lemmatis terminata divergens.

*Spiculae* angustae, demum hiantes, aristatae, brevissime pedicellatae, in rhachi racemi solitarii terminalis ortae; rhachilla supra glumas disarticulans, supra anthoecium producta, applanata, glabra, elongata, inter carinas paleae arcte appressa, et rudimento lemmatis terminata. *Antkoedum* 1, <J, glumis multo brevius; callus elongatus, gracilis, basi truncatus, marginibus dense villosulus, apice longe barbatus. *Glumae* persistentes, inaequales, infra medium dorso rotundatae, anguste lanceolatae, setaceo- vel aristato-acuminatae, chartaceae, glabrae; inferior superiore longior, 5-nervis; superior 3-nervis." *Lemma* glumis multo brevius, teres, marginibus involutis, ambitu elliptico-oblongum, explanatum late ellipticum, cartilagineum, tenuiter 9-nerve, breviter et late bilobum, lobis trinerviis glabris seta tenui elongata scaberula terminatis, inter lobos aristatum, infra lobos villosum, e callo basi loborum dense transverse barbatus; arista validiuscula, geniculata, columna applanata torta laevi, seta rigida scaberula. *Paled* oblonga, lemmati aequilonga, apice breviter bifida, hyalina, bicarinata, carinis interne approximatis parallelis glabris supra medium divergentibus et rigide ciliatis. *Lodiculae* 2, membranaceae, glabrae, cuneatae. *Stamina* 3; antherae anguste oblongae. *Ovarium* anguste ellipsoideum, glabrum; styli distincti, terminates, elongati, tenuissimi; stigmata plumosa, ex apice anthoecii exserta. *Caryopsis* ignota. *Lemmatum rudimentum* ellipticum, parvum, apice mucronatum.—*Gramen* annuum; culmi graciles, paucinodes, teretes; foliorum laminae breves, lineares, planae vel involutae; ligulae ad seriem ciliatorum minorum redactae; racemi paucispiculati, spiciformes; spiculae longiusculae.

Species unica, Indiae occidentalis incola.

**D. Gammiei** (*Bhide*) C. E. Hubbard, comb. nov. *Danthonia Gammiei* **Bhide** in Journ. & Proc. As. Soc. Beng. 1911, n.s. vii. 513, 516, t. 6 (1912). Blatter et McCann in Journ. Bomb. Nat. Hist. Soc. xxxiii. 236 (1929), et in Ind. Counc. Agric. Res., Sci. Monogr. no. 5, 200: 1935 (Bombay Grasses).

*Gramen* annuum, 10-60 cm. altum. *Culmi* erecti, 2-3-nodes, simplices vel basin versus ramosi, racemum versus pilosi, ceterum glabri, laeves.

*Folia* glabra ; vaginae tenuiter striatae, lites, internodiis breviores ; laminae anguste lineares, obtusae, 1-5-7\*5 cm. longae, 1-2-3 mm. latae, erectae, marginibus tenuiter scaberulis, ceterum laeves. *Racemus* contractus, 2-5 cm. longus, 1-1-8 cm. latus, circiter 3-10-spiculatus ; rhachis breviter et laxe pilosa ; pedicelli circiter 1 mm. longi. *Spiculae* stramineae. *Gluma inferior* 1-6-2 cm. longa (arista usque ad 4 mm. longa inclusa) ; *gluma superior* 1-3-1-5 cm. longa (arista usque ad 3 mm. longa inclusa). *Lemma* 3-4 mm. longum (lobis exclusis), infra lobos pilis usque ad 1 • 5 mm. longis transverse barbatum, lobis circiter 1 mm. longis, setis lateralibus 5-7 mm. longis ; aristae usque ad 2-7 cm. longae, columna 5-7 mm. longa ; callus usque ad 1-5 mm. longus, apice pilis usque ad 2 mm. longis barbatus. *Palea* usque ad 4 mm. longa. *Antherae* 1-1-5 mm. longae. *Rhachilla* usque ad 2-5 mm. producta, lemma circiter 1 mm. longum apice ciliatum gerens.

INDIA. Bombay Presidency: Castle Rock, Oct. 1902, *Gammie in Herb. Econ. Bot. Bombay* 15636 (type) ; Jog to Siddhapur, open grassland, on rocky soil, *McCann* A.50, A.51 (ex Blatter et McCann); Mirjan, laterite flats, *Hallberg* A.49 (ex Blatter et McCann).

During a preliminary examination of the material of *Danthonia* in the Kew Herbarium, it was noticed that *D. Gammiei* Bhide differed from all other species of the genus in possessing one-flowered spikelets. A more detailed study revealed a number of other differences, the more important of which were the inverse position of the glumes and the curious prolongation of the rhachilla beyond the floret. It is probable that *D. Gammiei* was referred to *Danthonia* because of the bearded and 3-awned lemma, but a similar type of lemma is to be found in several genera of the *Arundinelleae* (*Danthoniopsis* Stapf, *Trichopteryx* Nees, *Tristachya* Nees) and *Agrosteae* (*Stephanachne* Keng); and although of frequent occurrence in *Danthonia*, it is not characteristic of every species. The genera of the *Arundinelleae* mentioned above may be readily separated from *Danthonidium* by their two-flowered spikelets, the lower floret of which is male or barren.

The Australian genus *Anisopogon* R. Br. resembles *Danthonidium* in possessing one-flowered spikelets and awned lobes of the indurated lemma, but may be distinguished by its perennial habit, short truncate ligule, loose panicle, larger spikelets, many-nerved glumes, elongated pungent callus, shortly villous lemma, stouter awn, very fine bristle-like prolongation of the rhachilla, larger lodicules (up to 5 mm. long) and the hairy-topped ovary.

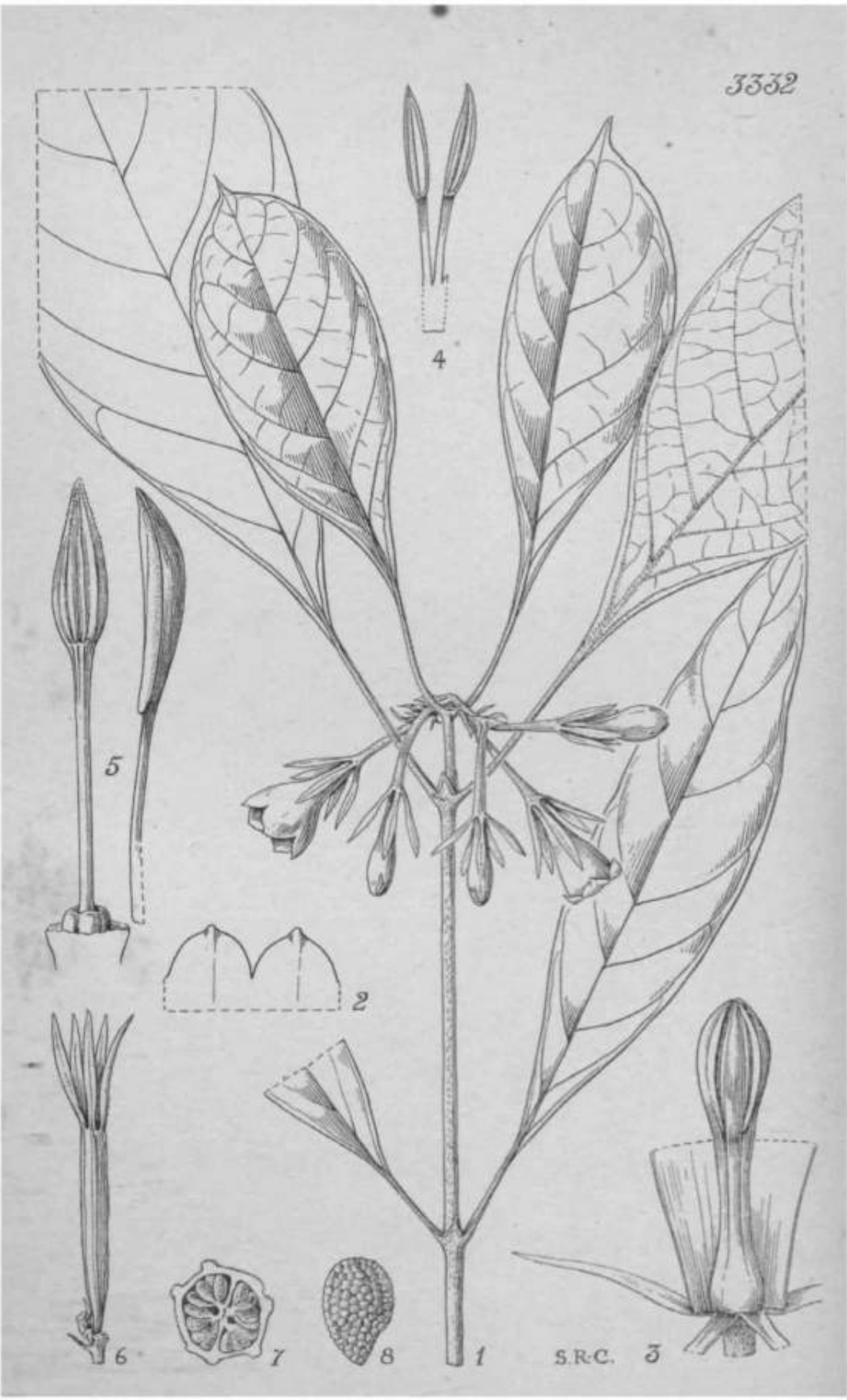
On account of the one-flowered spikelets, *Danthonidium* might be referred to the *Agrosteae*. The only genus in this tribe with which it might be confused is *Stephanachne* Keng in *Contrib. Biol. Lab. Sc. Soc. China*, ix. Bot. Ser. 134, Aug. 1934 (*Pappagrostis* Roshev. in Komarov, *Fl. URSS*.\* ii. 749, Sept. 1934). Both species of that genus are, how-

\* According to S. Nevski in litt., vol. ii. of this flora left the press late in Sept. 1934.

ever, perennials, with membranous ligules, subequal glumes, herbaceous-membranous 5-7-nerved lemmas, slender awns, very short callus, and with the rhachilla not or only minutely produced beyond the floret.

C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, spikelet, x 4; 3, lower glume, x 4; 4, upper glume, x 4; 5, floret, x 8; 6, callus, x 16; 7, lemma, opened out, x 8; 8, palea and prolongation of rhachilla, x 8; 9, rhachilla and rudiment of lemma, x 40; 10, lodicules, x 12; 11, stamens, x 12; 12, pistil, x 12.



## TABULA 3332.

### PSILOBIUM SIAMENSE *Kerr.*

RUBIACEAE. Tribus MUSSAENDEAE.

**Ps. siamense** *Kerr.*; species nova, *P. nutanti* Jack affinis, a quo inflorescentia terminali, stigmatibus haud exserto inter alia differt.

*Frutex* circiter 1 m. altus; ramuli teretes vel subquadrangulares, juventute pilis ascendentibus sparse appresse hirsuti, mox glabrescentes, statu sicco nigrescentes. *Stipulae interpetiolares* in vaginam angustam confluentes, leviter bicarinatae, apice subulato-acuminatae, acumine appresse hirsuto rarius infra apicem dentibus 1-2 minutis praedito circiter 1-5 mm. longo. *Folia* saepius elliptica, interdum oblanceolata, apice leviter acuminata, acuta, basi in petiolum sensim angustata, usque ad 16 cm. longa et 6 cm. lata, membranacea, statu sicco supra nigro-brunnea subtus fusca, supra glabra vel praesertim ad marginem et basin versus sparse appresse hirsuta, subtus secus costam nervosque sat dense appresse hirsuta, nervis lateralibus utrinque 6-9 leviter arcuatis subtus prominentibus supra subprominulis; petiolus usque ad 3 cm. longus, sparse subappresse hirsutus, supra alte canaliculatus. *Inflorescentia* cymosa, terminalis, foliis multo brevior, 4-20-flora, ramis plus minusve deflexis, floribus nutantibus, partibus omnibus appresse hirsuta; bractae persistentes, anguste triangulares, acutae, 1-3 mm. longae; pedicelli 2-4 mm. longi. *Alabastrum* apice truncatum, breviter 5-carinatum, corollae lobis valvatis. *Receptaculum* circiter 5-costatum. *Calycis lobis* sub anthesin patuli, lanceolatis, acutis, leviter carinati, 8-9 mm. longi, 1 mm. lati, persistentes, accrescentes. *Corolla* infundibulari-campanulata, viridula, lobata; tubus 1-7 cm. longus, extus pilis appressis sparse instructus, intus glaber; lobi rotundati, apiculati, 3 mm. longi, basi 1 mm. lati. *Stamina* imo tubo corollae inserta, inclusa; filamenta robusta, 1 cm. longa, basin versus connata; antherae basifixae, inrorsa, apice acutae, circa stigma cohaerentes, 6 mm. longae. *Ovarium* primo uniloculare, placentis duabus parietalibus mox in medio ovario cohaerentibus duos loculos formantibus, ovulis perplurimis; stylus 1 cm. longus, robustus, longitudinaliter striatus, basi disco annulari leviter 5-lobato 1 mm. alto cinctus; stigma fusiforme, 5 mm. longum, longitudinaliter 10-alatum. *Fructus* cylindricus, 5-costatus, usque ad 1 cm. longus, 3 mm. diametro, calycis lobis persistentibus 1-5 cm. longis coronatus. *Semina* lenticularia, minute reticulo-tuberculata, circiter 0-5 mm. diametro.

*Siam*. Pattani, Bukit, 100 m., in evergreen forest, No. 7114 (type), Kiah 24265.

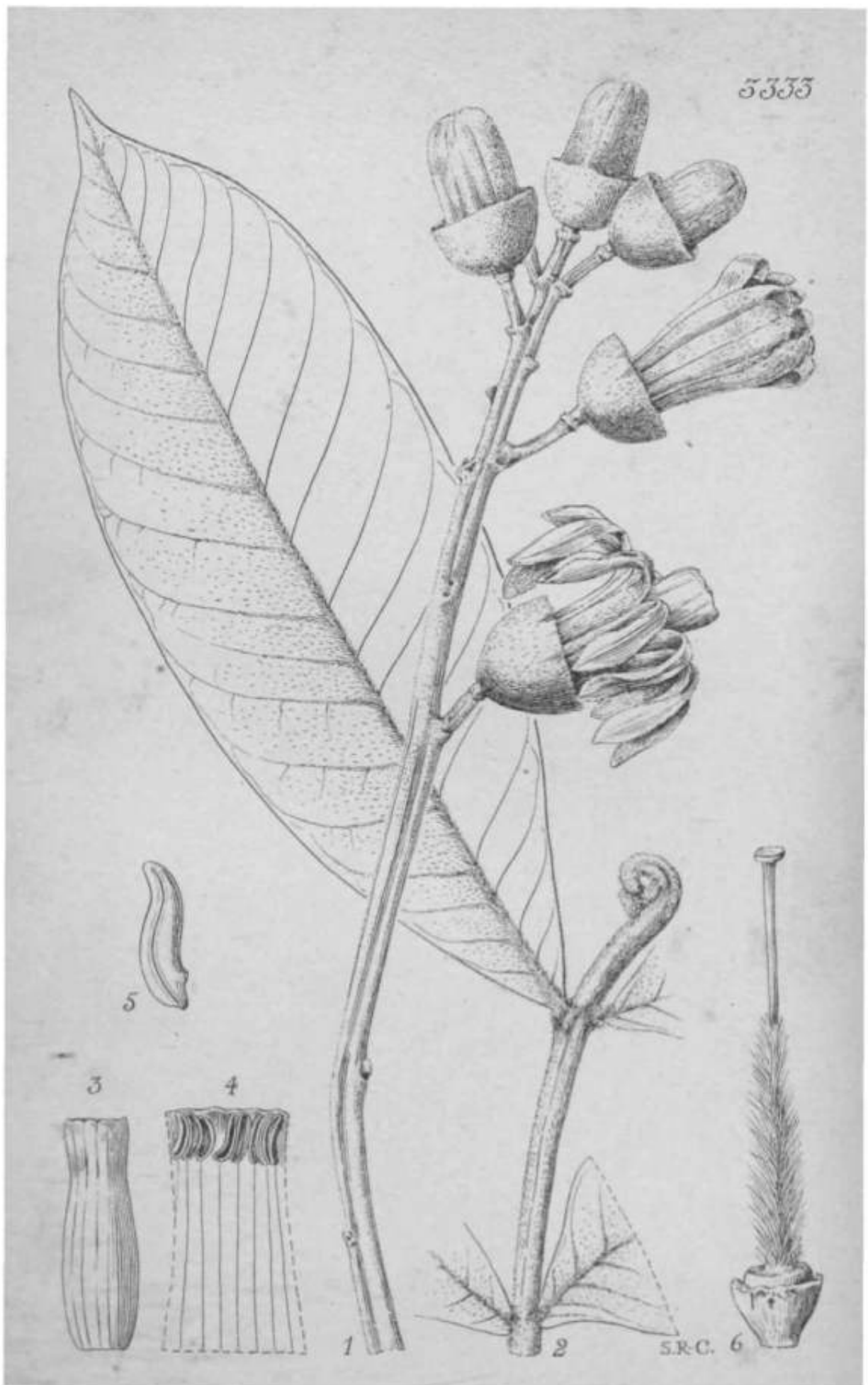
This plant seems to be rightly placed in Jack's genus *Psilobium* (Misc. ii. No. 7, 84: 1822). The chief points in which it does

not fit the original generic description are the inclusion of the stigma and the rather long corolla-tube. The ten-winged stigma and the long "siliquose" fruit, crowned by the persistent calyx-lobes, are as described by Jack. The structure of the sexual organs is interesting; together they form a column in the centre of the flower. The style and stigma are almost completely hidden by the stamens, the tips of the anthers being united over the top of the stigma. The anthers, however, do not cohere laterally, but narrow slits are left between them, through each of which protrudes a stigmatic wing.

Jack's original species, *P. nutans*, from Bencoolen on the west coast of Sumatra, described in 1822, was lost sight of for many years, till Ridley (Kew Bulletin 1925, 84) reported its rediscovery among a collection of plants made by C. J. Brooks in the type locality. Comparison of the Siamese plant with that collected by Brooks shows that the former has much larger flowers with relatively narrower calyx-lobes.

It seems probable, judging from a cursory examination, that some plants assigned to *Gardenia*, Section *Gardeniella*, should rather be referred to *Psilobium*.—A. F. G. KERB.

FIG. 1, flowering branch, *natural size*; 2, two corolla-lobes, x 2; 3, staminal column exposed by partial removal of corolla, x 3.5; 4, two stamens, anterior view, x 3; 5, gynoeceum and side view of a stamen, x 6; 6, fruit, *natural size*; 7, transverse section of fruit, x 4; 8, seed, x 20.



## TABULA 3333.

### CHISOCHETON MEDUSAE *Airy-Shaw*.

MELIACEAE. Tribus TRICHILIEAE.

**C. Medusae** *Airy-Shaw*; species nova, ex affinitate *C. macranthi* (Merr.) *Airy-Shaw*,\* a qua ramis rhachibus foliolis subtus inflorescentiisque fulvo-pubescentibus vel -tomentosis, inflorescentiis subsimplicibus multo brevioribus, calyce truncato, petalis 10-14, tubo stamineo integro intus glabro, antheris glabris, ovario glabro 8-loculari abunde distinguitur.

*Arbor* circiter 7 m. alta, cortice fusco pubescentia fulvida persistente tecto atque lenticellis numerosis parvis inconspicuis rubro-brunneis notato, cicatricibus foliorum delapsorum oblongis 4-5 cm. longis 1-2 cm. latis. *Folia* gigantea, usque 12 dm. longa vel ultra, 9-10-juga, jugis 2-3 infimis delapsis; rhachis (petiolo incluso) subteres, inferne 6-8 mm. crassa et facie adaxiali fere plana utrinque acute bicarinata, petiolo 20 cm. longo in caulem breviter decurrente et cum eo vaginanti-connato cavitatem axillarem efformante, superne supra bicanaliculata, apice more generis foliolis nondum evolutis circinatim involuto, undique  
*Foliola matura* (annotina et vetustiora) oblonga usque oblongo-oblancoolata, 35-39 cm. longa, 8-10 cm. lata, 1-2 cm. inter se distantia, brevissime incrassato-petioluta vel subsessilia, inferne in basin ipsam rotundatam subcuneato-angustata, apice modice acuminata vel breviter caudata, acuta, margine integerrima, angustissime revoluta, supra (costa pubescente excepta) glabrata, subtus longiuscule pubescentia costa nervisque dense fulvido-tomentosis, nrm membranacea; costa et nervi supra fere plani vel levissime impressi, subtus prominentes; nervi primarii laterales utrinque 24-28, 1-2 cm. inter se distantes, angulo 50°-60° a costa orti, graciles, recti, prope marginem sursum arcuati et regulariter anastomosantes; nervi secundarii et ultimi gracillimi, inter primarios subscalariformiter dispositi. *Foliola hornotina* 1-3-juga, 15-27 cm. longa, 4-6 cm. lata, nemper membranacea, supra sparse (sed costa dense) fulvo-pubescentia, ceterum annotinis similia. *Inflorescentiae* axillares, pro rata brevissimae, 15-21 cm. longae, simpliciter racemosae vel inferne angustissime paniculatae; rhachis valde complanata, basi usque 1-2 mm. lata, superne angustata et irregulariter angulata, fulvido-tomentosa; ramuli (cum adsint) brevissimi, 1-3 cm. longi; bracteae bracteolaeque non visae, cito caducae, cicatricibus tumidis crescentibus ramulos pedicellosque relictis; pedicelli 1-2 mm. longi, 1-5-2 mm. crassi, rigidi, plerumque recti, patentes vel patuli, angulati, dense fulvido-subsericeo-tomentosi, apice abrupte umido-ampliati, 2-3 mm. lati, calyci articulati. *Calyx* late cupularis, *macranthi* (Merr.) *Airy-Shaw*, comb. nov.—*Clemensia macrantha* Journ. Sci. iii. 144 (1908), et in Straits Br. Roy. As. Soc, special (1921), et Enum. Philipp. Fl. Pl. ii. 371 (1923).



fere hemisphaericus, 1-1-3 cm. altus, basi in stipitem brevissimum 1-2 mm. longum subito constrictus, ore truncato circiter 1-6 cm. diametro (sub pressione), minutissime 5-denticulatus, extra dense fulvo-sericeus, intus glaberrimus, subcoriaceus. *Petala* 10-14, valvata, reflexa vel subrevoluta, lorata vel angustissime spatulata, 4—4\*5 cm. longa, latissima parte (apicem versus) 2-6 mm. lata, basin versus sensim angustata atque tubo stamineo breviter adnata, apicem versus carnosio-incrassata et plus minus imbricata, obtusa vel subacuta, extra (ima basi excepta) adpresse fulvo-sericea, intus glaberrima, alba. *Tubus stamineus* 3^3\*5 cm. longus, 5-12 mm. latus (sub pressione), glaberrimus, angulato-striatus, inferne tener, apicem versus incrassatus et sub lente minutissime papillosus, truncatus, margine integro leviter incurvo. *Antherae* 15-20, subsessiles, paullo supra basin suam et circiter 2\*5 mm. infra apicem tubi affixae, crescentiformes, circiter 3 mm. longae et 1 mm. latae, utrinque obtusae, valde complanatae, glabrae, lateraliter versatiles. *Discus* brevissime annularis vel discoideus, circiter 3 mm. diametro, glaber. *Ovarium* ovoideum, vix 2 mm. longum et 1 mm. diametro, glabrum, inferne in disco immersum, 8-loculare, loculis 1-ovulatis. *Stylus* tubum stamineum aequans, triente vel fere dimidio inferiore longe adscendenti-ferrugineo-barbato excepto glaber, striatus; stigma capitatum, 2 mm. diametro, glabrum, vertice truncatum, planum, inferne plus minus rotundatum. *Fructus* ignotus.

SARAWAK. Dulit, secondary forest, under 300 m., 19 Feb. 1932, **Richards 2631.**

I am unable to find any qualitative characters by which to separate the genus *Clemensia* from *Chisocheton*. The points emphasized by Merrill for *Clemensia*, namely, the large size of the flowers, the 5-locular ovary, and the numerous anthers, are purely quantitative, while the indehiscent fruit finds a parallel in Sect. *Dasycoleum*, the species of which are otherwise indistinguishable from typical *Chisocheton*. In their large flowers and polymerous androecium both *C. macranthus* and *C. Medusae* may be regarded as the most primitive species in the genus (*C. Medusae*, having a polymerous corolla and gynoecium in addition, being the more primitive of the two), though the non-dehiscence of the fruit is of course a derivative character. Since these two species cannot well be referred either to Sect. *Euchisocheton* Harms\* or to Sect. *Dasycoleum* (Turcz.) Harms,\* it may be convenient to treat *Clemensia* as a new section, with the following diagnosis:—

**Chisocheton** Sect. **Clemensia** (Merr.) Airy Shaw, stat. nov.—*Clemensia* Merr. in Philipp. Journ. Sci. iii. 143 (1908); Pilger u. Krause in Engl. Nat. Pflanzenf. Ergänzungsheft iii. 162 (1914); pro gen.—Flores pro genere maximi, 3-5-4-5 cm. longi, 1-2 cm. lati. Corolla, androecium et gynoecium polymera: petala 8-14, stamina (antherae) 15-20,

\* Harms in Engl. u. Prantl, Natlrl. Pflanzenf. iii. 4. 295-6 (1896).

ovarii loculi 5-8. Fructus (quoad cognitum) indehiscens.—Spp. 2, Borneenses et Philippinenses. Typus: *C. macranthus* (Merr.) Airy-Shaw.

In his original description (l.e. 145), Merrill says: "apparently allied to *Chisocheton* and *Dysoxylum*," but I am unable to find any character common to *Clemensia* and *Dysoxylum* which is not also possessed by *Chisocheton*, whilst the structure of the disk definitely excludes *Clemensia* from subtribe *Dysoxylinae* and places it in *Chisochetoninae* (sensu Harms \*).

The epithet *Medusae* refers to the numerous reflexed or subrevolute petals.

Although Harms maintained *Dasycoleum* as a section when transferring the species to *Chisocheton*, he admitted that the best course would have been to interpolate them among those of *Euchisocheton*, but could not carry this out owing to lack of material. Examination of the Kew material shows that the species concerned would all fall into § *Paniculati* Harms. Pending a complete revision of the genus, therefore, the writer provisionally regards Sect. *Dasycoleum* as indistinguishable from Sect. *Euchisocheton*, the amended diagnosis of which will be as follows:—

**Chisocheton** Sect. **Euchisocheton** Harms, emend.—*Chisocheton* Sect. *Dasycoleum* (Turcz.) Harms, l.c., synonym. nov.—Flores mediocres vel parvi, nonnunquam anguste elongati. Corolla, androecium et gynoecium pro rata oligomera: petala 4-6, stamina 4-10, ovarii loculi 2-5. Fructus varie dehiscens vel indehiscens.—Typus: *C. patens* Bl.

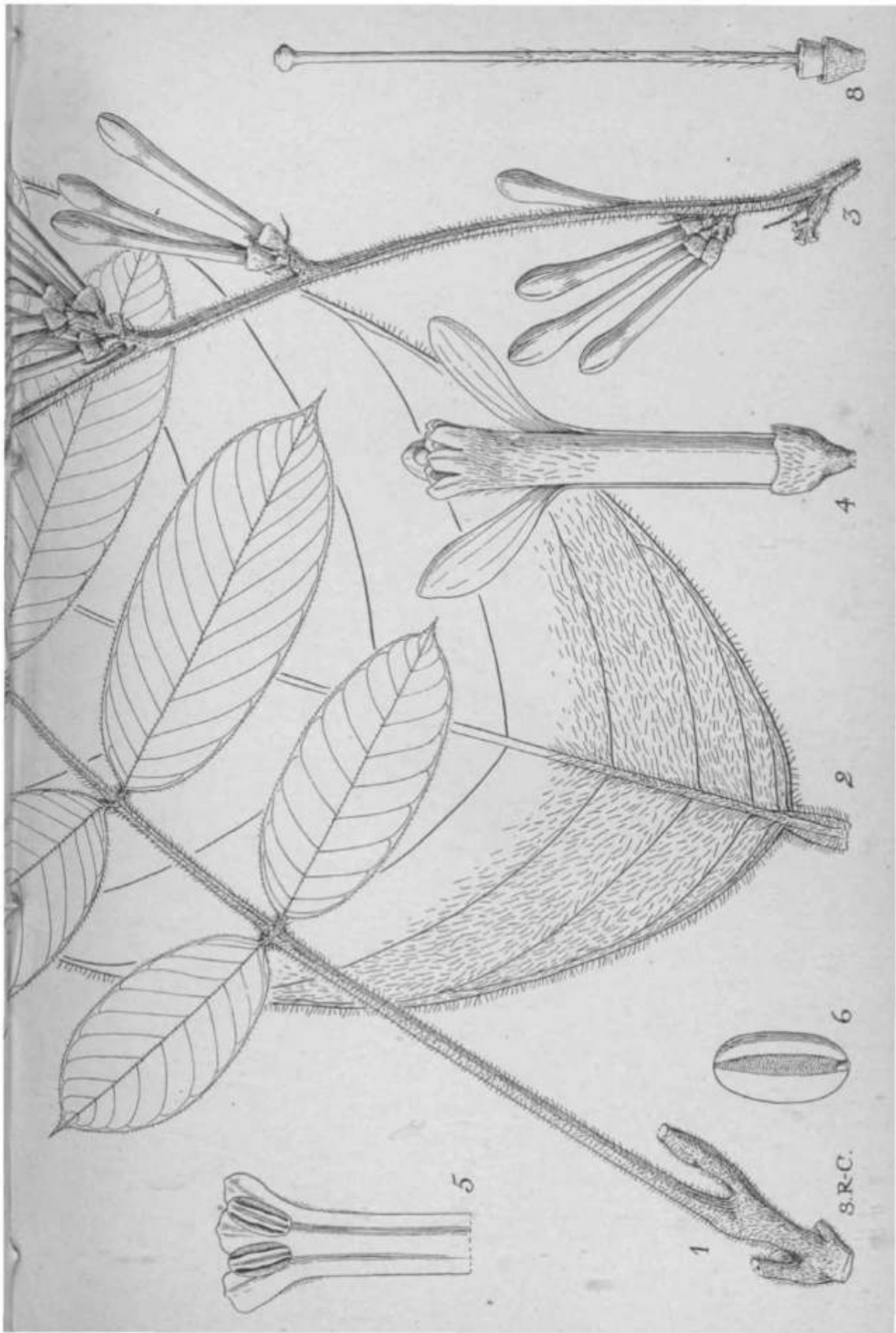
H. K. AIRY-SHAW.

FIG. 1. 1, upper part of leaf, natural size; 2, upper part of inflorescence, natural size; 3, staminal tube, from outside, natural size; 4, upper part of staminal tube, from inside, showing anthers after dehiscence, x 2; 5, anther before dehiscence, x 6; 6, gynoecium, x 2.

5334



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## TABULA 3334.

### CHISOCHETON SETOSTIS *Ridley*.

MELIACEAE. Tribus TRICHILIEAE.

*C. setosus* *Ridley* in *Kew Bull.* 1930, 366 ; species distinctissima, in § *Gracilium* *Harms* ponenda, nulli speciei arete affinis, indumento longo setoso, inflorescentia perelongata, corolla elongata glabra statim recognoscenda.

*Arbor* parva, circiter 3 m. alta. *Caulis* superiore parte 1 cm. diametro, teres, dense longe ferrugineo-setosus. *Folia* ingentia, imparipinnata : rhachis (petiolo 34 cm. longo incluso) circiter 1 m. longa, subteres, infra jugum primuin foliolorum supra 1-sulcata, supra eum 2-sulcata, basin versus 6 mm., apicem versus 3 mm. diametro, ipsa basi conspicue tumida supra in cupulam axillarem excavata, tota dense longe patenter ferrugineo-setosa, setis 2-3 mm. longis. *Foliola* 6-juga, infima elliptico-oblonga, 20 cm. longa, 8-8-5 cm. lata, basi rotundata, intermedia oblanceolato-oblonga, 28-35 cm. longa, 10-11 cm. lata, basi rotundata, suprema oblanceolata, 36-37 cm. longa, 9-10 cm. lata, in basin sub-obtusam cuneato-attenuata, omnia apice abrupte breviter caudata (cauda 1-2 cm. longa), integra, margine levissime revoluta, utrinque densiuscule ferrugineo-setosa, setis paginae superioris tactu jucunde sonantibus, tenuiter chartacea, pallidiuscule viridia, inter se 10-16 cm. distantia ; foliolorum lateralium petioluli brevissimi, 5-6 mm. longi, crassi, densissime ferrugineo-setosi; folioli terminalis petiolulus 1 cm. longus ; costa infra valde elevata, dense patenter setosa, supra leviter elevata ; nervi laterales foliolorum intermediorum 17-20-jugi, graciles, infra prominentes, supra plani, angulum circiter 45° cum costa efformantes, niarginem versus arcuati atque anastomosantes, nervis tertiariis tenuibus plus minus scalariformiter dispositis. *Panicula* longissime pendula, Usque 1-84 m. longa, densiuscule ferrugineo-setosa atque minute puberula, irregulariter angulo&a vel complanata, tenuiter striolata, inferne per 1-12 m. eramosa, inde ramulos floriferos dissitos valde abbreviates apogeotropicos usque 1\*5 cm. longos setosos et brevissime dense pubescentes gerens, quoque ramulo bractea lineari-subulata p-7 mm. longa dense longe ferrugineo-setosa nonnunquam usque 5 mm. mfra ramulum sita sufEulto. *Flores* (ut ramuli) apogeotropici, i.e. sursum (basin inflorescentiae versus) spectantes. *Pedicelli* brevissimi, A-2 mm. longi, apice abrupte conspicue cupulatim expansi. *Calyx* cupularis, subinteger vel valde obscure 3-4-dentatus, circiter 3 mm. longus et 4 mm. diametro, parce setosus et puberulus, Vuber, inferne in stipitem 1-2 mm. longum fere esetosum sed pubescentiorem pedicello articulatum abruptiuscule contractus. *Corolla* anguste cylindrica, <Y3-5 cm. longa, 2-3 mm. diametro (sub pressione), alabastro clavata, glaberrima, alba : petala 4-6, oblanceolata, 1-5-4 mm. lata, obtusa, alabastro superne imbricata, demum subrevoluto-potentia. *Tubus*

*stamineus* 2-3-3\*2 cm. longus, 6-8-lobus, albus, superne extra infra lobos longe ferrugineo-hirsutus, ceterum glaber; lobi elongato-quadrati, 2-3 mm. longi, 1—1.5 mm. lati, truncati, brevissime tricuspидati vel interdum altiuscule bilobulati, glabri. *Antherae* tot quot tubi lobi, intra sinuum basin filamentis brevissimis insertae, basifixae, oblongae, 2 mm. longae, viz 1 mm. latae, levissime curvatae, utrinque obtusae, glabrae, creberrime minutissime puncticulatae, brunneae, inclusae vel lobos subaequant. *Discus* cupularis, circiter 1 mm. altus, integer vel sinuosus, erectus, glaber, crassus, ut videtur induratus. *Ovarium* in receptaculo immersus, loculis minimis vix distinguendis. *Stylus* gracilis, tubi staminei lobos paullo superans, inferne longe sparse ferrugineo-pilosus, superne glaber, stigmatе annulari-capitato brunneo. *Fructus* ignotus.

SAEAWAK. Dulit, primary forest, under 300 m., 10 Feb. 1932, *Native Collector (Oxford Univ. Exped. Sarawak) 2539*. "Tree, c. 3 m. high. Calyx red. Outer petals white; inner (corona?) white with a few reddish hairs on the outside. Anthers and stigma brown. Inflorescence hanging down."

BRUNEI. Limbang, 1891, *Kunoeang* for *Haviland 598* ("c.o.d.z.") (type).

This striking species is not closely related to any hitherto described, but Ridley is probably correct in suggesting *C. penduliflorus* King as its nearest ally. The most remarkable feature of *C. setosus* is the clothing of long bristly hairs, which emit a faint but distinct tinkling sound when lightly brushed or stroked.

As Ridley notes, the type-specimen is imperfect, but the specimen obtained by the Oxford University Expedition to Sarawak in 1932 consists of a complete inflorescence and a (probably) complete leaf. It has therefore been possible to amplify considerably the original description. The flowers of the Sarawak specimen are slightly smaller and the corolla is 4-5- (as against 6-)merous, but the specific identity of the two is beyond doubt. It may be noted that in this species the disk is more strongly developed than in most species of *Chisocheton*, recalling rather that of *Dysoxylum*. The most careful dissection failed to reveal any trace of loculi in the ovary, which appears to be totally immersed in the woody receptacle and would probably require microtome sectioning to show its structure.

In stature *C. setosus* is apparently one of the smallest in the genus (cf. *C. penduliflorus*), but the leaves are among the largest (exceeded only by those of *C. princeps* Hemsl.) and the inflorescence is considerably longer than the maximum measurements recorded by Ridley for any species of § *Gractles*.—H. K. AIRY-SHAW.

Fia. 1, leaf, with portion of stem, x  $\frac{1}{2}$ ; 2, one of the lowermost leaflets, lower surface, *natural size*; 3, part of inflorescence in the natural pendulous position, *natural size*; 4, flower, with part of corolla removed, showing staminal tube, x 2; 5, upper part of staminal tube from within, x 4; 6, anther, dorsal view, x 8; 7, longitudinal section of base of flower, x 8; 8, gynoecium and disk, x 3.



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minima, uno vel duobus saepe deficientibus, linearia vel anguste spatulata, circiter 2 mm. longa, in lacinias 2-5 filiformes alte fissa vel interdum ad filum singulum redacta, laciniis filamenta staminum oppositipetalorum plerumque amplectentibus. *Stamina* 6(-8), inter segmenta disci inserta: filamenta subulato-filiformia, circiter 2\*5 mm. longa, glabra; antherae breviter oblongae vel subglobosae, circiter 0\*5 mm. longae, medio dorso affixae, versatiles. *Discus* annularis, conspicuus, ob staminum insertionem in segmenta 6 latiora quam longiora apice papillosa divisus. *Ovarium* (scil. inferum) 3(-4)-loculare, loculis 2-ovulatis, ovulis axilibus pendulis collateralibus. *Styli* 3(-4), liberi, subulato-filiformes, erecti vel »divergentes, subtrigoni, acuti, inferne minute papilloso, stigmatibus punctiformibus. *Capsula* anguste trigonofusiformis, late 3(-4)-alata, 1-5-2 cm. longa, 2-3 cm. lata, alis membranaceis semicircularibus crebre transverse venosis, sepalis persistentibus erectis coronata, siccitate saepe purpureo-caerulescens. *Semen* solitarium, elongato-fusifforme.

BRITISH NORTH BORNEO. Labuan, common in peaty ground, *Motley* 364 (type): "Small tree like Alder; red wood." Marintaman-Mengalong Forest Reserve, Sipitang, freshwater swamp, Sept'. 1931, *Melegrito* in *For. Dept.* 1573: "Tree, 30 ft. high, 18 in. girth; flower red." Kg. Mesapol, Weston, plain, 15 May 1932, *Suleiman* in *For. Dept.* 2204: "Tree, 25 ft. high, 16 in. girth, used for building; flower yellow." Mendahan, sandy plain, alt. 2-7 m., 13 Mar. 1932, *Bakar* in *For. Dept.* 2469: "Tree, 19 ft. high, 56 in. girth, used for building; flower white." Bangawan, near swamp, alt. 4\*5 m., 12 Feb. 1933, *Tandom* in *For. Dept.* 2816: "Shrub, 10 ft. high, 2 in. girth; flower white." Mile 41, Jesselton-Beaufort, freshwater swamp, alt. 7\*5 m., 20 Apr. 1934, *J. P. Edwards* in *For. Dept.* 3889: "Tree, 20 ft. high, 12 in. girth; not in flower."

SARAWAK. Sine loc. exact., 1865-68, *Beccari* 3163. Rejang, Sibuan, Aug. 1893, *Kalong* for *Haviland* 2919. Baram, 1931, *E. Banks's Collector*.

[DUTCH BORNEO. "Sampit. Niederung. 20 m. hoch, wohl der mächtigste Baum des Gebietes. Mit Friichten August 1923. *Hackenberg* 96." (Diels et Hackenb. I.e. 312; non vidi.)]

BILLITON. Sine loc. exact., 1911, *van Rossum* 50.

BANKA. [Djebus, 1857, *Teysmann*, teste Miquel, I.e.; non vidi.] *Blinjoe*, 1 Dec. 1914, *Grashoff* 109.

KARIMON. Sine loc. exact., Feb. 1896, *Ridley* 7114.

SUMATRA. Palembang, O. A. Kemmering, ± 10 m., 24 April 1918, *Endert* 302.

VERNACULAR NAMES. British North Borneo: *Perepat paya* (Brunei); *Perepat-perepat* (Bajau). Dutch Borneo: *Kayu tanah* (Malay). Billiton: *Perpat darat*. Banka: *Pragat darah* (Malay, teste Miquel), *Teroentoem batoe* [*Teruntum batu*]. Sumatra: *Perpat*.

Although the genus *Combretocarpus* was described as early as 1865, no illustration of it has hitherto been published in botanical literature.



The recent receipt at Kew of abundant material from the Forestry Department, British North Borneo, has afforded an opportunity to remedy the omission.

As will be seen from the synonymy given above, the sole species was actually described by Miquel in 1860, from sterile material, as a doubtful member of the *Loranthaceae*, from which obscurity Dr. Dansei's researches have only quite recently rescued it. The writer is indebted to Mr. C. F. Symington, of the Forest Research Institute, Kepong, F.M.S., for drawing his attention to this fact.

*Combretocarpus* is closely related to *Anisophyllea*, the floral structure (except for the number of ovules) being essentially the same. The inflorescence and fruits are, however, so very distinct that Baillon's opinion (I.e.; cf. Lemée, I.e.) that the two genera should be united cannot be upheld. The inflorescence of *Anisophyllea* is racemose or spicate, not cymose-paniculate, and the fruit is an unwinged nut or drupe. As noted in the Latin description supplied herewith, Hooker erroneously described the inflorescence of *Combretocarpus* as racemose, but the cymose structure is quite evident even in Hooker's rather meagre type-specimen. It is possible that Hooker's mistake was partly responsible for the view expressed by Baillon (*vide supra*), who probably saw no specimens of the plant. The error was perpetuated by Schimper (I.e.), who likewise may not have had access to herbarium material. The tribe *Anisophylleæ* is well distinguished from the other tribes of *Rhizophoraceæ* by the alternate exstipulate leaves and free styles. According to H. F. Marco (I.e. 5, 17), the wood anatomy indicates a close affinity between the *Anisophylleæ* and the *Gynotrocheæ*.

Hackenbergs's observations (I.e. 294) on the habit of *Combretocarpus*, as seen by him in Dutch Borneo, are worth quoting. After describing the type of growth exhibited by species of *Dyera* and *Tristania*, as examples of tall trees of the lowland forest, he proceeds :—

" Another kind of forking is shown by the, in places, very common, massive, Tanah tree (the Rhizophoraceous *Combretocarpus Motleyi* Hook. f.). At two-thirds of its height the stem forks many times, rather flatly and widely, with strong branches. In this way a great breadth of crown is attained, which however appears much broken up, unless it is rounded off into an umbrella or hemisphere by means of more upright side-branches in the centre. One may say shortly : the tree forms a crown sufficiently small, so that, with its great height and uncertain hold in the swampy ground, it may be less easily brought down by the frequent storms, for the danger of uprooting is very great.

" But Nature has here taken further precautions. The overthrown stem of the large-crowned Tanah tree just mentioned, which is often the victim of the storm, transforms those of its branches which reach into the swamp into roots. The upward-pointing twigs develop into new negatively geotropic erect stems, which in their turn send forth roots directly downwards through the old stem. When the old stem

in the course of time disintegrates, there are 4-6 young trees standing in its place. Thus the tree has unlimited duration of life."

According to Durant \* (I.e. 6), *Combretocarpus* occurs in great abundance in the freshwater swamps, associated with *Dactylocladus stenostachys* Oliv.\* and *Gonystylus* sp. The vernacular names *teruntum* and *perepat* are also applied to *Lumnitzera* and *Sonneratia* spp. respectively. There appears to be a promising future for commercial uses of the timber.

The geographical distribution of *Combretocarpus* is peculiarly restricted for a coastal swamp plant. Diels (I.e. 316) comments on its absence, "soviel ich weiss," from Sarawak, and appears also to have been unaware of its occurrence in Banka, but the specimens cited above demonstrate its existence in the former, and Heyne (I.e.) reports it as "common" in the latter locality. What is very strange is its occurrence on the Karimon Is. but apparent absence on the mainland of the peninsula. It seems almost certain that it must be there, but, in view of the great amount of work that has been done on the flora of the southern part of the peninsula, it is almost equally certain that it must be Only in very limited quantity.—H. K. AIRY-SHAW.

FIG. 1, flowering branchlet, *natural size*; 2, fruiting branchlet, *natural size*; 3, flower, x 6; 4 and 5, petals, x 12; 6, gynoecium, x 12; 7, transverse section of fruit, x 2; 8, seed, x 2.

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\* I am again indebted to Mr. Symington for drawing my attention to this Report, and for the information that the *medang tabak* there mentioned is *Dactylocladus*, not *Crypteronia*. Herbarium material of *medang tabak* received from the B.N.B. Forestry Dept. confirms this.



## TABULA 3336.

### TRIODIA PUNGENS R. Br.

GRAMINEAE. Tribus FESTUCEAE (sensu lato).

**T. pungens** R. Br. Prodr. Fl. Nov. Holl. 182 (1810); Benth. Fl. Austral, vii. 606 (1878), partim; F. M. Bailey, Syn. Queensl. Fl. 662 (1883), et Queensl. Fl. vi. 1911 (1902), et Compreh. Cat. Queensl. Pl. 629 (1913); Dominin Biblioth. Bot. xx. Heft 85, 384, fig. 90 (1915); Ewart et Davies, Fl. North. Territ. 48 (1917), ? partim. *T. viscida* Roem. et Schult. Syst. Veg. ii. 599 (1817). *Festuca viscida* F. Muell. Veg. Chath. Isl. 59 (1864). *Sieglingia pungens* O. Kuntze, Rev. Gen. PL ii. 789 (1891). *Triodia vulnerans* Domin in Biblioth. Bot. xx. Heft 85, 385 (1915).—Affinis *T. Mitchellii* Benth., a qua paniculis contractis elongatis angustis, glumis et lemmatibus angustioribus, lemmatibus carina infra medium et prope margines basin versus villosis differt.

*Gramen* perenne, 30-120 cm. altum, caespitibus magnis usque ad 2-7 m. vel ultra diametro horridis basi ramosissimis, innovationibus numerosis et stolonibus repentibus. *Culmi* erecti, graciles vel validiusculi, simplices vel basi ramosi, rigidi, 2-4-nodes, glabri, laeves vel paniculam versus scaberuli. *Foliorum vaginae* viscosae, siccitate resinosae, arete appressae, coriaceae, laeves, apice truncatae et dense ciliatae, ceterum glabrae, iis innovationum dense imbricatis, iis culmorum internodiis demum brevioribus; ligulae ad seriem ciliatorum densorum redactae; laminae setaceae, valde pungentes, 10-35 cm. longae, arete involuto-complicatae, 1-1.5 mm. diametro, explanatae usque ad 2-5 mm. latae, rigidae, virides vel subglaucae, supra nervis dense et minute hispidulae vel asperulae, subtus laeves. *Panicula* contracta, linearis vel lanceolata, 10-35 cm. longa, 1-5-4 cm. lata; rhachis superne angulata, plus minusve scaberula; rami solitarii, erecti, simplices vel longiores basin versus divisi, graciles, scaberuli, inferiores usque ad 10 cm. longi; pedicelli scaberuli, laterales 1-2 mm. longi, terminales usque ad 1 cm. longi. *Spiculae* oblongae vel ovato-oblongae, 8-15 mm. longae, 5-7 mm. latae, 4-11-florae, pallidae vel purpureo-tinctae. *Glumae* elliptico-vel ovato-oblongae, acutae vel obtusae, marginibus angustis membranaceis exceptis cartilagineae vel scariosae, sparse ciliolatae vel glabrae, dorso asperulae, nervis lateralibus obscuris; inferior 4-6-5 mm. longa, 5-14-nervis; superior 4-5-5 mm. longa, 4-9-nervis. *Lemmata* a latere visa lanceolata vel anguste ovata, explanata elliptico-ovata vel elliptica, 5-7 (raro 4) mm. longa, trilobata, lobis erectis rigidis subulatis scaberulis 2-3-nervibus 1-3 mm. longis subaequalibus vel lateralibus medio paullo brevioribus, marginibus tenuioribus exceptis cartilaginea, 7-13-nervia, lateribus laevia et nitentia, carina infra medium et prope margines basin versus villosa, supra medium marginibus ciliolata vel glabra; callus 0-3 mm. longus,

pilis usque ad 2 mm. longis barbatus. *Paleae* ellipticae, 3\*5-5 mm. longae, membranaceae, carinis alatis, alarum marginibus scabridociliolatis vel scaberulis. *Lodiculae* 1 mm. longae. *Antherae* 2-3 mm. longae. *Caryopsis* oblonga, subtrigona, 2-5 mm. longa.

QUEENSLAND. Cook District: Forest Home Station, Gilbert River, on desert sandstone, March 1931, *Brass* 1845. Burke District: islands in Gulf of Carpentaria, *Brown* 6257 ; Normanton, on low ridge in *Eucalyptus* forest, light grey gravelly sand, May 1935, *Blake* 8950, and on low barren ridge with red ferruginous lateritic crust, also extending to lower ground on yellow silt-loam, May 1935, *Blake* 9031 ; Riversleigh, widely spread, April 1935, *Blake* 8641 ; Mt. Isa, dominant grass on rocky hill-slopes and in open *Eucalyptus* forest, reddish-brown soil, 375-405 m., Feb. 1931, *Winders in Herb. Hubbard* 7426 ; on barren schist hills, 390 m., April 1935, *Blake* 8717 ; between Kajabbi and Quamby, on stony ridges, associated with *Eucalyptus pallidifolia*, June 1935, *Blake* 9313A ; Cloncurry, on hill, Feb. 1910, *Domin* ; Nov. 1930, *Allan* 16 ; dominant grass on dry hill-slopes, reddish-brpwn soil, 195-210 m., Feb. 1931, *Hubbard* 7321 ; exposed hillsides, 210 m., July 1934, *Blake* 6377 ; Malbon, between Cloncurry and Duchess, dominant grass on stony reddish-brown soil, 250 m., *Hubbard* 7358 ; near source of Poison Creek, about 90 miles north of Hughenden, in *Eucalyptus-Callitris* forest, on compact sand, 780 m., April 1935, *Blake* 8497 ; Fairlight Station, 34 miles north of Hughenden, on reddish-brown soil amongst basalt boulders, Feb. 1931, *Hubbard & Winders* 7477 ; at the summit of Mt. Walker, near Hughenden, March 1910, *Domin* ; top and slopes of Mt. Walker, on quartzite, April 1935, *Blake* 8446 ; Hughenden, gravelly red clay country, *McCarthy*. Mitchell District: Prairie, in partly cleared *Eucalyptus* forest, on low ridge, stony reddish-brown soil, 330 m., Feb. 1931, *Hubbard & Winders* 7057 ; Torrens Creek, March 1933, *Chisholm* 5J ; on ridge, hard red sandy soil, *White* 8787 ; on sandy hill near Barcaldine, March 1910, *Domin* ; Barcaldine, April 1919, *White* ; Lochnagar, Rocklea, Nov. 1930, *Sutherland* 2 ; April 1918, *Johnson* ; near Lochnagar, in *Eucalyptus* forest, on fine sand, 330 m., Nov. 1935, *Blake* 10315 ; near Jericho, on sandy hills of the Great Dividing Range, Feb. 1910, *Domin* ; slopes of Great Dividing Range, east of Jericho, dominant grass in mixed *Eucalyptus* forest, hard brown sandy soil, 360-390 m., Feb. 1931, *Hubbard* 7814 ; Jericho, March 1920, *Francis* ; on rather flat country, in railway enclosure, fine grey sand, 360 m., Nov. 1935, *Blake* 10244. North Kennedy District: on sandy hills of the Great Dividing Range, near Pentland, March 1910, *Domin* ; slopes of Great Dividing Range, west of Alpha, open *Eucalyptus* forest, hard brown sandy soil, 360 m., Feb. 1931, *Hubbard* 7854 ; Alpha, in mixed *Eucalyptus* forest, hard brown sandy soil, 340 m., Feb. 1931, *Hubbard* 7861.

In addition to the Queensland localities given above, *Triodia pungens* has been recorded from Western, Northern, Central and South Australia,

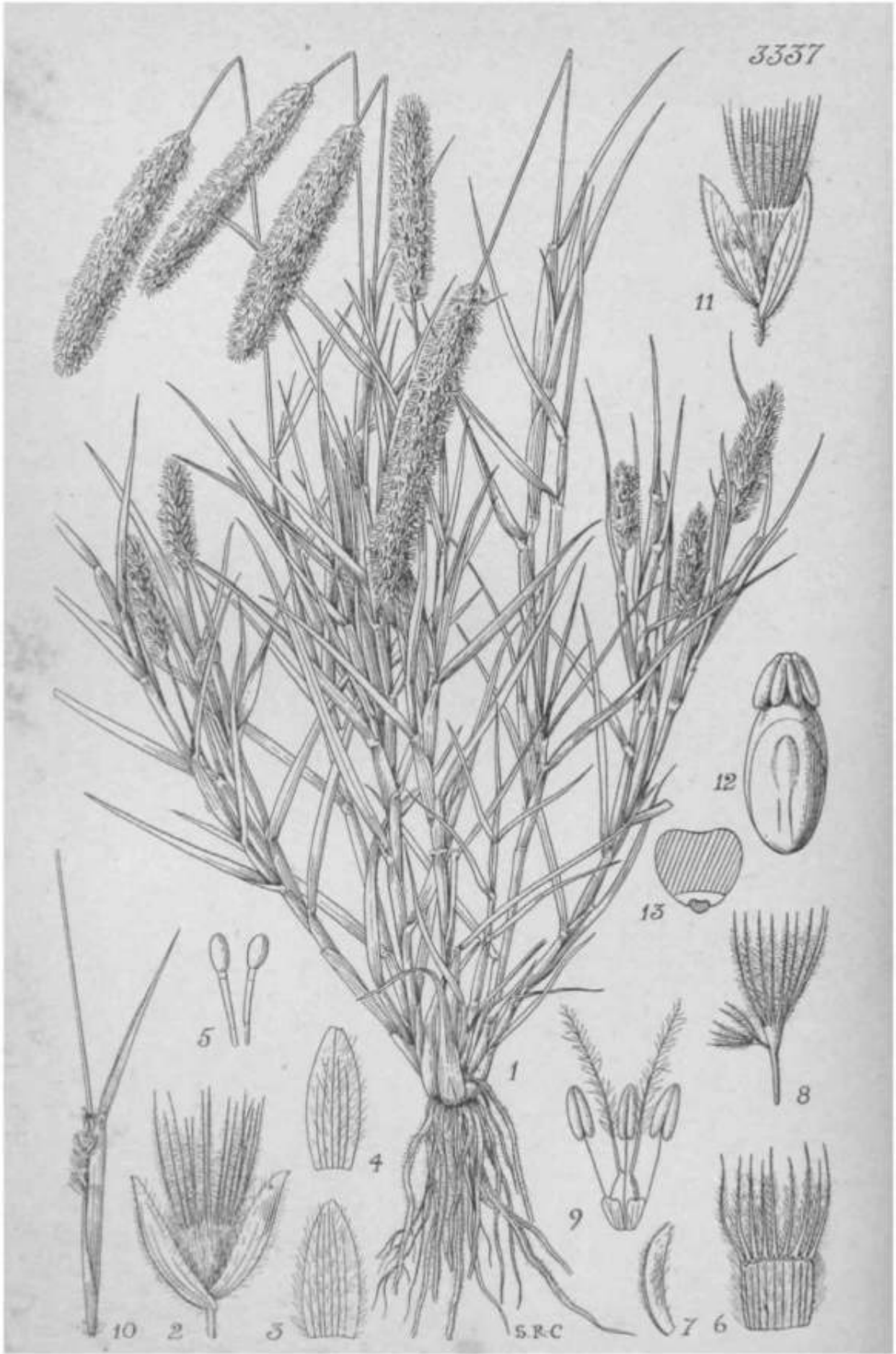
and New South Wales, but most of these records, if not all, refer to other species of the genus. Bentham (Fl. Austral, vii. 606) and Gardner (Enum. PL Austral. Occid. 9) included Western Australia in the area of distribution of *T. pungens*, but the specimens so named from that state represent a distinct species. Ewart and Davies (Fl. North. Territ. 48) cited one gathering from the southern part of Northern Australia ; no specimens of *T. pungens*, however, have been seen from that region, although it is very probable that the species may occur in the northern part of the state. Bentham (l.e.) identified with *T. pungens* specimens collected by Gosse (no. 57) in Central Australia, and by Cunningham in the interior of New South Wales. Gosse's specimen is referable to *T. Basedowii* E. Pritz., whilst Cunningham's specimens are too incomplete for determination. Tate (Handb. Fl. Extratr. S. Austral. 197, 269) and Black (Fl. S. Austral. 74) have recorded *T. pungens* from South Australia, but Black afterwards (l.e. 674) referred the South Australian specimens to *T. Basedowii* E. Pritz.

The species of *Triodia* are commonly known as "Spinifex" or "Porcupine Grasses." They cover vast areas in the interior of Australia, extending to the coast in suitable habitats in northern Australia. The species figured, *Triodia pungens* R. Br., is abundant and often dominant on stony ridges, hard stony or sandy soils, and on sandstone and quartzite formations in the drier parts of Northern and Central Queensland. It is especially common in the neighbourhood of Cloncurry, Duchess and Mount Isa, and on the slopes of the Great Dividing Range in Central Queensland, and the so-called desert country adjacent to it. In these areas it occurs in association with species of *Eucalyptus*, or in open almost treeless country, where it forms large clumps up to three yards or more in diameter. The bare patches between the clumps are frequently occupied by species of *Enneapogon*, *Aristida*, *Sporobolus*, etc., together with various annuals after the summer rains. *Triodia pungens* is extremely drought-resistant, being deep-rooted and possessing tough rigid leaf-blades. The leaf-sheaths are coated with a resinous secretion which has been used by the aborigines as a glue or cement, whilst the flowering and fruiting panicles provide nutritious food for cattle and horses.

A narrower conception of the genus *Triodia* R. Br., than that adopted by Bentham (Benth. et Hook. f. Gen. Pl. iii. 1175) and Hackel (in Engl. u. Prantl, Nat. Pflanzenf. ii. Abt. 2, 68), was taken by Stapf in his arrangement of the *Gramineae* in the Kew Herbarium. He restricted the genus to Australian species, such as *T. pungens* R. Br. (the type-species), *T. irritans* R. Br., *T. Mitchellii* Benth., etc., which are characterized by their rigid pungent leaf-blades and indurated 7-13-nerved lemmas. The excluded American species with 3-nerved lemmas were referred mainly to *Tridens* Roem. et Schult. This arrangement is a great improvement on both Bentham's and Hackel's classifications, for whilst *Tridens* Roem. et Schult. is more closely related to the genera grouped round *Eragrostis*, forming the tribe *Eragrosteae*, *Triodia* R. Br.

appears to be nearer to *Danthonia* DC. which has hitherto been placed in the *Aveneae*.—C. E. HUBBARD.

FIG. 1, plant, *natural size* ; 2, spikelet, x 6 ; 3, lower glume, x 6 ; 4, upper glume, x 6 ; 5, floret, side view, x 6 ; 6, lemma, flattened, x 6 ; 7, palea, side view, x 6 ; 7a, palea, front view, x 6 ; 7b, palea, back view, showing rhachilla-internode, x 6 ; 8, lodicules, x 12 ; 9, flower, x 6.





## TABULA 3337.

### ENNEAPOGON ASPERATUS C. E. Hubbard.

GRAMINEAE. Tribus PAPPOPHOREAE.

*E. asperatus* C. E. Hubbard; species nova, affinis *E. nigricanti* (R. Br.) Beauv., culmis et foliis scaberrimis, paniculis gracilioribus angustioribus, spiculis minoribus, caryopsibus elliptico-oblongis vel oblongis distinguitur.

*Gramen* perenne, 15-40 cm. altum, pilis glanduliferis minutis (fig. 5) et pilis simplicibus plus minusve pubescens. *Culmi* dense fasciculati, numerosi, erecti vel geniculato- vel arcuato-ascendentes, graciles vel gracillimi, rigidi, ramosi, multinodes, tenuissime striati, scaberrimi, plus minusve dense pubescentes vel pedunculo demum glabrescentes, e nodo summo disarticulantes, panícula demum exserta terminati, praeterea paniculam gracilem in axillis vaginarum superiorum plerumque gerentes. *Folia* siccitate glauca, scaberrima; vaginæ internodiis longiores, teretes, laxiusculae, demum stramineae, pubescentes vel puberulae vel glabrescentes, nodis villosulis vel villosis; ligulae ad seriem ciliorum densorum brevium redactae; laminae lineares, in apicem tenuiter acutum attenuatae, 3-9 cm. longae, arete involutae vel explanatae et 1-3-5 mm. latae, rigidae, e vaginis demum disarticulantes, pubescentes vel puberulae. *Paniculae terminatae* erectae, spiciformes, cylindricae, continuæ vel basi interruptae, 1-6 cm. longae, 4-9 mm. latae; paniculae axillares cleistogamae, in vaginis arete inclusae vel ex eorum lateribus vel apicibus leviter exsertae, angustissimae, paucispiculatae; rhachis et rami pubescentes; rami breves, erecti; pedicelli laterales brevissimi. *Spiculae* pallide virides, demum stramineae. *Glumae* lanceolato-oblongae, oblongae vel elliptico-oblongae, obtusae, subaequales, 2-2-3 mm. longae (in spiculis cleistogamis usque ad 4 mm. longae), plerumque mucronulatae, tenuiter papyraceae, 5-7-nerves, pubescentes, superne nervis scabridae. *Lemma fertile* late elliptico-oblongum vel latissime oblongum (explanatum), 1-1\*6 mm. longum (setis exclusis, in spiculis cleistogamis usque ad 2 mm. longum), villosum; setae 1-5-2-5 mm. longae, parte tertia superiore excepta scaberula rigide ciliatae; palea angusta, 1-7-2 mm. J<sup>o</sup>ga, carinis ciliolata, marginibus pilosa. *Lemmata sterilia* usque ad 0'5 mm. longa (setis exclusis), vel ad setas redacta. *Antherae* 0-4-Ū'7 mm. longae. *Caryopsis* oblonga vel elliptico-oblonga, subteres, nitens, 1-2 mm. longa.

QUEENSLAND. Gregory North District: Duchess, very abundant on reddish-brown soil, with *Enneapogon nigricans*, *Aristida* and *Triodia* PP., 350 m., Feb. 1931, Hubbard 7348.

In Australian Floras the species of *Enneapogon* Desv. have been referred to *Pappophorum* Schreb., but the restriction of that genus to the type-species, *P. alopecuroideum* Vahl and a few other American species results in a more natural arrangement. The genus *Pappophorum*, as thus composed, is characterized by the 1-nerved glumes,

7-nerved and 13-23-awned lemmas, whereas in *Enneapogon* the glumes are 3-21-nerved and the lemmas 9-nerved and 9-awned. The awns in *Enneapogon* are usually ciliate or plumose, and each contains the continuation of a nerve from the truncate apex of the lemma. In *Pappophorum*, on the other hand, the awns are never ciliate or plumose, whilst only 7 of the 13 to 23 contain the continuation of a nerve, the remainder being nerveless bristle-like prolongations of lobes between and outside the nerved awns.

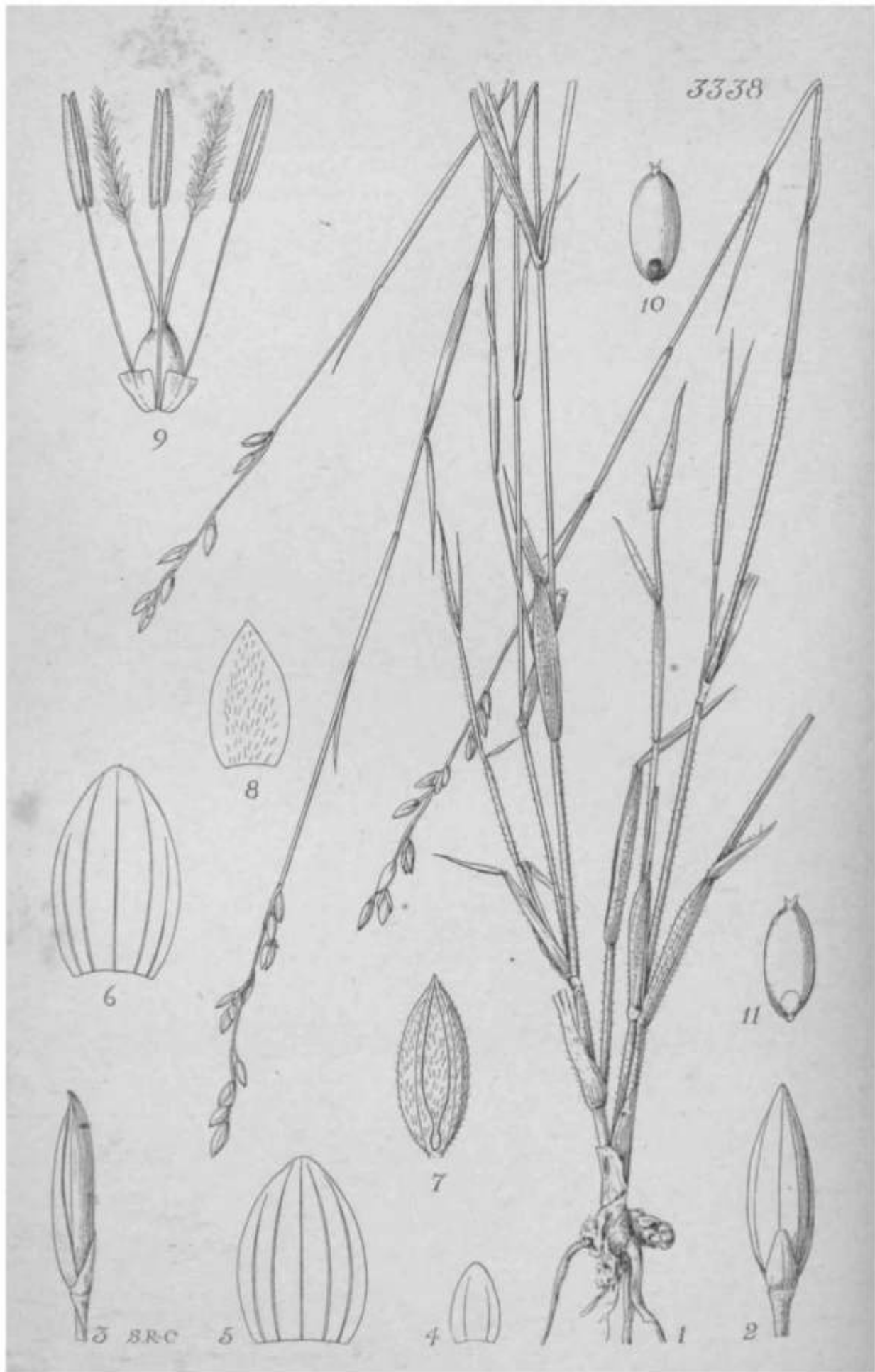
The genus *Enneapogon* comprises about 15 species, only one of which, *E. Wrightii* C. E. Hubbard,\* occurs in the New World. The remainder are distributed through the warm drier parts of Africa, southern Asia and Australia. The number of Australian species is uncertain owing to the need for revision, but there appear to be at least six, only two of which were recognized by Bentham (Fl. Austral, vii. 600). *Enneapogon asperatus* may be distinguished from the widely spread polymorphic *E. nigricans* (R. Br.) Beauv. by the very scabrid culms and leaves, narrower panicles and smaller spikelets. Two other Australian species, *E. Lindleyanus* (Domin) C. E. Hubbard and *E. avenaceus* (Lindl.) C. E. Hubbard, have smooth or less rough culms and leaves, whilst the former differs from *E. asperatus* by its ovoid or oblong panicles, and the latter by its looser and wider panicles, larger spikelets and 11-21-nerved glumes.

*Enneapogon asperatus* is the first Australian species of the genus in which cleistogamous spikelets have been described. These are borne in axillary inflorescences entirely or partially enclosed in the uppermost leaf-sheaths, and are very similar in structure to the chasmogamous spikelets of the terminal exerted inflorescences. The presence of these axillary inflorescences explains the final disarticulation of the culms at the uppermost node, as otherwise there would be no means of dispersal for the grain. This method of seed distribution has been noted in other cleistogamous grasses, such as *Triplasis purpurea* (Walt.) Chapm. and *Calyptochloa gracillima* C. E. Hubbard. An undescribed species of *Enneapogon* from the interior of Western and South Australia has axillary inflorescences similar to those of *E. asperatus* and, as in that species, the culms disarticulate at the uppermost node; it differs, however, in possessing smooth or slightly rough culms and leaves, and elongated panicles (6-14 cm. long). Cleistogamy also occurs in *Enneapogon brachystachyus* Stapf and *E. Wrightii* C. E. Hubbard. In these two species axillary cleistogenes (described by Mrs. Chase in Am. Journ. Bot. v. 256 : 1918) are borne at the lowest or lower nodes of the culm.—C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, spikelet, x 8; 3, lower glume, x 8; 4, upper glume, x 8; 5, glandular hairs, x 64; 6, fertile lemma, flattened, x 8; 7, palea, x 8; 8, sterile lemmas, x 8; 9, flower, x 8; 10, leaf, peduncle and axillary inflorescence, *natural size*; 11, cleistogamous spikelet, x 8; 12, caryopsis and anthers from cleistogamous spikelet, x 16; 13, transverse section of caryopsis, x 16.

\* *Enneapogon Wrightii* (S. Wats.) C. E. Hubbard, comb. nov.—*Pappophorum Wrightii* S. Wats, in Proc. Am. Acad. xviii. 178 (1883).

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## TABULA 3338.

### ENTOLASIA WHITEANA C. E. Hubbard.

GRAMINEAE. Tribus PANICEAE.

**E. Whiteana** C. E. Hubbard; species nova, ab *E. stricta* (R. Br.) Hughes spiculis majoribus oblongis vel elliptico-oblongis distinguenda.

*Gramen* perenne, laxe vel dense caespitosum, 20-60 cm. altum; rhizomata repentia, cataphyllis latis papyraceis stramineis plus minusve pilosis oblecta. *Culmi* plerumque geniculato-adscendentes, graciles, ramosi, 4-8-nodes, rigidi, duri, atro-virides, pilis albis erectis vel patulis e tuberculis ortis dense vel laxe hirsuti, vel glabrescentes, raro fere glabro. *Foliorum vaginae* internodiis breviores, demum laxae, striatae, ut culmi hirsutae, vel glabrescentes et tuberculatae; ligulae ad seriem ciliorum brevium redactae; laminae lineares, in apicem durum obtusum attenuatae, 1-8 cm. longae, 1-5 mm. latae, planae vel siccitate involutae, plus minusve rigidae, atro-virides, ut vaginae hirsutae vel glabrescentes, e vaginis demum disarticulantes. *Inflorescentia* angusta, linearia vel lineari-lanceolata, erecta, 2-10 cm. longa, 3-7 mm. lata; axis communis scaberula; racemi 2-9, erecti, usque ad 3 cm. longi, 2-6-spiculati, spiculis laxis vel contiguis; rhachis scaberula; pedicelli laterales, 0.6-1 mm. longi, incrassati, minute hispiduli. *Spiculae* solitariae, elliptico-oblongae vel oblongae, acutae, raro obtusae, 4-6 mm. longae, virides vel purpureae. *Gluma inferior* ovata vel ovato-oblonga, obtusa, 1-8-2-8 mm. longa, membranacea, laevis, apice ciliolata; gluma superior late elliptica vel oblongo-elliptica vel elliptico-ovata (explanata), obtusa, spiculae fere aequilonga vel aequilonga, herbaceo-membranacea, 5-nervis, apice et marginibus apicem versus ciliolata, ceterum glabra, laevis vel dorso superne asperula. *Antkoedum inferum* sterile: lemma glumae superiori simile sed spiculae aequilongum; palea nulla. *Anthoecium superum* \$, ellipticum vel elliptico-oblongum, subacutum; lemma et palea 3-5-4 • 6 mm. longa, coriacea, pilis albis tenuissimis sericeis pubescens; lemma 5-nerve; antherae 1-1-3 mm. longae; caryopsis oblonga vel oblongo-elliptica, 2-5-3 mm. longa.

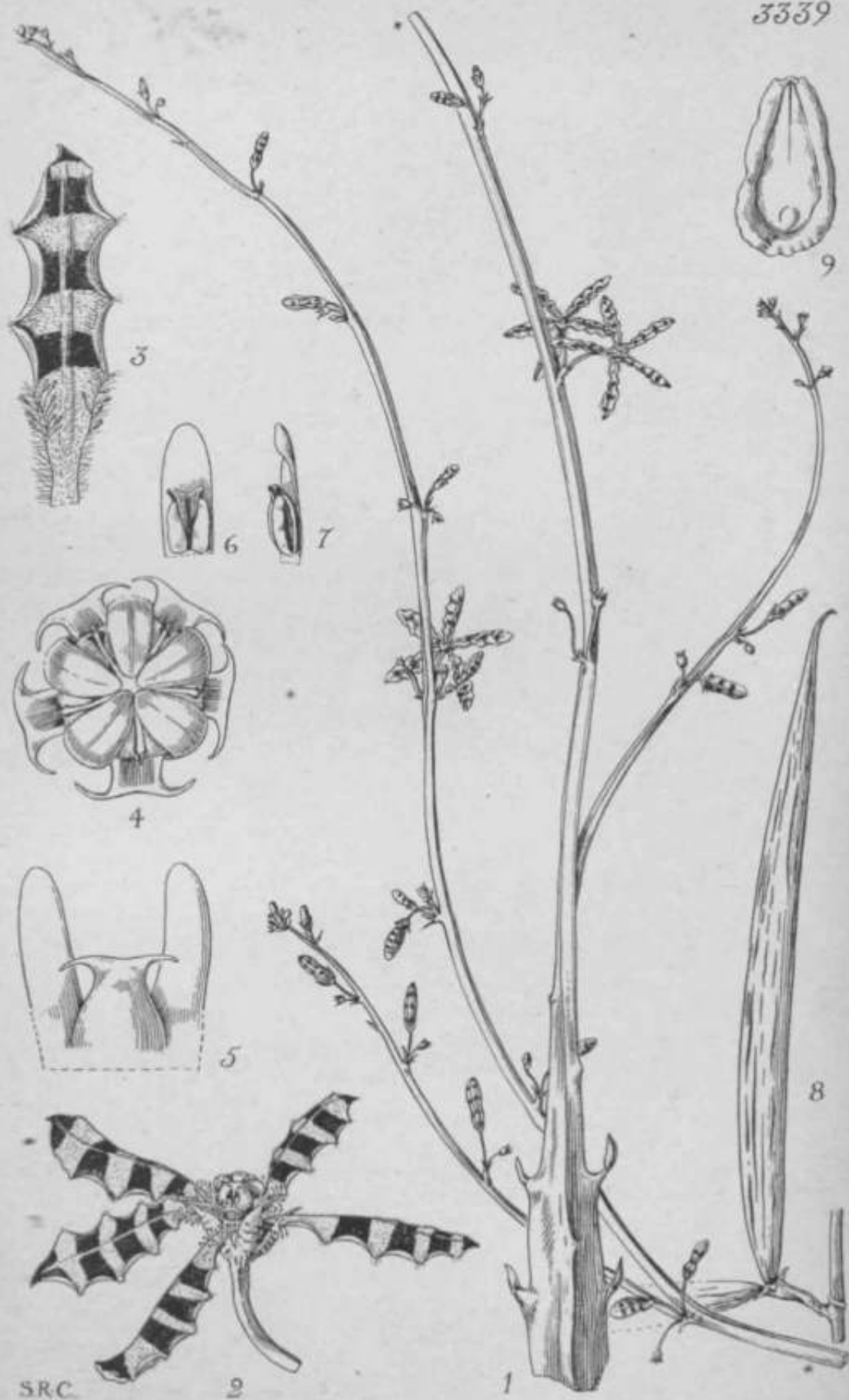
QUEENSLAND. Moreton District: Glass House Mtns.; Mt. Ngungun, on slopes in open *Eucalyptus* forest, 90 m., May 1930, *Hubbard* 2860; between One Mile and Samson Vale, on dry ridge in open forest, Dec. 1931, *Blake* 197 (in part); west of Strathpine, in *Eucalyptus-Xanthorrhoea* association, Jan. 1932, *Blake* 208; Mt. Nebo road, near Brisbane, June 1934, *Everist*; near Chermside, in open *Eucalyptus* forest, on <sup>TM</sup>ny slopes, common, July 1930, *Hubbard* 3335; Kedron Brook, Brisbane, April 1918, *White*; Taylor Range, Mt. Coot-tha, on slopes <sup>en</sup> *Eucalyptus* forest, in dry gravelly soil, 120 m., April 1930, *Hubbard* 2034; Seventeen Mile Rocks, Brisbane River, in *Eucalyptus*

forest, on top of small ridge, in very dry position, Jan. 1932, *Jackson*; between Riverview and Moggill, on sandstone and conglomerate ridges, in open *Eucalyptus* forest, common, Nov. 1930, *Hubbard* 4902 ; Moggill, dry stony hills, in mixed open forest, April 1931, *White* 7591, *Hubbard* 8110A, 8112 ; March 1934, *Blake & Middleton in Herb. Blake* 5285 ; Bulimba, Brisbane, abundant on dry barren rocky slopes, cleared *Eucalyptus* forest country, Sept. 1930, *Hubbard* 4079 (type); Eight Mile Plain, near Brisbane, in open *Eucalyptus* forest, on poor sandy soil, April 1930, *Hubbard* 2081; Mt. Gravatt, near Brisbane, common in *Eucalyptus* forest, April 1931, *White* 7671; on hills near Mt. Gravatt, on sandy soil on rocky ridges, abundant in *Eucalyptus* forest, July 1930, *Hubbard* 3292 ; March 1931, *Jackson*; near Mt. Gravatt and Sunnybank Cemetery Reserve, in open *Eucalyptus* forest, March 1931, *Hubbard* 8077 ; Sunnybank, March 1918, *White*; near The Blunder, near Brisbane, in recently burnt-off mixed open forest, May 1932, *Blake & Greenham in Herb. Blake* 275 ; on hills near Plunkett, top of sandstone ridge, in open *Eucalyptus* forest, common, Aug. 1930, *Hubbard* 3850.

The genus *Entolasia* was established by Stapf (in Prain, Fl. Trop. Afr. ix. 739 : 1920) for two tropical African grasses, *E. imbricata* Stapf (*Panicum endolasion* Mez ex Peter) and *E. olivacea* Stapf (*Panicum entolasium* Stapf). A few years later, in a revision of the genus *Panicum* of the 'Flora Australiensis,' Miss Hughes (Kew. Bull. 1923, 331) added two Australian species, *E. marginata* (R. Br.) Hughes (*Panicum marginatum* R. Br.) and *E. stricta* (R. Br.) Hughes (*Panicum strictum* R. Br., *P. singulare* Steud., *P. marginatum* R. Br. var. *strictum* Benth.). *Entolasia Whiteana* is most closely related to *E. stricta* -and differs mainly in the larger spikelets. In the former species the culms and leaves are usually stiffly hairy, whereas the latter is mostly glabrous. There is, however, a hairy form of *E. stricta* in south-east Queensland, which was described by Domin (Biblioth. Bot. xx. Heft 85, 313: 1915) as *Panicum strictum* R. Br. var. *hirsutum* Domin.

*Entolasia Whiteana* is one of a number of xeromorphic grasses common on dry stony or rocky hill-slopes in the Moreton District of Queensland. It is frequently associated with *Entolasia stricta* and species of *Aristida* and *Eragrostis* in open *Eucalyptus* forest.—C. E. HUBBARD.

FIG. 1, portion of plant, *natural size*; 2, spikelet, front view; 3, spikelet, side view; 4, lower glume; 5, upper glume, flattened; 6, lemma of lower floret, flattened; 7, upper floret; 8, palea of upper floret, flattened; 9, flower; 10, 11, caryopsis. Figs. 2-8,10-11, x 6; fig. 9, x 16.



## TABULA 3339.

### CARALLUMA TUBNERI E. A. Bruce.

ASGLEFIADACEAE. Tribus STAPELIEAE.

**C. (Eucaralluma) Turneri** E. A. Bruce; species nova, affinis *C. priogonio* K. Sch., sed caulibus simplicibus gracilioribus, corolla altius lobata intus pubescente transverse brunneo-purpureo-vittata, corona exteriore glabra horizontaliter bicornuta, interiore longiore differt.

*Planta* succulenta, simplex, circiter 45 cm. alta; caulis glaucus, tetragonus, basi 6 mm. diametro, inferne (2-5 cm.) distanter dentatus, sursum valde angustatus, superne subtefes in inflorescentiam nonnunquam ramosam usque 40 cm. longam sensim attenuata; dentes 8-14 mm. distantes, foliis parvis carnosiss lanceolatis vel subulatis 2 mm. longis mox deciduis instructi. *Flores* plerumque pro nodo 2-4, axillares, fasciculati, fasciculis subsessilibus 1-4 cm. distantibus, pedicellis patulis glabris 3-6 mm. longis. *Calyx* glabrescens, 5-lobatus; lobi lanceolati, longe acuminati, circiter 2 mm. longi, cum glandulis parvis basi alternantes. *Corolla* fere ad basin divisa; lobi oblongo-oblancheolati lateribus deflexis marginibus valde undulatis inflexis, apice rotundato-apiculati, basi breviter unguiculati, circiter 8 mm. longi, 2 mm. lati, supra leviter pubescentes, subtus glabri, basin versus pilis longis purpureis vibratilibus instructi, supra transverse brunneo-purpureo-vittati. *Corona* duplex, stipite gynostegii circiter 0-7 mm. longo; corona exterior in lobos 5 glabros oblongos vel subquadratos 0.7 mm. longos cum antheris alternantes producta, cornubus 2 ab angulis superioribus horizontaliter porrectis; corona interior in lobos 5 anguste oblongos circiter 1-5 mm. longos apice obtusos vel subacutos antheris oppositos ac eis dorsaliter affixos gynostegium 0.8 mm. superantes producta. *Folliculi* circiter 9 cm. longi, 1 cm. diametro, apice acuminati, griseo-straminei, purpureo-lineati. *Semina* obovata, 6 mm. longa, \* mm. lata, brunnea, margine alata.

KENYA COLONY. S. Kavirondo: Kanam, 1320 m., a spray of small violet-brown spotted flowers, with loose hinged petals, Jan. 1935, «*J. Allen Turner in Coryndon Mem. Mm. 3629* (type).

*Caralluma Turneri* is an interesting plant belonging to the Section *Eucaralluma* K. Sch. emend. White et Sloane (White and Sloane, The Stapeliaceae, ed. 2, p. 158, 1937). This Section contains all those species with raised stems, and includes Section *Lalacruma* K. Sch., which was previously separated on the character of the raised gynostegium. This character was scarcely sufficient in itself to differentiate a Section, as there was marked variation in the length of the gynostegium in the species concerned, that of *C. priogonium* being almost sessile. *C. Turneri* is most nearly allied to *C. priogonium* and

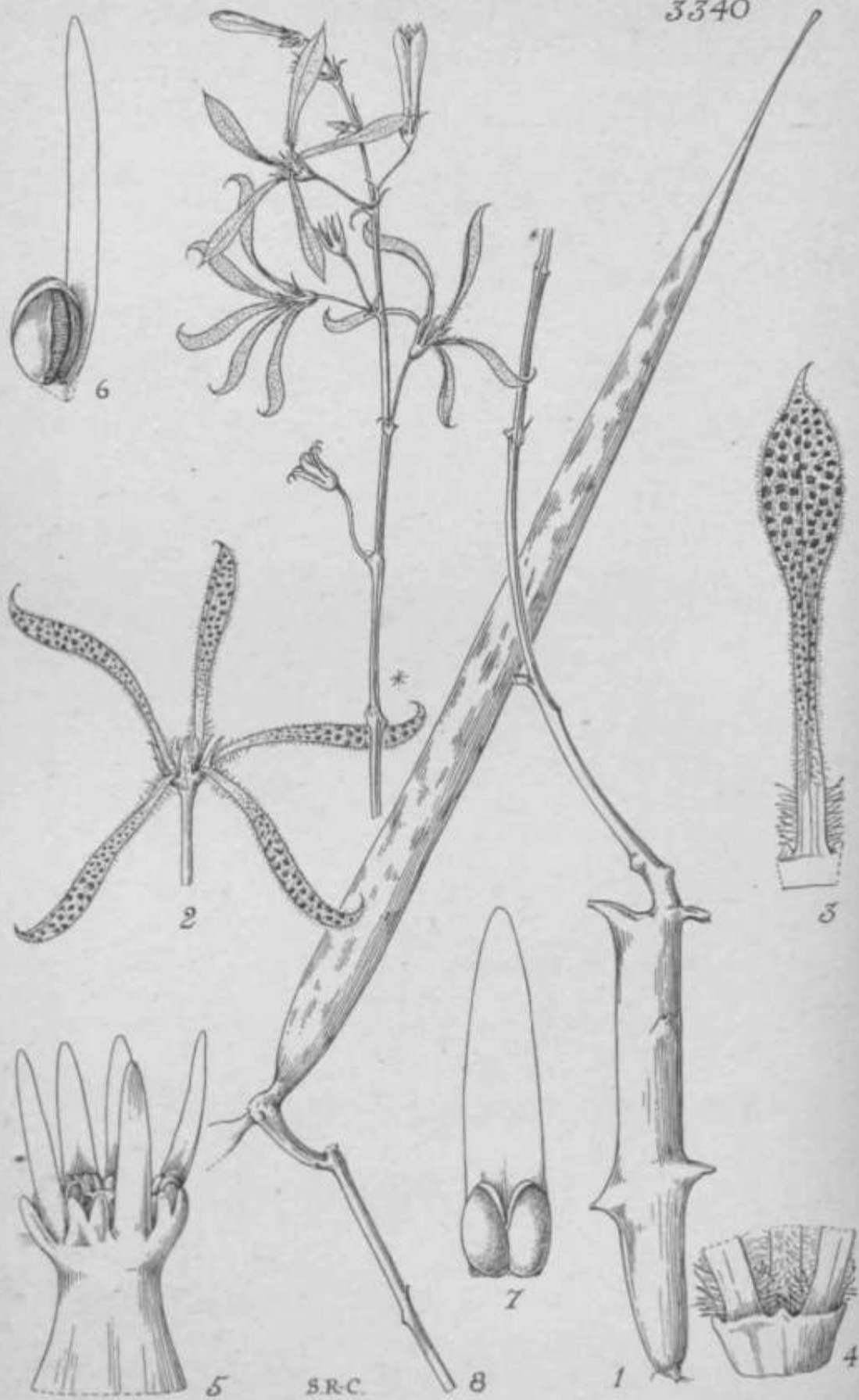
*C. gracilipes*. It differs from the former in the more slender habit, the undulate, mottled, pubescent corolla-lobes, and the peculiar horned outer corona-lobes. The type-specimen of *C. gracilipes* is unfortunately very inadequate, and it is impossible to make an accurate comparison, but as far as can be seen from the material the corolla-lobes are much narrower, glabrous and self-coloured, and, according to the description, the outer corona is inconspicuous and the corolla-tube inflated. A specimen collected by Mrs. Douglas Leakey (no. 35) on Lorogi Plateau, N.W. Kenya, is very close to *C. Turneri* but has larger self-coloured dark-chocolate flowers and much longer horns to the outer corona-lobes. It is possible that when more abundant material of this interesting Section is obtained our ideas of the species may have to be revised.

E. A. BRUCE.

FIG. 1, plant, *natural size*; 2, flower, x 4; 3, corolla-lobe, upper surface, x 6; 4, inner and outer corona from above, x 16; 5, inner and outer corona-lobes from outside, x 16; 6, inner corona-lobe and anther from inside, x 16; 7, the same from the side, x 16; 8, follicle, *natural size*; 9, seed, x 4.



3340



S.R.C.

TABULA 3340.

CARALLUMA DICAPUAE (*Chiov.*) *Chiov.*

ASCLEPIADACEAE. Tribus STAFELIEAE.

*C.* (*Eucaralluma*) *Dicapuae* (*Chiov.*) *Chiov.* in White and Sloane, *The Stapelieae*, ed. 2, i. 187, fig. 137 (1937). *C. quadrangula* N. E. Br. sec. *Di Capua* in *Ann. 1st. Bot. Rom.* viii. fasc. 2, 218 (1904), non N. E. Br. *Spathulopetalum Di Capuae* *Chiov.* in *Ann. di Bot.* x. 392 (1912).—*Affinis C. mogadoxensi* *Chiov.*, a qua corollae lobis pilosis elongato-spathulatis, dentibus intermediis, coronae structura recedit.

*Planta* succulenta, supra basin leviter ramosa, usque 40 cm. alta ; caulis glaucescens, 3-4-angulatus, basi circiter 1 cm. diametro, inferne (5-15 cm.) distanter dentatus, superne subteres, in inflorescentiam usque 30 cm. longam sensim et valde attenuata ; dentes 1-3 cm. distantes, deltoidei, horizontaliter patentis, foliis parvis triangularibus squamiformibus 1 mm. longis mox deciduis instructi. *Flores* in axillis bractearum fasciculati ; fasciculi 8-12, inter se 1-2 cm. distantes, plerumque 2-flori, in scapi parte superiore dispositi ; bractee subulatae, acutae, 3 mm. longae ; pedicelli graciles, glabri, patuli, circiter 1 cm. longi. *Calyx* fere usque ad basin divisus, glabrescens ; lobi linearilanceolati, acuminati, circiter 4 mm. longi, apice plerumque recurvati, cum glandulis parvis basi alternantes. *Corolla* in alabastro clavata, supra basin leviter constricta, apice rotundata et apiculata, 12-15 mm. longa, infra apicem 2-3 mm., supra basin 1 mm. lata, sub anthesi fere usque ad basin divisa ; tubus brevis, cupuliformis, usque 1.5 mm. longus ; lobi elongato-spathulati, basi anguste unguiculati, apice subacuti, abrupte apiculati, primum patuli, demum reflexo-penduli, replicati, marginibus valde reflexis, circiter 16 mm. longi, 2-5 mm. lati, mtus pallide virides, superne dense brunneo-purpureo-maculati, dense et breviter pilosi, basin versus et margine pilis paucis longis purpureis vibratilibus instructi, extra glabri, virides, lobi cum dentibus parvis intermediis alternantes. *Corona* duplex, stipite gynostegii circiter 1 pun. longo ; lobi coronae exterioris 5, 1 mm. longi, bidentati, dentibus triangularibus 0.5 mm. longis columnam staminum haud superantibus ; lobi coronae interioris 5, lineares, glabri, circiter 2 mm. longi, apice subacuti. *Folliculi* circiter 15 cm. longi, 7 mm. diametro, glaberrimi, apice caudati, griseo-straminei, pallido-purpureo-lineati.

ERITREA. Naro, 21 April 1909 » \*<sup>a</sup>W » §289 J Naro > Moga > 22 April 1909, Pappi 8314 ; Chelamet-Oazat, 11 May 1892, Terracciano and Pappi 498 (955) (type).

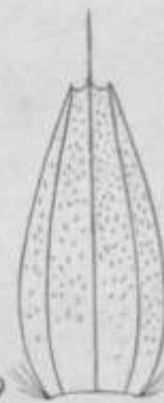
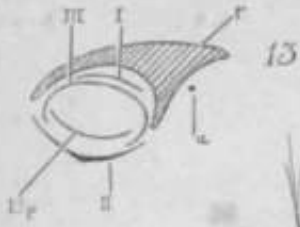
\*! ?<sup>ITISH</sup> SOMALILAND. N. Hargesia, lat. 9° 33' N., long. 44° 1' E., 10 W m., on sandstone slopes, 22 Sept. 1932, Gilktt 3993:—" Flowers greenish-brown ; eaten by Somalis (the stems), very bitter, said to be more bitter in morning than evening."

vernacular name : " Fera Hunshu " (vulture's fingers).

*C. Dicapuae* was originally placed by its author in a separate genus, on account of the unique form of the corolla, but it has now been transferred by him to the genus *Caralluma*. A pencil note by the late Dr. N. E. Brown shows that he also was of the opinion that *Spathuh-petalum* and *Caralluma* were congeneric. In the specific description the calyx is said to be eglandular, but on dissecting a flower from one of the specimens quoted by Prof. Chiovenda it was found that glands were present, and small intermediate teeth in the mouth of the corolla-tube were also observed. These intermediate teeth are a most interesting feature. They are characteristic of the genera *Huernia* and *Stapelian-thu*Sy but are also found in some species of *Caralluma*, Sect. *Boucerosia*, e.g. *C. carnosa*, *C. Keithii* and *C. Schweickerdtii*. The corona was originally described as simple, but the five short bidentate lobes are clearly outside the five long linear ones (fig. 5). *C. Dicapuae* falls into the Section *Eucaralluma* K. Sch. emend. White et Sloane, and is most nearly related to *C. mogadoxensis* Chiov., from which it differs in the pilose, elongate-spathulate corolla-lobes, intermediate teeth, and different coronal structure. The native name "Fera Hunshu," meaning vulture's fingers, aptly describes the flowers of this interesting species.—E. A. BRUCE.

FIG. 1, plant, *natural size* ; 2, flower, x 2 ; 3, corolla-lobe, upper surface, showing intermediate teeth at base, x 4 ; 4, base of corolla showing attachment of lobes to tube, x 6 ; 5, inner and outer coronas, x 12 ; 6, lobe of inner corona, side view, x 24 ; 7, lobe of inner corona, front view, x 24 ; 8, follicle, *natural size*.

JS41



S.R.C.

TABULA 3341.

CHABTOSTICHIUM MINIMUM (*Hochst.*) *C. E. Hubbard.*

GBAMINEAE. Tribus CHLORIDEAE.

**Chaetostichium** *C. E. Hubbard.* Genus novum cum *Oropetio* Trin. et *Lepturella* Stapf comparandum ; ab illo spiculis subsecundis in spicis dorsiventralibus plus minusve dorso compressis dispositis, gluma superiore aristata ; ab hac spicis continuis vel tarde disarticulantibus e vagina superiore demum longe exsertis, spiculis subsecundis, lemmate mucronato vel brevissime aristato differ t.

*Spiculae* angustae, acutae, aristatae, solitariae, biseriatae, leviter imbricatae, sessiles, subsecundae, in spicis solitariis gracilibus dispositae, ex excavationibus rhacheos gracilis continuae vel tarde disarticulantis ortae ; rhachilla supra glumam superiorem disarticulans, supra anthoecium haud producta. *Anthoecium* §, gluma superiore brevius. *Glumae* persistentes ; inferior in spiculis lateralibus minuta, adaxialis, hyalina, vel nulla, in spicula terminali glumae superiori similis ; superior spiculae aequilonga, lineari-lanceolata, acute acuminata, ex apice aristata, arista stricta vel demum curvata scaberula, dorso leviter convexa vel planiuscula, basi marginibus hyalinis exceptis coriacea, prominenter 1-nervis. *Lemma* ovatum vel oblongo-ovatum (explanatum), truncatum vel emarginatum, membranaceum, 3-nerve, nervis lateralibus nonnunquam minute excurrentibus, nervo medio in aristam brevissimam vel mucronem producto ; callus minutus, obtusus vel subacutus, breviter barbatus. *Palea* oblonga vel oblongo-lanceolata (explanata), emarginata, lemmate paullo brevior, bicarinata, membranacea. *Lodiculae* duae, oblongae. *Stamina* tria. *Ovarium* glabrum ; styli distincti, terminales ; stigmata breviter plumosa. *Caryopsis* anguste ellipsoidea, subteres, inter lemma paleamque laxè inclusa ; scutellum circiter tertiam partem caryopseos aequans ; hilum basale.—*Gramen* perenne, humile, caespitosum ; culmi gracillimi ; ligulae ad seriem ciliarum redactae ; laminae anguste lineares, e vaginis demum disarticulates.

Species 1, montium Africae boreali-orientalis incola.

**C. minimum** (*Hochst.*) *C. E. Hubbard*, comb. nov. *Lepturus minimus* Hochst. in *Flora*, xxxviii. 332 (1855) ; Durand et Schinz, *Consp. Fl. Afr.* v. 932 (1894) ; Schweinf. in *Bull. Herb. Boiss.* sér. 1, ii. App. 2, 102 (1894).

*Gramen* dense caespitosum, basi vaginis vetustis indutum, 5-12 cm. altum ; innovationes intravaginales. *Culmi* erecti, filiformes, simplices vel basin versus plerumque ramosi, supra basin 1-2-nodes, glabri, Javes. *Foliorum vaginae* basales latae, persistentes, stramineae, glabrescentes, ceterae angustae, virides, laeves, marginibus apicem versus

ciliatae, vel glabrescentes; ligulae ad seriem ciliorum brevissimorum redactae; laminae subsetaceae, apice subacutae, 1-5 cm. longae, usque ad 1-2 mm. latae, planae vel convolutae, rigidiusculae, virides, margines versus pilis patulis albis laxe pilosae, supra nervis minute hispidulae, subtus laeves vel fere laeves. *Spica* angustissime linearis, primo erecta, tandem recurvata vel flexuosa, usque ad 8 cm. longa et 1 mm. lata, viridis vel purpurea; rhachis glabra, laevis, dorso leviter convexa vel planiuscula. *Spiculae* lineari-lanceolatae. *Gluma inferior* in spiculis lateralibus oblata, usque ad 0-5 mm. longa; *gluma superior* usque ad 3 mm. longa, in aristam tenuem usque ad 7 mm. longam attenuata. *Lemma* 1\*5-2-8 mm. longum, plus minusve asperulum, arista usque ad 0-5 mm. longa; callus pilis albis usque ad 1 mm. longis barbatus. *Palea* 1\*5-2-7 mm. longa. *AntJierae* 0-6-1 mm. longae. *Caryopsis* fere 1 mm. longa.

ERITREA. Plateau of Kohaito, 2600 m., forming with other dwarf grasses a compact sward on rocky ground, May 1894, *Schweinfurth* 64 (ex Schweinf. l.e.).

ABYSSINIA. Samen; Jaja, on mountains, 1650 m., July 1853, *Schimper* 1145.

BRITISH SOMALILAND. Boundary Pillar 93, lat. 8° 37' N., long. 45° 9' E., Oct. 1932, *Gillett* 4163; Jebel Wotni Mtn., lat. 10° 18' N., long. 45° 6' E., limestone slopes, in open scrub, Jan. 1933, *Gillett* 4800.

\*  
The genus *Lepturus* K. Br., under which *Chaetostichium minimum* was originally described, may be distinguished from our new genus by the following characters:—

## LEPTUBUS.

1. Ligule a short membranous rim.
2. Chlorenchyma of the leaf-blades more or less evenly distributed between the vascular bundles.
3. Spikelets arranged on opposite sides of the fragile rhachis, forming a bilateral spike.
4. Florets 1-2.
5. Rhachilla always produced beyond the first floret.
6. Upper glume 5-many-nerved.
7. Callus obsolete.
8. Lemma acute, muticous.

## CHAETOSTICHUM.

1. Ligule reduced to a ciliate rim.
2. Chlorenchyma localized in layers of cells around the vascular bundles,
3. Spikelets arranged on one side of the continuous or slowly disarticulating rhachis, forming a unilateral spike.
4. Floret 1.
5. Rhachilla not produced beyond the floret.
6. Upper glume 1-nerved.
7. Callus minute, shortly bearded.
8. Lemma truncate or emarginate, mucronate or short-awned.

The differences in the structure of the leaf-blades and inflorescences of *Lepturus* and *Chaetostichium* are such as one would expect to find in genera belonging respectively to the tribes *Leptureae* and *Chlorideae*, and indicate the necessity for treating *Lepturus minimus* as the type of a new genus. *Lepturella* Stapf and *Oropetium* Trin., with which *Chaetostichium* has been compared, are two very closely related genera

superficially resembling *Lepturus* R. Br. in possessing bilateral spikes; but, as Stapf has pointed out (Dyer, Fl. Cap. vii. 742 :1900), their affinities are with the genera of the *Chlorideae*. *Lepturella aristata* Stapf, the type-species of the genus, agrees with *Chaetostichium minimum* in having an awned upper glume, but differs in being a dwarf annual, with very short fragile spikes almost wholly enclosed in the uppermost leaf-sheaths, and by the longer-awned lemmas and laterally compressed caryopses. *Oropetium* may be distinguished from *Chaetostichium* by the awnless upper glume and especially by its bilateral spikes. In *Lepturella*, *Oropetium* and *Chaetostichium* the lower glume of the lateral spikelets is much reduced or suppressed, whereas in *Microchloa* R. Br., *Rendlia* Chiov., *Brachyachne* Stapf and other genera of the *Chlorideae* in which the spikes may be solitary, the lower glume is well developed and usually as long as the upper.—C. E. HUBBARD.

FIG. 1, plant, *natural size* ; 2, upper surface of leaf-blade, x 3 ; 3, ligule, x 4 ; 4, portion of rhachis of spike, x 6 ; 5, upper part of spike, x 6 ; 6, lower glume, x 16 ; 7, upper glume, x 8 ; 8, floret, x 8 ; 9, lemma, flattened, x 16 ; 10, palea, flattened, x 16 ; 11, flower, x 16 ; 12, caryopsis, x 16 ; 13, diagram of transverse section through spikelet and rhachis, x 16 (r, rhachis; I, lower glume; II, upper glume ; III, lemma ; IIIp, palea ; a, awn of next spikelet).

3342



S.R.C.



TABULA 3342.

SYMPLOCOCARPOW *HITXTONI* (Bullock) Airy-Shaw.

THEACEAE. Tribus ADINANDREAE.

*Symplococarpon* Airy-Shaw. Genus novum, *Visneae* L. f. atque *Cleyerae* Thunb. affine, ab illa habitu arborescente, calyce glabro, antheris basi angustatis (nee cordatis vel emarginatis) longius caudatis, ab hac bracteolis persistentibus, antheris glabris, ab utraque insuper ovario omnino infero 2-loculari, loculis 1- (rarius 2-)ovulatis distinctum.

*Flores* hermaphroditi. *Sepala* 5, imbricata, persistentia. *Petala* 5, sepalis alterna, ima basi leviter cohaerentia, imbricata. *Stamina* circiter 30-35, uniseriata : filamenta petalis ima basi adnata, inferne leviter appanata ; antherae filamentis subduplo breviores, oblongae vel oblongo-ellipticae, basi in filamentum attenuatae, superne in caudam anthera subbreviorem abeuntes, usque ad basin lateraliter birimosae sed superne praecipue hiantes, glaberrimae. *Ovarium* omnino vel fere omnino inferum, 2-loculare ; ovula in utroque loculo solitaria, rarius bina collateralia, prope apicem loculi funiculis albis interdum incrassatis affixa, pendula, micropyle sup. erecta. *Styli* 2, omnino liberi, subulati, erecti, e disco hemisphaerico vel depresso conico piloso ovarium coronante orti ; • stigmata punctiformia. *Fructus* indehiscens, subexsuccus, oblongo-obovoideus, calyce stylisque persistentibus coronatus. *Semina* in quoque loculo solitaria (an semper ?) vel in altero loculo aborta. *Embryo* anguste hippocrepiformis, endospermio ut videtur tenuissimo.

*Arbores*, ramis alternis aequaliter foliosis. *Folia* distiche alterna, integra vel leviter serrulato-denticulata. *Flores* axillares, 1-5-fasciculati, pedicellis basi minute bracteatis, apice juxta hypanthium bibracteolatis, bracteolis oppositis vel leviter alternis persistentibus.

*S. Hintoni* (Bullock) Airy-Shaw, comb. nov.—*Eurya Hintoni* Bullock in Kew Bull. 1936, 391.—Species adhuc unica.

*Arbor* 10-metralis, ramis fusco-griseis lenticellosis, ramulis junioribus brunnescentibus longitudinaliter striatis parce lenticellosis glabris. *Folia* oblongo-elliptica usque sublanceolata, 4-12 cm. longa, 1\*5-3\*5 cm. lata (rarius ultra), basi attenuata vel raro vix rotundata, apice plus minus acuminata acumine obtuso usque acuto, margine integro vel superne dissite denticulato leviter recurvo, chartaceo-coriacea usque modice coriacea, glaberrima, laete viridia, costa supra impressa infra valde prominente, nervis lateralibus 8-10-jugis gracilibus patulis usque subpatentibus utrinque (sed infra magis) prominulis marginem versus frequenter anastomosantibus ; petioli 2-5 mm. longi, supra sulcati.

*Pedicelli* graciles, 6-12 mm. longi, glabri, rubescentes; bracteae minutissimae, puberulae, confertae; bracteolae ovatae, haud 1 mm. longae, ciliolatae, ceterum glabrae, viridulae. *Hypanthium* (vel calycis tubus) obconico-obovoideum, circiter 2 mm. longum, basi 0-5 usque apice 1-5 mm. diametro, glabrum, rubescens. *Calycis segmenta* etiam in alabastro patula vel patentia vel reflexa, ovata usque suborbicularia, 1-2 mm. diametro, marginibus exterioribus ciliatis interioribus late hyalinis glabris. *Petala* late obovata, 5-7 mm. longa, 4-5 mm. lata, apice rotundata, marginibus incurvis, integra, glabra. *Filamenta* circiter 2\*5 mm. longa, filiformia, inferne appanata; antherae 1 mm. longae, basi angustatae usque subrotundatae, caudis gracilibus 0\*5-1 mm. longis. *Ovarium* totum inferum vel imo vertice convexo piloso quasi discum intrastaminalem efformante. *Styli* circiter 3 mm. longi, persistentes. *Fructus* (an maturus?) viridis, usque 13 mm. longus et 7 mm. diametro, sublaevis, calyce patulo persistente coronatus. *Semina* oblongo-ellipsoidea, subtrigona, funiculo expanso quasi arillum parvum pileiformem efformante, 7-9 mm. longa, testa brunnea nitida subtiliter oblique transverse reticulato-striata ventraliter intrusa.

MEXICO. District of Temascaltepec, State of Mexico: in barranca at Temascaltepec, "1900 m.," 18 Nov. 1932, *Hinton* 2426; *ibid.*, from identical tree, "2080 m.," 31 March 1933, *Hinton* 3678 (type of fruit); Nanchititla, barranca, 2 Jan. 1933, *Hinton* 3081; Mina de Agua, barranca, 13 Nov. 1935, *Hinton* "et al." 8653 (type).

The new genus differs from all previously known *Theaceae* in its wholly inferior ovary and fruit. The latter bears a striking resemblance to that of *Symplocos*, and the fruiting specimens of *Eurya Hintoni* were originally assigned provisionally to that genus.

The writer accepts the view of Urban, expressed in his paper, "Ueber einige Ternstroemiaceen-Gattungen," in *Ber. Deutsch. Bot. Ges.* xiv. 45-51 (1896), that the genera *Ternstroemiopsis* Urb., *Eurya* Thunb., *Cleyera* Thunb. and *Freziera* [Sw.] Choisy should be kept distinct. To reduce them to the rank of subgenera under *Eurya*, as has been done by Szyszylowicz and, following him, Melchior, would logically require the similar reduction of the closely related genera *Visnea* L. f. and *Patascويا* Urb., since the differences between these genera and *Eurya* (*sensu* Melch.) are no greater than the differences between Szyszylowicz's and Melchior's subgenera.

Accepting these six genera, then, as sufficiently homogeneous groups of equal rank, we find that *Eurya Hintoni* Bullock undoubtedly represents a seventh group, comparable to and as distinct as the six already mentioned. The remarkable resemblance of the fruit to that of many species of *Symplocos* made the choice of the generic name here proposed almost automatic.

*Symplococarpon* is most closely allied to *Cleyera*, with which it agrees in its arborescent habit, foliage, fasciculate long-pedicelled flowers, and

anther-structure. It also agrees with *Patascoya* in anther-structure, 2-locular ovary and pauciovulate loculi, but differs greatly in habit, foliage, inflorescence and free styles. The inferior ovary might at first suggest a closer comparison with *Visnea*, but the ovary of the latter is only very slightly adnate to the calyx at the base, even in the fruiting stage, although it has been described as semi-inferior ("halbunterständig," Melchior in Engl. Pflanzenf. ed. 2, xxi. 126 : 1925 ; "frucht . . . bis zur Mitte mit dem Kelchtubus zusammengewachsen," I.e. 145). Bentham and Hooker correctly described it as "vix immersum" (Gen. Pl. i. 178 : 1862), "toro leviter immersum" (I.e. 182), and indeed Melchior himself describes it as "etwas in den Blütenboden eingesenkt" (I.e. 145) and reproduces a figure of the fruit in longitudinal section (ibid. fig. 652?) confirming this point. *Visnea* further differs from *Symplocarpon* in anther-structure, agreeing in this respect with *Eurya* s. str. It may be pointed out here that Melchior, in his key to the genera of *Theaceae* (I.e. 126), not only contradicts his description of the ovary of *Visnea* given on a later page (I.e. 145), but erroneously associates that genus with *Adinandra* under the key-heading : "Stam. in mehreren bis 2 Reihen angeordnet." The stamens of *Visnea* are perfectly 1-seriate, as is shown e.g. in Hook. Ic Pl. iii. t. 253 (1840), Webb & Berthelot,\* Phytogr. Can. t. 69 B, figs. 3-6 (1844), and Payer, Organogr. t. 154 (1857), and indeed as may be confirmed by dissection.

In its persistent bracteoles *Symplocarpon* agrees with *Visnea*, although in the latter genus one of the bracteoles is generally some distance from the calyx. As implied in the diagnosis given above, the bracteoles in most species of *Cleyera* are deciduous ("plerumque valde decidua," Urban, I.e. 50), but a conspicuous exception is *C. albopunctata* (Griself.) Krug et Urb., in which they are large and persistent. Urban does not mention this point, though his "plerumque" may refer to it; Melchior says categorically (of subgen. *Cleyera*), "Vorblätter . . . sehr hinfällig."

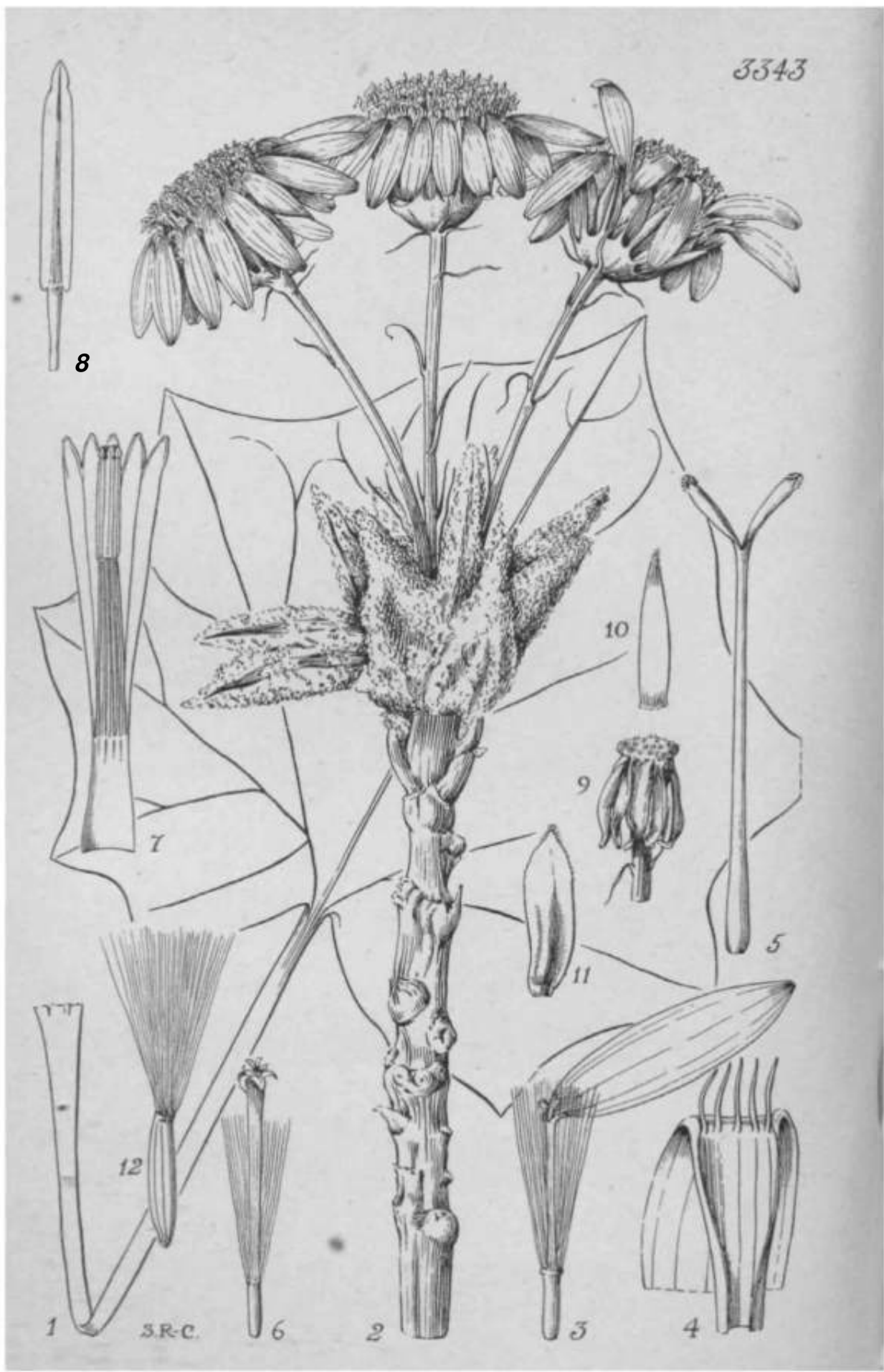
*Symplocarpon* stands in the same relation to *Cleyera* as *Anneslea* does to *Ternstroemia*, and as the *Symplocaceae* (broadly speaking) do to the *Camellioideae*. For evidence of the latter affinity it is only necessary to compare, for example, *Symplocos coccinea* Humb. et Bonpl. and *S. Hartwegii* A. DC. with species of *Laplacea*. This relationship was generally recognized during the earlier part of the nineteenth century : cf. DC. Ess. Propr. Méd. PL ed. 2, 201-203 (1816) ; DC. in Mém. Soc. fays. Gen. i. 403-5 (1822) (Mém. Fani. Ternstr. 11-13 : 1823) ; Choisy & Mem. Soc. Phys. Gen. xiv. 99-101, 129-130 (1855) (Mém. Fam. Ternstr. et Camell. 9-11, 39-40 : 1855) ; Le Maout and Decaisne, Gen. Syst. Bot. ed. Hook. 542 (1873). The emphasis was, however, placed rather upon the connection between the *Symplocaceae* and the *Ternstroemioideae*, through *Anneslea* and *Visnea*, although the difference in androecium-structure was pointed out: but it is, of course, precisely

\* Explicitly stated to be 1-seriate, I.e. sect. 2,144,145 (1842).

in this character that the *Symplocaceae* and *Camellioideae* show such close agreement. It will no doubt be advisable eventually either to resuscitate the *Camelliaceae* and *Ternstroemiaceae* (s. str.) as distinct families, or to include the *Symplocaceae* under the *Theaceae* (s.l.) with the rank of subfamily.—H. K. AIRY-SHAW.

FIG. 1, flowering branch, *natural size* ; 2, flower, with petals, etc. removed, x 4 ; 3, an inner calyx-segment, x 4 ; 4, longitudinal section of flower, with petals and stamens removed, x 6 ; 5, petal, with two adherent stamens, x 4 ; 6, stamen,, x 12 ; 7, fruiting branchlet, *natural size* ; 8, immature seed, x 4.

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**SENECIO BOMBYCOPHOLIS** *Bullock.*

COMPOSITAE. Tribus SENECEAE.

*S. bombycopholis* *Bullock*; species nova, fruticosa, perulis inflorescentiarum persistentibus extra gossypino-lanatis, pedunculis glabris, capitulis magnis subumbellatim dispositis distinctissima.

*Frutex* usque ad 3 m. altus, trunco 20 cm. diametro; rami crassi, glabri, cicatricibus foliorum delapsorum tuberculati; medulla crassa transverse locellata. *Folia* alterna, apice ramorum aggregata, longe petiolata, petiolis usque ad 17 cm. longis satis gracilibus basi manifeste ampliatis primum dense lanato-tomentosis mox glabrescentibus; laminae tenuiter herbaceae, ambitu plus minusve rotundatae, 15 cm. diametro vel ultra, irregulariter palmato-lobatae, lobis 5-9 plus minusve triangularibus acutis, nervis 3-4 principalibus manifestis venis reticulatis haud prominentibus, supra primum arachnoideae, subtus lanato-tomentosae, demum supra glabratae, subtus tenuiter arachnoideae. *Inflorescentiae* perulatae, ramulos annotinos defoliatos terminantes. *Perulae* numerosae, persistentes, revera lineari-lanceolatae vel subulato-lanceolatae, sed propter lanam vestientem formam ovato-lanceolatam simulantes, circiter 3 cm. longae et 1-5-3 mm. latae, acutissimae, extra densissime gossypino-lanatae, intus glabrae. *Pedunculi* 3-6, ex axillis perulorum orti, subumbellatim dispositi, circiter 6 cm. longi, glabri, bracteis paucis lineari-subulatis circiter 1 cm. longis praediti. *Capitula* radiata, cupularia, 2 cm. alta et (sine radiis) 1-5 cm. diametro; bractee involucri oblongae, 1-3 cm. longae, 3-4 mm. latae, acutae vel acuminatae, apice breviter ciliato-barbatae, in statu fructifero abrupte reflexae. *Flores radii* ligulati, aurantiaco-lutei, feminei sed staminodiis 5 (rarissime 6) subulatis 1\*3 mm. longis infra faucem insertis praediti; corolla fere 3 cm. longa, ligula patente vel (demum) reflexa oblonga 2 cm. longa 4 mm. lata apice truncata minutissime trifida. *Flores disci* tubulosi, lutei, hermaphroditi; corolla 1-6 cm. longa, apice breviter 5-fida. *Achaenia* cylindrica, 5\*5 mm. longa, 1-3 mm. diametro, pallide brunnea, longitudinaliter 4-6-costata, glabra. *Pappi setae* sericeo-albae, deciduae, copiosae, vix 1 cm. longae.

MEXICO. District of Temascaltepec, State of Mexico: Pungarancho, on cliffs, April 1934 (fl.), *Hinton* 5898; Acatitlán, on cliffs, May 1935 (fr<sup>5</sup>\* young leaves), *Hinton* 7790 (type); *ibid.*, July 1935 (leaves), *Hinton* 8124.

The cotton-wool-like covering of the perulae distinguishes *Senecio bombycopholis*\* from all other Mexican species. A similar, though less dense tomentum occurs on the petiole and lower surface of the

young leaves; as growth proceeds, however, this becomes much attenuated, and finally disappears. The woolly covering of the perulae, on the other hand, is persistent, and forms the most striking feature of the plant.

A character of great morphological interest is the presence of staminodes in the female ray-florets. The occurrence of staminodes in the *Compositae* is comparatively rare, and Bentham's remarks concerning them may be quoted: \* " The presence or absence of staminodia, or abortive or imperfect stamens in the female florets, has been regarded as a character of some importance; and it is, in a few cases, perhaps generic, but never much to be relied on. These staminodia are frequently to be met with, and perhaps constant in some genera, in *Mutisiaceae* (*Mutisieae*), in *Petrobieae*, and a few other *Helianthoideae*, and a very few *Senecionideae*, rare, if ever observed, in *Asteroideae*, *Inuloideae* (except one or two species of *Bupthalmeae*), *Helenioideae* and *Anthemideae*."

The affinities of *Senedo bombycopholis* are obscure. In habit it resembles such species as *S. praecox* (Cav.) DC. and *S. velatus* Greenm., both of which are placed by Greenman in his habit-section *Terminates*, f and have a locellate pith. The capitula of these two species are, however, comparatively small, very numerous, and arranged in terminal corymbs of cymes. The key characters of Greenman's *Terminates* are " stems abruptly terminated by . . . two to several more or less pedunculate, compound, corymbose cymes " ; allowing for the reduction of the latter to single capitula, *S. bombycopholis* may be placed in the *Terminates*, while recognizing that the section may be to some extent artificial.—A. A. BULLOCK.

FIG. 1, leaf, *natural size*; 2, flowering branch, *natural size*; 3, ray-floret, x 2; 4, part of the corolla of a ray-floret opened to show the staminodes, x 8; 5, style and stigmas, x 6; 6, disk-floret, x 2; 7, disk-floret opened to show the androecium, x 4; 8, stamen, x 8; 9, old fruiting receptacle, after the abscission of the achenes, *natural size*; 10, 11, bracts of the involucre, x 2; 12, achene with its pappus, x 3.

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\* Journ. Linn. Soc, Bot. xiii. 363 (1873).

t Contrib. U.S. Nat. Herb, xxiii.1621 (1926).





## TABULA 3344.

### SENECIO MORE LI AE *Hemsl.*

COMPOSITAE. Tribus SENECTIONEAE.

**S. moreliae** *Hemsl.*, Biol. Centr.-Amer., Bot. ii. 243 (1881). *Psacalium laoriflorum* **Benth. PL Hartweg. 41 (1840)**, non *Senecio laxiflorus* Viv. (1824). Species hactenus minus cognita, foliis peltatis palmato-lobatis subtus albicantibus longe petiolatis, inflorescentiis paucicapitulatis scapos elongatos terminantibus distincta.

*Herba* Tosulata, perennis, rhizomate adscendente satis crasso apice villosulo-lanato. *Folia* radicalia, longe petiolata, petiolis usque ad 10 cm. longis adscendentibus plus minusve dense crispato-pubescentibus; laminae peltato-affixae, horizontales, ambitu rotundatae, profunde palmato-lobatae, usque ad 9 cm. diametro, supra plus minusve scabridulo-pubescentes, infra fere glabra et manifeste albicantes; lobi 5-6, acuti, oblongi vel obovati, plerumque lateraliter acute 2-lobulati, denticulis paucis irregulariter dispositis praediti, usque ad 3\*5 cm. longi et 1-5 cm. lati. *Caules floriferi* foliis 1-3 redactis haud peltatis petiolis valde ampliatis praediti, plus minusve crispato-pubescentes, 50 cm. alti vel ultra, apicem versus pauciramosi; rami ex axillis bractearum orti, capitulis pedunculatis 1-6 instructi, bracteis lanceolatis vel linearibus sursum redactis praediti; pedunculi ultimi usque ad 3 cm. longi, bracteis 1-3 linearibus vel linearilanceolatis praediti. *Capitula* homogama, eradiata, sub anthesin subcylindrica, circiter 1-5 cm. alta et 8 mm. diametro, statu fructifero obconica. *Bractee involucris* circiter 8, lanceolatae, 1-3 cm. longae, 3 mm. latae, apice obtusiuscule acuminatae, membranaceae, dorsaliter obtuse carinatae et leviter pubescentes. *Flores* circiter 8, herniaphroditi, tubulosi; corolla 1-2 cm. longa, profunde 5-fida, lobis linearibus fere 5 mm. longis siccitate spiraliter recurvis; antherae longe exsertae, apice appendice ovato cuspidato coronatae. *Pappi setae* copiosae, albae. *Achenia* ampullacea, 5 mm. longa, glabra.

MEXICO. District of Temascaltepec, State of Mexico: Comunidad, 2535 m., in a pine forest, July 1932, *Hinton* 968; Tequesquipan, in a barranca, Aug. 1935, *Hinton* 7997; Nanchititla, July 1935, *Hinton* 8108. Morelia, State of Michoacan, in pine woods, 1839, *Hartweg* 318 (type).

. As indicated in the enumeration, nearly a hundred years elapsed between Hartweg's discovery of this plant and its rediscovery in 1932<sup>b</sup> by Mr. Hinton, from whose excellent material the accompanying

figure and description have been made. As a species, it is most distinct, the palmately lobed peltate leaves, with a silvery white lower surface, and the purplish glandular indumentum, being unique in the genus. The capitula and florets are also very characteristic.—A. A. BULLOCK.

FIG. 1, flowering plant, *natural size*; 2, involucre bract, x 4; 3, floret, with half of the pappus removed, x 6; 4, apex of a corolla-lobe, x 20; 5, part of the androecium, x 12; 6, stigmas, x 12; 7, achene, x 6.



## TABULA 3345.

### CHAPTALIA NUTANS (Linn.) Hemsl.

COMPOSITAE. Tribus MUTISIEAE.

**C. nutans** (Linn.) Hemsl. Biol. Centr.-Amer., Bot. ii. 255 (1881). *Tussilago nutans* Linn. Sp. PL ed. 2, 1213 (1763), et Amoen. Acad. v. 406 (1788); Swartz, Obs. Bot. 305 (1791). *T.* (§ *Chaptalia*) *lyrata* Pers. Syn. PL ii. 456, no. 18 (1807). *Leria nutans* (Linn.) DC. in Ann. Mus. Par. xix. 68 (1812), et in DC. Prodr. vii. 42 (1838); H.B.K. Nov. Gen. iv. 5 (1820); Cham, et Schlecht. in Linnaea, v. 131, t. 2, fig. 3 (1830); Less, in Linnaea, v. 131 (1830); D. Don in Trans. Linn. Soc. xvi. 248 (1833); Uexkull-Gyllenband in Bibl. Bot. x. Heft 52, 37, fig. 18 (1901). *L. lyrata* (Pers.) Cass. in Diet. Sc. Nat. xxvi. 102 (1823). *Gerbera nutans* (Linn.) Sch. Bip. in Seem. Bot. Voy. Herald, 313 (1856).—*Yztac Cihvatl* Hernandez, Thes. Nov. PL Hist. 208, cum ic. (1651). *Dens leonis folio subtus incano, flore purpureo* Sloane, Nat. Hist. Jam. i. 255, t. 150, fig. 2 (1707). *Aster primulae veris folio, flore singulari purpureo* Plum. PL Amer. ed. Burm. i. 29, t. 41, fig. 1 (1755). *Leontodon no. 1* P. Browne, Nat. Hist. Jam. 310 (1756), et *I.e.* ed. II (1789).\*—Species distincta, foliis sessilibus inferne lyrato-lobatis subtus albido-tomentosis, floribus purpureis; a *C. Hintoni* Bullock foliis sessilibus, acheniis longioribus facile distinguitur.

*Herba* perennis, rosulata, scapigera, rhizomate satis crasso adscendente baud apice lanato-villoso. *Folia* omnia radicalia, sessilia, ambitu obovata, 6-15 cm. longa, 2-5-5 cm. lata, marginibus sinuatis et distanter repando-denticulatis, inferne lyrato-lobata, lobo terminali plus minusve ovato vel oblongo, apice rotundata usque subacuta, supra glabrata, subtus albido-tomentosa. *Scapi* solitarii vel pauci, lanati, graciles, circiter 30 cm. alti, aphylli, ebracteati. *Capitula* obconica, circiter 2 cm. alta et 1 • 5 cm. diametro. *Bracteae* involucri circiter 3-seriatae, lineares vel lineari-subulatae, acutae, extra lanatae, anteriores subaequales, circiter 2 cm. longae, manifeste 1-costatae, apice purpureo-tinctae. *Flores* purpurei, bracteas vix superantes; nores radii feminei, lineares, exteriores corolla 1-3 cm. longa, labio exteriori apice inaequaliter trifido, labio interiore multo minore usque ad basin bifido, interiores labiis subaequalibus multo minoribus praediti; flores disci hermaphroditi, lineari-tubulosi, bilabiati, labio exteriori apice trifido, labio interiore subaequilongo usque ad basin bipartite. *Antherae* fere 3 mm. longae, basi longe caudatae, apice rotundatae. *Stylt* florum disci circiter 1 cm. longi, ramis intus laevibus extra papillis satis elongatis pubescentibus praeditis; styli florum radii paullo longiores, ramis duplo longioribus intus papilloso-stigmatici extra glabris. *Achaenia* elongato-ampullacea, 1\*5 cm. longa, circiter -costata, papilloso-puberula. *Pappi setae* copiosae, 1-5 cm. longae.

\* Only the second (1789) edition seen.

MEXICO. District of Temascaltepec, State of Mexico : Tejupilco, 1430 m., July 1932, *Hinton* 1006 ; Volcán, 1410 m., July 1932, *Hinton* 1179.

Widely distributed in Mexico, also in the southern United States, West Indies, Central America and Tropical South America.

No good figure of this common plant has been available hitherto, though it was well known as early as the seventeenth century, when Hernandez described and figured it as a useful medicinal herb.

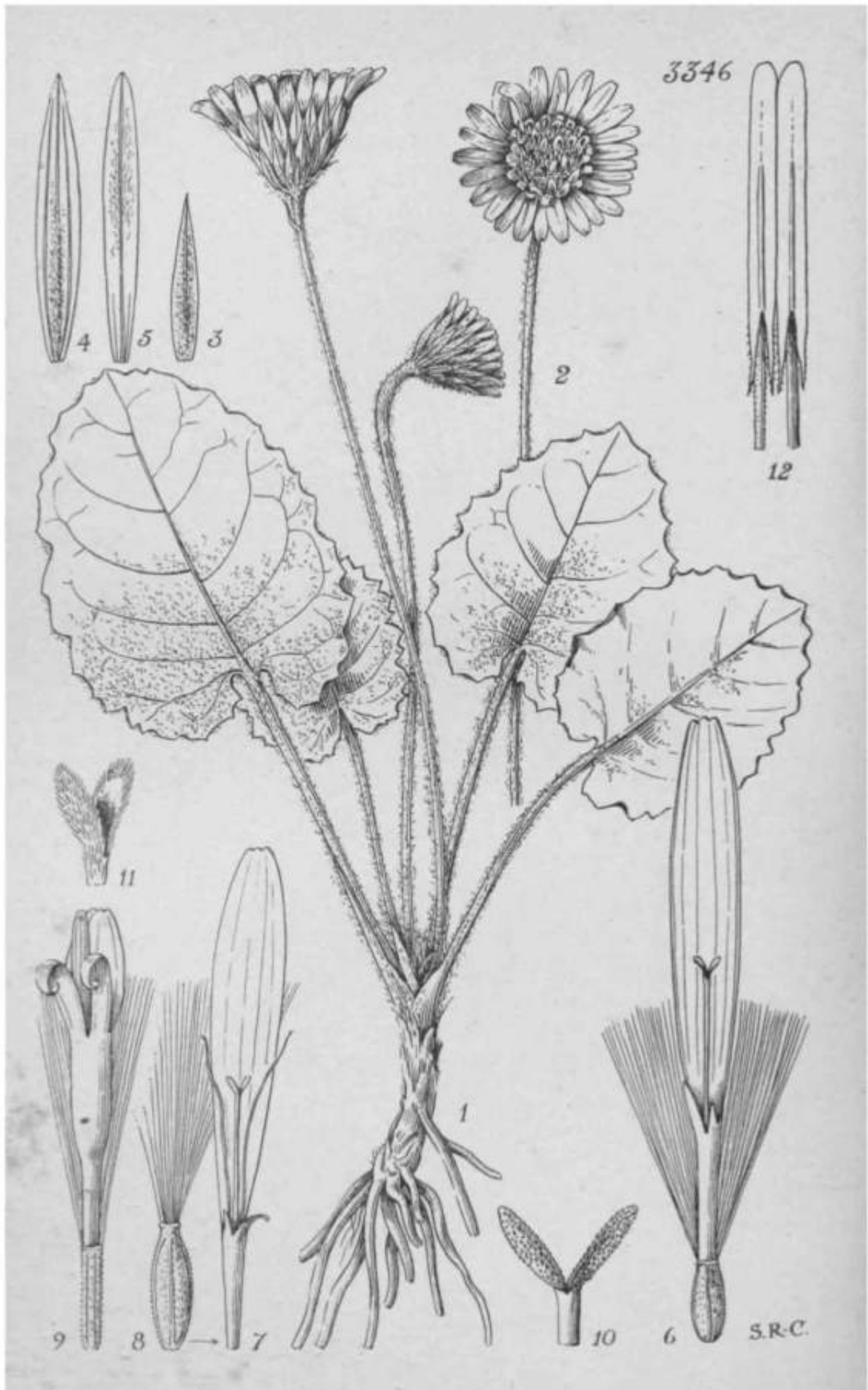
Numerous specimens from all the areas listed above are deposited in the Kew Herbarium, but the figure and description are taken entirely from Mr. Hinton's specimens. A few florets from these specimens have three-armed styles, but this is probably an abnormal condition.

As in *C. Hintoni* Bullock (t. 3346), there is some gradation between the fertile ray-floret<sup>^</sup> and the sterile hermaphrodite florets of the disk. No florets with staminodes have been observed, but the innermost fertile florets are very similar in form to the sterile disk-florets.

A. A. BULLOCK.

FIG. 1, plant, *natural size*; 2, 3, 4, outer, intermediate and inner involucre bracts, x 4; 5, ray-floret, with part of pappus removed, x 6; 6, stigmas of ray-floret, x 16; 7, upper part of transitional floret, x 6; 8, disk-floret, with part of pappus removed, x 6; 9, disk-floret, upper part of corolla, laid open, with stamens removed, x 6; 10, stigmas of disk-floret, x 16; 11, stamen, inside view, x 16; 12, mature achene, x 2.

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## TABULA 3346.

### CHAPTALIA HINTONI *Bullock.*

COMPOSITAE. Tribus MUTISIEAE.

**C. Hintoni** *Bullock* ; species nova, affinis *C. nutanti* (Linn.) DC, sed petiolis longissimis distincta.

*Herba* scapigera, perennis ; radices e rhizomate erecto satis crasso haud lignoso orti, numerosi, simplices, plus minusve carnosi. *Folia* omnia radicalia, rosuliformiter disposita, longe petiolata, lamina oblonga vel ovato-oblonga vel fere rotundata, usque ad 12 cm. longa et 5-5 cm. lata, sed plerumque minora, apice rotundata usque subacuta, saepe mucronulata, basi truncata usque profunde cordata, saepe inaequalateralia, marginibus undulato-lyrato-lobato, supra primum arachnoideo-tomentosa, demum glabrescentia, infra dense lanato-tomentosa, nervis lateralibus utrinsecus circiter 6(-9), petiolis lanato-tomentosis plus minusve alatis 9-14 cm. longis. *Scapi* 1-3, erecti, graciles, nudi, plus minusve lanato-tomentosi, usque ad 40 cm. alti sed plerumque breviores. *Capitula* solitaria, obconica, 1-1\*5 cm. alta, heterogama, radiata. *Involucri bractearum* multiseriatae, exteriores gradatim minores, interiores lineares vel lineari-lanceolatae, acutae vel subacutae, 1 • 2 cm. longae, 1\*5 mm. latae, extra lanato-pilosae vel lanato-tomentosae. *Flores* glabri; flores disci feminei, 1- vel 2-seriati, fertiles; flores disci pseudohermaphroditi, ut videtur steriles. *Corolla* § 1-5 cm. longa, labio exteriori apice 3-crenato liguliformi 1 • 1 cm. longo et usque ad 1 • 5 mm. lato, labio interiori usque ad basin bilobo lobis inaequalibus subulatis 2\*5 mm. longo ; corolla £ tubulosa, 8-9 mm. longa, limbo 2-labiata, labio exteriori 3-crenato, labio interiori usque ad basin 2-fido, staminodiis 2 filiformibus saepe praedita. *Antherae* totae 5 mm. longae, basi caudatae, apice obtusae, caudis pauca papillosae, ceterum glabrae. *Stylus* florum femineorum 8 • 5 mm. longus, glaber, ramis intus papilloso-stigmaticis; stylus florum sterilium brevior, ramis extra subadpresso-pubescentibus intus laevibus. *Achaenia* fertilia immatura fusifonia, 5 mm. longa, 5-costata, costis adscendenti-pubescentibus. *Pappi setae* copiosae, uniseriatae, brevissime plumosae.

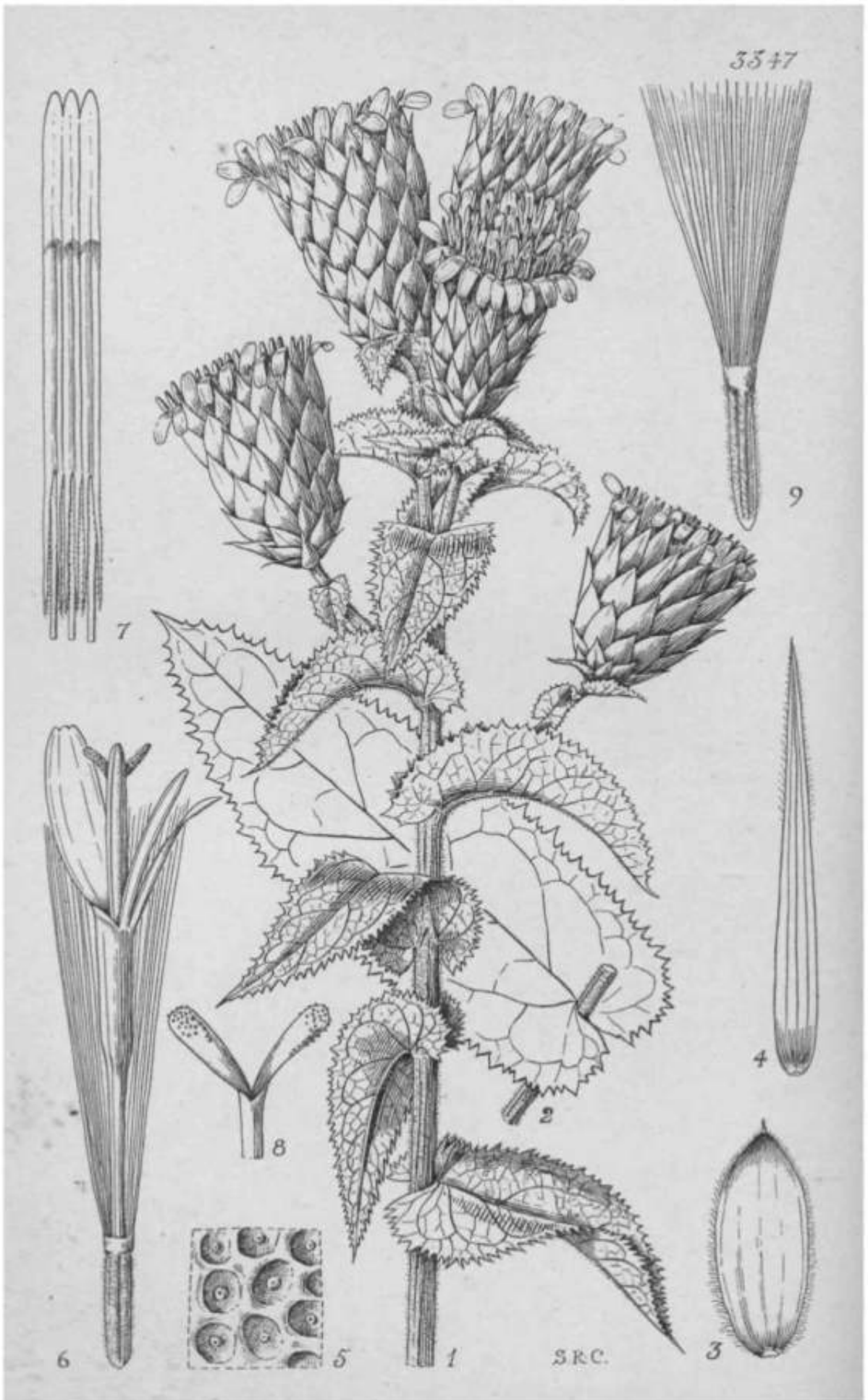
MEXICO. District of Temascaltepec, State of Mexico : Nanchititla, May 1933, *Hinton* 3098 (type); *ibid.*, Aug. 1935, *Hinton* 8228; *ibid.*, Oct. 1935, *Hinton* 8562 ; La Sierrita, April 1933, *Hinton* 3465.

The long-petiolate leaves of *Chaptalia Hintoni* are in striking contrast to those of *C. nutans* (Linn.) DC. figured on the preceding plate (t. 3345), and this character is sufficient to distinguish the two species. The type-specimen (*Hinton* 3465) is smaller than the others, but this is merely

due to habitat conditions. The difference between the stigmatic style arms of the fertile female and sterile pseudo-hermaphrodite flowers is most marked and is well illustrated in figs. 10,11.—A. A. BULLOCK.

FIG. 1, flowering plant, *natural size*; 2, capitulum, from above, *natural size*; 3,4,5, outer, intermediate and inner phyllaries, x 4; 6, female ray-floret with part of the pappus removed, without staminodes, x 6; 7, corolla of a ray-floret, with staminodes, x 6; 8, immature achene and pappus of the preceding, x 6; 9, disk-floret, with part of pappus removed, x 6; 10, stigmas of a ray-floret, x 16; 11, stigmas of a disk-floret, x 16; 12, part of the androecium of a disk-floret, inside view, x 12.





## TABULA 3347.

PEREZ IA PRING-LEI *Robins, et Greenm.*

COMPOSITAE. TribuS MUTISIEAE.

**P.** (§ *Acourtia*) **Pringlei** *Robins, et Greenm.* in Proc. Am. Acad. xxix. 388 (1894) ; Bacigalupi in Contrib. Gray Herb, xcvi. 60 (1931). Species perdistincta, habitu *P. cuernavacanae* Robins, et Greenm., sed foliis sessilibus basi auriculatis marginibus argute spinuloso-dentatis, pedunculis brevioribus bracteis foliaceis nee lineari-subulatis praeditis recedit.

*Herba* erecta, perennis, 1-1 • 5 m. alta ; caules stricti, simplices, regione florifero tantum pauciramosi, plus minusve lignescentes, purpureo-tincti, pilis uniseriatis pubescentes, dense foliosi, internodiia 2-3 cm. longis. *Folia* patentia, ovato-lanceolata, nonnunquam lanceolato-oblonga praesertim inferiora, plus minusve arcuatim recurva, subconduplicata, superiora usque ad 7 cm. longa et fere 3 cm. lata, inferiora majora, usque ad 11 cm. longa et 5 cm. lata (teste *Bacigalupi*), apice breviter spinoso-acuminata, basi profunde cordato- (haud hastato-)auriculata, dupliciter spinuloso-dentata, discoloria, supra saturate viridia, conspicue elevato-reticulata, nervis venulisque pubescentibus vel puberulis, subtus reticulata, pilis uniseriatis longius fulvo-pubescentia. *Rami floriferi* apicem versus caulium racemose dispositi, 1 • 5-8 cm. longi, capitulis solitariis terminati; bractee foliis similes sed multo minores. *Capitula* satis magna, obconico-campanulata, 3 cm. longa, apice 2-5 cm. diametro. *Involucri bractee* imbricatae, 6-7-seriatae, acutae, exteriores ovatae vel ellipticae, abrupte acuminatae, interiores oblongo-lanceolatae vel subulato-lanceolatae, sensim acuminatae, omnes ciliatae, ceterum glabrae, rigidae, striatae, superne purpureae. *Flores* circiter 50, pallide purpureo-rosei, involucrum vix superantes, omnes hermaphroditi. *Corolla* vix 2 cm. longa, extra intusque glabra, sicco transverse rugosa, bilabiata, labio exteriori oblongo apice minute trifido 7 mm. longo, labio interiori in lobos 2 ligulares usque ad basin diviso, 6 mm. longo, tubo 1-2 cm. longo longitudinaliter 5-costato. *Antherae* exsertae, totae fere 1 cm. longae, superne 2\*7 mm. steriles, apice obtusae, basi longe caudatae, caudis 2 mm. longis leviter minutissime aculeato-papillosis. *Stylus* 1 • 7 cm. longus, basi bulbosus; rami truncati, 1\*5 mm. longi, inter partes steriles antherarum protrusi. *Achaenia* immatura ambitu lineari-oblonga, 7 mm. longa, costata, satis dense strigilloso-pubescentia. *Pappi setae* copiosae, involucrum haud superantes, minutissime pauciplumosae.

MEXICO. District of Temascaltepec, State of Mexico : Temascaltepec, 1750 m., Dec. 1932, *Hinton* 2782 ; Ixtapan, Dec. 1932, *Hinton*

2944; *ibid.*, Nov. 1935, *Hinton* 8722 ; Tenayac, in oak woods, Dec. 1935, *Hinton* 8783. State of Michoacan: near Morelia, Oct. 1893, *Pringle* 5464 (type in Gray Herb.).

This species was hitherto known only from the type-specimen, collected in the hills near Morelia, Michoacan, by Pringle (no. 5464) in 1893 ; it was not previously represented at Kew, but comparison of Mr. Hinton's specimens with the type, kindly sent to Kew on loan from the Gray Herbarium, leaves no doubt that they are conspecific : his numbers 2782 and 8722 match the type-specimen particularly well.

In the dried state the leaves are irregularly marked with purple patches, this colour being repeated on the exposed parts of the imbricate involucre bracts. The flowers are sweetly scented, and the plant may prove to be of some horticultural value.

In Bacigalupi's arrangement, *P. Pringlei* comes between *P. Thurberi* A. Gray and *P. Dugesii* A. Gray ex Bacigalupi, though it is actually not closely allied to either of these species, which have comparatively small capitula arranged in cymose inflorescences. As far as the inflorescence is concerned, *P. Pringlei* approaches *P. cuernavacana* Robins, et Greenm., though in that species the leaves are very shortly petioled and exauriculate, with denticulate margins, and the long leafless peduncles bear linear-subulate bracts which pass gradually into the phyllaries.

The following species of *Perezia* have also been collected in the Temascaltepec District of the State of Mexico by Mr. Hinton :—

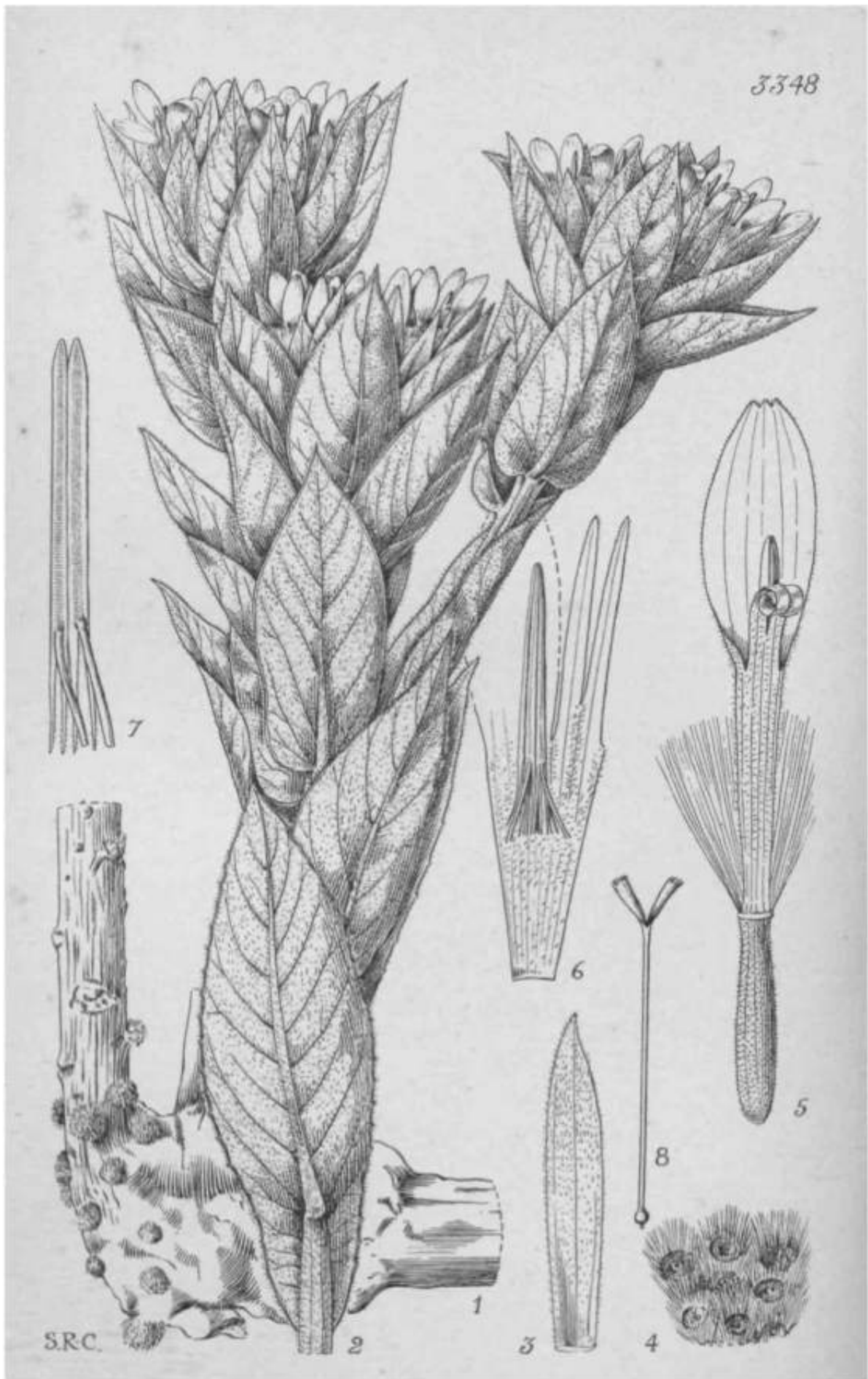
1. *P. reticulata* {*Lag. ex Don*) A. Gray; Bacigalupi in *Contrib. Gray Herb*, xcvii. 37 (1931).—Temascaltepec, 1750 m., Nov. 1932, *Hinton* 2398 ; Vigas, 1080 m., Nov. 1932, *Hinton* 2618. " 3 m. high."

2. *P. platyptera* B. L. Robins.; Bacigalupi, I.e. 55.—Ypericones, 1500 m., Dec. 1932, *Hinton* 2952. " One stem 2 m. high."

3. *P. turbinata* *La Llave et Lex.*; Bacigalupi, I.e. 58.—Rincón, Feb. 1932, *Hinton* 260; Mesón Viejo, 2830 m., in pine woods, Feb. 1933, *Hinton* 3277.

4. *P. Dugesii* A. Gray; Bacigalupi, I.e. 61.—Ixtapan, 1000 m., Dec. 1932, *Hinton* 2934 ; Ypericones (top), ± 1500 m., Jan. 1933, *Hinton* 3069; Nanchititla, Jan. 1933, *Hinton* 3086. " Shrub (2-3-)5 m. high. Boiled with a 1 cent piece and taken internally for alacran bite." Vernacular name: "Espanta vaquero." This is Bacigalupi's var. *typica*.—A. A. BULLOCK.

FIG. 1, part of a flowering stem, *natural size*; 2, lower leaf (from another plant), *natural size*; 3, intermediate involucre bract, x 3; 4, inner involucre bract, x 3; 5, part of the receptacle, x 8; 6, floret with part of the pappus removed, x 4; 7, part of the androecium, x 8; 8, stigmas, x 12; 9, achene with mature pappus, x 3. All from *Hinton* 2944 (except fig. 2).



## TABULA 3348.

### TRIXIS DECURRENS DC.

COMPOSITAE. Tribus MUTISIEAE.

**T. decurrens** DC. in DC. Prodr. vii. 68 (1838); A. DC. Calq. Dess. Pl. Mex. t. 515 (1875); Hemsl. Biol. Centr.-Amer., Bot. ii. 258 (1881); Robins, et Greenm. in Proc. Am. Acad. xl. 7 (1904); Standl. in Contrib. U.S. Nat. Herb, xxiii. 1638 (1926). *Perdicium decurrens* Sessé et Moc. ex DC. *I.e.* in syn.; Sessé et Moc. PL Nov. Hisp. ed. 2, 130 (1893).—*Tlamacazqui y papan, vel Coapatli* Hernandez, Thes. Nov. PL Hist. 414, **cum ic. (1651)**. *Coapatli, quant etiam Tlamacazquipapan vocant Hernandez*, Opera, ed. Ortega, i. 399 (1790). *Coapatli, que llaman otros Tlamacazquiypa* Hernandez y Ximenez, Cuatro libros de la Naturaleza, ed. Leon, 1 (1888); et op. cit. ed. Peñafiel, 5 (1888).\*—Species hactenus imperfecte cognita, distinctissima, foliis adscendentibus imbricatis sessilibus infra basin decurrentibus, inflorescentibus paucicapitulatis corymboso-paniculatis, capitulis magnis foliis redactis circumdati.

*Herba* perennis, erecta, 1-1\*5 m. alta, hirsuto-pubescentia; caules stnati, apicem versus tantum pauciramosi, e rhizomate crasso lignoso C? \* l, ^ U s m \* nus ve lignosi, circiter 1 cm. diametro, basin versus sicut in rhizomate gemmis satis numerosis perennantibus villosolanatis praediti, stnati, pilosi, foliis dense induti; rami plerumque breves, capitulis 1-3 sessilibus vel brevissime pedunculatis terminati. *Folia* sessilia, ovata vel ovato-lanceolata, usque ad 11 cm. longa et 5 cm. lata, apice acute apiculata vel breviter cuspidata, infra basin decurrentia, denticulis distantibus praedita, superiores gradatim minores et minus decurrentia, utrinque, praecipue subtus, maxime in nervis subappresse pubescentia, supra demum minute scabridula; pili glandulis brevioribus mtermixti. *Capitula* terminalia, usque ad apicem foliis plus minusve redactis circumdata, cylindrica, 2\*5 cm. alta, 1-5 cm. diametro; involucri bractee 12-15, inaequales, lineari-oblongae, 2'2-2\* 8 cm. longae et circiter 4 mm. latae, apice acutae, basin versus dorsaliter obtuse carinatae, ciliatae, extra pubescentes, intus apicem versus tantum pubescentes; receptaculum areolatum, areolis subcupuliformibus marginibus villosociliatis. *Flores* flavidi, homogami, hermaphroditae. *Corolla* bilabiata, 1-8 cm. longa, extra pubescentia, intus limbo glabro et tubo pubescente, labio exteriori erecto ovato-elliptico 8 mm. longo \* nun. lato apice minute 3-denticulato, labio interiori 6 mm. longo \*& lobos 2 ligulares circinatim recurvos fere usque ad basin diviso. *Antherae* totae 1 cm. longae, basi caudatae, caudis basin versus pilis b brevissimis paucis patentibus praeditis, apice subacutae. *Stylus*

\* The <sup>†</sup> ^ v e n o t seen the original of this work, which was published in 1615. The two editions cited are Spanish translations of the Latin of Hernandez and Aunenez—A. A. B.

circiter 1 • 1 cm. longus, basi bulbosus, ramis viz 1 mm. longis. *Achaenia* immatura striata, papilloso-puberula. *Pappi setae* copiosae, minutissime plumosae.

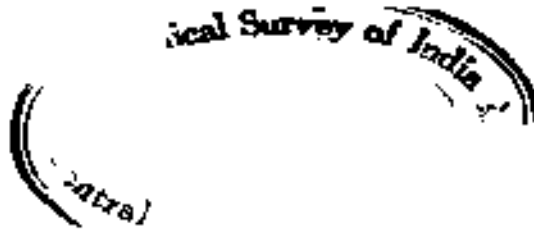
MEXICO. District of Temascaltepec, State of Mexico: Tejupilco, 1340 m., Oct. 1932, *Hinton* 2198; *ibid.*, Oct. 1935, *Hinton* 8546. Ayacapixtl, grassland, Nov., *Sessé and Mociño* (type ; represented by the figure in A. DC. *Calq. Dess. Fl. Mex.* t. 515).

*Trixis decurrens* was first described by Hernandez in 1615 in his work entitled " *Quatro libros de la Naturaleza*," two reprinted and translated editions of which are cited above. He gave an unmistakable figure in his *Thesaurus* (1651), and a further description appeared in the *Opera*, edited and published by Ortega in 1790. It was collected, figured and described in manuscript by Sessé and Mociño, under the name *Perdicium decurrens*, and from the manuscripts De Candolle described it in the *Prodromus* under its present name. Hitherto, however, it has not been represented in herbaria, and Mr. Hinton's specimens may be the only ones in existence.

Three feet or more in height, it is a perennial herb of the plains (*llanos*), with a stout woody rhizome. The perennating buds are densely clothed with brown villous hairs. It is indeed remarkable that such a distinct and conspicuous plant should so long have remained incompletely known.—A. A. BULLOCK.

FIG. 1, rhizome with the lower part of a leafy stem, showing the perennating buds, *natural size*; 2, upper part of a leafy flowering stem, *natural size*; 3, involucreal bract, x 2; 4, portion of the receptacle, x 6; 5, floret with part of the pappus removed, x 4; 6, corolla opened to show the androecium and hairy tube, x 4; 7, part of the androecium, x 6; 8, style and stigmas, x 4.





TABULA 3349.

VALERIANA PARNASSIIFOLIA *Sandw. & Th.*

VALERIANACEAE.

**V. parnassiifolia** *Sandw. & Th.*; species nova Sectionis *Euvalerianae*, Ser. *Lapathifoliarum* vel *Carnosarum*?, a speciebus adhuc cognitis ob formam foliorum, petiolo sub lamina tenui valde dilatato lamina fere suborbiculari basi saepius plicato-cordata, praeterea ob inflorescentiam bracteis primariis foliaceis praeditam valde distincta.

*Herba* perennis, rhizomate longo lignoso cicatricibus approximatis usque ad 1 cm. diametro inferne fibroso superne lamoso, ramis apice reliquiis petiolorum vetustorum obtectis. *Folia* basalia apice rhizomatis ramorum compluria, circiter 6, glaberrima; petiolus, 6—14 cm. longus, applanatus, tenuis, nervosus, basi valde dilatatus, vaginans, praeterea apicem versus sensim conspicue dilatatus et sub lamina ipsa 5—10 mm. latus, prope medium 2\*5—3\*5 mm. latus; lamina satis pallide viridis, tenuis, chartaceo-membranacea, saepius ovato-suborbicularis vel fere suborbicularis, rarius ovata, apice late rotundato-obtusa, basi leviter plicata atque cordata, rarius truncato-attenuata, 5-5 cm. longa, 2\*4—4\*5 cm. lata, integerrima sed margine aliquantum irregulari atque terminatione nervorum majorum minute emarginatulo, costa nervisque primariis lateralibus utrinque tenuiter prominulis, lateralibus basalibus utroque costae latere 3—4 in petiolum decurrentibus atque demum in nervos duos costae parallelas mergentibus, reticulatione obscura impressa; folia caulina nulla vel bina, opposita, prope caulis basin orientia, radicalibus similia, ut videtur inflorescentias minutas subtendentia. *Caules* apice ramuli rhizomatis cujusque singuli (alius unicus minutus apice florifer ex axilla folii cujusdam basalis est visus), sulcati, glabri, usque ad 28 cm. longi, inferne siccitate usque ad 5 mm. lati. *Inflorescentiae* subdioicae; thyrsus fere dimidium caulis aequans, 11—14.5 cm. longus, anguste oblongus et usque ad 3\*5 cm. tantum latus, glaber sed minute praesertim nodis papillatus; rami ascendentes, inferiores ex axillis bractearum magnarum foliacearum eos subaequantium exorientes, usque circiter 4 cm. longi; bractee primariae inferiores foliis radicalibus subsimiles, petiolatae, ovatae, basi rotundatae vel attenuatae, superiores gradatim minores, subsessiles, apice obtuse acutae, basi pinnatifidae lobis utrinque 1-2 pblongis. *Cymae* congestiflorae, bracteis bracteolisque oblongo-linearibus. *Flores* pallide cremei. *Calyds* h&j&bus e laciniis compluribus (circiter 10) minutis involutis compositus. *Flores masculi* corollae tubo infundibuliformi et dimidio superiore subito late ampliato fere 1\*75 mm. longo prope apicem circiter 2 mm. lato; consociis glandularum vel papillarum minutarum infra sinus loborum nianifestae; lobi oblongi vel ovato-oblongi, apice obtusi vel rotundati, 1 "5 mm. longi, 1 -2 mm. lati; filamenta circiter 1 -3 mm. longa; antherae circiter 0-6 mm. longae; stylus circiter 1 mm. longus, minute 3-~~adus~~.



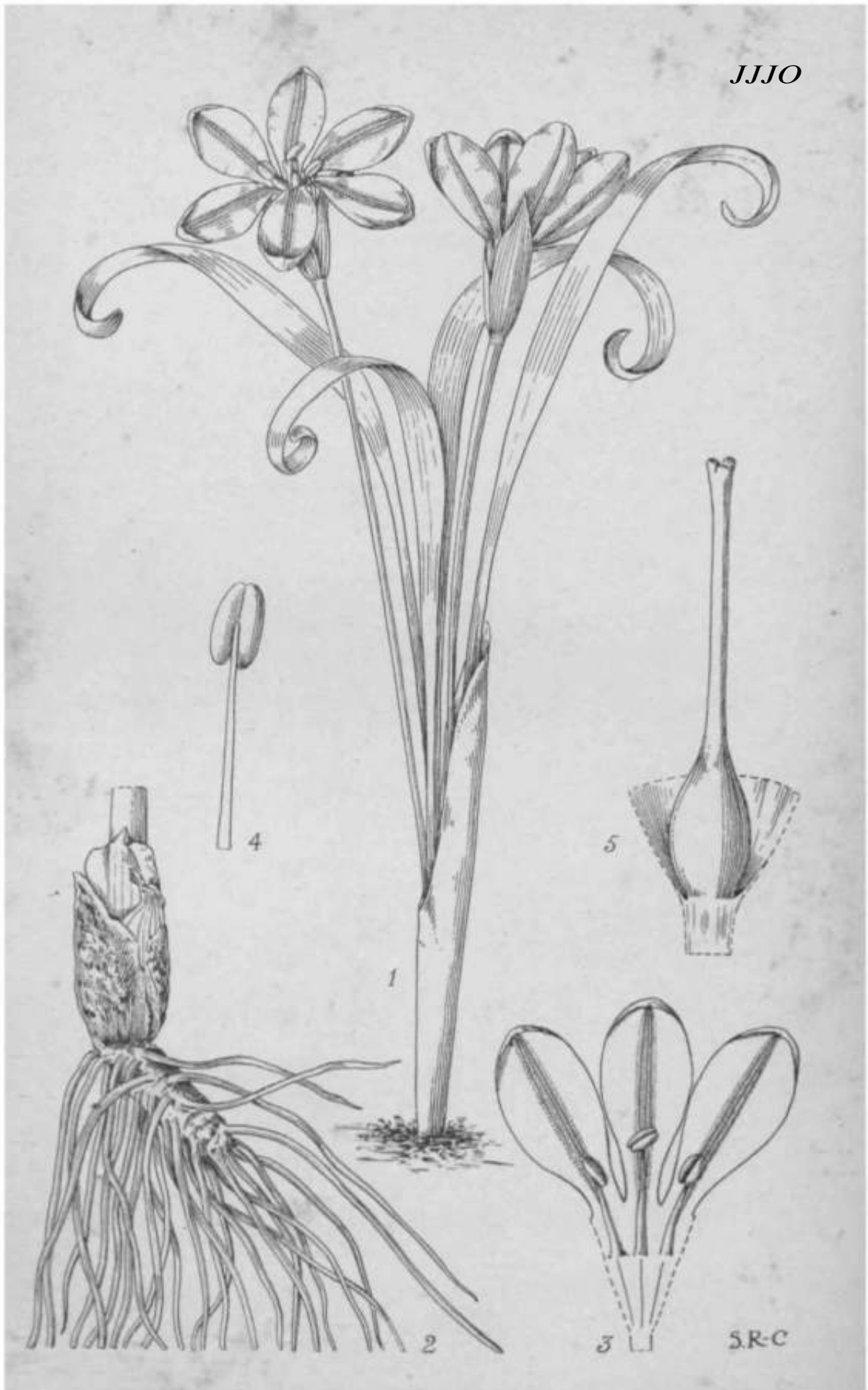
*Flores feminei* corollae tubo brevissimo, lobis ovatis obtusis circiter 0-7 mm. longis atque latis; consociis glandularum vel papillarum infra sinus manifestae; antherae subsessiles; ovarium 1-5 mm. longum, 0-5 mm. latum; stylus usque vix 1-2 mm. longus, e fauce exsertus, conspicue 3-fidus. *Fructus* (adhuc immaturus) glaber, fere 4 mm. longus, basi 1 mm. latus, peranguste oblongo-lanceolatus; calycis limbus pappiformis nondum evolutus.

ARGENTINA. Gobernación del Neuquen; Santa Julia, near Lago Huechulafquen, in clefts of rocks at 1500 m., 24 Dec. 1926, H. F. Comber 895: "Herbaceous perennial. Leaves light green, soft. Flowers pale cream, dioecious. Shade plant, not common."

It is difficult to suggest a specific affinity for this Valerian, which combines the woody rhizome of the series *Carnosae* with the delicate foliage of the *Lapathifoliae*. Forms of *F. lapathifolia* Vahl, which bear a superficial resemblance to Mr. Comber's plant, are immediately distinguished by the more or less horizontal, creeping rhizome, and by the pilose-pubescent (not merely papillose) nodes of the inflorescence. It is possible that a closer affinity will be found among species of the series *Radicales*, of which practically no material is available at Kew for examination. This is the second new Valerian to be discovered by Mr. Comber on the high Andes of Neuquen, the other being *Valeriana Comberi Sandwith*, nom. nov. (*F. chionophila* Sandwith in Kew Bull. 1928, p. 110, non *F. chionophila* Popow et M. Kultiassow in Trans. Turkest. Univ. Pt. 4, p. 65: 1922).—N. Y. SANDWITH.

FIG. 1, plant with ♂ inflorescence, *natural size*; 2, male flowers, x 8; 3, male flower opened out, x 8; 4, stamen from bud, x 16; 5, abortive ovary and style from male flower, x 16; 6, part of female inflorescence, x 8; 7, female corolla, x 8; 8, style of female flower, x 20; 9, immature fruit and calyx limb partly unrolled, x 12.

JJO



## TABULA 3350.

### BRODIAEA CIRCINATA *Sandwith.*

AMARYLLIDACEAE. Tribus ALLIEAE.

B. (§ *Triteleia*) *circinata Sandwith*; species nova, ut videtur inter *B. unifloram* (Lindl.) Engl. atque *B. patagonicam* (Bakei) Baker ponenda, ab illa regiones multo minus elevatas occupante imprimis floribus sessilibus, perianthii segmentis intus longitudinaliter trinerviis, ab hac foliis latis glaucis apice circinatis, perianthii segmentis latis apice Totundatis obtusis valde distincta.

*Herba* perennis, infra bulbum insigniter rhizomatosus, rhizomate usque ad 8 mm. crasso fibras multas longas usque ad 1-5 mm. crassas emittente; bulbus ipse oblongo-ovoideus, usque ad 2-5 cm. longus et 1-5 cm. diametro, vaginis membranaceis albo-hyalinis striatis obtectus; vagina summa longissima, supra bulbum usque ad 7-5 cm. longa, siccitate usque ad 7 mm. lata, folia scaposque involvens, 2-3 • 5 cm. infra apicem unilateraliter spathaceo-fissa. *Folia* 3-4, synanthia, glauca, apicem versus fere semper conspicue recurvato-circinata, apice ipso obtuso, circiter 10-16 cm. longa, flores aequantia vel paullo superantia, superne 3-5-75 mm. lata, inferne valde angustata. *Scapi* 1-2, purpurascens, 7-5-13 cm. longi, superne siccitate usque ad 2 mm. lati. *Valvae spathae* 2, prope basin connatae, albo-membranaceae, violaceo-nervatae, 1-8-2-1 cm. longae, usque ad 7 mm. latae, obtusae, erectae et perianthii tubum satis arete includentes. *Flores* solitarii, sessiles, albi, translucens, erecti. *Perianthii* tubus anguste infundibuliformi-campanulatus, 1-2-1-4 cm. longus, apice 6 mm. latus, siccitate violaceo-vittatus; segmenta spathulata, apice rotundato-obtusa leviter cucullata demum emarginata, inferne valde angustata, unguiculata, 1-7-1-8 cm. longa, 6-8 mm. lata, alba, membranacea, nisi zona mediana longitudinali siccitate olivaceo-brunnea crassiore ac intus conspicue trinervia. *Stamina* 6, aequaliter circiter 8 mm. supra tubi basin inserta; filamenta inaequalia, alterna longiora 10 mm., breviora 8 mm. longa, appendicibus nullis; antherarum loculi oblongi, 2-3-75 mm. longi. *Ovarium* ovoideo-ellipsoideum, circiter 5 mm. longum atque 2\*3 mm. diametro, stipite perianthii tubo adnato circiter 2 mm. longo; stylus 1-15 cm. longus, apice brevissime obtuse trisigmaticus. *Fructus* non visus.

ARGENTINA. Gobernación del Neuquen; Cerro Colohuincul, near San Martin de los Andes, 1800-2100 m., 17 Dec. 1926, *H. F. Comber* 879: "Bulbous perennial from near snow-line; flowers white, translucent; stems purplish; leaves glaucous, rolling up."

- This interesting plant, which has been collected only at a very high altitude on the eastern side of the main chain of the Andes, is evidently

related to *B. patagonica* (Baker) Baker, a species with a wide distribution in Patagonia and occurring in the Territory of Neuquen both at low levels, as on sandy soil near Zapala, and at 1650 m., as in grassland on the Cerro Colorado Lolog. *B. patagonica* is a plant with very narrow, dark green or purplish leaves which are normally straight and not curled at the apex, while its perianth segments are typically narrow and acute in outline, with usually only a single longitudinal median nerve. The inflorescence is 1-2-flowered, and the pedicels may be very short or up to 2-5 cm. long. A certain amount of variability may also be seen in the shape of the perianth segments, especially in *Koslowsky* 65, from the Valle de la Laguna Blanca, Terr. Chubut, in which the shape and triple median nervation of some of the segments suggest a passage towards *B. circinata*. Another ally of *B. patagonica* Baker is *B. Spegazzinii* Macl. (*B. patagonica* Speg., non Baker). This perhaps represents an extreme form of *B. patagonica* growing on the deserts near the Patagonian coast; it has extremely narrow, linear, very attenuate perianth segments which are about as long as the tube. Skottsberg (Svenska Vet. Akad. Handl., n.s., lvi. 189 : 1916) suggested that it should be referred to the genus *Tristagma*, but a reading of Spegazzini's description and comparison with the material of *Tristagma* fails to give any ground for support of his proposal. The well-known *B. uniflora* has broad glaucous leaves similar to those of Mr. Comber's new species but, besides differing in characters of the inflorescence, is a lowland plant of the province of Buenos Aires and of Uruguay.—N. Y. SAND WITH.

FIG. 1, plant, *natural size*; 2, base of stem, bulb and rhizome, *natural size*; 3, interior of perianth, with stamens, x 1\*5; 4, a shorter stamen, x 4; 5, corolla-tube cut from below ovary to show stipe, x 4.



**DIANTHUS LEUCOPHOBNICEUS** *Dörf. et Hayek.*

CARYOPHYLLACEAE. Tribus SILENEAE.

*D. leucophoeniceus* *Dörf. et Hayek* in Oesterr. Bot. Zeitschr. lxx. 13 (1921); Hayek in Denkschr. Akad. Wiss. Wien, Math.-Nat. xcix. 118 (1924); Bornm. in Allg. Bot. Zeitschr. xxxii. 27 (105) (1926); Jávorka in Magy. Tud. Akad. Balk.-kutat. Tud. Eredm. iii. 232 (1926); Hayek, Prodr. Fl. Penins. Balcan. i. 235 (1924); Bornm. in Magy. Bot. Lap. xxxii. 117 (1933). *D. sanguineus* Vis. f. *latihyalinus* Bornm. in Engl. Bot. Jahrb. lix. 395 (1925).—A *D. sanguineo* Vis. squamis calycinis interioribus scarioso-marginatis breviter aristatis, floribus majoribus diversus est.

*Herba* perennis, basi plus minusve lignosa, surculis subdense caespitosis foliosis. *Caules* erecti, validi, 3\*7-8 dm. alti, teretes, glaberrimi, glauco-pruinosi. *Folia* basalia anguste linearia, acuta, 3-8 cm. longa, 1-2 mm. lata, infima valde redacta vel squamuliformia; caulina linearia vel anguste linearia, acuminata, 3\*5-10 cm. longa, 1-5-4 mm. lata, glabra, viridia, basi in vaginam 1-4\$ cm. longam glaucam connata. *Capitula* terminalia, 4-25-flora, 1-5-4\*5 cm. diametro. *Involucri squamae* lanceolatae vel ellipticae, in aristam floribus multo breviorum circiter 5 mm. longam plus minusve sensim acuminatae, 1\*4-2 cm. longae (arista inclusa); squamae calycinae late ellipticae vel ovatae vel obovatae, obtusae, nervo mediano supeme purpurascete in aristulam 0\*75-1\*5 mm\*, longam excurrente, circiter 0\*6-1-1 cm. longae et 0\*6 cm. latae, membranaceae, albae, late pellucido-membranaceae. *Calyx* 1-3—1-6 cm. longus, 3-4 mm. diametro, intense purpureus, <sup>a</sup> squamis calycinis valde distans, dentibus ovatis vel lanceolato-ovatis acutis et saepe leviter aristulatis 3-4 mm. longis et 2-2\*5 mm. latis atropurpureis membranaeo-marginatis minute puberulis. *Petala* 1\*9 cm. longa, ungue 1 mm. lato, lamina latissime triangulari-obovata <sup>a</sup>pice dentata 7-8 mm. longa et 7\*5 mm. lata in pagina superiore fauce praecipue barbatula velutino-atropurpurea. *Filamenta* 1-5 cm. longa; antherae (dehiscentes) oblongae, 2•5 mm. longae. *Ovarium* cylindricum, 5 mm. altum, fere 2 mm. diametro. *Capsula* anguste compresso-ellipsoidea, 1-2 cm. longa, 5-5 mm. lata, dentibus 4 lanceolatis acutis patentibus. *Semina* plana, late ovata vel late elliptica vel fere rotunda, circiter 2 mm. longa.

ALBANIA. Montes Albaniae boreali-orientalis inter opp. Prizren et Debra jacentes in lapidosis graminosis ad pedem montium nivalium Korab ad pagum Plostan, 1300 m., 21 Jul. 1918, solo calcareo, *KummerU*; Nemercka Range above Biovishde, turfy upper limestone slopes, 1530 m., 22 Jun. 1933, *Alston & Sandwith* 1838.

Species of *Dianthus* with the flowers grouped, often densely, in heads, are notoriously difficult both to distinguish and to classify satisfactorily. This applies especially to the species placed by F. N. Williams (Journ. Linn. Soc, Bot. xxix. 353-354, 371-390 : 1893) in section *Carthusianum*, subsections *Carthusianoides* and *Macrolepides*. Stojanoff and Achtaroff, in their valuable account of the pinks of Bulgaria (Sbor. Balg. Akad. Nauk. xxix. 1935), point out that in this section "fliessen die Sippen allmählich ineinander in der Weise, dass eine genaue Begrenzung von Arten fast unmöglich wird, obwohl die extremen Formen derselben Verwandtschaftsgruppen sich voneinander in dem Masse unterscheiden, dass man sie nicht unberechtigt für Arten halten kann." That such complexity is partly due to hybridization is now generally realized, and controlled genetical experiments have confirmed the conclusions reached by other methods, since Andersson-Kottō and Gairdner have shown (in *Genetica* xiii. 77 et seq.: 1931) that many species of *Dianthus* when crossed with one another exhibit varying degrees of compatibility.

*D. leucophoeniceus* Dorfl. et Hayek is, so far as can be judged from the material and data at present available, a relatively well-marked and distinct species. It is characterized especially by the broad pellucid-white membranous margins to the scales, which contrast strongly with the dark purple calyces projecting in the head beyond them. Only a small degree of variation has been found in the three sheets (of two collections) available for study, and this mainly in the width of the calyx. In Alston and Sandwith's material from southern Albania the calyx has a slightly greater diameter than in Kümmerle's material from north-eastern Albania, but the flowers are young in the former and ripening to fruit in the latter. Kümmerle's specimens are also taller and generally more robust.

The species was originally described from specimens growing "in pratis subalpinis ad ascensum a pago Plostan ad Fusa Korabit, ca. 13-1600 m., leg. Dörfler." It was collected by Kümmerle in approximately the same locality. Bornmüller (1933) places under *D. leucophoeniceus* specimens collected by him "in den südlichen Vorbergen des Sardagh bei Raduse, 500 m. (11. vi. 1917; Bornm. No. 325)," and material from near Veles collected by Burgeff. Alston and Sandwith have now considerably extended the known range of the species by collecting it in southern Albania.—W. B. TURRILL.

FIG. 1, portion of plant, x ½; 2, upper part of flowering stem, natural size; 3, outer calycine scale, x 4; 4, inner calycine scale, x 4; 5, calyx opened out, showing gynoeceum and gynophore, x 4; 6, petal, x 4; 7, stamen, x 4; 8, capsule, x 4; 9, seed, dorsal view, x 8; 10, seed, ventral view, showing hilum, x 8.

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## TABULA 3352.

### GYPSOPHILA SPERGULIFOLIA Griseb.

CARYOPHYLLACEAE. Tribus SILENEAE.

**G. spergulifolia** Griseb. Spic. Pl. Kumel. et Bithyn. i. 183 (1843); Visiani et Pančić in Mem. Inst. Ven. xv. 15, t. 20, f. 3 (1870) (formae *albanica* et *serbica*); Pančić, PL Princip. Serb. 173 (1874); Conrath in Oesterr. Bot. Zeitschr. xxxviii. 50 (1888); Boiss. PL Or. Suppl. 88 (1888); F. N. Williams in Journ. Bot. xxvii. 323 (1889); Baldacci in Mem. R. Acad. Sci. Bologna, Ser. 5, ix. 518 (1901); Beck in Glasnik, xix. 27 (1907); Vandas, Reliq. Formánek. 78 (1909); Janchen in Oesterr. Bot. Zeitschr. lxxix. 141 (1920); Aschers. u. Graebn. Syn. Mitteleur. PL v. 2. 259 (1921); Hayek, Prodr. Fl. Penins. Balcan. i. 221 (1924); Jávorka in Magy. Tud. Akad. Balk.-kutat. Tud. Eredm. iii. 232 (1926); Novák in Preslia, v. 87 (1927); Maly in Glasnik, xlvii. 106 (1935); non *G. spergulaefolia* (Jaub. et Spach) Boiss. FL Or. i. 559 (1867). *G. serbica* ("Griseb.") Degen in Magy. Bot. Lap. iv. 122 (1905).—A *G. macedonica* Vand. planta robustiore, foliis lineari-triquetris glaberrimis, ramis superne pedicellis calycibusque glanduloso-pilosis, seminibus majoribus e descriptione differt.

*Herba* perennis, caespitosa, e basi valde ramosa. *Radix* tenuis, profunde descendens. *Caules* 0.5-2.8 dm. alti, ramis tenuioribus valde ramosi, subteretes, inferne glaberrimi, laevigati, plus minusve viscosi, superne minute scabridiusculi, ramis summis pellicellisque piloso-glandulosis, pilis horizontaliter patentibus capitulatis. *Folia* basalia dense imbricata, lineari-triquetra, apice acuta, saepe brevissime mucronulata, 4-16 mm. longa, 0.5 mm. lata, subnervia, glabra, basi in vaginam 0.5-1 mm. longam persistentem connata, infima saepe abbreviata; caulina opposita vel inferiora saepe quaterna, foliis basalibus similia, superiora sensim breviora, summa brevissima in bracteas transeuntia. *Pedicelli* 5-10 mm. longi, tenues, apice cum nore plus minusve cernui vel erecti. *Calyx* turbinato-obconicus, 3.5 mm. longus, herbaceus, glanduloso-pilosus, lobis late ovatis obtusis vel rotundatis circiter 1 mm. longis et 1 mm. latis trinerviis patentibus in margine late membranaceis. *Petala* spathulata, apice truncata vel leviter emarginata sed haud lobata, 5-6 mm. longa, 2 mm. lata, basi trinervia, plus minusve albida vel rosea. *Stamina* 10, circiter 4 mm. longa; antherae (dehiscentes) breviter oblongae, 0.75 mm. longae. *Ovarium* elongato-ovoideum, 1.6 mm. longum, 1 mm. diametro; stigmata ascendenti-patentia, 2 mm. longa. *Capsula* 3-5 mm. longa, valvis anguste ellipticis 1-5 mm. latis. *Semina* rotundato-vel latissime obovoideo-biconvexa, 1 mm. diametro, leviter rugulosa.

ALBANIA. " Consociata cum Galio rupestri Vis. gregarie in rupium aioriticarum fissuris alt. 1200'-1500' in m. Puka octo leucas a litore

adriatico pr. Alessio distante ! Fl. Jul. Aug. M.\* " *Grisebach* ;<sub>w</sub> ad occidentem opp. Djakova extensi: in argillosis infra jugum " *Cafa Morins*" versus pag. Tropoja, 500 m., 9 Sept. 1918, *Jdvorka* ; in serpentinis ad Kenci distr. Scutari, 9 Aug. 1897, *Baldacci* 203 ; Moskopolë (Voskopoj), locally plentiful on rocky serpentine slopes at head of ravine, 1540 m., 20 Sept. 1935, *Alston* & *Sandwith* 2552.

SERBIA. Divfcibare, auf Serpentinfelsen, July 1875, *Pavhvid*.

BOSNIA. Inter Zlatna ruda et m. Smolin prope Zepfie, solo serpentino, 650 m., 25 Aug. 1934, *Maly*.

The interesting plant figured here is limited, so far as is known, to the western central parts of the Balkan Peninsula, where it occurs especially on soils derived from serpentine rocks, from 500 to 1540 m. In addition to the localities of the specimens quoted above it has been recorded from Zlatibor in western Serbia and from near Tesanj and several other places in Bosnia.

The colour of the flowers apparently varies. Hayek says " Petala . . . alba " ; *Grisebach* gives " petalis albidis " ; and *Alston* and *Sandwith* have a note which records " petals pale pinkish-white above, pinkish-maroon with white margin on back." In *Maly's* dried material from Bosnia in the Kew Herbarium the petals are deep red-purple and the calyx has relatively broad deep green lines running from the base to the apices of the five lobes with white pellucid tissue in between, the latter continuing upwards into the membranaceous margins of the lobes.

The seeds have testa markings which may be described as " weak armadillo " in the sense in which this descriptive phrase has been applied to *Silene* (see *Kew Bull.* 1929, 174).

Many authors refer to var. or forma *serbica* and var. or forma *albanica* *Vis. et Pane*<sup>n</sup>, in *Mem. Inst. Ven.* xv. 15, t. 20, f. 3 (1870). *Baldacci* (I.e.) also contrasts the var. *albanica* (i.e. the *Grisebachian* type) with var. *serbica*. It is doubtful if the var. *serbica* has any more taxonomic worth than indicating a certain variation in the density of the glandular indumentum of the upper part of the plant, of the degree of reduction of the lowest leaves, of the nodding of the flowers on their pedicels, and of the colour of the petals.—W. B. TURRILL.

FIG. 1, plant, *natural size*; 2, flower, x 6; 3, petal, x 6; 4, stamen, x 6; 5, gynoecium, x 6; 6, capsule, x 6; 7, seed, ventral view, showing hilum, x 20; 8, seed, lateral view, x 20.

• M = regione mediterraneo.



## TABULA, 3353.

### SILENE FABARIOIDES *Hauskn.*

CARYOPHYLLACEAE. Tribus SILENEAE.

*S. fabarioides* *Hauskn.* in Mitt. Thir. Bot. Ver. X.tf v. 47 (1893) : Degen in Oesterr. Bot. Zeitschr. xliv. 217 (1894) ; F. N. Williams in Journ. Linn. Soc, Bot. xxxii. 43 (1896) ; Velen. Fl. Bulg. Suppl. 37 (1898) ; Halácsy, Consp. Fl. Graec. i. 159 (1901) ; Vandas, Reliq. Formánek. 60 (1909) ; Velen. in Sitz. Böhm. Ges. Wiss., Prag, 1910, 6 (reimpr.) ; Velen. Reliq. Mrkvifikanae, 7 (1922) ; Urumoff in Spis. Balg. Akad. Nauk. xxviii. 120 (1923) ; Stoyanoff in xx. Jahrb. Univ. Sofia Agronom. Fak., Bd. ii. 135 (1924) ; Stoyanoff et Stefanoff, Fl. Bulg. 373 (1924), et ed. 2, 348 (1933) ; Hayek, Prodr. Fl. Penins. Balcan. i. 256 (1924).—A *S. Fabaria* Sibth. et Sm. calyce florendi tempore ventricosoinflato sub<sup>7</sup> fructu quam capsula multo majore nee ei accumbente differt.

*Herba* perennis, glaber, glaucescens. *Radix primaria* saepe haud valde ramosa. *Caulis* fere a basi plus minusve ramosus (ramis 2-13) vel simplex, inferne cum ramis dense foliosus. *Rami floriferi* usque ad 6\*7 dm. alti, teretes, superne nudi. *Folia* subcarnosa, costa nervisque vix conspicuis, inferiora obovata vel late oblanceolata, apice obtusa saepissime apiculata, basi vix connata, 2-4 cm. longa, 1-1 - 3 cm. lata, margine plus minusve denticulato-ciliata, superiora oblanceolata vel elliptica, 2-4 cm. longa, 0\*6-1\*5 cm. lata, acuta vel subacuta. *Injlorescentia* valde pseudo-dichotome divaricata, 3-18-flora, ramis saepe longis gracilibusque ; bractee lanceolatae vel ovatae, acutae, membranaceo-marginatae ; pedicelli 0\*3-2\*8 cm. longi. *Calyx* ventricosoinflatus, circiter 1 - 1 cm. longus et 0 - 7 cm. diametro, pallide viridis vel plus minusve rubescens, valde reticulatim viridicinereo- vel rubrovenosus, dentibus latissime ovato-triangularibus acutis 2 mm. longis 2 • 5 mm. latis apice ciliolatis. " *Gynophorum* " 2\*5 mm. longum, glabrum. *Petala* 8 mm. longa, unguibus angustissime oblanceolatis 6-5 mm. longis 1\*5 mm. latis, lamina profunde bifida 1\*5 mm. longa alba vel viridi-alba segmentis anguste oblongis vel spathulatis 0\*5 mm. latis, corona usque ad basin bifida 0\*75 mm. longa. *Filamenta* usque ad 1\*4 cm. longa, gracilia ; antherae (dehiscentes) oblongae, 2-2\*5 mm. longae. *Ovarium* anguste ovoideum, apice cupuliforme, 3 mm. altum, 2 mm. diametro ; styli 3, 1 • 1 cm. longi. *Capsula* ovoidea, 1 cm. longa (carpophoro 2 mm. longo excluso), dentibus anguste lanceolatis vix 2 mm. longis.

GREECE. M. Korax Aetoliae adjectae, 11 Jun. 1899, *Leonis* 286.

THESSALY. Pindus Tymphaeus : in summo montis Zygos (Lakmon veter.) supra Metzovo, 1380-1540 m., Jul. 1885, substratu " silicico-serpentino," *Hausshnecht*.

ALBANIA. Near Ersekë, 1010 m., 29 June 1933, stony ground in river-bed, *Alston* & *Sandwith* 1992; district of Korçë, Gjergjeviçë, 1200 m., 21 Aug. 1935, bare places in serpentine gorge, *Alston* & *Sandwith* 2589.

S. MACEDONIA. Pisoderion, west of Fiorina, 9 June 1932, by roadside bank, *Alston* & *Sandwith* 765.

RODOPE MASSIF. In lapidosis supra coenobium Bačkovo, 17 Jun. 1928, *N. Stoyanoff* & *B. Stefanoff*.

*Silene fabarioides*, like *S. Fabaria*, bears a strong, if superficial, resemblance to some varieties and forms of *S. Cucubalus* Wib. It has, however, a 10-veined and not a 20-veined calyx, in the sense that there are 10 longitudinal veins from the base, of which 5 pass into the teeth and 5 nearly reach the sinuses before forking. The forks of the intersepaline veins reach the sepal veins near the apices of the teeth. There is thus a complete anastomosing of the vein system of the calyx in addition to a well-marked reticulation of secondary veins and their branches. The calyx is both inflated and asymmetrical, one side being more convex than the other, with the broadest part about or a little above the middle.

The size of the petals varies considerably, as in other species. This variation, as in *S. Cucubalus* Wib. and *S. maritima* L., is only partly correlated with the "sex" of the flowers. Flowers functionally female have generally smaller petals than fully hermaphrodite flowers. Amongst the latter, however, there is a considerable range of petal size, especially in flowers from different plants. The measurements given in the description above have been made from hermaphrodite flowers taken from *Alston* & *Sandwith* 1992, sheet I, and these have probably exceptionally small petal blades. On sheet II is a plant with only female flowers, and the vestigial stamens of this are 5-7 mm. long, i.e. they are completely enclosed in the calyx, and have only non-polliniferous reduced anthers, but the petal lamina is up to 2\*75 mm. long. The material from Aetolia (*Leonis*) has the petal lamina 4 mm. long, and hermaphrodite flowers.

*S. fabarioides* has a fairly wide distribution in the Balkan Peninsula. It is said to be abundant in southern Albania and north-western South Macedonia, and has several times been recorded on soils derived from serpentine rocks, but is probably not limited to such. Grown out of doors in the Herbarium Ground, Kew, from seeds collected by *Alston* and *Sandwith*, it has behaved as a rather short-lived perennial.

W. B. TURRILL.

FIG. 1, portion of plant, *natural size*; 2, portion of lower leaf, upper surface near and including margin, x 4; 3, flower, with calyx split open and petals and stamens removed, x 3; 4, petal, from inside, x 4; 5, capsule, x 3; 6, seed, x 12.



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S.R.C.

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TABULA 3354.

SILENE SCHWARZENBERGERI *Haldcsy*.

CARYOPHYLLACEAE. Tribus SILENEAE.

*S. Schwarzenbergeri* *Haldcsy* in Denkschr. Akad. Wiss. Wien, Math.-Nat. lxi. 472 (1894); F. N. Williams in Journ. Linn. Soc, Bot. xxxii. 177 (1896); Baldacci in Nuov. Giorn. Bot. Ital. n.s. vi. 31 (1899); *Haldcsy*, Consp. Fl. Graec. i. 180 (1901), Suppl. 1, 18 (1908), et Suppl. 2, 18 (1912); Vandas, Reliq. Formánek. 64 (1909); Hayek, Prodr. Fl. Penins. Balcan. 285 (1924). *S. tymphaea* Form, in Verhandl. Naturf. Ver. Briinn, xxxiv. 87 (1896), sec. Vandas, l.e.—A *S. paradoxa* L. calyce brevissime puberulo eglanduloso differt; a *S. linifolia* Sibth. et Sm. foliis inferioribus obovato-spathulatis facile distinguitur.

*Herba* perennis, inferne valde ramosa et suffrutescens. *Rhizoma* lignosum, 2-3 mm. diam. *Caulis steriles* dense foliosi, breves vel brevissimi, minute puberuli; floriferi usque ad 10 (vel numerosiores), erecti, 1\*7^3\*6 dm. alti, teretes, inferne minute superne minutissime puberuli et leviter viscosi, internodiis 6-12 mm. longis. *Folia inferiora* obovato-spathulata, apice rotundata et plus minusve brevissime apiculata, inferne in petiolum gracilem sensim attenuata, tota 1 • 8 cm. longa et 5 mm. lata (vel saepe minora, praecipue breviora), utrinque dense puberula, costa in pagina inferiore conspicua, ceterum venis invisibilibus. *Folia caulina* linearia vel inferiora anguste spathulato-lineararia, superiora valde diminuta, basi breviter connata. *Injiorescentia* 1-4-flora, internodio infimo usque ad 6 • 3 cm. longo; bractee lineares, acutae, basi connatae, 4-6\*5 mm. longae, margine plus minusve membranaceae; pedicelli 2-10 mm. longi. *Calyx* elongato-clavato-cylindricus, 2-1 cm. longus (dentibus inclusis), apice 4 mm. diametro\*, valde 10-nervosus, nervis in tubi apice anastomosantibus, brevissime puberulus, eglandulosus, dentibus ovatis acutis vel obtusis 3 mm. longis 2-5 mm. latis latissime membranaceo-marginatis valde ciliolatis. "*Carpophorum*" anguste cylindricum, 11 mm. longum, 1\*25 mm. diametro, praecipue inferne puberulum. *Petala* 1 • 7 cm. longa, unguibus anguste oblanceolatis 1 cm. longis 2-5 mm. latis deflexo-ciliatis trinerviis, laminis profunde bilobatis lobis oblique suboblongis 4 mm. longis, corona bifida 1-5 mm. longa. *Filamenta* 8 et 12 mm. longa, gracilia; antherae (dehiscentes) oblongae, 1 • 75 mm. longae. *Ovarium* anguste cylindricum, 5 mm. longum, 1\*75 mm. diametro, glabrum. *Capsula* oblonga, 1 cm. longa, carpophoro circiter 1-1 cm. longo excluso.

EPIRUS. In saxosis reg. mediae M. Smolika supra Paleosali, distr. Konia, 19 Jul. 1896, *Baldacci* Iter Albanicum (Epiroticum) Quartum 220.

ALBANIA. District of Moskopolë, W. of Korçë: near Gjergjevicë, 1230 m., on serpentine rocks in deep gorge, 6 July 1933, *Alston 6b Sandwith 2134*.

*Silene Schwarzenbergeri* was originally described from Thessaly, on the cliffs of Mt. Oxya at 1500 m. above Chaliki (Khaliki), in the district of Trikkala. It is one of the many distinct endemic species of *Silene* occurring in the Balkan Peninsula, whose flora contains over one hundred species of the genus; of which approximately 46 (or 44 • 2 per cent, of those known for the area) are endemic.

Alston and Sandwith, from whose material the figure has been prepared, record the flower (petal) colour as "reddish and green." Halácsy says "petalis lividis" and Hayek "petalorum lamina viridescens." In dried herbarium material the petal lobes are incoiled, and this suggests that, as in other species of *Silene*, they roll up over the inner (upper) surface in a dry sunny atmosphere, naturally spreading widely open only in the evenings or during dull weather with a moist atmosphere.

The indumentum of the calyx is important taxonomically. The description "calyx eglandulosus" is possibly only correct so far as examination with a simple lens is concerned and for comparison with some other species. Under the compound microscope some of the hairs on the calyx, in material preserved, dried, and then boiled, seem to be club-shaped or even capitate, especially towards the upper part of the calyx and at the margins of the teeth. Examination of living material is necessary to prove or disprove that these hairs are really glandular and secretory.

The intercalary growth between the calyx and the petals produces a slender puberulous "stipe" which persists in fruit, without further elongation, as the carpophore. In the flowering state the free petals, stamens, and gynoecium arise from its apex. Other points of morphological interest in the flower are the flat petal-claws, with three distinct longitudinal nerves and ciliated margins with multicellular deflexed hairs, and the well-formed coronal scales. The pollen grains are spherical **and** provided **with** numerous "stopples."—W. B. TURRILL.

FIG. 1, portion of plant, *natural size*; 2, portion of leaf, upper surface, x 8; 3, flower, with calyx split open and petals and stamens, except the lower part of the filaments, removed, x 3; 4, calyx-lobe, from inside, x 12; 5, petal, from inside, x 4; 6, stamen x 4; 7, capsule with carpophore, x 3.



3355



S.F.C.

TABULA 3355.

SCABIOSA TENUIS *Sprunner*.

DIPSACACEAE.

**S.** (§ *Sclerostemma*) **tenuis** *Sprunner* in Boiss. Diagn. Pl. Or. Nov. ser. 1, ii. 1H (1843); Boiss. Fl. Or. iii. 134 (1895); Halácsy, Consp. Fl. Graec. i. 769 (1901); Hayek, Prodr. Fl. Penins. Balcan. in Fedde, Rep. Sp. Nov. Beih. xxx. Band ii. 521 (1931).—Species *S. columbariae* Linn. sens. ampl. affinis, sed habitu annuo, calycis et corollae tubo et calycis setis longioribus, floribus intense rubro-purpureis inter alia facile distinguenda.

*Herba* annua, 10-70 cm. alta. *Caulis* gracilis, ramosus, vel in specimenibus minoribus simplex, pilis brevibus retrorsis. praecipue basin versus leviter indutus vel subglaber. *Folia* radicalia rosulata, in plantis vetustioribus saepe emarcida, ambitu oblanceolata, circiter 3-6 cm. longa et 0.5-1.5 cm. lata, varie dentata; folia caulina inferiora pauca, lyrato-pinnatipartita, cetera pinnatipartita vel bipinnatipartita, circiter 3-9 cm. longa, segmentis linearibus 1-2-5 cm. longis 0.5-1 mm. latis marginibus breviter setoso-pubescentibus saepe setis longioribus 1-2 apicem versus praeditis. *Pedunculus* terminalis usque 30 cm. longus, laterales saepe 15-20 cm. longi, nudi, breviter et retrorse pubescentes. *Capitula* 2-5-3 cm. diametro, vertice piano. *Involucri bractee* circiter 6-8, parte basali obovata 1 mm. longa et fere 1 mm. lata, parte suprabasali lineari-lanceolata in apicem acuminata; longa dorso breviter pubescente marginibus setis paucis rigidis praedita. *Receptaculum* conicum, inter flores pubescens. *Bractee* receptaculi lanceolatae, acutae, 2-5 mm. longae, ciliatae. *Flores* intense rubro-purpurei, fere consimiles, sed exteriores paullo majores et P&tuli, quisque involucello 1 mm. longo praeditus. *Calycis tubus* pulliformis, ovarium amplexans, basi ipsa et apicem versus breviter pubescens. *Calycis limbus* stellatus, glandulis stipitatis plus minusve indutus; radii 5, setiformes, rigidi, scabriduli, 1-2 cm. longi, patentes. *Corollae* floris exterioris tubus 1 cm. longus, extra breviter retrorse pubescens, intus dimidio inferiore glaber, dimidio superiore pubescens; limbus profunde 5-lobatus; lobi oblongi, rotundati, anterior 5 mm. longus et 4 mm. - latus, antero-laterales 4 mm. longi et - 7 mm. - lati, postero-laterales 3-5 mm. longi et 2-2.5 mm. lati, omnes extra apicibus exceptis breviter pubescentes, intus glabri. *Stamina* 4, aequalia; filamenta 5 mm. longa, fauci corollae affixa, glabra; antherae fixae. *Stylus* 1-2.5-1.5 cm. longus, glaber, stigmatibus obliquo umbiliciformi. *Fructus involucelli* tubus 3 mm. longus, profunde 8-sulcatus, sulcis pilis brevibus crassis hyalinis, costis praecipue versus pubescentibus; corona 1-5 mm. alta, 20-nervis, extra collum (nervis exceptis) et intus glabra, diaphragmate urnum 0-75 mm. altum circum calycis tubum formante.

GREECE. N.W. Macedonia, Kastoria, 660 m., in *Paliurus* scrub on limestone slopes near the town, flowers red, 27 June 1932, *Alston & Sandivith* 1029; Malakasi, 18 July 1896, *Sintenis* 534; Agrapha, 1050-1110 m., in regione inferiore montis Pindi circa monasterium Korona, in nemorosis quercinis substrato schistoso, 20-28 June 1885, *Hausknecht*; Acarnania, 100 m., in collibus calcareis apricis prope urbem Agrinion, 3 July 1893, *Haldcsy*; Pindus region, Mt. Zoupari, 300 m., dry hillsides, Aug. 1931, *Atchley* 616; Thessaly, Mt. Olympus, *Aucher-Eloy* 778; Thessaly prope Karditza, 24 July 1893, *Heldreich*; ad radices montis Olympi, inter Lithochoron et Scalum, 270 m., *Orphanides* 882; Lithochoron, in maritimis ad Braiabatti, 17 Aug. 1891, *Sintenis & Bornmüller* 1277; Phthiotis, prope Hypatam ad radices montis Oetae, July 1879, *Heldreich*; Epirus, fields on Papingo, 600 m., 26 June 1934, *Giuseppi* 5.

*Scabiosa tennis* is one of the few species belonging to the section *Sclerostemma* which can be easily distinguished from the bewildering plexus of forms centring round *S. columbaria* L. Firstly, it is an annual species, the only other annual known in this section being the Sicilian *S. dichotoma* Ucria, which is a plant of very different appearance having the capitula almost sessile between the branches, after the manner of *S. prolifera* Linn., in the section *Asterocephalus*. Other distinguishing characteristics of *S. tennis* are the long tube of the calyx and corolla, and the long bristles of the calyx. The flowers also stand more erect in the flower-head, which has a flatter top than in other species.

In its involucrel and fruit, which provide the more important diagnostic features throughout the family, *S. tennis* agrees closely with *S. columbaria*. The involucrel, morphologically interpretable as composed of connate bracteoles, has three parts: a funnel-shaped tube which is deeply 8-sulcate, a membranous 20-veined corona, and a diaphragm which almost closes the mouth of the tube and forms a small collar around the neck of the calyx-tube. The limb of the calyx is star-shaped, the five rays of the star forming long, rigid, barbellate setae. In longitudinal section the calyx-tube (fig. 9, c) is very thin and closely surrounds the equally thin wall of the pericarp (figs. 9, 10); the style (s) runs up the hollow neck of the calyx-tube. Within the achene is a layer of endosperm (fig. 9, end.), the rather large embryo (fig. 9, em.) occupying a central position.

*S. tennis* is confined to the Balkan Peninsula, the most northerly specimen seen being from Kastoria in N.W. Greek Macedonia (40° 34' N.), while southwards it reaches the Gulf of Corinth but does not penetrate into Attica: it has been recorded also from Corfu and Euboea by Halácsy. Despite this somewhat restricted distribution, its clear-cut morphological characteristics seem to indicate that the ancestors of *S. tennis* diverged from the main *S. columbaria* stock relatively early in the history of the group.

Like so many annual plants, *S. tennis* varies enormously in size,

flowering specimens ranging from 10 to 70 cm. in height; the smaller plants are unbranched, and bear only a single capitulum. The species occurs from sea level up to the lower mountain slopes, and its habitats have been recorded as dry hillsides, fields and oakwoods.—B. L. BUBTT.

FIG. 1, flowering plant, x £; 2, lowermost cauline leaf from another plant, *natural size*; 3, an involucral bract, x 3; 4, outermost flower, x 4; 5, posterior half of corolla, x 4; 6, anterior half of corolla, x 4; 7, fruiting head, x £; 8, fruit with persistent calyx enclosed in involucel, x 2; 9, the same cut longitudinally (i = involucel, c — calyx-tube, end. = endosperm, em. = embryo, s = style); 10, the same cut transversely through tube of involucel (letters as in 9), x 6; 11, fruit enclosed in persistent calyx, removed from involucel, x 6 :—some of the calyx-bristles are cut short in figs. 4, 9, and 11.



TABULA 3356.

TULIPA BOKSZCZOWII *Regel*

LILIACEAE. Tribus TULIPEAE.

*T. Borszczowii* *Regel* in Bull. Soc. Nat. Mosc. xli. pars 1, 438 (1868); Sealy in Bot. Mag. civii. sub t. 9370 (1934). *T. montana* Lindl. sec. Aitchison in Trans. Linn. Soc, Ser. 2, Bot. iii. 119 (1888), non Lindl. *Tulipa*, M'Clelland, Itin. Notes Griffith, 237 (1848).—Species bulbi tunicis ad apicem longe attenuatis laceratis scariosis caulem usque ad folium infimum vaginantibus insignis ; cum *T. montana* Lindl. confusa, sed insuper bulbi tunicis densissime et appresse sericeo-tomentosis (haud apice lanatis) tepalis acuminatis vel cuspidatis discrepat.

*Bulbus* ovatus, usque ad 3 cm. longus et 2-5 cm. diametro; tunicae fusco-brunneae, scariosae, intus densissime et appresse sericeo-tomentosae, in apicem longe attenuatae, laceratae, caulem usque ad folium infimum vaginantes, parte vaginante intus glabra. *Caulis* totus (ab apice bulbi usque ad basin floris) 13-40 cm. longus ; pars vaginata (7-112-29 cm. longa, pars libera 3-5-20 cm. longa et glabra. *Folia* 4, glabra, glauca, margine anguste scarioso, plus minusve undulato-cnspata, valde concava ; duo infima patenti-falcata, lorato-lanceolata, acuta, 8-23 cm. longa, 1-3-5 cm. lata, inferiore paullo majore; duo superiora erecta vel suberecta, linearia, longe acuminata, duobus infimis multo minora, 4-15-5 cm. longa, 0-3-1-5 cm. lata. *Tepala* flava vel rubra, macula atro-purpurea basi insignia, 3 • 5-5 • 5 cm. longa, 1 • 5-2 • 5 cm. lata; exteriora ovata et acuminata usque obovata rotundata cuspidata; interiora cuneiformia, rotundata vel truncata, cuspidata. *Filamenta* subulata, atro-purpurea, apice et basi flava, circiter 8-10 mm. longa; antherae filamentis aequilongae vel iis paullo longiores ; pollen flavum. *bynoecium* oblongo-trigonum, apice leviter constrictum, circiter 1 • 1 \* 3 cm. longum, 2-3 mm. latum ; stigma diametro ovarium aequans. *Vapsula* oblonga, circiter 3-5 cm. longa et 2 cm. lata. *Semina* obtuse triangularia, compressa, tenuissima, circiter 6 mm. longa et 4 mm. lata, siccitate brunnea.

— TURKESTAN. Desertum Aralense, Kara-Kum, 3 maio 1858, *E. Titchin* 677 ; inter Turkestaniam et Chiwam, *Korolkow & Krause* (?); *Katu*, 1886, *Krassnow*, *Fl. Iliensis*.

— AFGHANISTAN. Hari-rud valley near Tirphul, April 1885, *Aitchison* 151 et 111M.

— BRITISH BALUCHISTAN. Bolan Pass, Siriab, Quetta, Khojak Pass, Koshuk") Pass, *Griffith* 290 [Itin. Notes] (*Herb. Hook* 447, *Herb. East India Co.* 5789); Shelabagh, Khojak Pass, 11 April 1888, *J. F. Guthrie* 8723; Shelabagh, Peshii, etc., 1800 m., 11 April 1888, *J. H. Lacepede* 61; Shelabagh, Khojak Pass, May 1890, *Mrs. R. Egerton*; Khantol, 8 April 1893, *A. V. Munro*; *Stocks* 860 (quoad fr. non fl.).

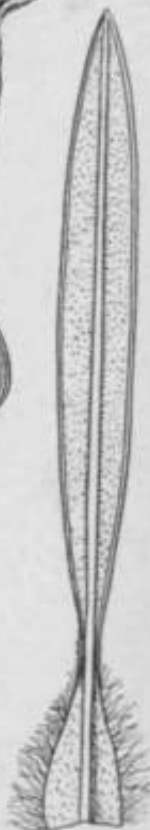
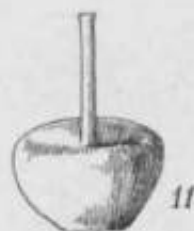
*Tulipa Borszczowii* may be distinguished from all other species by the scarious sheath, formed by the elongation of the bulb-tunics, which clothes the stem up to the lowermost leaves. The latter are evidently borne at ground level, so that the sheath covers the underground part of the stem, and its length thus depends on the depth of the bulb. In his description of the species Regel referred to the sheathed part of the stem as :—" caule . . . a basi ad tertiam partem caulis altitudinis vagina scariosa lacera cincto . . . ," but on the original sheet (*Borszczow* 677) there is a complete plant with the whole stem 24-5 cm. long and the part covered by the sheath 16-5 cm. long. Perhaps Regel meant sheathed as far as the uppermost third, the word " supremam " having been omitted. The longest sheath seen is on a plant collected by Duthie (no. 8723), where the sheath-covered portion of the stem is 29 cm. long, and the aerial part is only 7 cm. long. In certain specimens of *T. Alberti* Regel (*A. Regel* 303), *T. Greigii* Regel (*A. Regel*, Karatau), *T. montana* Lindl. (*Mrs. Sykes*, Khorassan), and *T. Willmottae* Freyn, the bulb-tunics are produced upwards for a short distance and sheathe the lower part of the stem, but the sheath is much smaller than in *T. Borszczowii*, and is not a striking feature; normally there is no sheath in these species.

*T. Borszczowii* was first recorded from the Kara-Kum area south of the Sea of Aral, and subsequently from Katu further east (79°-80° E., 44° N., about 100 km. W.N.W. of Kuldja). Aitchison collected it in the neighbourhood of Herat, whilst other collectors found it still further south in British Baluchistan.

Aitchison, from whose specimens our plate was prepared, writes: " Native names : *Lala*, *Lale*; bulbs, *Gol-i-hle*. In early spring the plains between Chashma-salz pass and Tirphul are coloured with this species, which varies from every shade of red to pure yellow, the base of the perianth always deep purple. The natives collect and eat the bulbs, which are rather nice in flavour." Most of the flowers from Baluchistan are red, but yellow ones also occur so far as one can judge from the dried specimens. In the Kara-Kum area only yellow flowers are recorded.

*T. montana* Lindl., with which the Afghanistan and Baluchistan material of *T. Borszczowii* was confused, differs not only in the character of the sheath, but also in the bulbs having a tuft of wool at the apex, and in the tepals not being acuminate or cuspidate.—J. R. SEALY.

FIG. 1, flowering plant, *natural size*; 2, bulb-tunic showing hairs on the inner surface, *natural size*; 3, outer tepal, *natural size*; 4, inner tepal, *natural size*; 5, stamen, x 2; 6, gynoecium, x 2.



S.R.C.



## TABULA 3357.

### ANDROSACE GRAMINIFOLIA C. E. C. Fischer.

PRIMULACEAE. Tribus ANDROSACEAE.

*A. graminifolia* C. E. C. Fischer; species nova, affinis *A. longifoliae* Turcz., a qua foliis brevioribus rigidioribus inflorescentia superatis, bracteis coriaceis in sicco flores fere occultantibus, floribus pro umbella numerosioribus, pedicellis brevioribus, corolla colorata differt.

*Herba* caespitosa, inferne indurata, radice verticali terete usque ad 10 cm. longa. *Caules* saepius complures, 1-2 cm. longi, graciles, saepius reliquiis brevibus erectis foliorum omnino vestiti, interdum areis nudis interspersis. *Folia* radicalia dense intricata, rigida, linearia usque anguste lineari-lanceolata, inferne deorsum angustata et juxta basin expansa, apice acuta, cartilagineo-mucronata, 5-23 mm. longa, 0.5-2.5 mm. lata, glabra vel praesertim juxta basin sparse pubescentia, costa subtus prominente, marginibus integris crasse cartilagineis. *Pedunculi* 1-3, erecti, teretes, 0.4-3 cm. longi, densiuscule breviter villosi. *Umbella* 4-20-flora; flores bracteis pluribus coriaceis lanceolatis vel ovatis foliis similibus 3-10 mm. longis 1.5-3 mm. latis dimidio inferiore plus minusve villosa-ciliatis suffulti et in sicco semiocculsi; pedicelli usque ad 3.5 mm. longi, hirsuti, saepe purpurei. *Calyx* cupularis, extra hirsutus, intus glaber; tubus 1-4 mm. longus; lobi ensiformes, acuti, dorso leviter carinati, circiter 2 mm. longi, margine angustissime hyalini, pilis septatis hyalinis ciliati. *Corolla* ut videtur colore malvina; tubus ellipsoideus, basi angustatus, ore leviter constrictus, 2-5 mm. longus, 1 mm. diametro; os tubi annulo incrassato lobulato intus 10-costato praeditum; lobi patentes, obovati usque suborbiculares, interdum latiores quam longiores, 1.6 mm. longi, integri, minutissime papilloso. *Stamina* medio corollae tubo inserta, inclusa; filamenta crassiuscula, 0.5 mm. longa; antherae rotundatae, filame/ita aequantes. *Discus* brevissimus, annularis. \* *Ovarium* obconicum, 1.1 mm. longum, glabrum; ovula circiter 14; stylus 1 mm. longus; stigma subcapitatum. *Capsula* ellipsoidea, obtusa, calyce persistente paullo brevior, cartilaginea, pallida, 5-valvis. *Semina* 4-5, oblonga, compressa, uno latere carinata, 1.7-2 mm. longa, 1-1.2 mm. lata, intense brunnea, testa cellularibus circularibus vel breviter oblongis reticulata, glabra, humefacta minute papillosa.

- TIBET. Gyantse, collected during the Tibet Frontier Commission, July-Sept. 1904, *Capt. H. J. Walton* (typus in Herb. Kew.); mountain behind Drepung, K.W. of Lhasa, 5445 m., fl. Sept., *F. Spencer Chapman* 12; Pass I, S. of Lhasa, 3900 m., fl. and fr. Sept., *F. Spencer Chapman* 677; 2 miles S.E. of Lhasa, 3600-3900 m., *F. Spencer Chapman* 674; above Singma Khangchung, fl. Aug., *F. Spencer Chapman* 675; Phari, »200 m., *F. Spencer Chapman* 676; road from Tuna to Dochen,

4200 m., *F. Spencer Chapman 678* :—Mr. Chapman's specimens were collected during the Political Mission to Lhasa, led by Mr. B. J. Gould, I.C.S., in Aug.-Sept. 1936.

The specimens collected by Capt. Walton were recognized as belonging to an undescribed species by Sir D. Prain, who proposed the name now adopted. Neither of the collectors has given any details about the plants or the colour of the flowers ; some of the specimens, however, show that the corollas were not white, being now distinctly mauve.

C. E. C. FISCHER.

FIGS. 1, 2, large and small plants, *natural size*; 3, leaf, lower surface, x 4; 4, 5, 6, outermost, intermediate and innermost bracts, from outside, x 4; 7, calyx, from inside, opened out, x 6; 8, corolla, x 6; 9, part of corolla, from inside, with gynoecium from the same flower, x 8; 10, stamen, x 16; 11, ovary, x 16; 12, capsule, enclosed in calyx, x 6; 13, seeds, x 8.

JJd



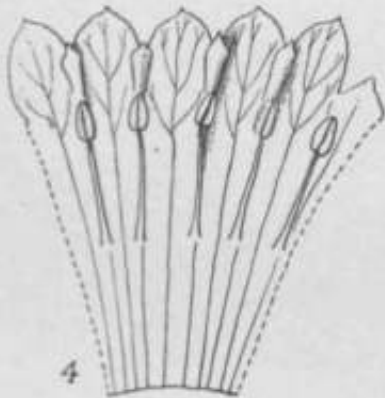
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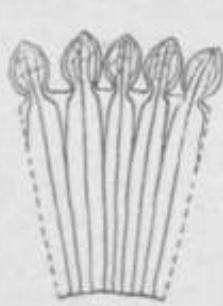
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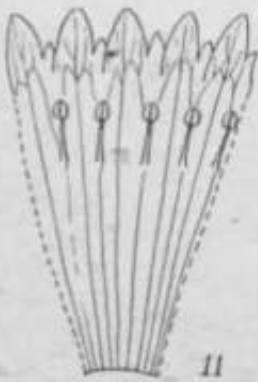
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## TABULA 3358.

Figs. 1-7 : **GENTIANA STYLOSA** *Biswas*.

Figs. 8-15: **GEWTIAWA ANDEBSONII** *Biswas*.

GENTIANACEAE. Tribus SWERTIEAE.

**G. (Chondrophylla) stylosa** *Biswas* ; species nova, affinis *G. squarrosae* Ledeb., a qua corollae lobis ovato-ellipticis mucronatis, plicis integris, stylis linearibus recedit.

*Herba* annua, pusilla, erecta, glabra, radice gracili. *Caulis* simplex vel ramosus, 1-2-5 cm. altus, minute papillatus, ramis basalibus divergentibus rarius erectis. *Folia radicalia* rosulata, late petiolata, petiolis margine scabriusculis basi in vaginam brevem connatis, ovato-elliptica, petiolo incluso 5-7 mm. longa, 3-4 mm. lata, acuta, anguste cartilagineo-marginata. *Folia caulina* opposita, petiolis scaberulo-ciliatis inferne in vaginam brevem connatis basi in caulem decurrentibus, suberecta, superne recurvata, anguste ovato-elliptica, petiolo margine scabriusculo inoluso 3-5 mm. longa, 0.5-2.5 mm. lata, apice plus minusve recurvato-aristata, margine anguste cartilagineo. *Flores* caulem et ramos terminantes, solitarii, erecti, sessiles vel usque ad 3 mm. pedunculati, 0.7-1 cm. longi, 4-7 mm. diametro. *Calyx* 5-7 mm. longus, viridis ; lobi 5, late ovati, 2 mm. longi, 1-2 mm. lati, basi plerumque constricti, sinibus angustis, acute apiculati, apiculis paullo recurvatis, margine anguste cartilagineo glabro. *Corolla* infundibuliformis, 0.7-1 cm. longa, 5-fida, tubo calycem parum superante ; lobi ovato-elliptici, mucronati, 2 mm. longi, 1.5-2 mm. lati ; plicae minutae, acute deltoideae, integrae. *Stamina* 1.5-3 mm. longa ; antherae subreniformi-oblongae, 0.8-1 mm. longae. *Ovarium* oblongo-ellipsoideum, superne leviter ampliatum, stipitatum, stipite 5 mm. longo ; styli distincti, lineares, 1-5 mm. longi ; stigmata capitata. *Semina immatura* oblonga, glabra.

SIKKIM. Lang-mang-nang-zo, 3000 m., May 1885, *King's Collector* 133A (typus in Herb. Calcutt. ; duplum in Herb. Kew.).

\* This new species bears some resemblance to *Gentiana squarrosa* Ledeb. in habit and foliage, but the floral structure is very different. Among the distinguishing characters are the more numerous and crowded radical leaves ; the broader and mucronate corolla-lobes ; the entire, deltoid, acute plicae ; the distinctly stipitate, oblong-ellipsoid ovary ; and the linear styles with capitate stigmas.—K. BISWAS.

**G. (Chondrophylla) Andersonii** *Biswas* ; species nova, affinis *G. stylosae* *Biswas*, a qua foliis, calyce, corollae lobis, ovario elongato differt.

*Herba* annua, pusilla, erecta, glabra, radice gracili. *Caulis* simplex vel ramosus, usque ad 0-8 cm. altus, ramis basalibus divergentibus.

*Folia radicalia et caulina* similia ; caulina opposita, late petiolata, petiolis basi in vaginam brevem connatis, margine primo visu laevibus revera minute asperulis, oblongo-ellipticis, petiolo incluso 2-5 mm. longa, 1-3 mm. lata, erecta, rarius superne paullo recurva, inferne cauli adpressa, obovata, acuta vel obtusa, non-aristata, plerumque extus medio rubra. *Flores* caulem et ramos terminantes, solitarii, erecti, sessiles vel subsessiles, 0.8-1.5 cm. longi, usque ad 5 mm. diametro. *Calyx* 6-10 mm. longus, albido-viridis, nervis extus rubris ; lobi 5, suborbiculati vel late elliptici, 1-2 mm. diametro, apiculati vel obtusi, basi valde constricti, sinibus latis truncatis, marginibus haud cartilagineis. *Corolla* anguste infundibuliformis, usque ad 1 cm. longa, 5-fida, extus albido-viridis vel pallide caerulea, nervo medio rubro-suffuso ; lobi ovati, 1 mm. longi, basi circiter 1 mm. lati, acuti, intus caerulei ; plicae anguste triangulares. *Stamina* 2 mm. longa ; filamenta hyalina ; antherae ovatae vel ovato-ellipticae, 0.5-0.8 mm. longae. *Ovarium* oblongum, 5-10 mm. longum, stipitatum, stipite circiter 2 mm. longo ; styli distincti, lineares, 1.5-2 mm. longi ; stigmata capitata. *Capsula* ab apice dehiscens, placentis membranaceis. *Semina* numerosa, ovato-rotundata, 1 mm. longa, 0.5-0.8 mm. lata, minute scrobiculata.

BHUTAN. Paro, 5000 m., 10 Oct. 1935, *Sir John Anderson et H. P. Nasker* 1101 (typus in Herb. Calcutt.; duplum in Herb. Kew.).

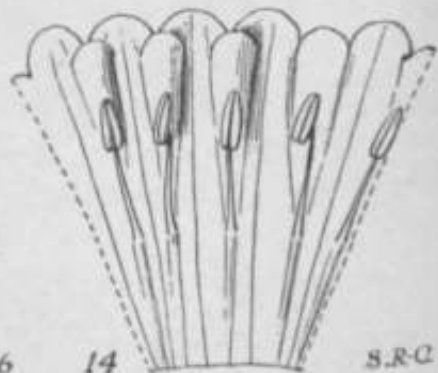
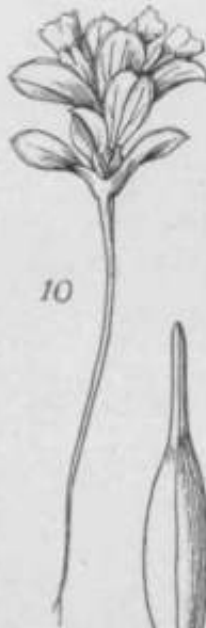
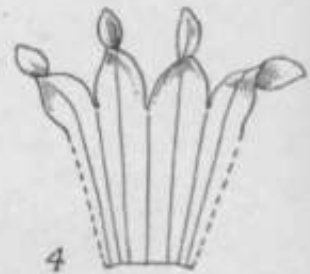
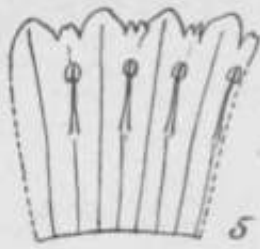
*Gentiana Andersonii* is easily distinguished from all the other species of Section *Chondrophylla* by the nature of its calyx, the most striking feature being the truncate sinuses. The calyx-lobes are strongly constricted at the base, and three-nerved, the marginal nerves of adjacent lobes gradually approaching each other in the upper third or half of the calyx-tube and finally uniting, so that the tube is only ten-nerved in its lower part. The plicae of the corolla are like those of *G. stylosa*, but narrower, and the styles also resemble those of *G. stylosa*, but are slenderer. The elongate ovary and scrobiculate seeds are characteristic.—K. BISWAS.

#### GENTIANA STYLOSA.

FIG. 1, plant, *natural size*; 2, flower, with uppermost pair of leaves, x 4; 3, calyx, laid open, x 4; 4, corolla, laid open, x 4; 5, stamen, x 8; 6, gynoecium, x 4; 7, immature seed, x 18.

#### GENTIANA ANDERSONII.

FIG. 8, plant, *natural size*; 9, flower, with upper leaves, x 4; 10, calyx, laid open, x 4; 11, corolla, laid open, x 4; 12, stamen, x 8; 13, gynoecium, x 4; 14, capsule and stipe, x 4; 15, seed, x 30.



TABULA 3359.

Figs. 1-9 : GENTIANA TETRASEPALA *Biswas*,  
Figs. 10-16 : GENTIANA EUMAONENSIS *Biswas*.

GENTIANACEAE. Tribus SWERTIEAE.

6. (*Chondrophylla*) *tetrasepala* *Biswas*; species nova, inter species hujus sectionis foliis radicalibus 4, foliis caulinis per paria remota dispositis, floribus tetrameris distincta.

*Herba* annua, pusilla, erecta vel diffusa, delicata, glabra, radice tenui filiformi. *Caulis* simplex vel ramosus, 1-1-8 cm. altus, glaber, hyalinus vel nonnunquam pallide viridis, ramis basalibus divergentibus vel caespitosis rarius adscendentibus. *Folia radicalia* 4, sessilia vel subsessilia, basi in vaginam connata, margine integra, hyalina, glabra, ovato- vel obovato-elliptica, petiolo incluso 2-3 mm. longa, 1\*5-2 mm. lata, obtusa vel anguste rotundata. *Folia caulina* opposita, petiolata, petiolis glabris inferne in caulem decurrentibus, subrecta, superne recurva, anguste ovato-elliptica vel sublanceolata, petiolo incluso usque 4 mm. longa, 1 mm. lata, subacuta vel obtusa, margine integra, glabra. *Flores* caulem et ramos terminantes, solitarii vel gemini, erecti, usque 2 mm. pedunculati, 2-4 mm. longi, 2-3 mm. diametro. *Calyx* usque 4 mm. longus, viridis; lobi 4, elongato-oblongi, 2-3 mm. longi, 1-2 mm. lati, basi haud constricti, sinibus acutis, anguste rotundati vel obtusi, rarius acuti, margine haud cartilagineo, integri, glabri. *Corolla* infundibuliformis, usque 3-4 mm. longa, 4-fida, primum vix e calycis tubo emergens; lobi late deltoidei, late obtuse rotundati, usque 1 mm. longi et 0-8 mm. lati; plicae late triangulares, bidentatae. *Stamina* 4, circiter 1 • 2 mm. longa; antherae subreniformi-oblongae. *Ovarium* ellipsoideum, 2 mm. longum, 1-5-2 mm. latum, breviter stipitatum, stipite 0\*5-1 mm. longo; styli distincti, breviter lineares, 0\*5 mm. longi; stigmata capitata. *Semina* 8-12, ovato-oblonga, leviter compressa, dorso vix convexa, 1 mm. longa, 0\*5-8 mm. lata, striata, brunnea.

KUMAON. Ratam valley, 4000-5000 m., 26 Aug. 1884, J. F. Duthie 3166 (typus in Herb. Calcutt.; duplum in Herb. Kew.).

This remarkable little Gentian stands out from the rest of the known species by its tetramerous flowers, and more or less closed corolla with tofid plicae. The radical leaves are only 4 in number.—K. BISWAS.

7. (*Chondrophylla*) *kumaonensis* *Biswas*; species nova, inter species uujus sectionis foliis et corolla distincta.

*Herba* annua, pusilla, subcaespitosa, glabra, radice valida. *Caulis* suberectus, simplex, 1\*7 cm. altus. *Folia radicalia et caulina* similia;

caulina opposita, sessilia, basi in vaginam connata, margine glabra, late obovato-elliptica, nonnunquam late spathulata, 5-8 mm. longa, 4-5 mm. lata, apice late rotundata, emarginata, interdum recurvato-mucronata, cartilagineo-marginata, margine hyalino vel albido, glabra. *Flores* axillares, solitarii, erecti, subsessiles, bibracteolati, bracteolis calycem paullo superantibus, usque ad 10 mm. longi et 5 mm. diametro. *Calyx* 5-7 mm. longus, albido-viridis, 15-nervis; lobi 5, oblongi vel sublanceolati, 2-2-5 mm. longi, 1-1-5 mm. lati, obtusi vel acuti, apice aculeati, basi haud constricti, marginibus late cartilagineis. *Corolla* infundibuliformis, 7-8 mm. longa, 5-fida; lobi late ovati, 1 \* 5-2 mm. longi, basi circiter 2 mm. lati, late rotundati; plicae late obtuse rotundatae. *Stamina* 5 mm. longa; filamenta hyalina; antherae anguste oblongae, usque ad 2 mm. longae. *Ovarium* anguste elliptico-oblongum, circiter 3 mm. longum, 1 mm. diametro, brevissime stipitatum; stylus indivisus, linearis, circiter 2 mm. longus; stigma acutum vel obtusum.

KUMAON. Purkia, 3300 m., 10 June 1919, *N. Gill* 827B (typus in Herb. Kew.; photo in Herb. Calcutt.).

This new Gentian is distinguished from all previously known species by the following combination of characters: Leaves obovate, broadly rounded, emarginate, minutely mucronate, with a glabrous cartilaginous margin; calyx-lobes with a similar margin and apices; corolla-lobes broadly rounded with plicae similar but smaller; anthers linear; ovary narrowly elliptic-oblong surmounted by an undivided style with an acute or obtuse stigma.—K. BISWAS.

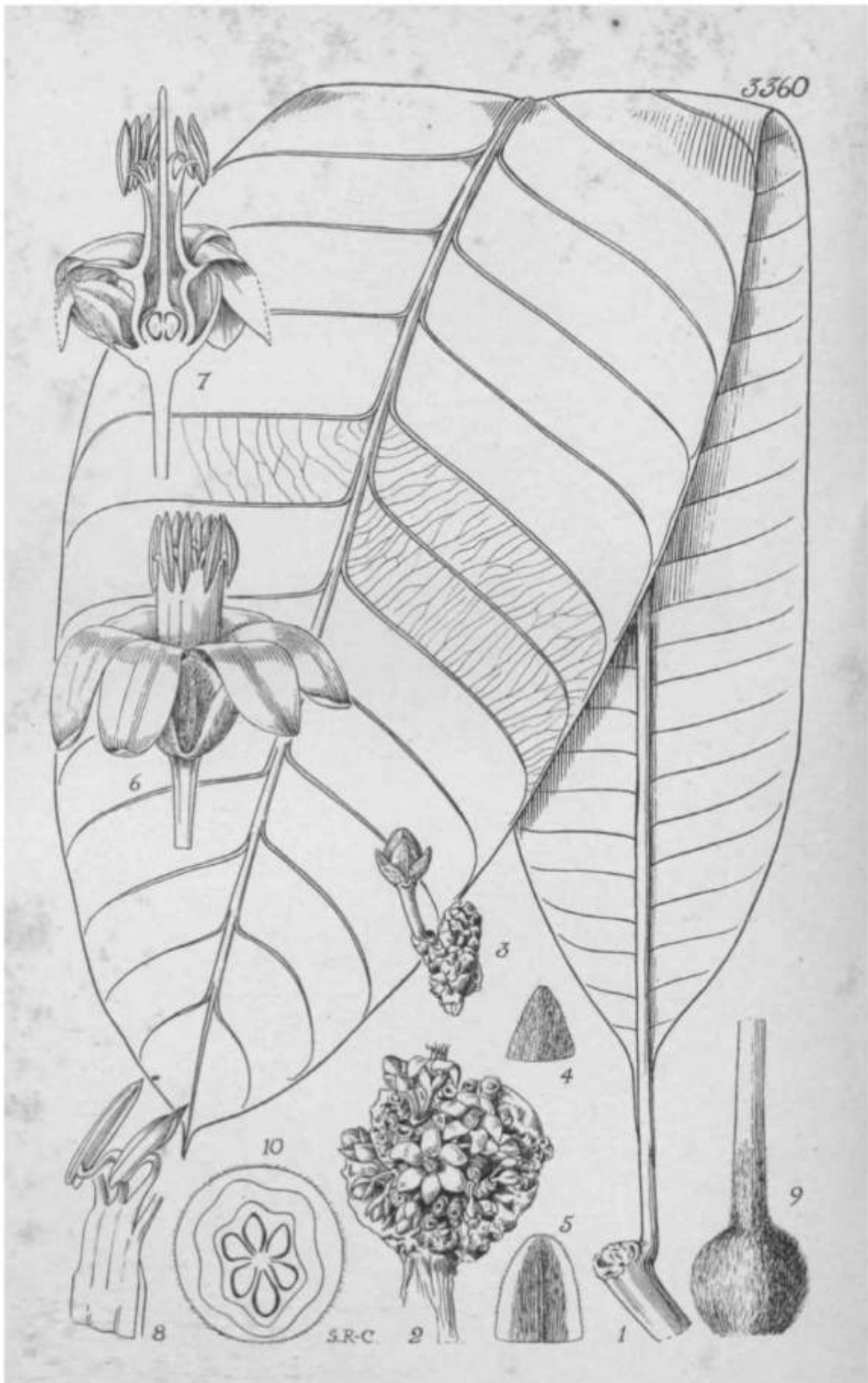
#### GENTIANA TETBASEPALA.

FIG. 1, plant, *natural size*; 2, basal part of plant showing 4-leaved rosette and lower pair of cauline leaves, x 4; 3, flower, with upper pair of leaves, x 6; 4, calyx, opened out, x 6; 5, corolla, opened out, x 6; 6, stamen, x 24; 7, ovary, x 6; 8, capsule, x 8; 9, seed, x 30.

#### GENTIANA KUMAONENSIS.

FIG. 10, plant, *natural size*; 11, leaf, x 4; 12, flower, with pair of bracteoles, x 4; 13, calyx, opened out, x 4; 14, corolla, opened out, x 4; 15, stamen, x 8; 16, gynoecium, x 8.





## TABULA 3360.

### AULANDRA CAULTPLORA *H. J. Lam.*

SAPOTACEAB. Tribus PA!LAQUIEAE.

*A. cauliflora* *H. J. Lam.*; species nova, *A. hngifoliae* *H. J. Lam* affinis, sed foliis majoribus et latioribus, petiolo longiore, nervis pluribus, inflorescentiis ex arboris trunco ortis glomeratis haud elongato-divaricatis distincta.

*Arbor* parva vel mediocris, 10-15 m. alta, trunco 10 cm. diametro, latice albo. *Ramulus* (pars brevis solum visa) glaberrimus, angulato-teres, vix lignosus, 1 • 2 cm. diametro. *Folium* (unum tantum visum) permagnum, glaberrimum, 64 cm. longum, 18 cm. latum, elongato-obovatum ; lamina rigida, latitudine maxima circiter ad  $\frac{1}{2}$  longitudinis a basi, basin versus sensim, denique subabrupte angustata, in petiolum contracta, marginibus integris, apice lata, subabrupte minute acuteque acuminata, acumine 0 • 6 cm. longo ; petiolus solidus, supra paullum, subtus valde convexus subacute carinatus, 6-7 cm. longus, 0-5 cm. diametro ; costa media lata, solida, supra vix, subtus valde carinatum prominens; nervi secundarii utrinque circiter 34, medio folio angulo circiter  $60^{\circ}$ - $65^{\circ}$ , basi usque ad  $80^{\circ}$  a costa adscendentes, prope margines abrupte curvati et diminuentes, haud conjuncti; nervi tertiarum pergraciles, densiusculi, prope costam curvati, ceterum inter sese subparallele transversi, angulo circiter  $145^{\circ}$  a costa descendentes. *Inflorescentiae* fide collectore e basi trunci usque ad 7 m. a solo caulicolae, dense glomeratae; glomerulae examinatae (duae) 2-3 cm. diametro, multiflorae; inflorescentiae singulae breves, vix vel paullum exsertae, axibus e pedunculo brevi breviter et horizontaliter divaricatis, cicatricibus multis bracteisque squamiformibus glabrescentibus rugosae; florum ex apicibus inflorescentiarum ortorum pedicelli 3-5 mm. longi, adpresse pubescentes. *Calyx* biseriatus, in alabastro subacuto-globosus, 3 • 5-4 • 5 mm. longus ; sepala intus glabra, extus adpresse pubescentia, 3 exteriora minora, 3 mm. longa, deltoidea, apice acuta, 3 interiora majora, 4-5 mm. longa, ovata, apice obtusa vel subrotundata, marginibus glabra. *Corolla* alba, subcarnosa, glabra; tubus brevis, cylindricus, 2 • 5 mm. longus et diametro ; lobi 6, uniseriati, imbricatione variabili, oblongi, per anthesin reflexi, 6 mm. longi, 3 mm. lati, apice subacuti-usque subrotundati. *Stamina* 18-19 ; filamenta glabra, pro maxima parte connata ; tubus stamineus 3 mm. longus, erectus, apice in filamentorum partes liberas 1-3 • 5 mm. longas extrorsum reflexas irregulariter divisus; antherae in alabastro longe pilosae, denique glabrescentes, angustae, acutae, fere basifixae, 2-5 mm. longae. *Ovarium* globosum, basi 6-angulatum, pilosum, 1 • 25-1 • 5 mm. altum et diametro, in stylum basi excepta glabrum filiformem vix exsertum 5 mm. longum abrupte contractum; loculi 6, uniovulati. *Ovula* axi

affixa, 3 ut apparet paullo altius affixa, semianatropa, adscendentes, apotropae, micropyle infera. *Fructus* ignotus.

BORNEO. Sarawak : Dulit, in secondary forest on hill ridge, 300 m., 5 Aug. 1932 (fl.), P. W. Richards 1125 (typus in Herb. Kew.) : " Tree, c. 10 cm. diam., c. 10-15 m. high. Cauliflorous, flowers from near ground to c. 7 m. Fls. creamy white. Petals of thick texture. White latex."

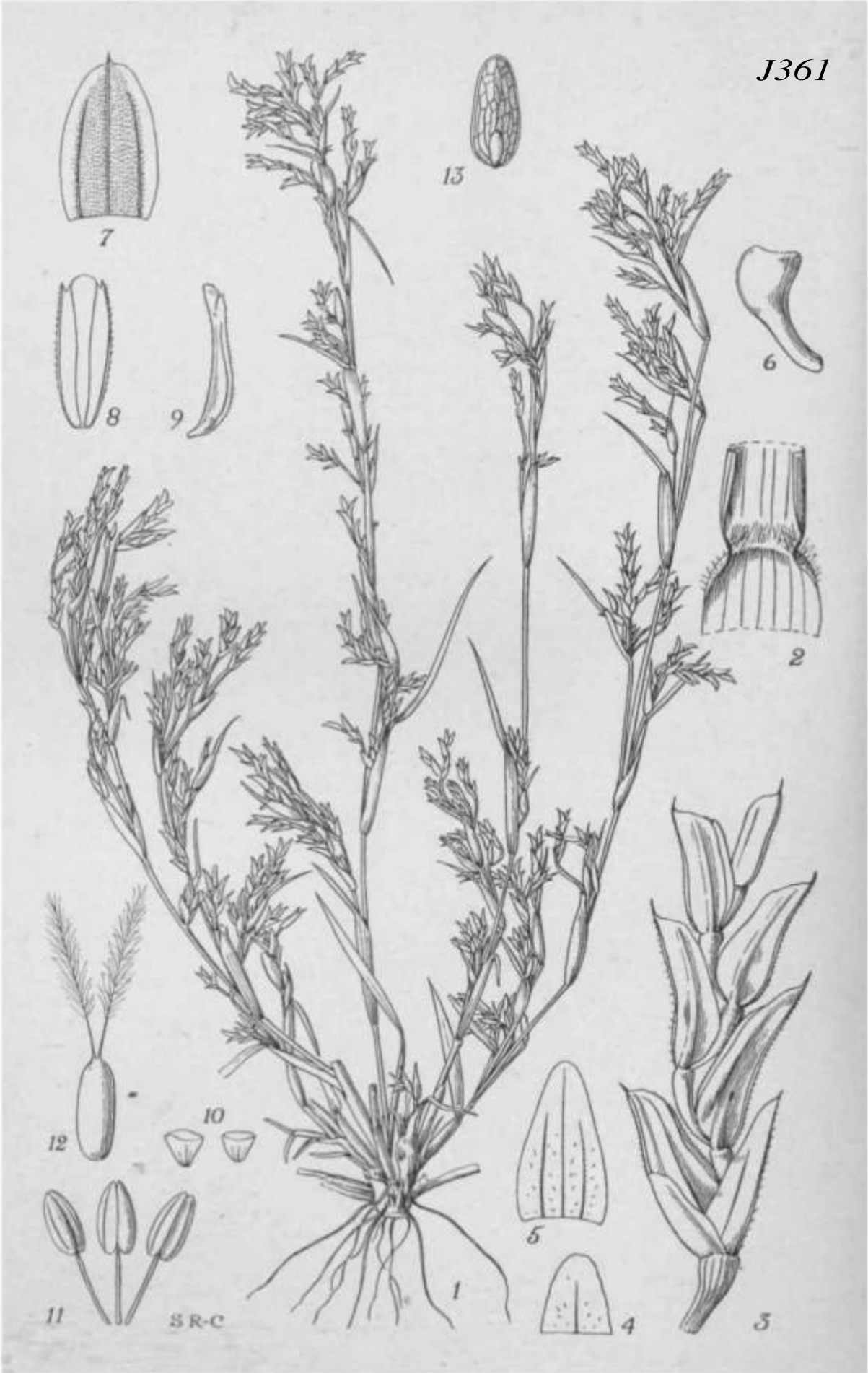
*Aulandra cauliflora* is a noteworthy find, being the second known species of this genus endemic in Borneo. The genus was described in 1927, and the type species is *A. longifolia* H. J. Lam (Bull. Jard. Bot. Buitenzorg, Sér. 3, viii. 415, fig. 6). This was found first by the native collector Amdjah in 1912, and then by the Netherlands Indian Government forester Endert during the East Borneo Expedition, 1925. Its localities were Loembis and Long Petak, both in East Borneo, where it grows at an altitude of 550 m.

*Aulandra* is closely related to *Palaquium*, from which it differs by its staminal tube, its exceptional inflorescences and its seed scars (known only in *A. longifolia*). It may be supposed that the genus is one of those numerous young, local offsprings which have originated from older and more widely spread genera, e.g. from *Palaquium-ancestois*.

*A. cauliflora* is distinguished from *A. longifolia* by its marked cauliflory. In *A. longifolia* the flowers are borne on older leafless branches or parts of branches ; cauliflory in the genus is therefore not surprising, as it is a continuation of a tendency apparent in the whole family. However, it only rarely reaches the *A. longifolia* stage (cf. *Diploknema sebifera* Pierre, also from Borneo), and real cauliflory has hitherto not been recorded in the *Sapotaceae* as far as I know.

The inflorescences in *A. cauliflora* are much shorter and less distinctly branched than in *A. longifolia*, but they are fundamentally of the same type, which, in the *Sapotaceae*, is only equalled to a certain degree by *Planchonella nitida* (Bl.) Dub. in which the flowers are often borne on leafless shoots, and further by *Sarcosperma*, which I consider represents the separate family *Sarcospermataceae* (cf. Revision of the *Sarcospermataceae* by H. J. Lam and W. W. Varossieau in *Blumea*, iii. no. 1, pp. 182-200: 1938).—H. J. LAM.

FIG. 1, leaf and part of branch, x £; 2, glomerule of inflorescences, *natural size*; 3, individual inflorescence, x 2; 4, exterior sepal, x 4; 5, interior sepal, x 4; 6, flower, x 6; 7, flower, longitudinal section, x 6; 8, part of staminal\* tube, from outside\*, x 8; 9, ovary and base of style, x 12; 10, ovary, transverse section, x 16.



TABULA 3361.

PSAMMAGROSTIS WISEANA C. A. Gardner et C. E. Hubbard.

GRAMINEAE. Tribus ERAGROSTEAE.

*Psammagrostis* C. A. Gardner et C. E. Hubbard. Genus novum, *Eragrosti* Beauv. affinis, sed spicis 1-3-spiculatis in axillis vaginarum fasciculatis, rhachillae internodiis superne incrassatis clavatis, lemmatibus brevissime aristatis vel mucronatis (Jivergens).

*Spiculae* inter se similes, solitariae, ambitu oblongae, leviter lateraliter compressae, in spicis brevibus 1-3-spiculatis ortae; spiculae laterales sessiles, terminates pedunculatae; rhachilla continua vel inter anthoecia tarde disarticulans, internodiis glabris superne incrassatis et clavatis. *Anthoecia* 3-7, <J vel summum sterile et plus minusve redactum. *Glumae* pedunculis continuae, inaequales, superiore longiore, ovatae vel ovato-oblongae (explanatae), obtusae vel subacutae, carinatae, membranaceae, vel inferior plus minusve redacta et hyalina; inferior enervis vel 1-nervis; superior 3-nervis, nonnunquam mucronata. *Lemmata* laxa, e glumis longe exserta, elliptico-oblonga vel ovato-oblonga vel late ovata (explanata), apice rotundato-obtusa vel truncata vel leviter emarginata, dorso leviter carinata, marginibus et apice membranaceis exceptis coriacea, prominenter 3-nervia, inter nervos siccitate leviter concava, nervo medio in mucronem vel aristam brevissimam producto, glabra. *Paleae* lemmatibus subaequilongae vel paullo breviores, bicarinatae, inter carinas cartilagineo-induratas concavae et membranaceae, oblongae, a latere visae basin versus curvatae, apice rotundato-obtusae vel truncatae, marginibus infra apicem minute auriculatis. *Lodiculae* duae, late cuneatae, carnosulae. *Stamina* tria; antherae elliptico-oblongae. *Ovarium* glabrum; styli distincti, terminales; stigmata plumosa, ex anthoeciis lateraliter exserta. *Fructus* oblongus, trigonus, inter lemma paleamque inclusus; pericarpium liberum, tenue, membranaceum, albidum; scutellum circiter tertiam partem caryopsis aequans; hilum basale.—*Gramen* annuum; culmi gracillimi, ramosi; ligulae ad seriem ciliorum redactae; laminae breves vel brevissimae; spicae graciles, fasciculatae, in axillis vaginarum fere omnium ortae; pedunculi inferne attenuati, superne leviter incrassati, maturitate basi disarticulantes.

Species unica, Australiae occidentalis incola.

*P. Wiseana* C. A. Gardner et C. E. Hubbard; species nova.

*Gramen* diffusum, usque ad 50 cm. diametro. *Culmi* fasciculati, e basi prostrata geniculato-adscendentes vel omnino prostrati, 4-35 cm. longi, gracillimi, uno latere applanati vel late sulcati, pauci- vel multinodes, e nodis ramosi, ramulis ultimis dense fasciculatis spicigeris, asperuli vel angulis asperulis exceptis laeves, glabri. *Foliorum vaginae*

inflatae, apice abrupte contractae, internodiis plerumque breviores, 0.4-2.5 cm. longae, tenuiter striatae, pilis debilibus brevibus e tuberculis minutis densis ortis pubescentes, vel glabrae et inter nervos minute tuberculatae; vaginae ultimae subspathiformes, laminis plus minusve redactis; ligulae ad seriem ciliorum brevissimorum redactae; laminae anguste lineares, in apicem subacutum durum attenuatae, 0.3-3.5 cm. longae, usque ad 2 mm. latae, planae vel siccitate convolutae vel involutae, patentis, rigidiusculae, ut vaginae pubescentes vel glabrae. *Spicae* plerumque 3-4-natae et 1-spiculatae, e vaginis exsertae vel basi inclusae • pedunculi 3-10 mm. longi, gracillimi, apicem versus minute scaberuli, stricti vel curvati, demum rigidi. *Spiculae* erectae vel divaricato-patentes vel reflexae, 4-8\*5 mm. longae, usque ad 3 mm. diametro, flavido-virides vel purpureo-suffusae. *Glumae* inferne pilis minutis exceptis glabrae; inferior 2 • 5 mm. longa; superior 2.5-3 mm. longa. *Rhachilla* flexuosa, internodiis 1-2 mm. longis. *Lemmata* 2-2-3-3 mm. longa, dorso leviter incurva, carina scaberrima, nervis viridibus; mucro vel arista stricta vel incurva, usque ad 0.3 mm. longa. *Paleae* 2 • 2-3 mm. longae, carinis scaberulae. *Antherae* 0.5-0.6 mm. longae. *Caryopsis* 1 mm. longa, brunneo-reticulata.

WESTERN AUSTRALIA. Gascoyne Eiver; Manberrie Station, drift sand on hills, 15 Aug. 1931, *Gardner* 3035 (typus; Herb. Kew. et Herb. Austral. Occid., Perth).

The general structure of the spikelets, their 3-nerved lemmas and the utricule type of grain, suggest a close relationship with *Eragrostis* Beauv. Among the Australian species of that genus, however, there are none with the facies of *Psammagrostis*. *Eragrostis Dielsii* Pilger var. *Pritzeli* Pilger possesses prostrate or geniculately ascending culms, terminated by spicate inflorescences of few to many spikelets, but the latter have a slender rhachilla and awnless closely imbricate lemmas. In *Psammagrostis* the florets are somewhat loose, with the clavate-tipped internodes of the flexuous rhachilla exposed between them.

The distribution of the seed in species of *Eragrostis* is effected in various ways: in some species there is an articulation at the tip of the pedicel and the spikelet falls entire at maturity (*E. superba* Peyr.); in others the rhachilla disarticulates between the florets, and the grain falls enclosed between the lemma and palea, together with the adjacent internode of the rhachilla (*E. japonica* Trin.); in a third type the lemma falls from the rhachilla at maturity, setting free the grain whilst the rhachilla and palea persist (*E. parviflora* Trin.), or the palea may at length fall (*E. pilosa* Beauv.); in a fourth type the lemma and palea are more or less persistent and the grain protrudes between them and finally becomes dislodged (*E. megalosperma* F. Muell.). *Psammagrostis* does not fit into any of these methods of seed-dispersal. The internodes of the rhachilla do not appear to disarticulate very readily, whilst the lemma and palea are persistent. The distribution of the grain seems to be effected by the peduncle of the usually 1-spiculate spikes

disarticulating at the base, probably in a similar manner to that of *Thaumastochloa* C. E. Hubbard (tab. 3313). The hardened peduncle then might conceivably act like the pointed basal callus in species of *Heteropogon*, *Stipa* and *Aristida*, but with a less penetrating effect.

Only a few grains of *Psammagrostis* have been available for examination, but in all of these the thin membranous pericarp readily separates from the seed after soaking for a short time in water. It possesses this character in common with *Apochiton* C. E. Hubbard and those genera cited in the text under tab. 3319 of this work.

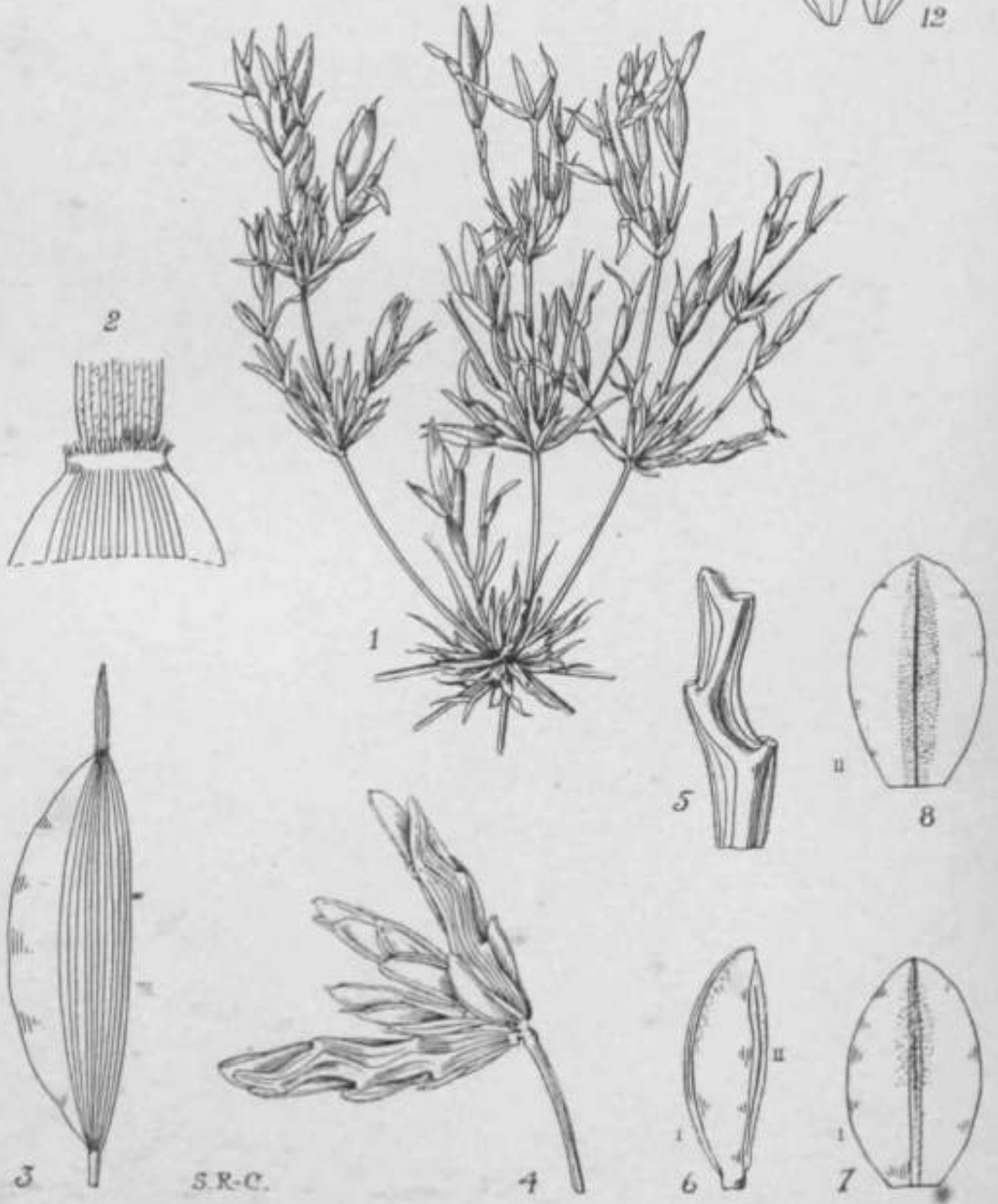
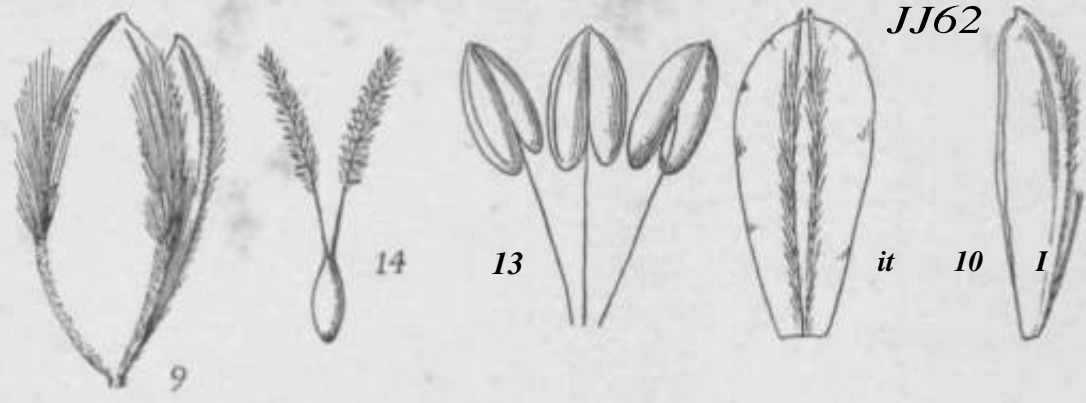
*Psammagrostis Wiseana* is apparently not of wide distribution, being restricted, as far as we know, to the red sand hills which occur in the sublittoral areas of the Austin District between the Gascoyne and Minilya Rivers in the Eremaean region. These sand hills, while supporting such characteristic Eremaean species as *Acacia aneura* F. Muell., *Eremophila leucophylla* F. Muell., and *Cassia desolata* F. Muell., together with *Eriachne* sp. and *Chloris acicularis* Lindl., contain also some elements more typical of the South West Province, such as species of *Diplopeltis*, *Pityrodia* and *Calothamnus*.

This species is named in honour of Frank J. S. Wise, Minister for Agriculture in Western Australia, who assisted one of us in collecting this and several other interesting species in North Western Australia.

C. A. GARDNER and C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, ligule, x 6; 3, spikelets, x 8; 4, lower glume, x 8; 5, upper glume, x 8; 6, internode of rhachilla, x 12; 7, lemma, x 8; 8 and 9, palea, x 8; 10, lodicules, x 12; 11, stamens, x 20; 12, gynoeceium, x 20; 13, caryopsis, x 16.

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S.R.C.



TABULA 3362.

BRACHYACHNE PROSTRATA C. A. Gardner et C. E. Hubbard.

GRAMINEAE. Tribus CHLORIDEAE.

*B. prostrata* C. A. Gardner et C. E. Hubbard; species nova, affinis *B. ciliari* (Benth.) C. E. Hubbard, a qua culmis prostratis e nodis multiramosis, foliis brevioribus, spicis multo brevioribus in vagina spathiformi inclusis vel demum lateraliter exsertis differt.

*Gramen* annuum, prostratum, tegetiforme. *Culmi* fasciculati, gracillimi, teretes, rigidi, plurinodes, internodiis elongatis nudis, e nodis radicantes et multiramosi, ramulis erectis vel adscendentibus dense fasciculatis, glabri, laeves, atro-purpurei. *Foliorum vaginae* latae, 5-14 mm. longae, imbricatae, tenuissime striatae, ore sparse barbatae, ceterum glabrae vel pilis paucis praeditae, laeves, virides vel purpureo-suffusae, marginibus latis tenuissimis hyalinis, summae inflatae, spathiformes, laminas nullas vel minutas tantum gerentes; ligulae ad seriem ciliorum brevissimorum redactae; laminae anguste lanceolatae vel lineari-lanceolatae, in apicem subacutum vel obtusum durum attenuatae, 1-10 mm. longae, usque ad 1-6 mm. latae, planae, rigidae, subtus glabrae et laeves, supra brevissime pubescentes, marginibus cartilagineis scaberulis. *Spicae* 3-4, digitatim dispositae, in vagina spathiformi inclusae vel demum lateraliter exsertae, 4-11 mm. longae, 1 • 3-1 • 8 mm. latae, a pedunculo demum disarticulantes; pedunculi gracillimi, usque ad 10 mm. longi, apice pubescentes; rhachis flexuosa, 0-8-1 mm. lata, glabra, dorso tenuiter striata, nervis et marginibus scaberula. *Spiculae* imbricatae, appressae, oblongo-ellipticae, obtusae, 3-3-3 mm. longae, pallidae vel purpureo-suffusae. *Glumae* prominenter 1-nerves, nervis viridibus; inferior a latere visa semi-elliptica, obtusa, acute carinata, carina scaberula, tenuiter membranacea; superior elliptico-oblonga vel elliptica (explanata), obtusa, dorso ecarinata indurata asperula, marginibus tenuiter membranaceis. *Lemma* carinatum, a latere visum ellipticum, obtusum, 2-2-2-5 mm. longum, membranaceum, nervis infra medium breviter pubescentibus et circa tedium pilis sericeis albis usque ad 1 mm. longis dense barbatis, carina prope apicem scaberula; callus brevissimus, minute pilosus. *Palm lemma* subaequans, dorso curvata, carinis (parte subapicali scaberula excepta) ciliatis. *Rhachilla* tenuissima, glabra, usque ad 1 mm. producta. *Antherae* 0-7--0-9 mm. longae.

WESTERN AUSTRALIA. Austin District: 1 mile north of Meekatharra, on granite elevated ("breakaway") country, associated with *Acacia Wadrimarginea*, *Styliidium yilgarnense* and *Eragrostis Dielsii* var. <sup>^</sup>*nt*<sup>z</sup>, 2 Aug. 1927, Gardner (typus; Herb. Kew. et Herb. Austral. -cid., Perth); Meekatharra, on hard red stony soil, with *Acacia*

*aneura* and *A. quadrimarginea*, 3 Aug. 1927, Gardner (Herb. Austral. Occid., Perth).

*Brachyachne prostrata* is a very distinct species, readily recognized by its prostrate habit, radiating stolons, very short sheaths, blades and spikes, and by its spathe-like uppermost sheaths.

The genus *Brachyachne* was first proposed by Stapf in his key to the genera of tropical African grasses published in Prain's Flora of Tropical Africa (ix. 20 : 1917). No generic description, other than that which appeared in the key, has so far been published, but in Hooker's Icones Plantarum (xxxii. t. 3099: 1922) Stapf described a new species, *B. fulva*, from the Belgian Congo, and also gave some account of his new genus. After referring to a note by Bentham (Journ. Linn. Soc, Bot. xix. 101 : 1881), in which that author indicated the anomalous position of certain Australian species in the genus *Cynodon*, Stapf pointed out that Bentham later separated these species as the basis of his new section *Brachyachne* of the genus *Cynodon* (Benth. et Hook, f. Gen. PL iii. 1164 : 1883). Stapf, however, considered that, as these Australian species of *Cynodon*, together with *Microchloa obtusiflora* Benth. and *Brachyachne fulva* Stapf, formed a uniform group similar in the structure and arrangement of their spikelets, it should be raised to generic rank. Thus *Brachyachne* Stapf is based on *Cynodon* sect. *Brachyachne* Benth. The Australian species, *B. convergens* (F. Muell.) Stapf, has been chosen as lectotype for the following reasons. Of the three species included by Bentham in *Cynodon* sect. *Brachyachne*, one, *Cynodon ciliaris*, does not agree with Stapf's description ("both glumes . . . keeled") and is therefore excluded. *Brachyachne convergens* is chosen in preference to *B. tenella*, because the new combination under *Brachyachne* was made for it by Stapf. Both species agree well with the characters given in the key.

*Brachyachne* may be distinguished from *Cynodon* Pers. by both glumes being longer than the delicate lemma and palea, whereas in *Cynodon* they are shorter, and the lemma is also of a firmer texture. *Microchloa* R. Br., to which genus three of the Australian species of *Brachyachne* were referred by Domin, differs from all species of *Brachyachne* by its solitary spikes, and, with the exception of *B. ciliaris* and *B. prostrata*, by its dorsally flattened upper glume. *Brachyachne* is represented in tropical Africa by about six species, each of which inhabits a rather limited area. They differ markedly from the Australian species by the brownish colour of their glumes and by their caespitose habit; the latter have pale green or purplish glumes and are stoloniferous annuals.

The Australian species of *Brachyachne* may be divided into two groups. The first, comprising *B. convergens* and *B. tenella*, occurs in the open grassland and savannah forest of northern Australia, an area of summer rainfall. In this group the lower and upper glumes are acutely keeled, the lemma pubescent or ciliate along the nerves, and the grain laterally compressed. The second group, containing *B. ciliaris*

and *B. prostrata*, occurs in the Eremaea, a region of low and irregular rainfall. It differs from the first group in the upper glume being more or less rounded on the indurated back, with a prominent wingless middle nerve, and in the lemma being bearded at or above the middle. The grain in *B. dliaris* is less compressed and almost pyriform, and in addition possesses a free pericarp which swells up in water and is then easily removed from the seed. A similar type of grain might be expected to occur in *B. prostrata*, but no grains are available for examination. The florets in *B. ciliaris* appear to be cleistogamous since, in all mature spikelets dissected, the very small anthers (0.3 mm. long) were found entangled amongst the stigmatic hairs at the apex of the grain.

KEY TO THE AUSTRALIAN SPECIES OF BRACHYACHNE.

- Spikes 1.5-8 cm. long, exerted from the uppermost leaf-sheath; leaf-blades up to 7 cm. long :
- Spikelets 1.8-2.2 mm. long ; upper glume laterally compressed and keeled. . . . . 1.2?. *tenella*.
- Spikelets 3-4.5 mm. long :
- Upper glume laterally compressed and keeled, with the keel winged; leaves usually glabrous except at the mouth of the sheath. . . . . 2. *B. convergens*.
- Upper glume more or less rounded on the back, with a prominent wingless middle nerve ; leaves loosely pilose with fine tubercle-based hairs. . . . . 3. *B. (dliaris)*.
- Spikes 0.4-1.1 cm. long, enclosed in or finally laterally exerted from the spathe-like uppermost leaf-sheath ; leaf-blades 0.1-1 cm. long ; plant prostrate. . . . . 4. *B. prostrata*.

ENUMERATION OF SPECIES.

I- *B. tenella* (R. Br.) C. E. Hubbard in Kew Bull. 1934, 448. *Cynodon tenellus* R. Br. Prodr. 187 (1810). *Cynodon altior* F. Muell. Fragm. Phyt. Austral, viii. 113 (1873). *Capriola tenella* O. Kuntze, Rev. Gen. Pl. ii. 764 (1891). *Microchloa tenella* Domin in Fedde, Repert. x. 119 (1911).

Queensland and Northern Australia.

~~HOO~~ <sup>2</sup>*B. convergens* (F. Muell) Stapf in Hook. Ic. Pl. xxxi. sub t. 3099  
~~n-y~~ <sup>2</sup>*Gynodon convergens* F. Muell. Fragm. Phyt. Austral, viii. 113  
~~M-3~~ <sup>2</sup>*Capriola convergens* O. Kuntze, Rev. Gen. Pl. ii. 764 (1891).  
~~M~~ <sup>2</sup>*Microchloa convergens* Domin in Fedde, Repert. x. 119 (1911).

Queensland, Northern and Western Australia.

3. *B. ciliaris* (Benth.) C. E. Hubbard in Kew Bull. 1934, 448. *Cynodon cilians* Benth. Fl. Austral, vii. 610 (1878). *Capriola ciliaris* O. Kuntze,

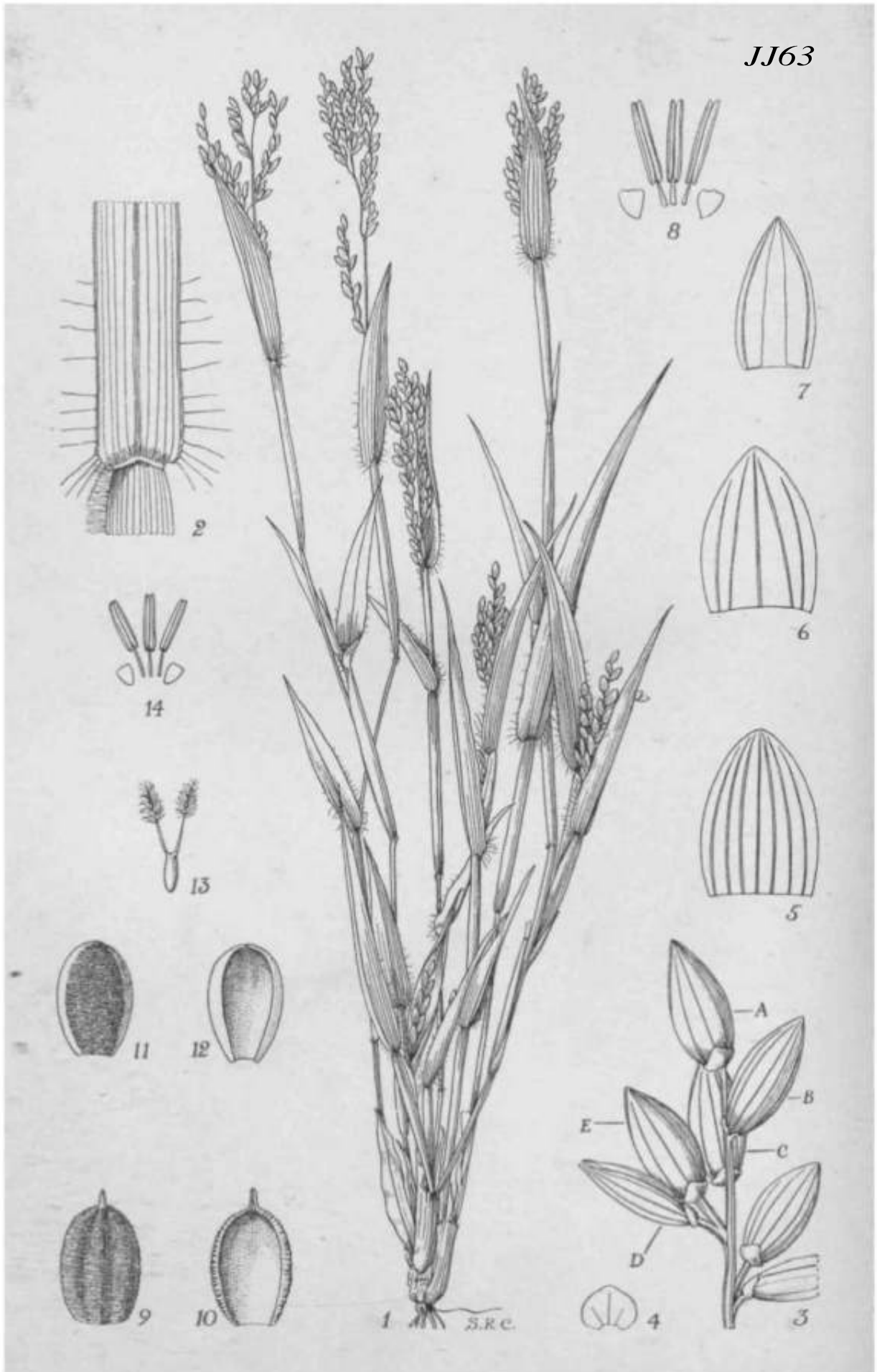
Eev. Gen. Pl. ii. 764 (1891). *Microchloa ciliaris* Domin in Biblioth. Bot. xx. Heft 85, 364 (1915).

Western Queensland, Central Australia, northern South Australia, western New South Wales.

4. *B. prostrata* C. A. Gardner et C. E. Hubbard, vide supra.  
Western Australia.

C. A. GARDNER and C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, ligule, x 6; 3, uppermost leaf-sheath and reduced blade, x 4; 4, inflorescence, x 4; 5, portion of rhachis, x 8; 6, spikelet, x 8; 7, lower glume, flattened, x 8; 8, upper glume, flattened, x 8; 9, floret, x 18; 10, palea and prolongation of rhachilla, x 18; 11, palea, flattened, x 18; 12, lodicules, x 22; 13, stamens, x 18; 14, gynoeceium, x 18.



TABULA 3363.

**BBACHIABIA OCCIDENTALIS** C. A. Gardner et C. E. Hubbard.

GRAMINEAE. Tribus PANICEAE.

*B. occidentalis* C. A. Gardner et C. E. Hubbard ; species nova, affinis *B. praetervisae* (Domin) C. E. Hubbard, laminis basin versus sparse et rigide ciliatis, spiculis ovatis acutis paullo minoribus, gluma inferiore brevior tenuissime 1-3-nervi, anthoecio supero brevior distinguenda.

*Gramen* annuum. *Culmi* laxe fasciculati, e basi prostrata geniculato-adscendentes, interdum e nodis radicanes, 10-30 cm. alti, graciles vel gracillimi, 3-6-nodes, e nodis plerumque ramosi, vel simplices, glabri, laeves. *Foliorum vaginae* internodiis demum multo breviores, solutae, pilis patentibus e tuberculis ortis sparse pilosae vel uno margine ciliolato excepto glabrae et laeves ; nodi villosi vel barbati ; ligulae brevissimae, truncatae, dense ciliolatae ; laminae lineari-lanceolatae vel lanceolatae vel anguste ovatae, apice acutae, basi abrupte contractae vel rotundatae, 1\*5-5-5 cm. longae, 4-9 mm. latae, planae, virides, minute pubescentes, demum glabrescentes, marginibus incrassatis scaberulis basin versus pilis rigidis e tuberculis ortis sparse ciliatis. *Inflorescentia* 2-5-6 cm. longa, plus minusve contracta ; axis primarius angulis scaberulus, nodis pubescens ; rami 3-5, erecti vel leviter patententes, usque ad 5 cm. longi, densiuscule spiculati, gracillimi, triquetri, angulis scaberulis ; pedicelli glabri vel prope apicem pilo rigido praediti, laterales usque ad 0\*5 mm. longi, terminates 1-2 mm. longi. *Spiculae* contiguae, binae vel racemorum apices versus solitariae, a dorso visae ovatae vel elliptico-ovatae, acutae, 3-3-8 mm. longae, pallide virides, glabrae, laeves. *Gluma inferior* latissima, obtusa, 0-4-0-8 mm. longa, tenuissime 1-3-nervis, tenuiter membranacea ; gluma superior spiculae aequilonga, late ovato- vel late elliptico-oblonga (explanata), obtusa, membranacea, 7-nervis. *Anthoecium inferum* £ vel sterile : lemma glumae superiori simile, sed 5-7-nerve ; palea lemmati aequilonga, elliptica vel elliptico-ovata, hyalino-membranacea, carinis angustissime alatis ; antherae 1-1-5 longae. *Anthoecium superum* ♂, a dorso visum late ellipticum vel elliptico-oblongum, obtusum, plano-convexum, 2-3-2-5 mm. longum : lemma mucronatum, mucrone usque ad 0-4 mm. longo, coriaceum, transverse rugosum ; palea transverse rugosa ; antherae 0\*7-1 mm. longae ; caryopsis late elliptico-oblonga, 1 • 5 mm. longa.

WESTERN AUSTRALIA. Minilya River ; Wandagee Station, in clay depressions, 29 Aug. 1932, Gardner 3227a (type ; Herb. Kew. et Herb. Austral. Occid., Perth) ; July 1937, Meadly 50, 61 ; Turee Station, Oct. 1933, MacGuire (Herb. Kew. et Herb. Austral. Occid., Perth).

The genus *Brachiaria* Griseb. is characterized by the more or less secund raceme-like branches of the inflorescence, and especially by the reversed (adaxial) position of the spikelets (fig. 3, B, C), the back of the fertile lemma being turned away from, and the lower glume facing, the axis on which the spikelet is borne. In inflorescences with undivided branches and solitary shortly pedicellate spikelets, such as occur in *Brachiaria distachya* (L.) Stapf, *B. piligera* (F. Muell.) Hughes, and many other species, the orientation of the spikelet is readily ascertained. On the other hand, in a group of species, including *Brachiaria praetervis* (Domin) C. E. Hubbard, *B. occidentalis* C. A. Gardner et C. E. Hubbard, *B. Windersii* C. E. Hubbard (vide infra), *B. reptans* (L.) C. A. Gardner et C. E. Hubbard (vide infra), *B. lata* (Schumacher) C. E. Hubbard,\* *B. paspaloides* (Presl) C. E. Hubbard,\* and *B. setigera* (Retz.) C. E. Hubbard,\* from the tropics of the Old World, and several species from the New World, in which the branches are divided and the spikelets for the greater part are borne in pairs on short lateral branchlets, the adaxial arrangement is obscured and difficult to determine. If, however, the tips of the branches are examined (see fig. 3), one or more solitary short-pedicellate *adaxial* spikelets (B, C) will usually be found beneath the terminal spikelet (A). In the case of the spikelets (D, E) on the lateral branchlets, the lower spikelet (D) is also *adaxial* on the axis below the terminal spikelet (E). Those authors who have referred these species to *Panicum* (sensu lato) or to *Urochloa* f Beauv. have considered only the orientation of the *terminal* spikelet of these lateral branchlets in relation to the mother axis (primary branch), but this is variable, whereas the orientation is constant in the lower spikelets. The lateral branchlets are usually reduced to two spikelets, but they may bear three or more, and then closely resemble the apical portion of the mother axis (primary branch). The orientation of the spikelets is occasionally obscured by the suppression or rudimentary development of the lower spikelet of a pair. When such a condition prevails, the terminal spikelet appears to be solitary and apparently *abaxial*, but it can be seen that it is a *terminal* and not a lateral spikelet by the unusually long " pedicel."

In addition to *Brachiaria occidentalis* three closely related species

\* *Brachiaria lata* {Schumacher} C. E. Hubbard, comb. nov.—*Panicum latum* Schumacher, Beskr. Guin. Pl. 61 (1827). *P. insculptum* Steud. Syn. Pl. Glum, i. 49 (1854). *Urochloa insculpta* Stapf in Prain, Fl. Trop. Afr. ix. 599 (1920). *U. lata* C. E. Hubbard in Kew Bull. 1934, 112.

*Brachiaria paspaloides* (Presl) C. E. Hubbard, comb. nov.—*Urochloa paspaloides* Presl, Rel. Haenk. i. 318 (1830). *Panicum ambiguum* Trin. in Mém. Acad. St. Petersb. Sér. 6, Sci. Nat. iii. 243 (1835).

*Brachiaria setigera* {Retz.} C. E. Hubbard, comb. nov.—*Panicum setigerum* Retz. Obs. Bot. iv. 15 (1786). *Urochloa setigera* Stapf in Prain, Fl. Trop. Afr. ix. 598 (1920).

t With the exception of cultivated species, *Urochloa panicoides* Beauv. is the only species of *Urochloa* at present known to occur in Australia. It is naturalized in the Darling Downs District of Queensland (Oakey, 1930, *Donges* 18; Drayton, on roadside, Feb. 1934, *Blake* 5165).

belonging to the same group are found in Australia. They may be distinguished by the characters given in the following key :—

Spikelets about 2 mm. long . . . . . 1. *B. reptans*.

Spikelets 3-4 mm. long :

Inflorescence contracted, 2\*5-7 cm. long, bearing 3-8 racemes; pedicels glabrous, or each with one stiff hair near the tip ; leaf-blades 1\*5-7\*5 cm. long :

Spikelets ovate or elliptic-ovate; lower glume one-fifth to one-fourth the length of the spikelet, finely 1-3-nerved; leaf-blades ciliate near the base with stiff tubercle-based hairs . . . . . 2. *B. occidentalis*.

Spikelets elliptic; lower glume one-fourth to one-third the length of the spikelet, 3-5-nerved; pedicels glabrous ; leaf-blades not ciliate as above . . . . . 3. *B. praetervisa*.

Inflorescence loose, mostly 7-18 cm. long and bearing 7-20 racemes ; pedicels usually with several stiff white hairs near the tip ; leaf-blades mostly 5-17 cm. long . . . . . 4. *B. Windersii*.

**1. *B. reptans***(L.) C. A. Gardner et C. E. Hubbard, comb. nov. *Panicum reptans* L. Syst. Nat. ed. 10, ii. 870 (1759). *P. prostratum* Lam. Illustr. i. 171 (1791) ; Benth. Fl. Austral, vii. 476. *Brachiararia prostrata* Griseb. in Abh. Gesellsch. Wiss. Gött. vii. 263 (1857). *Urochloa reptans* Stapf in Prain, Fl. Trop. Afr. ix. 601 (1920).

NORTHERN AUSTRALIA. Victoria Kiver, Oct. and Dec. 1855, *Mueller*.

QUEENSLAND. Burke District: Burketown, edge of lagoons, June 1935, *Blake* 9224. Riversleigh, on shady banks of the Gregory River, March 1935, *Blake* 8688. Moreton District: Brisbane, in yard of Agricultural Department, March 1891, *Bailey*.

. Widely spread in tropical Asia and America, also in Polynesia, Mascarene Islands and east tropical Africa.

**2. *B. occidentalis*** C. A. Gardner et C. E. Hubbard, vide supra.

WESTERN AUSTRALIA.

The material of each of the gatherings of this species (except for those of Meadly) was mixed with the following variety possessing hairy spikelets.

var. ***ciliata*** C. A. Gardner et C. E. Hubbard; varietas nova, spiculis 4 mm. longis, glumis et lemmate inferiore dorso dense vel sparse pubescentibus, lemmate inferiore margines versus pilis albis rigidiusculis circiter 1-1\*5 mm. longis e tuberculis minutis ortis ciliato distincta.

. WESTERN AUSTRALIA. Minilya River ; Wandagee Station, in clay depressions, 29 Aug. 1932, *Gardner* 3227b ; July 1937, *Meadly* 57, 66 ; Iuree Station, Oct. 1933, *MacGuire* (type; Herb. Kew. et Herb. Austral. Occid. Perth).



3. **B. praetervisa** (Domin) C. E. Hubbard in Kew Bull. 1934, 446. *Panicum praetervisum* Domin in Biblioth. Bot. xx. Heft 85, 309 (1915). *Panicum Kochii* Mez in Notizbl. Bot. Gart. Berlin, vii. 60 (1917). *Urochloa praetervisa* Hughes in Kew Bull. 1923, 319.

SOUTH AUSTRALIA. Vicinity of Lake Eyre, *Andrews* 156 (type). Cordillo Downs, in garden, April 1924, *Cleland* H. 215. Mt. Lyndhurst, March 1899, *Koch* 60. Koonamore, Siccus River, creek bank, March 1930, *PaUridge* 10.

NEW SOUTH WALES. Interior Districts (according to Maiden).

This species was identified with *Panicum adpersum* Trin. (a tropical American grass) by Bentham (Fl. Austral, vii. 481 : 1878) and by Maiden (Agric. Gaz. N.S. Wales, viii. 684, tab. : 1897, and Man. Grass. N.S. Wales, 43, tab. : 1898).

A specimen collected by S. T. Blake (no. 6434) on the timbered banks of Wills River, between Boulia and Selwyn in the Gregory North District of Queensland, resembles *B. praetervisa* in having relatively broader leaf-blades and slightly larger spikelets than *B. Windersii*, but the leaf-sheaths are hairy with tubercle-based hairs, the inflorescence more loosely spiculate and the pedicels usually beset with one or more stiff hairs.

4. **B. Windersii** C. E. Hubbard ; species nova, affinis *B. praetervisae* (Domin) C. E. Hubbard, culmis foliisque plerumque longioribus, inflorescentiis laxioribus et majoribus, ramis spiculatis plerumque 7-20, pedicellis pilis rigidis albis praeditis, spiculis paullo minoribus distincta.

*Gfremem* annum. *Culmi* laxe fasciculati, plerumque 20-60 cm. alti et usque ad 1 m. longi, suberecti vel e basi prostrata geniculato-adscendentes, e nodis inferioribus nonnunquam radicantes, graciles, laxe ramosi, 4-9-nodes, paniculam et nodos versus minute pubescentes vel glabri, laeves. *Foliorum vaginae* laxae, internodiis demum breviores, marginibus ciliatae, ceterum glabrae vel inter nervos minute pubescentes vel pilis e tuberculis ortis laxe pilosae ; nodi molliter villosi ; ligulae brevissimae, truncatae, dense ciliatae ; laminae lineari-lanceolatae vel anguste lanceolatae, tenuiter acutae, basi abrupte contractae vel rotundatae, plerumque 5-17 cm. longae et 6-18 mm. latae, planae, virides, minute pubescentes vel subtus glabrae, marginibus scaberulis. *Inflorescentia* laxa, plerumque 7-18 cm. longa et usque ad 10 cm. lata ; axis primarius angulatus, minute pubescens vel fere glaber, angulis scaberulis ; rami plerumque 7-20, demum patentes, laxispiculati, inferiores usque ad 8 cm. longi, omnes gracillimi, triquetri, minute pubescentes vel glabri, angulis scaberulis ; pedicelli plerumque pilis rigidis albis usque ad 3 mm. longis praediti, laterales breviores, usque ad 1 mm. longi. *Spiculae* binae vel racemorum apices versus solitariae, ellipticae, acutae, 3-3\*5 mm. longae, pallide virides vel purpureae,

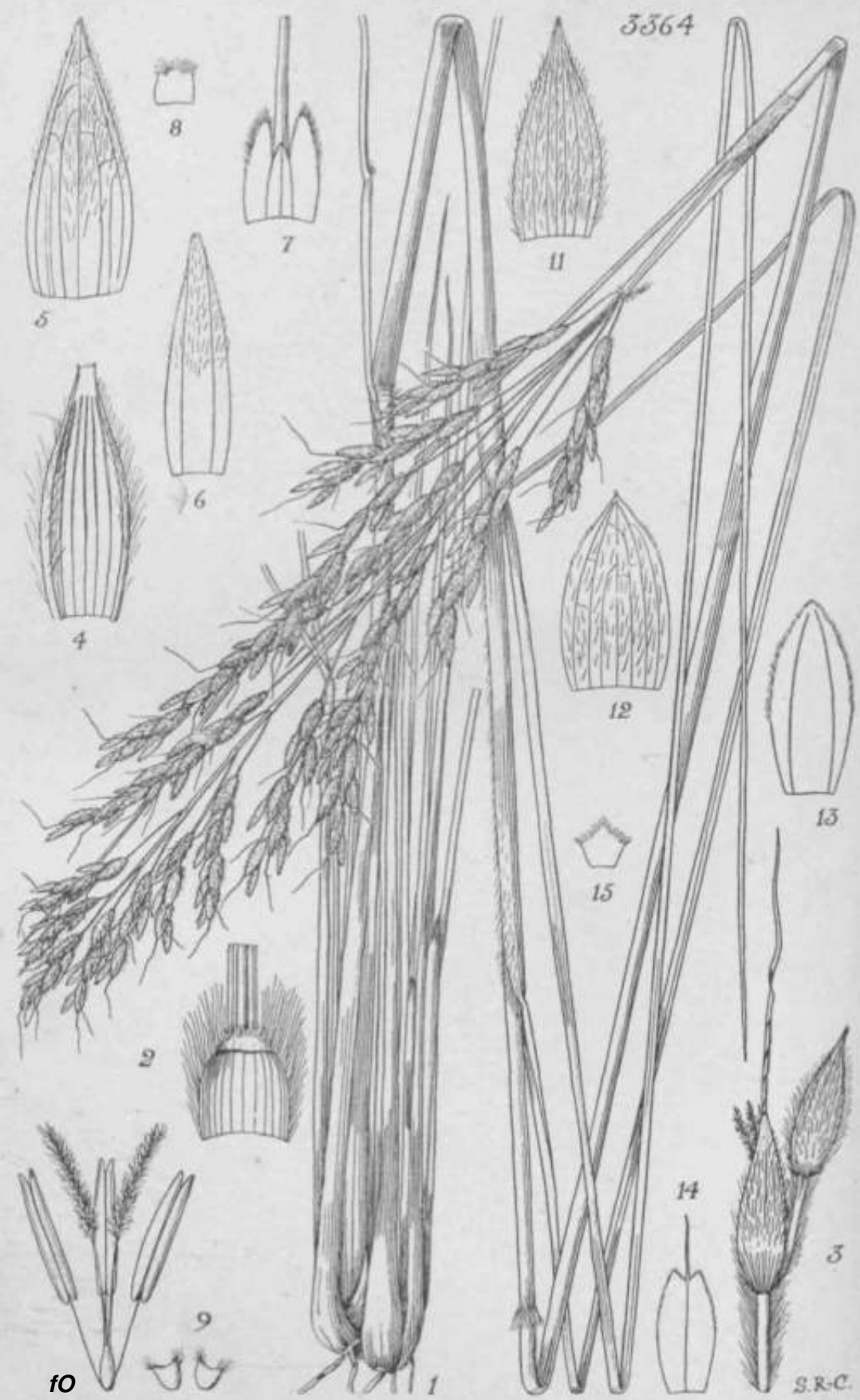
glabrae. *Gluma inferior* latissima, obtusa, circiter 1 mm. longa, tenuiter membranacea, 3-nervis; gluma superior late elliptica vel late ovato-elliptica (explanata), subacuta vel obtusa, spiculae aequilonga, membranacea, 7-nervis. *Anthoedum inferum* sterile: lemma glumae superiori simile, sed 5-nerve; palea elliptico-oblonga, obtusa, circiter 3 mm. longa, hyalino-membranacea, carinis anguste alatis. *Anthoedum superum* §, oblongo-ellipticum, 2 • 5-2 • 8 mm. longum; lemma apiculatum vel mucronulatum, mucrone usque ad 0-2 mm. longo, tenuiter transverse rugosum, coriaceum; palea transverse rugosum; antherae 0-8-1 mm. longae; caryopsis late oblongo-elliptica, 1-5-2 mm. longa.

QUEENSLAND. Cook District: Gilbert River, *Bick*; along headlands of cultivation paddocks, Feb. 1922, *White* 1465. Burke District: Camooweal, Morstone Downs Station, 1931, *Station Manager* 9; Mt. Isa, common on banks of Leichhardt River, in sandy reddish-brown soil, 375 m., Feb. 1931, *Winders in Herb. Hubbard* 7439 (type, Herb. Kew.); bed of Leichhardt River, at Mt. Isa, on sand, March 1935, *Blake* 8735; Richmond, dry stream bed, 210 m., June 1934, *Blake* 6282 (depauperate plants); Nonda, between Hughenden and Cloncurry, weed in drain on railway track, 150 m., Feb. 1931, *Hubbard & Winders* 7340; Mt. Emu Plains, 64 miles north of Hughenden, weed on site of old garden, Feb. 1931, *Hubbard & Winders* 7523; Wongalee, near Hughenden, March 1933, *McCarthy*; Hughenden, June 1919, *Hawthorn*; very common, Feb. 1933, *McCarthy*; bank of Flinders River, 330 m., June 1934, *Blake* 6196; Hughenden District, on Flinders River and Galah Creek, Feb. 1930, *Winchcombe, Carson Ltd.*; in bore drains and on farms, Dec. 1932, *McCarthy*; on the Rolling Downs, near the Flinders River and at the foot of Mt. Walker, near Hughenden, Feb. 1910, *Domin.* Mitchell District: Darr River, *Burgh Birch.* Leichhardt District: Minerva, north of Springsure, shady creek bank, 240 m., March 1935, *Blake* 7904. Warrego District: Yanna Siding, near Charleville, 1934, *Hutchinson.* Darling Downs District: cultivated at Inglewood, Jan. 1934, *White* 9738. Moreton District: cultivated at Lawnton, *White* 9892, 9912 (seed from Hughenden).

In depauperate plants growing under dry conditions (e.g. *Blake* 6282), although the culms, leaves and panicles are shorter than usual, the leaf-blades are relatively narrower and the inflorescences looser than those of *B. praetervis*.—C. A. GARDNER and C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, basal portion of leaf-blade, with ligule, x 2; 3, apical portion of raceme, x 6; 4, lower glume; 5, upper glume, flattened; 6, lemma of lower floret, flattened; 7, palea of lower floret; 8, male flower from lower floret; 9 and 10, lemma of upper floret; 11 and 12, palea of upper floret; 13, gynoeceum; 14, stamens and lodicules. Figs. 4r-14, x 8.

3364



fo

S.R.C.

## TABULA 3364.

### SORGHUM LEIOCLADUM (*Hack.*) *C. E. Hubbard.*

GRAMINEAE. Tribus ANDROPOGONEAE.

*S. leiocladum* (*Hack.*) *C. E. Hubbard*, status novus. *Andropogon australis* Spreng. subsp. *leiocladus* Hack, in DC. Monogr. Phan. vi. 524 (1889).—Affine *S. plumoso* (R. Br.) Beauv., a quo foliorum laminis plerumque angustioribus, spiculae sessilis callo obtuso brevioris usque ad 0\*5 mm. longo, arista multo brevioris 1-2\*5 cm. longa differt.

*Gramen* perenne, dense caespitosum, 0\*3-1 -5 m. (raro usque ad 3 m.) altum; innovationes intravaginales. *Culmi* erecti vel basi leviter geniculati, graciles vel plerumque validiusculi, simplices, 1-5-nodes, glabri, laeves, raro pilosi vel scaberuli. *Foliorum vaginae* striatae, eae innovationum angustae, basi villosae, ceterum glabrae vel plus minusve pilosae vel hispidae, eae culmorum internodiis breviores, apicem versus pilosae, ceterum plerumque glabrae, raro omnino pilosae; nodi dense barbati; ligulae truncatae, scariosae, usque ad 1-2 mm. longae; laminae angustissime lineares, tenuiter acutae, 10-70 cm. longae, 1-5-3-5 mm. (raro usque ad 7 mm.) latae, planae vel marginibus involutis vel revolutis, erectae vel recurvatae, rigidae, glabrae vel hispidulae, nonnunquam tuberculatae, marginibus et nervis scaberrimis, costa media albida usque ad 1-5 mm. lata. *Panicula* lanceolata vel lanceolato-oblonga, laxa vel plus minusve contracta, 5-35 cm. longa; axis laevis vel scaberulus; rami 2-6-nati vel solitarii, tenuiter filiformes, plerumque simplices, basi pubescentes, ceterum laeves et glabri, vel superne scaberuli vel apicem versus hispiduli; racemi 2-5-5 cm. longi, fragiles; rhacheos internodia 3-5 mm. longa, gracillima, pilis rufis vel fulvis dense ciliata; pedicelli internodiis similes sed 4-6 mm. longi. *Spiculae sessiles* lanceolatae vel lanceolato-oblongae, acutae, 6-8 mm. longae, pallidae vel purpurascens, infra medium demum brunneae; callus brevissimus, usque ad 0-5 mm. longus, obtusissimus, pilis rufis vel fulvis 1-3 mm. longis barbatus. *Gluniae* dorso pilis appressis fulvis vel rufis dense vel laxe hirsutae, vel glabrescentes et nitentes, coriaceae; inferior lanceolato- vel oblongo-elliptica (explanata), apice anguste truncata, marginibus angustis incurvis, 7-11-nervis, carinis apicem versus scabrigo-ciliata; superior elliptico-lanceolata vel elliptico-ovata (explanata), acuta vel obtusa, 8-10-nervis. *Antfoecium inferum*: lemma elliptico- vel oblongo-lanceolatum (explanatum), obtusum, 5-5-7 mm. longum, ciliolatum, dorso breviter pubescens vel glabrum, 2-nerve, tenuiter membranaceum. *Anthoecium superum*: lemma late oblongum, acute vel obtuse bilobum, 2-5-4 mm. longum, hyalinum, 3-nerve, supra medium ciliolatum; arista 10-20 (raro 25) mm. longa, columna 5-15 mm. longa fere laevi, seta scaberula; palea lata, truncata vel obtusa, 0-8-1-4 mm. longa, hyalina, enervis, ciliolata; lodiculae ciliolatae; antherae 3-5-4-5 mm. longae. *Spiculae pedicellatae*

lanceolatae vel lanceolato-oblongae, acutae, 5-8 mm. longae, purpurascentes vel pallide virides; callus breviter barbatus. *Glumae* firme membranaceae vel chartaceae, pilis pallidis laxe hirsutae; inferior elliptico-ovata vel elliptico-lanceolata (explanata), 6-8-nervis; superior elliptico-oblonga vel elliptico-lanceolata (explanata), 3-6-nervis. *Anthoecium inferum*: lemma obtusum, 5-6\*5 mm. longum, 2-nerve, ciliolatum. *Anthoecium superum*: lemma breviter bilobum vel integrum, 3-4 mm. longum, 1-2-nerve, ciliolatum; arista 0.5-2.5 mm. longa; palea circiter 1 mm. longa, ciliolata; antherae 3-4 mm. longae.

QUEENSLAND. Leichhardt District: Wandoan, bank of creek, 270 m., Nov. 1930, *Hubbard* 4983. Port Curtis District: Maryvale, between Byfield and Yeppoon, on hillside, Sept. 1931, *White* 8170; Biloela, Dec. 1933, *Strong* A 41; Rosedale, *Dovey* G 36 (Herb. Brisbane). Burnett District: Mundubbera, 1930, *Bhxsome* 46; Kingaroy, March 1931, *Pointon* 18; Tingoora, April 1934, *Long*. Wide Bay District: Biggenden, very common in *Eucalyptus* forest, Oct. 1930, *White* 7245; Booyal, April 1931, *Coleman* 8. Moreton District: near Buderim, damp places in *Eucalyptus* forest, Dec. 1937, *Blake* 13166; Toombul, near Brisbane, railway embankment, Feb. 1931, *Blake* 158; Brisbane River, *Mueller*; upper slopes of Mt. Gravatt, near Brisbane, stony places in open forest, Jan. 1934, *Blake* 5123; Kuraby, near Brisbane, in railway enclosure, Dec. 1933, *Blake* 5005; near Runcorn, south of Brisbane, in railway enclosure, *Eucalyptus* forest country, 45 m., Sept. 1930, *Hubbard* 4104; Cooyar, Nov. 1934, *Kehoe*; between Calvert and Lanefield, railway enclosure, April 1930, *Hubbard* 2118; near Laidley, railway enclosure, cleared *Eucalyptus* forest country, 120 m., July 1930, *Hubbard* 3186; Mt. Mistake, on rocky slopes in upper part of open *Eucalyptus* forest, 450-600 m., Nov. 1930, *Hubbard* 5245; Tamborine Mtn., open places in *Eucalyptus* forest, on red soil, common, 495-540 m., May 1930, *Hubbard* 2433; Jan. 1916, *White*; Macpherson Range, Feb. 1912, *White* (Herb. Brisbane); Mt. Roberts, in *Eucalyptus* forest, 660 m., Nov. 1937, *Blake* 13154; Darling Downs District: Bunya Mtns., Oct. 1919, *White* (Herb. Brisbane); Wyreema, 525 m., March 1931, *Hubbard* 5896; Wyberba, in *Eucalyptus* forest and cleared land, granitic soil, 750-900 m., Jan. 1933, *Blake* 4563; Stanthorpe, Feb. 1891, *Bailey*; Wallangarra, in partially cleared or uncleared open forest, granite country, 900 m., Jan. 1933, *Blake* 4418; Dalveen, March 1916, *Clarke*; east of Gurulmundi, 1930, *Belson*; Warrego District: Chesterton, in *Callitris* forest, on loose sand, 540 m., April 1936, *Blake* 11124 A.

. NEW SOUTH WALES. McIntyre River, *Ker*; New England, open forest land, *Moore* 52, 58; near Tenterfield, *Stuart*, Glen Elgin, Feb. 1930, *White-Haney*; Glen Innes, Nov. 1910, *Kenny*; Bald Blair, 9 miles from Guyra, basaltic soil, 1350 m., dominant and characteristic grass of New England grasslands, Nov. 1930, *McKie* 695; Armidale, *Perrott* (Herb. Leiden); Uralla, Nov. 1907, *Bateson* (Herb. Vienna); Walcha, Dec. 1912, *Boorman*; Hastings River, *Beckler*; Wellington

Valley, in forest country, Nov. 1825, *Cunningham* 110 ; hills of Bathurst, very common, Nov. 1822, *Cunningham* 241 ; Parramatta, *Woolls*; Port Jackson, *Gaudichaud*, *Brown* 6192 (Herb. Mus. Brit., partim); Cobbitty, neighbourhood of Sydney, in grassland, on shale, Oct. 1930, *Vickery* 106 ; Campbelltown, *Atkin* (Herb. Brisbane); Maneroo, *Mossman* 390 ; without precise locality, *Whittet*, *Verreaux* 578.

VICTORIA. Snowy River, *Mueller*.

This new species belongs to the section *Para-Sorghum* Snowden (Kew Bull. 1935, 222) which comprises about 8-10 annual and perennial species occurring in East Africa, India, China, the Malayan Region and Australia. The section is characterized by bearded sheath-nodes and simple panicle-branches, and in Australia is represented by *Sorghum plumosum* (R. Br.) Beauv., *S. leiocladum* C. E. Hubbard, *S. nitidum* (Vahl) Pers., and *S. stipoides* (Ewart et White) C. A. Gardner et C. E. Hubbard. *Sorghum leiocladum* has been included usually under *S. plumosum* Beauv., of which it has been regarded as a short-awned form. The following references, so far as the descriptions, specimens or illustrations are concerned, apply wholly or in part to *S. leiocladum* :—" *S. plumosum* Beauv." Benth. Fl. Austral, vii. 540 (1887), in part; Turner in Agric. Gaz. N.S. Wales, i. 311, fig. (1890) et Austral. Grasses, 49, fig. (1895), descr. in part; Maiden, Man. Grasses N.S. Wales, 91 (1898), in part; F. M. Bailey, Queensl. Fl. vi. 1869 (1902), in part; Maiden & Betche, Census N.S. Wales PL 15 (1916). *S. serratum* var. *majus* Domin in Biblioth. Bot. xx. Heft 85, 270 (1915), as to the specimen.

The following key to the species of *Sorghum* occurring in Australia was drawn up to assist in the study of their relationship to *S. leiocladum*, and is included here for the benefit of others who have experienced difficulties in determining specimens of this very important economic genus.

KEY TO THE SPECIES OF SORGHUM FOUND IN AUSTRALIA.

Pedicelled spikelets well-developed, usually male, narrowly lanceolate to lanceolate-oblong:

Ovary glabrous at the apex :

Sheath-nodes glabrous or finely pubescent; primary branches of the panicle divided, bearing terminal and lateral racemes; spikelets usually greenish; pedicels and rhachis with pallid hairs :

Perennials, with creeping rhizomes or basal buds; pedicelled spikelets finally deciduous :

Rootstock with long creeping rhizomes; sessile spikelets elliptic, oblong- or ovate-elliptic, obtuse or subacute, 4-5-5 mm. long; culms relatively slender . 1. *S. halepense*.

Rootstock with buds at the bases of the old culms; sessile spikelets elliptic-lanceolate or elliptic-ovate, acute, 5-7 mm. long ; culms relatively stout to very stout

2. *S. verticilliflorum*.

Annual; pedicelled spikelets persistent; sessile spikelets elliptic-oblong or elliptic, obtuse or subacute, 6 mm. long; culms rather slender. . . . . 3. *S. sudanense*.

Sheath-nodes bearded, or at least the upper bearded; primary branches of the panicle undivided, only bearing terminal racemes; spikelets usually becoming brown; pedicels and rhachis with brownish hairs:

Sessile spikelets 4-5-5 mm. long, lanceolate to oblong-ovate or oblong-elliptic, becoming dark brown and glossy; panicle-branches whorled, 4-24-nate; perennial . . . 4. *S. nitidum*.

Sessile spikelets 6-9 mm. long, lanceolate or lanceolate-oblong: Awns 1-2.5 cm. long; callus of the sessile spikelet obtuse, up to 0.5 mm. long; leaf-blades mostly 1.5-3.5 mm. wide; perennial . . . . . 5. *S. leiocladum*.

Awns 3-9 cm. long; callus of the sessile spikelets usually sharply acute, up to 6 mm. long; leaf-blades mostly 3-7 mm. wide:

Pedicelled spikelets 6-9 mm. long; awns 3-6 (rarely -9) cm. long; callus up to 3 mm. long; perennial

6. *S. plumosum*.

Pedicelled spikelets 10-12 mm. long; awns 6-9 mm. long; callus 3-5-6 mm. long; annual (?) . . . 7. *S. stipoides*.

Ovary densely hairy at the apex; sheath-nodes glabrous; racemes 1-2-jointed; annual, rooting from the lower nodes; callus 4-5 mm. long; awns 6-9.5 cm. long; pedicelled spikelets 10-13 mm. long

8. *S. intrans*.

Pedicelled spikelets narrowly linear, sterile, usually, reduced to the lower glume; panicle-branches divided. . . . . 9. *S. laxiflorum*.

#### ENUMERATION OF SPECIES.

1. *S. halepense* (L.) Pers. Syn. PL i. 101 (1805). *Holcus halepensis* L. Sp. PL ed. 1, 1047 (1753). *Andropogon arundinaceus* Scop. FL Cam. ed. 2, ii. 274 (1772). *Milium halepense* (L.) Cav. Descr. PL 306 (1802). *Blumenbachia halepensis* (L.) Koel. Descr. Gram. 29 (1802). *Andropogon halepensis* (L.) Brot. FL Lusit. i. 89 (1804). *A. Sorghum* (L.) Brot. subsp. *halepensis* (L.) Hack. var. *halepensis* (L.) Hack, subvar. *genuinus* Hack, in DC. Monogr. Phan. vi. 502 (1889). *A. halepensis* (L.) Brot. var. *genuinus* (Hack.) Stapf in Hook. f. FL Brit. Ind. vii. 183 (1896). *A. halepensis* (L.) Brot. *typicus* Asch. et Graebn. Syn. Mitteleur. Fl. ii. Abt. I. 47 (1898).

Mediterranean Region; now introduced into most warm temperate and subtropical countries; naturalized in Queensland, N.S.Wales, Victoria, S. Australia and W. Australia. A troublesome weed on arable land. "Johnson Grass."

The awnless form, f. *muticum* (Hack.) C. E. Hubbard (status now),

which occurs in Australia, has been given the following names :—  
*Andropogon Sorghum* (L.) Brot. subsp. *halepensis* (L.) Hack. var. *halepensis* (L.) Hack, subvar. *muticus* Hack, in DC. Monogr. Phan. vi. 502 (1889) ; *A. halepensis* (L.) Brot. *muticus* (Hack.) Aschers. et Graebn. Syn. Mitteleur. Fl. ii. Abt. I. 47 (1898) ; *A. halepensis* (L.) Brot. subsp. *anatherus* Piper in Proc. Biol. Soc. Wash, xxviii. 28 (1915).

2. **S. verticilliflorum** (Steud.) Stapf in Prain, Fl. Trop. Afr. ix. 116 (1917). *Andropogon verticilliflorus* Steud. Syn. PL Glum. i. 393 (1854). *A. Sorghum* (L.) Brot. subsp. *halepensis* (L.) Hack. var. *effusus* Hack, in DC. Monogr. Phan. vi. 503 (1889), in part. *A. halepensis* (L.) Brot. var. *effusus* (Hack.) Stapf in Hook. f. Fl. Brit. Ind. vii. 183 (1896) et in Dyer, Fl. Cap. vii. 346 (1898), in part. *A. Sorghum* (L.) Brot. subsp. *verticilliflorus* (Steud.) Piper in Proc. Biol. Soc. Wash, xxviii. 37 (1915). *Holcus Sorghum* L. subsp. *verticilliflorus* (Steud.) Hitchc. in Proc. Biol. Soc. Wash. xxix. 128 (1916).

Tropical East Africa, S. Africa, Mascarene Islands ; introduced into India, Australia, Polynesia and the West Indies; naturalized in Queensland.

3. **S. sudanense** (Piper) Stapf in Prain, Fl. Trop. Afr. ix. 112 (1917). *Andropogon Sorghum* Brot. subsp. *sudanensis* Piper in Proc. Biol. Soc. Wash, xxviii. 33 (1915). *Holcus Sorghum* L. subsp. *sudanensis* (Piper) Hitchc. I.e. xxix. 128 (1916). *Andropogon sudanensis* (Piper) Leppan & Bosnian, Field Crops S. Afr. 286 (1923). *Holcus sudanensis* (Piper) Bailey, Gentes Herb. i. 132 (1923). *Sorghum vulgare* Pers. *sudanense* (Piper) Hitchc. in Journ. Wash. Acad. Sci. xvii. 147 (1927).

North-east Tropical Africa ; introduced as a fodder grass into warm temperate and tropical regions throughout the world ; cultivated in Australia. " Sudan Grass."

4. **S. nitidum** (Vahl) Pers. Syn. Pl. i. 101 (1805). *Holcus nitidus* Vahl, Symb. Bot. ii. 102 (1791). *Anatherum nitidum* (Vahl) Spreng. Syst. Veg. i. 290 (1825). *Andropogon nitidus* (Vahl) Kunth, Rév. Gram. i. 166 (1829). *Sorghum tropicum* Nees var. *muticum* Nees in Hook. Kew Journ. Bot. ii. 99 (1850), nomen. *Andropogon consimilis* Steud. Syn. PL Glum. i. 394 (1854). *A. pedicellatus* Steud. I.e. *A. serratus* Thunb. var. *nitidus* (Vahl) Hack, in DC. Monogr. Phan. vi. 521 (1889). *Sorghum fwratum* (Thunb.) O. Kuntze var. *nitidum* (Vahl) Domin in Biblioth. Sot. xx. Heft 85, 270 (1915). *Holcus fulvus* R. Br. var. *nitidus* (Vahl) Honda in Tokyo Bot. Mag. xl. 101 (1926). *Andropogon amboinicus* (L.) Merrill var. *nitidus* (Vahl) Backer, Handb. Fl. Java, Afl. 2, 99 (1928).

China, Japan, India, Malayan Region, Queensland.

The awned form, f. *aristatum* C. E. Hubbard (forma nov.), also occurs in Queensland and has the following synonyms :—*Andropogon serratus* Thunb. Fl. Jap. 41 (1784). *A. laxis* Willd. Sp. PL iv. 907 (1806). *Holcus julvus* R. Br. Prodr. 199 (1810). *Sorghum fulvum* (R. Br.) Beauv. ex Roem. et Schult. Syst. Veg. ii. 840 (1817). *Andropogon tropicus* Spreng. Syst. Veg. i. 287 (1825). *A. fuscus* J. S. Presl in C. B. Presl, Reliq.



Haenk. i. 342 (1830). *Chrysopogon fuscus* (J. S. Presl) Trin. ex Steud. Nomencl. Bot. ed. 2, 360 (1840). *Sorghum tropicum* (Spreng.) Biise in Miq. PL Jungh. 359 (1854). *Andropogon dichroanthus* Steud. in Zoll. Syst. Verz. ii. 58 (1854). *Sorghum fuscum* (J. S. Presl) Miq. Fl. Ind. Bat. iii. 503 (1857). *S. Junghuhnii* Miq. I.e. 753 (1859). *Andropogon serratus* Thunb. var. *genuinus* Hack, in DC. Monogr. Phan. vi. 521 (1889). *Sorghum serratum* (Thunb.) O. Kuntze, Rev. Gen. Pl. 791 (1891), non Roem. et Schult. (1817). *S. serratum* (Thunb.) O. Kuntze var. *genuinum* (Hack.) Domin in Biblioth. Bot. xx. Heft 85, 270 (1915). *Holcus fulvus* R. Br. var. *genuinus* (Hack.) Honda in Tokyo Bot. Mag. xl. 101 (1926). *Andropogon amboinicus* (L.) Merrill var. *genuinus* (Hack.) Backer, Handb. Fl. Java, Af. 2, 99 (1928).

5., **S. leiocladum** (Hack.) C. E. Hubbard, vide supra.

6. **S. plumosum** (R. Br.) Beauv. Agrost. 132, 165, 178 (1812). *Holcus plumosus* R. Br. Prodr. 200 (1810). *Andropogon australis* Spreng. Syst. Veg. i. 287 (1825). *A. australis* Spreng. subsp. *plumosus* (R. Br.) Hack, var. *genuinus* Hack, in DC. Monogr. Phan. vi. 523 (1889). *Sorghum plumosum* (R. Br.) Beauv. var. *typicum* Domin in Journ. Linn. Soc., Bot., xli. 275 (1912). *S. plumosum* vars. *robustissimum* Domin et *piligerum* Domin in Biblioth. Bot. xx. Heft 85, 271 (1915). *Andropogon plumosus* (R. Br.) Backer, Handb. Fl. Java, Afl. 2, 100 (1928).

North Western Australia, Northern Australia, North Queensland.

7. **S. stipoideum** (Ewart et White) C. A. Gardner et C. E. Hubbard, comb. nov. *Sarga stipoidea* Ewart et White in Proc. Roy. Soc. Viet, n.s. xxiii. 297 (1911). *Andropogon Sargus* Ewart, I.e. xxv. 113 (1912). *Chrysopogon stipoideus* (Ewart et White) Domin in Biblioth. Bot. xx. Heft 85, 271 (1915), non Trin. (1836). *Sorghum Mjöbergii* Cheel in Kungl. Svensk. Vet.-Akad. Handl. n.s. lii. no. 10,3 (1916) ? *Andropogon stipoideus* (Ewart et White) C. A. Gardner, Enum. PL Austral. Occid. 5 (1930), non H.B.K. (1816).

North Western Australia.

8. **S. intrans** F. Muell. ex Benth. FL Austral, vii. 541 (1878). *Andropogon intrans* (F. Muell.) F. Muell. Census Austral. PL 132 (1882).

Northern Australia.

9. **S. laxiflorum** F. M. Bailey in Rep. Exped. Bellenden-Ker, 70 (1889). *Andropogon Baileyi* F. Muell. in Viet. Natural, viii. 16 (1891).

North Queensland, Philippine Islands, New Guinea.

C. E. HUBBARD.

FIG. 1, plant, *natural size* ; 2, portion of blade and sheath, to show ligule, x 3 ; 3, pair of spikelets, x 4 ; 4-10, details of sessile spikelet:—i, lower glume ; 5, upper glume, flattened ; 6, lemma of lower floret ; 7, lemma of upper floret ; 8, palea ; 9, lodicules ; 10, stamens and gynoecium ; 11-15, details of pedicelled spikelet:—11, lower glume, flattened ; 12, upper glume, flattened ; 13, lemma of lower floret ; 14, lemma of upper floret ; 15, palea. Figs. 4<sup>^</sup>15, x 6.



**CHRYSOPOGON SYLVATICUS** *C. E. Hubbard.*

GRAMINEAE. Tribus ANDROPOGONEAE.

**C. sylvaticus** *C. E. Hubbard*; species nova, a *C. pallido* (R. Br.) Trin. ex Steud. culmis gracilioribus, vaginis basalibus persistentibus, panicula laxiore, racemis plerumque biarticulatis (e spiculis sessilibus 2 et pedicellatis 3 compositis) raro uni- vel triarticulatis, spiculis et aristis brevioribus, spiculis pedicellatis muticis distinguenda.

*Gramen* perenne, dense caespitosum, 0\*3-1\*2 m. altum. *Culmi* erecti vel leviter geniculati, graciles vel validiusculi, basin versus plus minusve compressi, superne teretes, 3-5-nodes, ramosi vel raro simplices, glabri, laeves. *Foliorum vaginae* glabrae, carinatae, laeves vel carinae apicem versus scabridae, basales imbricatae et compressae, superiores internodiis breviores; ligulae brevissimae, truncatae, minute ciliolatae; laminae anguste lineares, subacutae, usque ad 30 cm. longae, 2-5-6 mm. latae, conduplicatae vel raro explanatae, erectae, glabrae vel supra sparse pubescentes, marginibus spinuloso-ciliatis vel basin versus pilis albis ciliatis. *Panicula* ovata, laxa, 8-18 cm. longa, usque ad 13 cm. lata; rhachis gracillima, scaberula; rami plerumque verticillati, capillares, demum patentes, simplices, flexuosi, usque ad 8 cm. longi, scaberuli vel hispiduli, apice incrassati oblique truncati hispiduli. *Racemi* 1-3\*5 cm. longi, spicularum sessilium 1-3 et pedicellatarum 2-4 compositi. *Spiculae sessiles* \$, anguste lanceolatae vel lanceolato-oblongae, 6-7-5 mm. longae, purpureae vel luteo-virides; callus acutus, 1\*3-2 mm. longus, pilis fulvis 2\* 5-3\* 5 mm. longis barbatus; gluma inferior dorso plus minusve convexa, apice anguste truncata vel raro naucronulata, 7-nervis, cartilaginea, infra medium marginibus asperulis exceptis laevis, supra medium scabrida et prope margines muricata; gluma superior lanceolato-oblonga (explanata), anguste truncata vel obtusa, dorso convexa, apice et marginibus hyalina, ceterum cartilaginea, ciliolata, 3-nervis, supra medium scabrida et carina hispidula, seta scaberula 3-5 mm. longa terminata: anthoecium inferum sterile; lemma oblanceolato-oblongum vel oblongum, obtusum, circiter 5 mm. longum, 2-nerve, pilis reflexis ciliolatum, hyalinum; palea nulla; anthoecium superum <J; lemma anguste oblongum, brevissime 2-lobum, circiter 5 mm. longum, 3-nerve, hyalinum, prope apicem sparse ciliolatum; arista geniculata, 1 • 7-2 • 5 cm. longa, columna dense scaberula 7-10 mm. longa; palea oblonga, truncata, 2-8-4 mm. longa, hyalina, 2-nervis; antherae 3 mm. longae; caryopsis oblonga, 3-5-4 mm. longa. *Spiculae pedicellatae* steriles vel masculae, lineares vel lanceolatae, acutae, 3-7-3 mm. longae; pedicelli lineares, applanati, vel leviter plano-convexi, 5 • 5-7 mm. longi, laeves, glabri vel apice minute hispiduli; gluma inferior anguste lanceolata, tenuiter acuta, membranacea, 0-7-nervis, supra medium asperula vel scaberula; gluma superior

ovata vel lanceolata, apice acute bidentata, 1.5—6\*5 mm. longa, membranacea, 3-5-nervis ; lemma anthoecii inferi oblongum, obtusum, usque ad 5 • 5 mm. longum, hyalinum, 2-nerve, ciliolatum, vel nullum ; lemma anthoecii superi oblongum, obtusum, usque ad 4-5 mm. longum, vel nullum ; palea oblonga, truncata, usque ad 3 mm. longa, vel nulla ; antherae 3\*5 mm. longae.

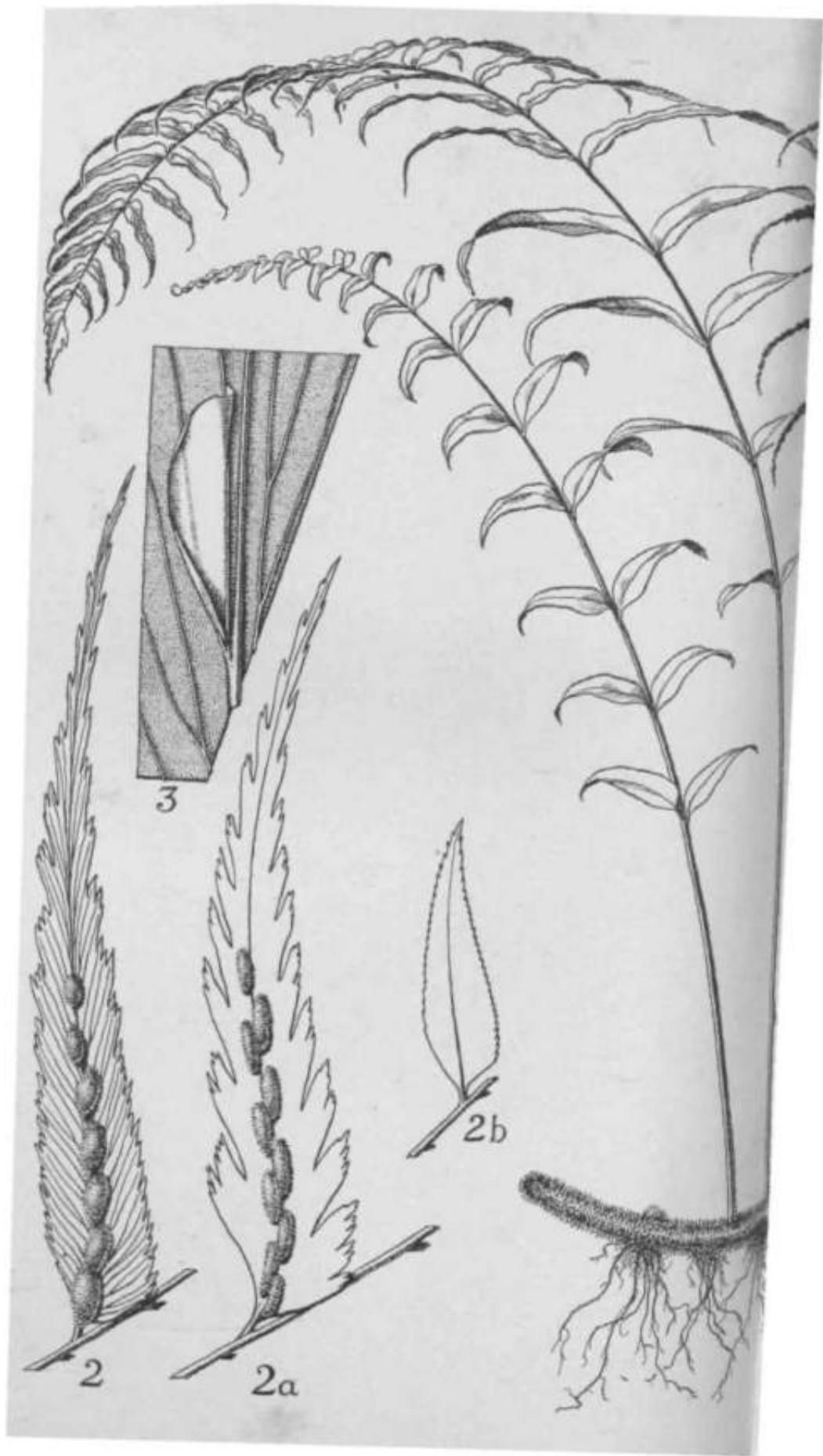
QUEENSLAND. Port Curtis District: near Rockhampton, mid and upper slopes of Mt. Berserker, in open forest, on dark grey sandy loam, March 1937, *Blake* 12728. Wide Bay District: Booyal, April 1931, *Coleman* 32. Burnett District: Nanango, April 1917, *Grove*. Moreton District: Buderim Mtn., April 1916, *White*; Upper Brisbane River, Pine Mtn., July 1916, *White* ; near Sidling Creek, Petrie, in open forest, Feb. 1931, *Blake* 148 ; near Samson Vale, in grass paddock, Feb. 1931, *Blake* 195 ; Enoggera Range, May 1916, *White*; Enoggera, March 1916, *White* & *Bick*; Brisbane, *Bailey*; Brisbane River, *Bailey*; Aspley, Brisbane, open forest, Jan. 1934, *Blake* 5100 ; Taylor Range, Mt. Coot-tha, near Brisbane, in *Eucalyptus* forest, 210 m., April 1930, *Hubbard* 2006 ; Mt. Petrie, near Brisbane, in stony soil, April 1930, *Hubbard* 2156 ; Coopers Plains, near Brisbane, in turf on roadside, April 1930, *Hubbard* 2343 ; Moggill, common in cleared *Eucalyptus* forest, April 1931, *White* 7599 ; near Moggill, on sandstone hills, in open *Eucalyptus* forest, April 1931, *Hubbard* 8587 (type); Goodna, forest country, June 1916, *White* ; Goodna, in open *Eucalyptus* forest, reddish-brown sandy soil, June 1930, *Hubbard* 2920 ; between Grandchester and Laidley, slopes of Little Liverpool Range, in *Eucalyptus* and *Acacia* forest, sandy soil, July 1930, *Hubbard* 3231 ; Mt. Edwards, near foot of mountain in *Eucalyptus* forest, April 1934, *Everist* 575.

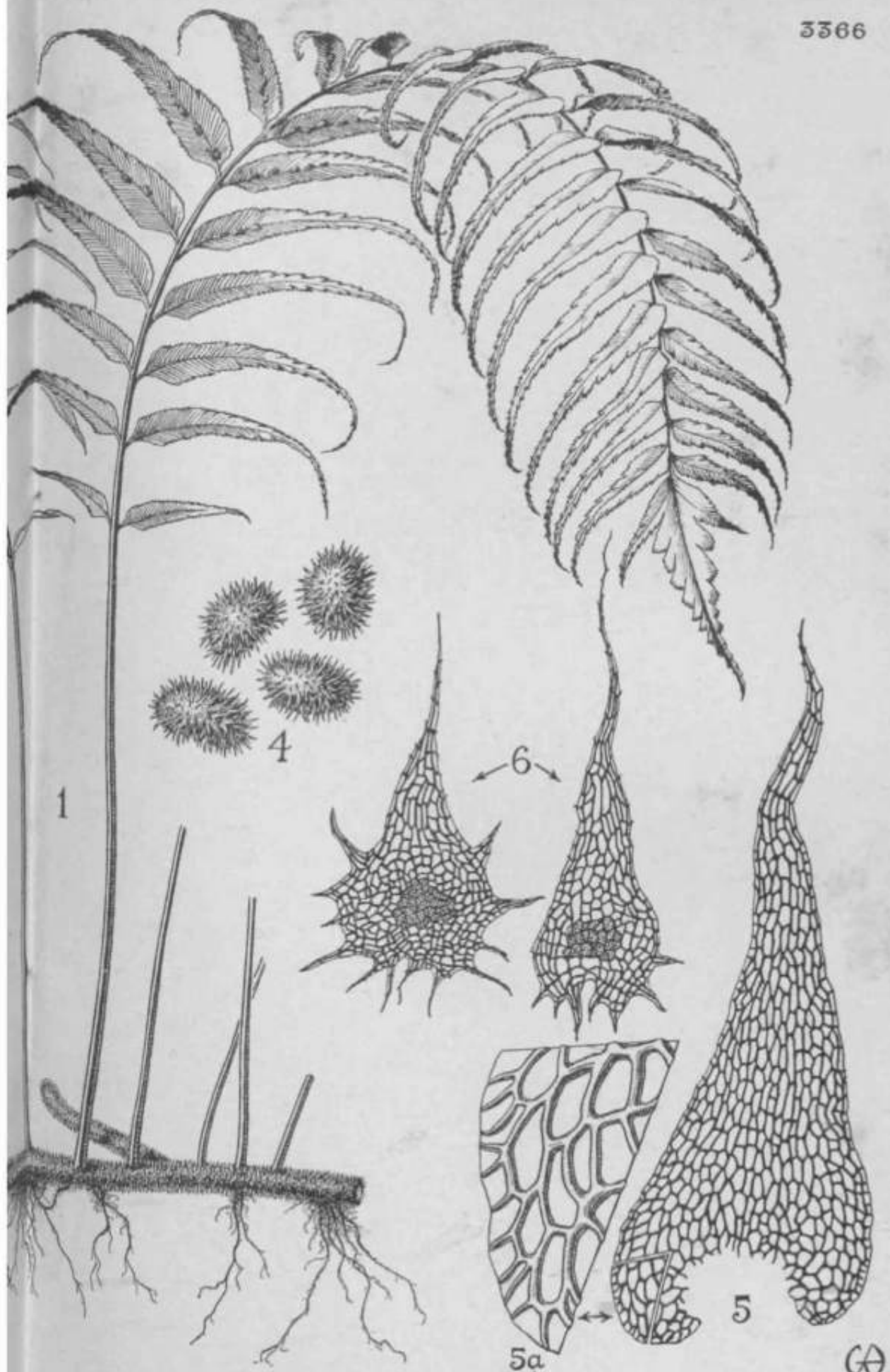
*Chrysopogon sylvaticus* is at present only known from the coastal districts of south-eastern Queensland. It occurs here and there on sandy or gravelly soils in open *Eucalyptus* forest, where it is associated with numerous tufted grasses, including *Cymbopogon refractus* (R. Br.) A. Camus, *Bothriochloa decipiens* (Hack.) C. E. Hubbard, *Panicum effusum* R. Br., and various species of *Entolasia*, *Digitaria*, *Aristida* and *Eragrostis*.

In the *Flora Australiensis* (vii. 536-539) Bentham included three species and four varieties under *Chrysopogon* Trin. Of these, *C. parviflorus* (R. Br.) Benth. and its var. *spidgera* Benth. are referred now to *Capillipedium* Stapf, whilst *Chrysopogon aciculatus* var. *elator* Benth., *C. ehngatus* (R. Br.) Benth. and its var. *filipes* Benth. are placed in *Vetiveria* Bory, leaving only *Chrysopogon Gryllus* (L.) Trin. and var. *pallidus* (R. Br.) Benth. in *Chrysopogon*. The specimens which Bentham named *C. Gryllus* represent, however, an undescribed species, whilst *C. Gryllus* var. *pallidus* (R. Br.) Benth. is also quite distinct. *C. Gryllus* (L.) Trin. is widely distributed in Southern Europe and Western Asia and differs from the Australian material, referred to above, in its sparsely pilose leaf-blades, looser ovate panicles, slightly narrower

fertile spikelets, less rough lower glume and in the finely pubescent column to the awn. There are probably six or more species of *Chrysopogon* in Australia, of which the following have been described:— 1, *C. pallidus* (R. Br.) Trin. ex Steud. Nomencl. Bot. ed. 2, i. 360 : 1840 (*Hohus pallidus* R. Br., *C. Gryllus* var. *pallidus* Benth.), Northern Australia, N. Queensland ; 2, *C. setifolius* Stapf in Kew Bull. 1917, 29, Northern Australia; 3, *C. aciculatus* (Retz.) Trin. Fund. Agrost. 188 (1820), Eastern Queensland, tropical Asia, etc.; 4, *C. sylvaticus* C. E. Hubbard, S.E. Queensland.—C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, triad of spikelets, x 4; 3, callus from base of sessile spikelet; 4, scar on callus; 5-15, details of sessile spikelet:—5, lower glume from outside; 6, lower glume from inside; 7, upper glume, flattened; 8, upper glume, side view; 9, lemma of lower floret; 10, lemma of upper floret; 11, palea of upper floret; 12, lodicules; 13, stamens % 14, gynoeecium ; 15, caryopsis; 16-18, details of pedicelled spikelet:—16, pedicelled spikelet and pedicel; 17, lower glume; 18, upper glume. Figs. 3-18, x 6.





## TABULA 3366.

### ASPLENITTM FRIESIOBUM *C. Chr.*

#### POLYPODIACEAE.

*A. Friesiorum* *C. Christensen* in Notizbl. Bot. Gart. Berl. ix. 181 (1924). *A. serra* L. & F. var. *natalensis* Bak., Syn. Fil. ed. 2, 485 (1883); Sim, Ferns of S. Africa 144, t. 72 (1892). *A. pseudoserra* Domin in Preslia viii. 6 (1929). *A. monilisorum* Domin in Preslia viii. 7 (1929). Ab *A. caudato* et *A. serra* soris pseudo-costalibus, paleis ovato-lanceolatis iridescentibus distinguenda.

*Filix repens. Rhizoma* longe repens, epigaeum, validum, fere usque ad 1 cm. diametro; paleae densae, persistentes, brunneae vel purpureo-brunneae, nitentes, iridescentes, lanceolato-ovatae vel lanceolatae, acuminatae, integrae. *Fronde* usque ad 2 m. longae; stipites usque ad 60 cm. longi, 2 cm. vel ultra inter se distantes, rigidi, obscure brunnei, basi dense superne sparse squamosi. *Laminae* lanceolatae, 1-pinnatae, usque 25-jugatae (vel ultra), usque ad 75 cm. longae et 30 cm. latae, atrovirides, herbaceo-membranaceae; rhachis stipiti similis, sparse squamosa. *Pinnae* petiolis 2-4 mm. longis praeditae, usque ad 15 cm. longae et 2 cm. latae, basi plus minusve inaequaliter cuneatae, lanceolatae, caudato-acuminatae, marginibus plus minusve profunde et oblique laciniatis vel nonnunquam pinnatifidis, lobis inaequaliter dentatis (vel frondium juvenilium pinnae haud longe caudatae, marginibus dentatis raro lobatis), supra glabrae et laeves, subtus squamis deciduis parvis pallidis iridescentibus ovatis usque lanceolatis irregulariter laceratis plerumque substellatis praeditae; nervi obliqui, 2-3-furcati, ramulis costae proximis ei subparallelis. *Sori* usque ad 8 mm. longi, in series parallelas duas dispositi, costae arete appressi; indusium hyalinum, integrum. *Sporae* echinatae.

CAMEROONS. Cameroons Mountain, 2100 m., *Mann* 1402; upper slopes, *H. H. Johnston* 108; Tongo, 2280 m., in forest, *T. D. Maitland* 1055; without locality, *Preuss* 812 (Herb. Mus. Brit.).

ANGLO-EGYPTIAN SUDAN. Mongalla Province, Imatong Mountains, Lomuleng, 2400 m., frequent in forest, Dec. 1935, *A. S. Thomas* 1792.

UGANDA. Toro District, Ruwenzori, Namwamba Valley, forest near Kyanyoki, 2550 m., Jan. 1935, *G. Taylor* 3135 (Herb. Mus. Brit.); Bwamba, 765 m., Oct. 1925, *R. Fyffe* 25; Bwamba Pass, 2340 m., Nov. 1935, *A. S. Thomas* 1444; Masaka District, Lake Nabugabo, 1140 m., Aug. 1935, *P. Chandler* 1407; July 1937, *P. Chandler* 1767; Buddu, 1350 m., *M. T. Dawe* 31; Sesse Islands, 1172 m., *M. T. Dawe* 57; Bukasa Island, 1200 m., Aug. 1935, *A. S. Thomas* 1358. Kigezi District, bamboo forest on hills overlooking Birunga mountain range,



2400 m., March 1934, *C. Longfield* 67 (Herb. Mus. Brit.); Virunga Mountains, Luzezi Camp, in dense bamboo forest, 2400 m., Nov. 1934, *G. Taylor* 1991 (Herb. Mus. Brit.); Virunga Mountains, below Kanaba Gap, by stream, 2250 m., Nov. 1934, *G. Taylor* 1841 (Herb. Mus. Brit.).

KENYA COLONY. E. Kinobep, Karuris, Feb. 1905, *Imp. For. Inst.* s.n.; Tusu forest, 2550 m., in dense shade on river bank, Jan. 1934, *E. R. Napier* 5853; Kerita District, S.E. Aberdare Forest, 2100 m., *H. M. Gardner* 971; Aberdare Mountains, *Evan James* s.n.; Mt. Kenya, Forest Station, 2300 m., Dec. 1921, *R. E. & T. C. E. Fries* 573 (type collection); dense forest, 2010 m., July 1927, *A. Insole* 144, 173 (Herb. Mus. Brit.).

TANGANYIKA TERRITORY. Bukoba District, Bushasha, in woodland, sandy loam, *H. Gillman* 307; Buyango, in swamp forest, Sept. 1935, *H. Gillman* 451; near Kitive, shade loving, 1200 m., Oct. 1931, *A. E. Haarer* 2198; Kilimanjaro, *R. G. Turrall* 30; 1900 m., Jan. 1934, *Schlieben* 4587 (Herb. Mus. Brit.); Maranga, 2000 m., Oct. 1893, *G. Volkens* 1272; mainland W. of Zanzibar, *J. T. Last* s.n. (type of *A. pseudoserra* Dom.); Kondo District, Great Irangi scarp, Mt. Kinyassi, 2100 m., Feb. 1928, *B. D. Burtt* 1835; Morogoro District, Uluguru Mountains, 1470 m., Oct. 1932, *Schlieben* 2806 (Herb. Mus. Brit.); Uluguru Mountains, Morningside, 1500 m., Nov. 1934, *E. M. Bruce* 13 (Herb. Mus. Brit.); Rungwe District, Rungwe, Aug. 1911, *A. Stolz* 870; without locality, *Busse* 169 (Herb. Mus. Brit.).

NYASALAND. Marimba District, Nchisi Mountain, 2000 m., in rain-forest near stream, Sept. 1929, *Burtt Davy* 1288.

PORTUGUESE E. AFRICA. Makua, Namuli, *J. T. Last* s.n.

RHODESIA. Gazaland, Chimanimani Mountains, 2100 m., Sept. 1906, *C. F. M. Swynnerton* 851; near Umtali (fide Sim in litt.).

NATAL. *McKen & Buchanan* 24 (type of *A. monilisorum* Dom.); *Buchanan* 84; Great Noodsberg, Little Noodsberg and Inanda (fide Sim in litt.).

var. *nesophilum* *Bollard*; varietas nova, a typo statura minore, rhachi pinnisque squamis fere omnino carentibus, soris haud pseudo-costalibus distinguenda.

MADAGASCAR. Antananarivo, *W. Pool* s.n.; N. Madagascar, *R. Baron* 6125; *W. G. Webb* 50; Central Plateau, *Hodgkin & Stansfield* s.n.; *H. Baker* s.n.; *Baron* 5637 (type); Ambohimombo, Dec. 1894, *Forsyth Major* 161.

*Asplenium Friesiorum* C. Chr., which is widely spread in Africa, has been variously confused with *A. serra* L. & F., *A. contiguum* Kaulf. and *A. caudatum* Forst. From all these, however, it is readily distinguished by its iridescent ovate-lanceolate rhizome scales and particularly by the somewhat short tumid sori which are closely

appressed to the prominent mid-nerve of the pinnae. Although appearing to arise from this middle nerve the sori actually originate on the acroscopic fork of a lateral nerve which runs for a short distance almost parallel to the midrib. In addition, the margins of the pinnae of *A. Friesiorum* are usually more lacinate than in the above-mentioned species. The margin, however, varies according to the age of the frond. Juvenile pinnae have almost entire margins and the degree of cutting or lobing of a particular pinna is therefore in most cases an indication of its age.

The particular specimens from which the present plate has been prepared have been grown at Kew for several years. Originally collected near Mt. Ruwenzori by Mr. G. N. Humphreys, the plants thrive and multiply in an open bed in a cool fernery. A plant of high altitudes, the species dislikes the conditions of a warm house and when grown in the restricted space of a pan, growth is retarded, the fronds retain their juvenile shape and the plants never attain their full size. It seems possible therefore that in the natural state unfavourable edaphic conditions may cause the retention of the juvenile stage even in adult fronds.

*A. pseudoserra* Dom. and *A. monilisorum* Dom. are both undoubtedly conspecific with *A. Friesiorum*, though from opposite ends of the scale of variation. The type of *A. pseudoserra* consists of fronds of the juvenile condition, although bearing good sori, while in *A. monilisorum* the pinnae are coarsely cut half-way to the midrib. There is also a distinct difference in size between the two forms, *A. monilisorum* being larger and more robust than *A. pseudoserra*.

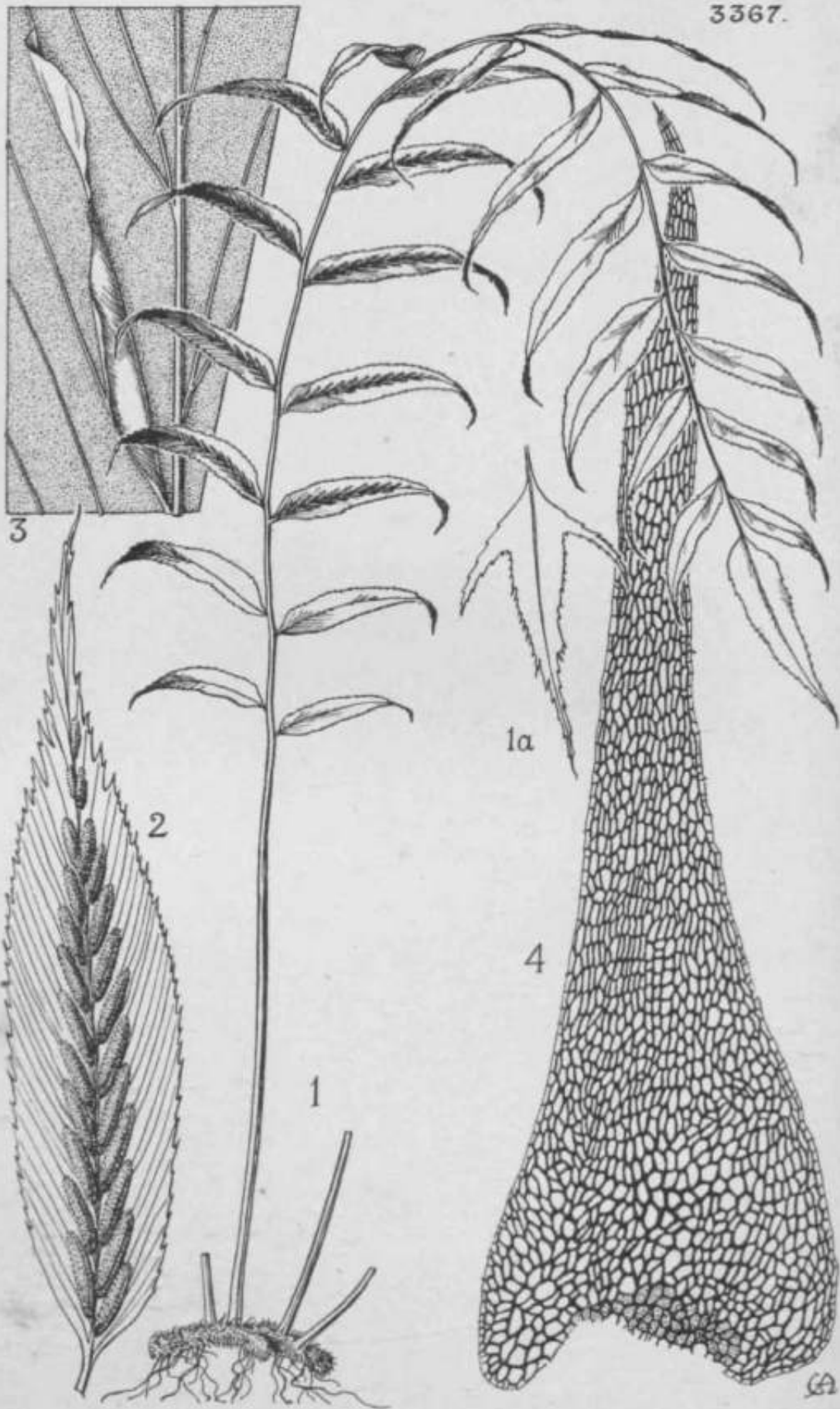
Dr. Christensen has pointed out in his account of the Madagascar ferns (Dansk Bot. Arkiv vii. 99 : 1932) that the island representatives differ from the typical mainland forms of *A. Friesiorum* in several particulars. He says:—"The specimens from Madagascar quoted above are smaller and scales of rachis and costae few or none and the sori not so closely appressed to the costa, but otherwise they agree with the type." Apart from the questions of size and degree of scaliness which are often doubtful criteria, the position of the sori in the Madagascar specimens serves to distinguish them at once from those of the mainland. In all the specimens quoted above from the mainland the sori are consistently "costal," whereas all the Madagascar specimens possess sori which are borne at a slight angle to the midrib. In the circumstances it has been deemed desirable to separate the island form as a distinct variety, *A. Friesiorum* C. Chr. var. *nesophilum* Ballard.

Dr. Christensen's remark in the above-mentioned work that the figure *oiHumboldt* 6631 figured on pi. 34, fig. 6, might possibly represent Domin's *A. pseudoserra* is not supported by reference to the type material. Both the Last and Fyfte specimens cited by Domin possess pinnae of the uncut juvenile type with "costal" sori and without a tendency to become narrowed towards the base.

Sim, in the first edition of his Ferns of South Africa, followed Baker in regarding the present species as a variety of *A. serra*, but in the

second edition (153, t. 56: 1915) he dropped the varietal epithet as a result of following the nomenclature of Christensen in the *Index Pilicum* of 1905.—F. BALLARD.

FIG. 1, part of plant showing juvenile and adult fronds, x J; 2, adult pinna, *natural size*; 2a, another adult pinna (from *Gardner 971*), *natural size*; 2b, juvenile pinna, *natural size*; 3, part of underside of pinna showing sorus with indusium turned back and sporangia removed, x 6; 4, group of ripe spores, x 450; 5, rhizome scale, x 37; 5a; part of 5, x 107; 6, scales from lower surface of pinna, x 37.



TABULA 3367.

ASPLENIUM BIAFRANUM *Alston et Bollard.*

POLYPODIACEAE.

*A. biafranum* A. H. G. Alston et F. Bollard; species nova, *A. Friesiorum* C. Chr. proxima, a quo pinnis plerumque oblongo-lanceolatis, soris longioribus obliquis, paleis longioribus angustis difiirt.

*Filix* repens. *Rhizoma* longe repens, epigaeum, validum, usque ad 1 cm. diametro; paleae densae, persistentes, atro-brunneae, nitentes, iridescentes, lanceolatae vel lineari-lanceolatae, acuminatae, integrae. *Frondes* usque ad 84 cm. longae; stipites usque ad 30 cm. longae, circiter 1-5 cm. inter se distantes, rigidae, obscure brunneae, plus minusve nitentes, basi squamosae. *Laminae* lanceolatae, 1-pinnatae, 14-jugatae, usque ad 54 cm. longae, 24 cm. latae, membranaceae; rhachis stipiti similis, glabra et laevis. *Pinnae* petiolis usque ad 4 mm. longis praeditae, usque ad 12 cm. longae, 3 cm. latae, basi plus minusve inaequaliter cuneatae, lanceolatae vel anguste oblongo-lanceolatae, caudato-acuminatae, marginibus inaequaliter biserratis, supra glabrae et laeves, subtus squamis minutis substellatis paucis praeditae vel glabrae; nervi obliqui, 2<sup>3</sup>-furcati. *Sori* obliqui, usque ad 2 cm. longi, marginem versus procurrentes et dimidium spatium attingentes; indusium lineare, hyalinum, integrum. *Sporae* echinatae.

CAMEROONS. *Preuss* 669a (Herb. Mus. Brit.).

FERNANDO PO. 900 m., *Mann* 346 (type).

ST. THOMAS ISLAND. Lagoa Amelia, 1260 m., at bottom of crater, Nov. 1932, *Exell* 201 (Herb. Mus. Brit.). Van Hulst, 1200 m., virgin forest, Oct. 1932, *Exell* 154 (Herb. Mus. Brit.); Pico de St. Tome<sup>1</sup>, 1950 m., *Moller* 27 (Herb. Mus. Brit.); S. Maria, 1350 m., June 1885, *Moller* s.n. (Herb. Coimbra); Monte Café & Pico, *Chevalier* 14543 (Herb. Paris.).

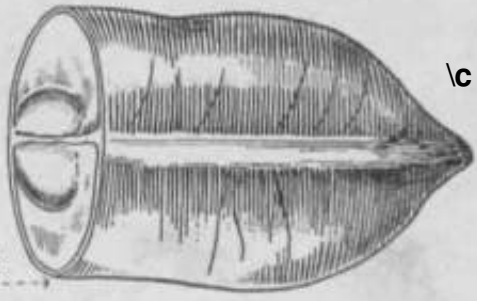
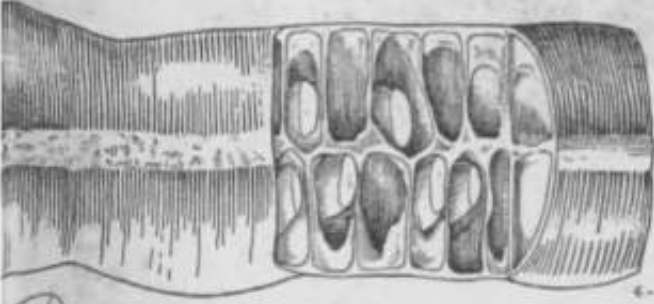
*Asplenium biafranum* is closely related to *A. Friesiorum* figured on tab. 3366, but may be readily distinguished from it by the longer and obliquely placed sori. The rhizome scales also are, on the average, longer and narrower in *A. biafranum* as will be seen from a comparison of the plates. The spores, however, appear to be identical in the two species.

The specific epithet refers to the Bight of Biafra, in and around which the species is distributed.—F. BALLARD.

FIG. 1, part of plant, x J-; 1a, tip of another frond, x J; 2, adult pinna with sori, *natural size*; 3, part of underside of pinna showing sori with indusium turned back and sporangia removed, x 6; 4, rhizome scale, x 37. (To facilitate comparison with the previous plate, corresponding figures have been drawn to the same scale.)

3368





S.R.C.

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5

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## TABULA 3368.

### CASSIA MANNII *Oliver.*

LEGUMINOSAE. Tribus CASSIEAE.

**C. (Fistula) Mannii** *Oliv.* in *Oliv. Fl. Trop. Afr.* ii. 272 (1871); Benth. in *Trans. Linn. Soc.* xxvii. 514 (1875); Taub. in *Engl. et Prantl, Nat. Pflanzenfam.* iii. 3. 159 (1892); De Wild. *Miss. Em. Laurent*, i. 101 (1905), et *Etudes Fl. Bas- et Moyen-Cong.* i. 253 (1906), excl. var.; Harms in *Engl. Pflanzenw. Afr.* iii. 1. 495 (1915); E. G. Baker, *Leg. Trop. Afr.* 631 (1930). *Cassia* aff. *Mannii* *Oliv. sec. Aubrév. Fl. Côte d'Ivoire*, i. 210, t. 77 (1936).—A *C. angolensi* *Welw. ex Hiern* foliolis plus minusve acutis vel acuminatis, petalis roseis vel albidis nee flavis facile distinguenda.

*Arbor* magna vel interdum parva, decidua. *Ramuli* glabri, cortice purpureo-brunneo laevi haud lenticellato obtecti. *Folia* 7-10-juga, usque 35 cm. longa; petiolus usque 3 - 5 cm. longus, eglandulosus; rhachis circiter 26 cm. longa, ut petioli supra leviter sulcata, puberula vel parcissime pubescens; foliola subaequalia, petiolulata, elliptica vel elliptico-ovata, apice plus minusve acuta vel breviter acuminata, basi rotundata, circiter 6 vel interdum usque 8 cm. longa, 2 -5-3 -5 cm. lata, supra in costa et subtus parcissime pubescentia, demum glabra; stipulae lineari-lanceolatae, vix 1 cm. longae, pubescentes, caducae. *Racemi* ramulos axillares terminantes, 8-12 cm. longi, multiflori; rhachis puberula vel demum glabrescens; bracteae ovatae, concavae, circiter 4 mm. longae, pubescentes, caducae; bracteolae bracteis similes sed minores; pedicelli circiter 4 • 5 cm. longi, recti, adscendentes, glabri. *Sepala* ovata vel elliptica vel obovata, apice rotundata, concava, circiter 12 mm. longa et 7 mm. lata. *Petala* obovata, apice rotundata, breviter unguiculata, concava, circiter 17 mm. longa et 11 mm. lata, rosea vel alba. *Stamina* 9; staminum 2 inferiorum (anticorum) filamenta 2\*4 cm. longa, valde arcuata, basi S-formiter curvata, antheris 4 • 5 mm. longis birimosis; staminum 5 (quorum quatuor intermedia et unum posticum) filamenta 3-5 mm. longa, antheris 3-5 mm. longis biporosis; staminum 2 filamenta 10 mm. longa, antheris 2 mm. longis birimosis. *Ovarium* anguste lineare, valde arcuatum, breviter stipitatum, circiter 3 cm. longum; stigma terminale, truncatum, dense hirsutum. *Legumen* rectum, teres vel dorsaliter leviter compressum, usque 9 dm. longum, 2-3 cm. diametro, septo Jongitudinali intersuturali et septis interseminalibus biseriatim multilocellatum. *Semina* obovoidea, compressa, circiter 10 mm. longa, 6 mm. lata et 4 mm. diametro, brunnea.

m Ivo<sup>Y</sup> ^OAST\* \*<sup>n</sup> forest by R. Comoë, Aniasué, *Aubréville* 655 (Herb. Paris.):—vernacular name " Akofiamende."



NIGERIA. Owerri Province : Umu-Akpo village, Nov. 1928, *Rose-vear* 20/28 :—medium-sized deciduous spreading tree ; leaves with 9-10 pairs of leaflets; leaflets bluntly acuminate, shiny; flowers white; fruit (from another tree in the village) cylindrical, 1 inch in diameter, open down one side showing compartments; seeds light brown, flattish, shiny, ½ inch long ; native name " Osara."

PRINCIPE Without exact locality, *Mann* 1125 (type):—tree 60 ft. high.

FRENCH CAMEROONS. South of K. Sanaga between Jaunde and Dengdeng near the junction of R. Lorn and R. Djerem, Feb., 1914, *Mildbraed* 8225.

GABOON. Tchibanga, 1914, *Le Testa* 2005 :—tree with deep rose-coloured flowers, rose-scented.

BELGIAN CONGO. Leopoldville Province : Kimuenza, March 1901, *Gillet* 2106 :—very large tree in flower ; fruits eaten by natives; native name " Mbiri." Near Kisantu, 1903, *Gillet*. Between Mushie and Bolobo, in secondary forest, Dec. 1932, *Lebrun* 6753:—shrub with white flowers. Coquilhatville Province: Ubangi, Dec. 1903, *Laurent*:—large tree with fruits like sausages. Busa, Jan. 1904, *Laurent* 122:—leguminous tree, 10-12 m. high with stick-shaped fruits. Without locality or date, *Van Houtte* 3968 :—shrub about 4 m. high with spiny trunk ; flowers sweet scented; plant probably medicinal, in any case ornamental (Herb. Brux.).

UGANDA. Bunyoro District: Bugoma Forest, *Dawe* 815 :—immense tree ; fruits often 2-3 ft. long. Budongo Forest, Dec. 1932, *Harris* 178 (For. Dep. 1138):—large tree in fruit. Waisoke River, Budongo Forest, Sept. 1933, *Eggeling* 1421 (For. Dep. 1367):—tree to 60 ft.; bark dark brown, similar to that of *Pygeum*; fruits up to 3 ft. long; Lunyoro name " Ntanyenya." Budongo Forest, Feb., 1935, *Eggeling* 1605 (For. Dep. 1504):—tree up to 60 ft.; flowers rosy-pink borne in great profusion ; the most decorative of Uganda's indigenous trees.

*Cassia Mannii* is the only pink-flowered African member of the section *Fistula* DC. It is usually a very large tree of the evergreen rain-forest. It is probably much more common than is indicated by the gatherings here cited, for, on account of its stature, it is difficult to obtain material of it from the ground. One or two of the gatherings from the Belgian Congo supply information rather difficult to reconcile with data from other sources. Van Houtte describes *Cassia Mannii* as " a shrub about 4 m. high, with spiny trunk," and Lebrun refers to it as a " shrub." Other collectors are unanimous in stating that it is a large or very large tree. The colour of the flowers, which is normally pink, is sometimes said to be white, and several collectors refer to the sweet scent.

*Cassia Mannii* is very closely allied to *C. angolensis* Welw. ex Hiern, a species originally described from Angolan material. The latter occurs also in the Belgian Congo, specimens of it having been found in the Brussels Herbarium under the name *C. Mannii*, and has recently

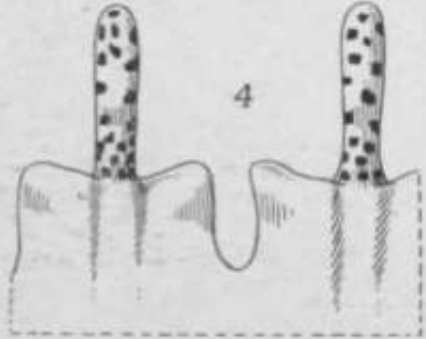
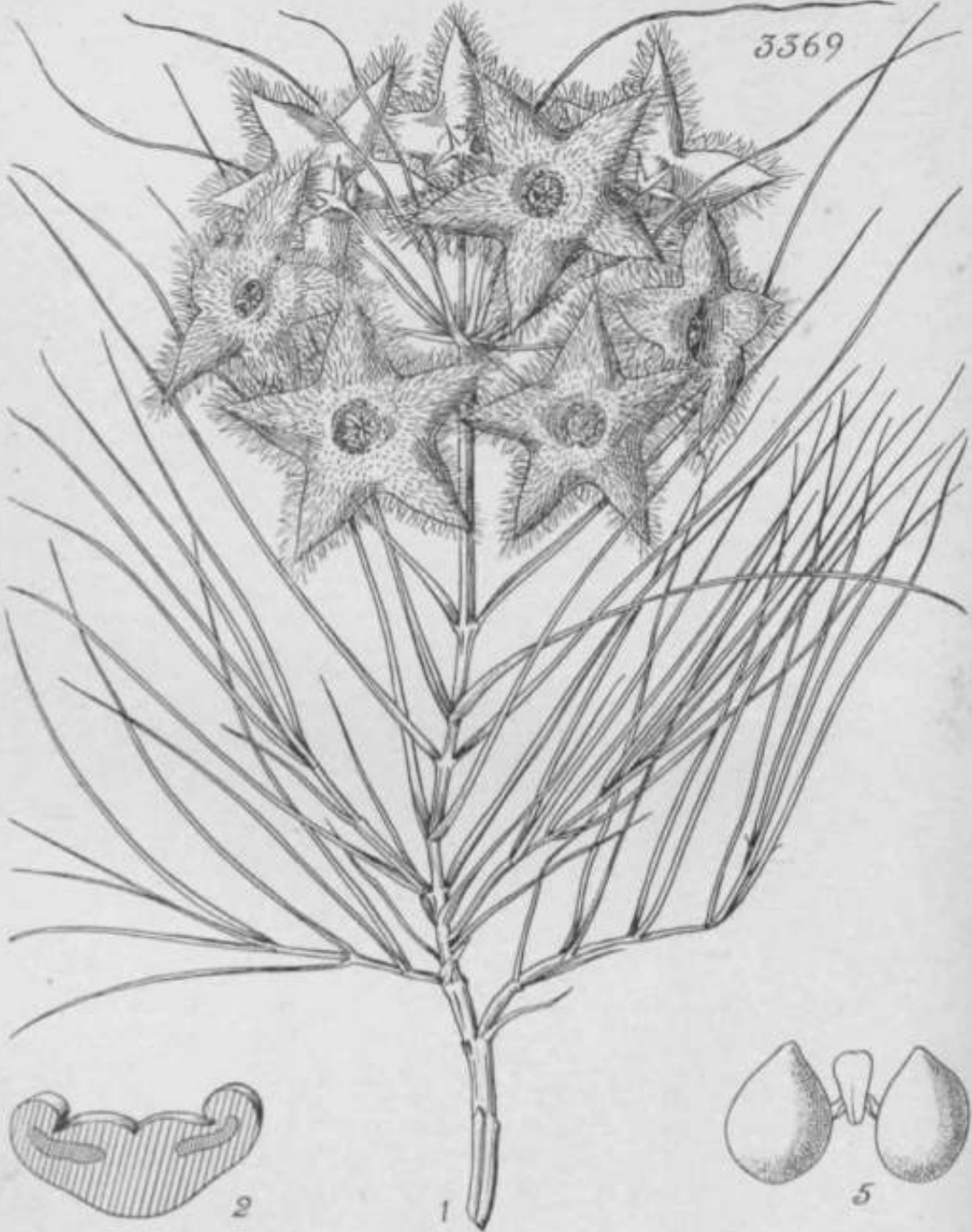
been recorded by Mr. P. J. Greenway as growing wild at Amani, Tanganyika Territory. *C. angolensis* is distinguished from *C. Mannii* by its smaller, emarginate or retuse leaflets and its yellow flowers. The inflorescence is usually shorter and more pubescent than in *C. Mannii*. In fruit, however, the two species agree very closely. The legume, which is often 3 ft. long, possesses a longitudinal septum which divides the transverse loculi into halves, each of which contains one seed. The presence of this longitudinal septum is not mentioned by Bentham in his description of the fruits of section *Fistula* (I.e. 514), and the writer has not been able to find any other species of *Cassia* with similar fruits. The only mention of the longitudinal septum that has been traced is that of Aubréville (I.e.), where an illustration and description of a fruit are given.

The androecium of *C. Mannii* presents some unusual features. In all the flowers examined there are only nine stamens; the anterior stamen is lacking, there being two stamens with bent filaments and large anthers dehiscing by longitudinal slits instead of the three which are present in other species of the section *Fistula*. There are two stamens on each side with short straight filaments and anthers dehiscing by basal pores, and a fifth (posticous) stamen, similar to these four, but provided with a much smaller anther; on either side of this is a stamen with long filament and small longitudinally dehiscing anther.

E. MILNE-REDHEAD.

<sup>a</sup> FIG. 1, leaf, *natural size*; 2, upper part of branch showing inflorescence, *natural size*; 3, lateral view of androecium, x 3; 4, diagrammatic anterior view of androecium, x 3; 5, anther showing basal pores, x 3; 6, part of legume showing longitudinal and transverse septa, *natural size*; 7, seed, x 2.

3369



S.R.C.

TABULA 3369.

BBACHYSTELMA PESTUCIFOLIUM *E. A. Bruce.*

ASCLEPIADACEAE. TribuS CEROPEGIEAE.

**B. festucifolium** *E. A. Bruce*; species nova, a congeneribus foliis lineari-subulatis, corolla rotata lobis triangularibus valde diversa.

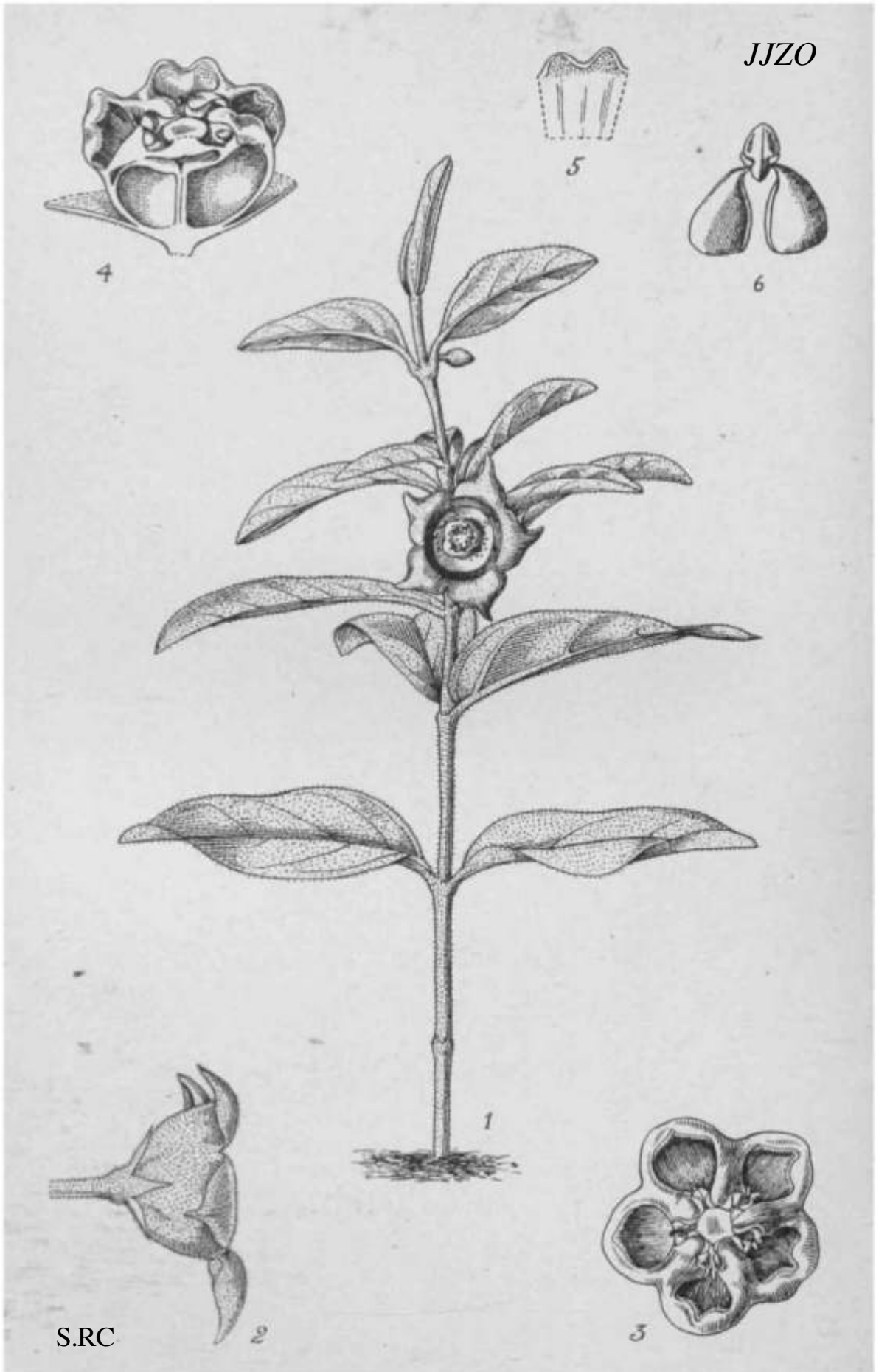
*Planta* subscandens, leviter ramosa ; caulis sulcatus, 3 mm. diametro, glaber, pallide brunneus, internodiis 6-8 mm. longis. *Folia* sessilia, lineari-subulata, acuta, 5-7\*5 cm. longa, basi 1-1\*5 mm. lata, glabra, margine valde incurvata, apicem versus subteretia, costa subtus prominente. *Umbella* terminalis, 8-flora ; bractee foliaceae, lineari-subulatae, 6-6 cm. longae ; pedicelli 2-2 • 5 cm. longi, sulcati, parce pubescentes. *Calycis lobi* ovato-lanceolati, acuminati, apice plerumque incurvati, extra pilosi. *Corolla* atro-purpurea, subrotata, circiter 3 cm. diametro ; tubus brevissimus, patelliformis, circiter 5 mm. diametro, glaber, pallidus, atro-maculatus; lobi 5, anguste deltoidei, acuti, 7-12 mm. longi, basi 8 mm. lati, pilis longis vibratilibus ciliati, supra atro-maculati, dense strigosi, medium versus puberuli, subtus pluri-sulcati, glabri. *Corona* duplex, exteriore et interiore in unum confluentibus; exterior basi breviter cupuliformis, 10-dentata; dentes bini, erecti, cum lobis coronae interioris connati, apice liberi, late et obtuse triangulares, vix 0 • 5 mm. longi; lobi coronae interioris oblongo-cuneati, 1-5 mm. longi, apice rotundati, basi leviter contracti, super antheras incumbentes et eas paullo superantes.

TANGANYIKA TERRITORY. Tabora District: Kakoma, 1170 m., 11 Jan. 1936, *H. M. Lloyd* 68 (typus in Herb. Kew.):—scrambler with dark mauve flowers.

*Brachystelma festucifolium* belongs to a group with the flowers arranged in terminal umbels. It differs from related species in combining linear-subulate leaves and deltoid corolla-lobes. The coronal structure is rather difficult to interpret, as the inner corona is adnate to the outer. The inner 5 lobes are incumbent on the backs of the anthers and are easily recognized, but the outer 5 lobes are deeply divided in the middle to form 5 pairs of incurved teeth, each pair alternating with an inner coronal lobe. The indumentum of the dark mauve flowers is characteristic. On the upper surface of the corolla-lobes there is an adpressed felt of outwardly directed bristle-like hairs, becoming shorter and less dense towards the centre ; and the margins are densely bearded with long pale purple trembling hairs. In a breeze the vibration of these hairs must give the plant an uncanny appearance.—E. A. BRUCE.

FIG. 1, flowering branch, *natural size*; 2, transverse section of leaf, x 30; 3, gynostegium, from above, x 8; 4, part of outer and inner corona, from above (spread out), x 12; 5, pair of pollinia, x 30.

JJZO



S.R.C

## TABULA 3370.

### BRACHYSTELMA CHLOBOZONCTH *E. A. Bruce.*

ASCLEPIADACEAE. Tribus CEROPEGIEAE.

*B. chlorozonum* *E. A. Bruce* ; species nova, affinis *B. brevipedicellato* Turrill, a qua floribus majoribus, corollae tubo longiore, lobis deltoideis abrupte acuminatis pilis brevibus purpureis obtectis facile distinguitur.

*Caulis* simplex, erectus, circiter 14 cm. altus, pilis albis hispidulo-pubescentibus, internodiis 1-3-2 cm. longis. *Folia* breviter petiolata, aut elliptica, 4-5 cm. longa, 2-2 cm. lata, aut elliptico-lanceolata, 5-5 cm. longa, 1\*7 cm. lata, apice acuta vel subacuta, basi late cuneata, utrinque hispidulo-pubescentia. *Flores* axillares, ut videtur solitarii. *Calyx* hispidulo-pubescentibus, 5-lobatus; lobi triangulari-lanceolati, acuminati, 3-5 mm. longi, 1-5 mm. lati. *Corolla* usque ad medium 5-lobata, extra breviter hispidulo-pubescentibus, obscure viridi-flava ; tubus late campanulatus, 4-6 mm. longus, intus glaber, fauce zona caeruleo-viridi 1-1-5 mm. lata ornatus, inferne viridi-punctatus ; lobi arcuato-patentes, ovato-deltoidei, cuspidati, circiter 5 mm. longi et lati, pilis brevibus purpureis obtecti. *Corona* duplex, interiore et exteriori in unum confluentibus, purpureo-brunnea, inter lobos viridi-tincta ; tubus in pocula 5 divisus; lobi exteriores 5, apice incurvati, profunde emarginati, apicem versus et margine minute albido-pubescentes ; lobi interiores 5, oblongi, apice rotundati, 1-5 mm. longi, antheris oppositi, incumbentes. *Folliculi* non visi.

TRANSVAAL. Barberton (?), *Thorncroft* s.n. (type). Described from a plant cultivated at Kew (790/33).

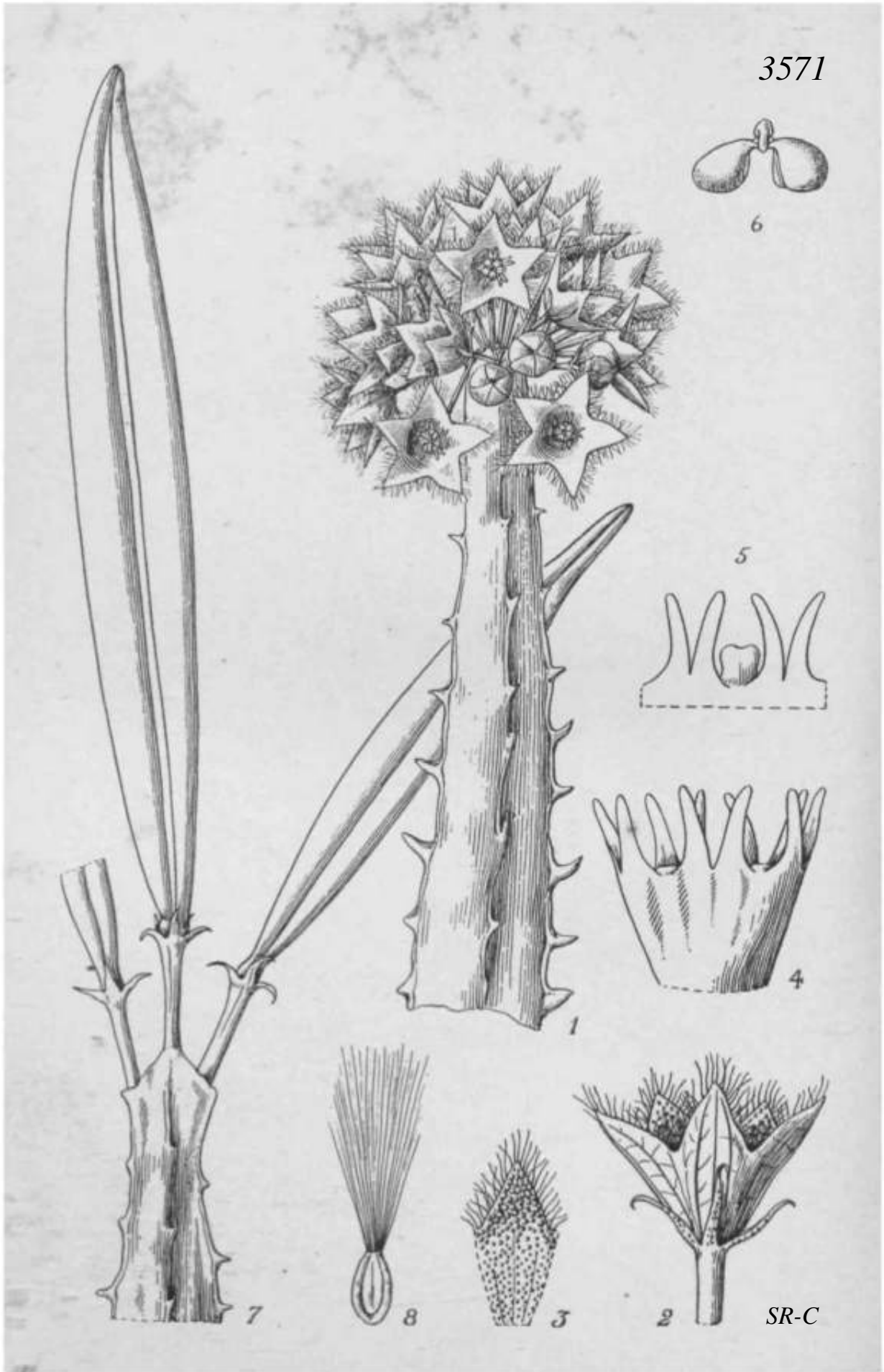
*Brachystelma chlorozonum* is a distinct species with very beautiful flowers. These have a conspicuous "poisonous blue-green" band of colour within the corolla-tube just below the lobes, and it is from this character that the name is derived. The species is rather isolated and it is difficult to find a close ally. The corolla and vegetative parts are comparable in some respects to those of *B. brevipedicellatum* Turrill, whilst the structure of the corona resembles that of *B. campanulatum* N. E. Br.

The figure was drawn in 1936 from a plant cultivated in the Royal Botanic Gardens, Kew. This was received from the late Mr. Thorncroft of Barberton, Transvaal, in 1933, and the species is unfortunately no longer in cultivation. It is hoped that botanists in the Barberton district will collect further material of this interesting species.

E. A. BRUCE.

FIG. 1, plant, *natural size*; 2, lateral view of flower, x 2; 3, gynostegium, from above, x 6; 4, longitudinal section of gynostegium with base of corolla, x 6; 5, outer corona-lobe (spread out), x 6; 6, pair of pollinia, x 20.

3571



TABULA 3371.

CARALLUMA POBTIDA *E. A. Bruce.*

ASCLEPIADACEAE. Tribils STAPELIEAE.

**C. (Boucerosia) foetida** *E. A. Bruce* ; species nova, affinis *C. speciosae* N. E. Br., a qua corolla minore, gynostegio paullo maj ore, coronae lobis exterioribus brevioribus, interioribus majoribus recedit; ab *C. Edithae* N. E. Br. corollae lobis ciliatis, coronae lobis interioribus subquadratis facile distinguitur.

*Planta* succulenta, 10-15 cm. alta ; caules simplices, erecti, tetragoni, crassi, glabri, basi circiter 2 cm. diametro, sursum sensim angustati, apice 9 mm. diametro, angulis dentatis ; dentes 0\*7-1-4 cm. distantes, patentes, plerumque deltoidei, indurati, flavido-cartilaginei, e basi secus angulos sursum deorsumque producti. *Fasciculi* terminales, sessiles, globosi, multiflori (ut videtur 30-50-flori), circiter 4 cm. diametro; bractee lineares, usque ad 5 mm. longae ; pedicelli 6-12 mm. longi, glabri, sulcati. *Calycis* hbi patuli, subulati, circiter 4 mm. longi, tuberculati, apice plerumque recurvi, margine undulati, cum glandulis parvis alternantes. *Corolla* atro-purpurea, foetida, circiter 1-5 cm. diametro, glabra, extra conspicue reticulato-nervosa, fere usque ad medium 5-lobata ; tubus late campanulatus, 5-7 mm. longus, fauce 1 \* 2 cm. diametro, glaber ; lobi patuli, ovato-deltoidei, apice acuti, circiter 5 mm. longi, basi 4 mm. lati, intus parce ruguloso-tuberculati, pilis longis purpureis vibratilibus 3 mm. longis dense ciliati. *Corona* duplex, glabra : exterior 5-loba, lobis erectis profunde bifidis 2 mm. longis, lobulis paullo divergentibus linearibus obtusis ; lobi interiores 5, subquadrati, truhcati vel emarginati, 1 mm. longi et lati. *FolHculi* stricte paralleli, **Arciter** 13 cm. longi, 0 • 7 cm. diametro, apice acuminati, straminei, glabri.

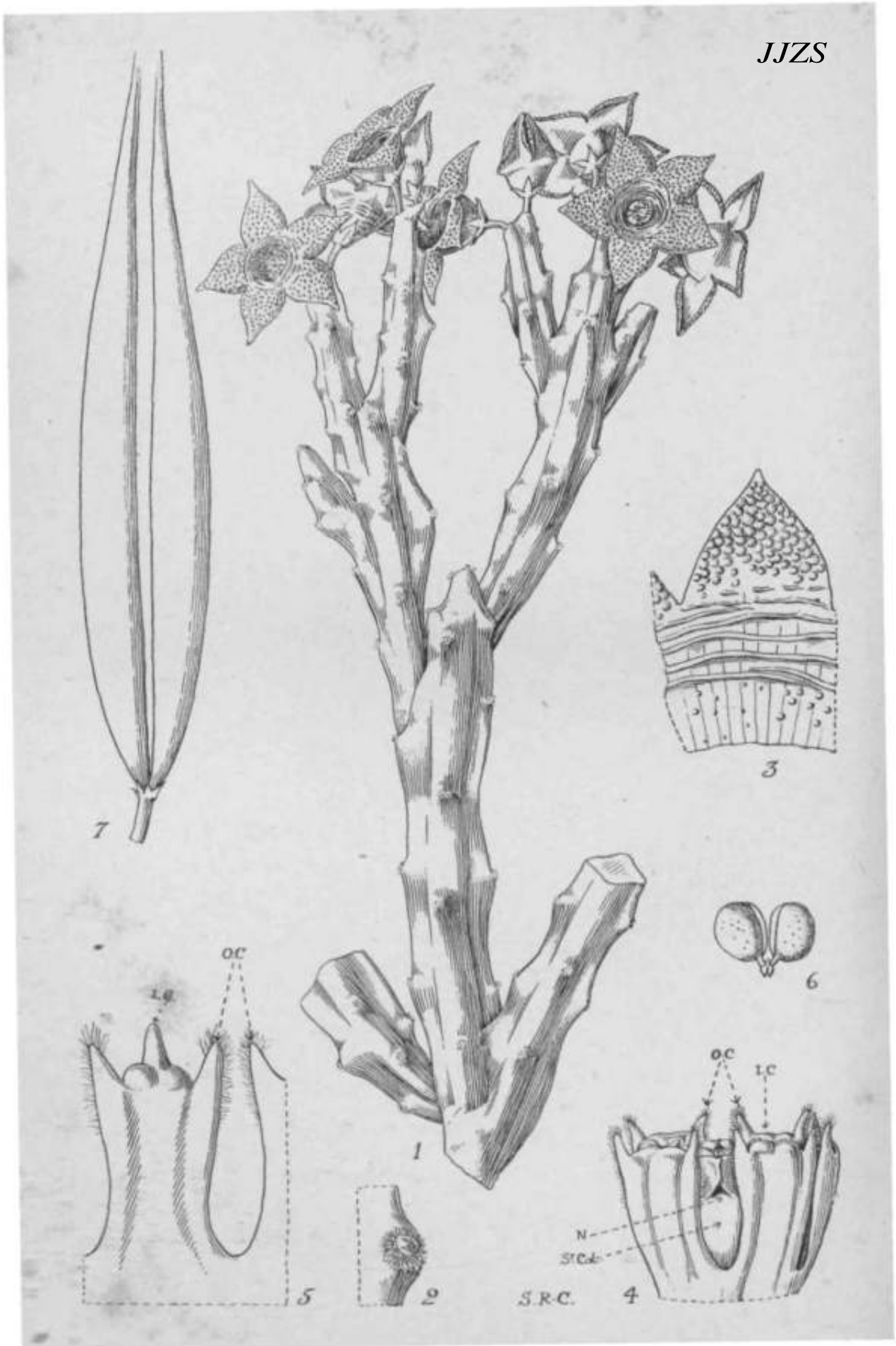
UGANDA. Karamoja, Moroto River, *W. J. Eggeling* E. 2955 (typus in Herb. Kew.).

This interesting species of Sect. *Boucerosia* belongs to White and Sloane's group, *Umbellata-Europaea*, which is characterized by a large, terminal, globose fascicle of flowers. *C. foetida* has many near allies in the north, namely in India, Arabia, Abyssinia and Somaliland, but the group is poorly represented in Central Africa and not at all in South Africa. The only other Central African members of this group are a variety of *C. retrospidens* (Ehrenb.) N. E. Br. from Witu, Kenya, and *C. codonoides* K. Schum. from Tanganyika ; this latter, however, is apparently synonymous with *C. speciosa* from Somaliland.

E. A. BRUCE.

**FIG. 1**, flowering stem, *natural size*; **2**, flower, x 2 ; **3**, corolla-lobe and part of tube from within, x 2 ; **4**, corona from outside, x 6 ; **5**, outer and inner coronalobes from outside (flattened out), x 6 ; **6**, pair of pollinia. x 20 ; **7**, upper part of fruiting branch, *natural size*; **8**, seed, *natural size*.





TABULA 3372.

CABALLUMA SOCOTRANA (*Balf.f.*) *N. E. Brown.*

ASCLEPIADACEAE. Tribus STAPELIEAE.

*C. (Boucerosia) socotrana* (*J. B. Balf.*) *N. E. Brown* in *Gard. Chron.* Ser. 3, xii. 370 (1892) ; *Berger, Stapel. u. Klein.* 77 (1910) ; *White et Sloane, The Stapelieae*, ed. 2, i. 214, fig. 154-A (1937). *C. Rosengrenii* *Vierh.* in *Oesterr. Bot. Zeitschr.* lv. 91 (1905) ; *Fl. Südarab. u. Sokotra*, i. 90, fig. 16 (1907) ; *Denkschr. Math. Nat. Kl. Kais. Acad. d. Wiss.* lxxi. 410, fig. 16 (1907) ; *Berger, l.e.* 90 ; *White et Sloane, l.e.* 251, fig. 190. *C. corrugata* *N. E. Br.* in *Kew Bull.* 1912, 280 ; *White et Sloane, l.e.* 259 (1937). *C. Rivae* *Chiov. Fl. Somala*, 222 (1929) ; *White et Sloane, l.e.* 260. *C. subulata* (*Forsk.*) *Decne. sec. K. Schum.* in *Ann. 1st. Bot. Rom.* vii. 43 (1897), non (*Forsk.*) *Decne.* *Boucerosia socotrana* *I. B. Balf.* in *Proc. Roy. Soc. Edinb.* xii. 79 (1884) ; *Bot. Socotra*, 173 (1888) ; et in *H. O. Forbes, Nat. Hist. Sokotra and Abd-el-Kuri*, 487 (1903) ; *Vierh. Fl. Sudarab. u. Sokotra, l.e.* 92.—*Affinis C. speciosae* (*N. E. Br.*) *N. E. Br.*, a qua caulibus gracilioribus margine haud fiavido-cartilagineis, dentibus inconspicuis, floribus solitariis vel caulium apices versus dispositis, corolla minore intus prominenter corrugata recedit.

*Planta* erecta, succulenta, circiter 15 cm. alta ; caules basi 8—10 mm. diametro, superne multiramosi ; rami suberecti, conferti, crassi, tetragoni, glabri, apice 3-5 mm. diametro ; anguli obtusi, ambitu repando-dentati, dentibus inconspicuis depresso-deltoideis apice cartilagineis brunneo-crispo-papillois. *stores* solitarii, terminates et apices versus ramorum dispositi ; pedicelli 1-3 mm. (sub fructu usque 7 mm.) longi, glabri. *Calycis lobi* ovato-deltoidei, 2-2\*5 mm. longi, acuti, saepius breviter acuminati, glabri, cum glandulis parvis alternantes. *Corolla* 1.6—2 cm. diametro, glabra, fere ad medium 5-lobata ; tubus campanulatus, 6-8 mm. longus, fauce 9—11 mm. diametro, extra laevis, intus in parte superiore concentrice et prominenter corrugatus, inferne parce tuberculatus ; lobi patuli, ovato-deltoidei, breviter acuminati, acuti, circiter 5 mm. longi et lati, glabri, intus dense tuberculati, extra laeves, margine valde recurvo. *Corona* duplex, interiore et exteriori in corpus unum confluentibus, basi in tubum 1-8 mm. longum producta ; coronae exterioris lobi profunde bifidi, sinu 2 mm. longo superne margine albo-piloso, bicornuti, cornubus erectis anguste triangularibus subacutis 0\*5 mm. longis interdum utrinque sed saltern supra sinum dense albo-ciliatis cum lobis coronae interioris confluentibus ; coronae interioris lobi inter cornua loborum exteriorum adjacentium dispositi, anguste triangulares, 0-6 mm. longi, glabri, antheris oppositi, decumbentes, antheras haud superantes. *Folliculi* circiter 10 cm. longi, 5-8 mm. diametro, acuminati, glabri, pallide straminei, purpureo-maculati.

Botanical Survey of India

SOCOTRA. Fl. & fr. April, *Balfour* 524 (type); Galonsir (1J hrs. S.E.), fr. 18 May, *Schweinfurth* 740; *Bent* s.n.

BRITISH SOMALILAND. Buramo, *Gillett* 4840; without locality, *Drake-Brockman* 477, 478; *Mrs. Lort Phillips*.

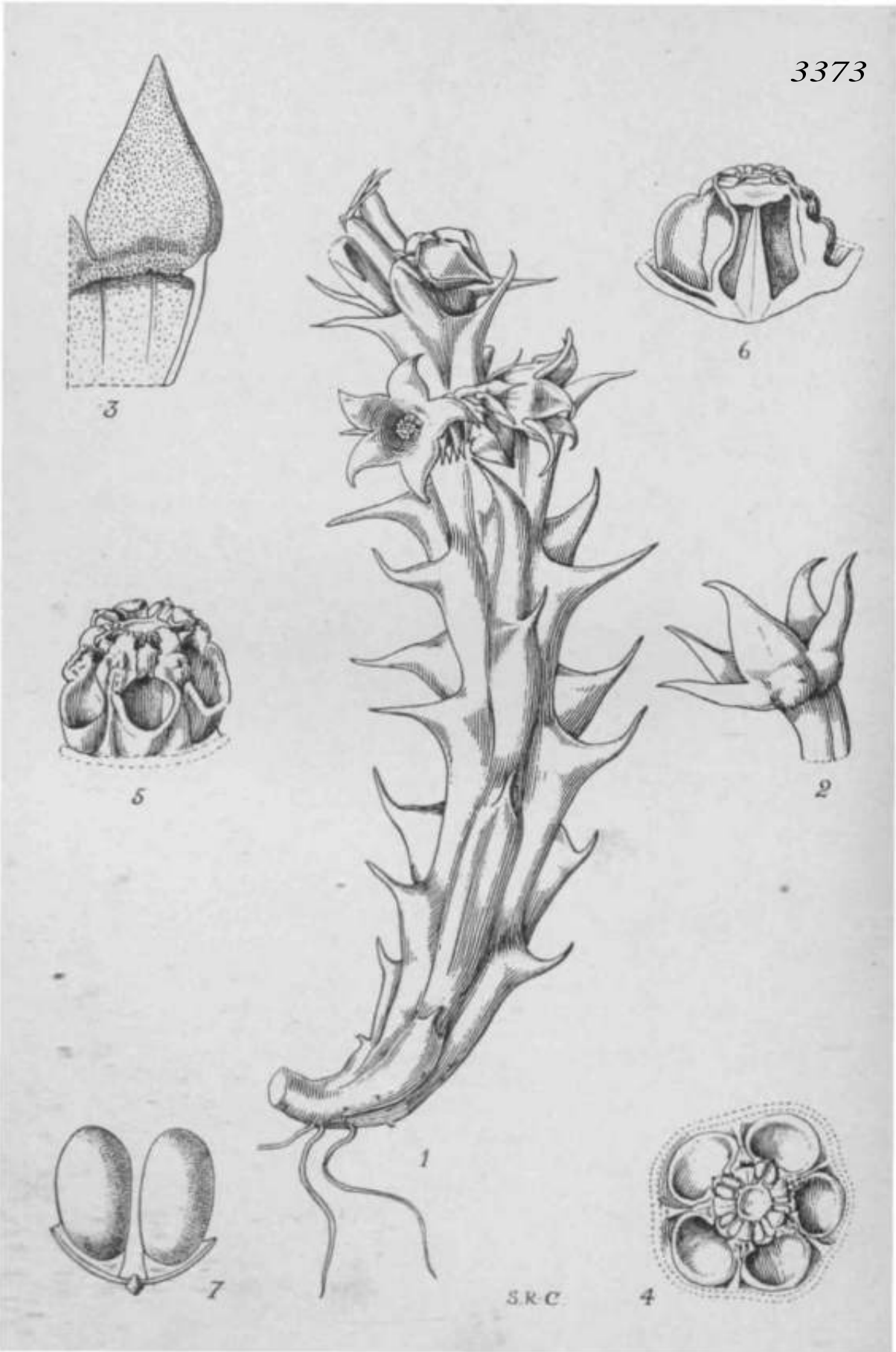
ITALIAN SOMALILAND. Sultanate of Obbia, between Bilhelli and the S. slopes of Ilbehlá, fl. May, *Puccioni & Stefanini* 527 [580].

ABYSSINIA. Ogaden, 5 hours from Lafarug, fr. Dec, *Ruspoli & Riva* 44; Milmie, fr. Jan., *Ruspoli & Riva* 3.

The prominent concentric corrugations on the inner surface of the corolla-tube of *Caralluma socotrana* form an excellent diagnostic character. Similar ones are present on the basal part of the lobes of *G. cicatricosa* (Deflers) N. E. Brown, but there the corolla-tube is quite smooth within and much shorter. Unfortunately no mention was made of these corrugations in the description of *C. socotrana*, so that the species has been re-described three times under new names. Vierhapper distinguished *C. Rosengrenii*, also from Socotra, by the lobes of the stem-angles not being produced into spines, the much smaller calyx, much longer corolla-tube, and the shortly lanceolate, not subulate, lobes of the outer corona. In the type material of *C. socotrana* (*Balfour* 524) there is considerable variation in the stem-angles, some specimens having very inconspicuous teeth; the flowers, however, are shrivelled, and it is impossible to give accurate measurements of them.

*C. corrugata* and *C. Rivae* both come from Somaliland. *C. Rivae* was distinguished from *C. corrugata* by having concentric *lines* instead of *corrugations* within the corolla-tube, but comparison of the types of the two species shows that there is no difference in this respect between them. The three-angled stem mentioned in the original descriptions of these Somaliland species cannot be maintained as a diagnostic character, since, on tracing down the stem teeth, four distinct lines are visible, corresponding to the four angled of the stem. Some of the stems may be three-angled, but this is not a constant character.—E. A. BRUCE.

FIG. 1, flowering stem, *natural size*; 2, part of stem showing tooth, x 6; 3, corolla-lobe and part of tube from within, x 3; 4, corona from outside, x 8; 5, outer and inner corona-lobes from outside (flattened out), x 12; 6, pair of pollinia, x 20; 7, pair of follicles, *natural size* :—o.c. = outer corona; i.e. = inner corona; n. = nectar cavity; st. col. = staminal column.



## TABULA 3373.

### CABALLUMA VENENOSA *Maire*.

ASCLEPIADACEAE. Tribus STAPELIEAE.

**C. (Boucerosia) venenosa** *Maire* in Bull. Soc. Hist. Nat. Afr. Nord, xxii. 305 (1931); White et Sloane, The Stapelieae, ed. 2, i. 266 (1937).— Affinis *C. Hesperidum* *Maire*, a qua corollae lobis angustioribus longioribusque, tubo longiore a limbo abrupte discreto, corona in corollae tubo inclusa recedit.

*Planta* succulenta, erecta, circiter 12 cm. alta ; caules simplices vel parce ramosi, tetra- usque hexagoni, angulis obtusis, circiter 2 cm. diametro (dentibus exclusis), pallide virides, brunneo-maculati; dentes patentes vel patuli, inferne conico-deltaidei, caudato-acuminati, crassi, 1-5-2 cm. longi. *Flores* caulis apicem versus 1-4-fasciculati; bractee minutae, lineares, circiter 1 mm. longae ; pedicelli 3-4 mm. longi, crassi, glabri. *Calycis lobi* patuli, lanceolati vel ovato-lanceolati, acuminati, circiter 5 mm. longi, 2 mm. lati, glabri, corollae sinus non attingentes, cum glandulis parvis alternantes. *Corolla* 2-2-3 cm. diametro, usque infra medium 5-lobata ; tubus 6-7 mm. longus, fauce 9-10 mm. diametro, extra glaber, intus minute papillatus, a limbo margine intus prominente abrupte discretus ; lobi leviter recurvopatuli, ovato-deltaidei, acute acuminati, 9 mm. longi, 6 mm. lati, extra glabri, intus papillati. *Corona* duplex, interiore et exteriori in corpus unum confluentibus ; corona exterior tubo valde brevior, in pocula 5 semiorbicularia circiter 2-5 mm. diametro crasse marginata divisa ; lobi interiores 5, cuneiformes, parte superiore subdeltaidei, circiter 2 mm. longi, 1-5 mm. lati, dorso medio leviter incrassati, plus minusve ruguloso-sulcati, superne irregulariter dentati, antheris incumbentes. **Folliculi non visi.**

SAHARA. Hoggar Mts. : Tigendaoui, Oued Hainan and Tehi-n-Tekart, 2000-2100 m., in cracks of granite rocks, fr. March, April 1928, *Maire*, Iter saharicum, 805, 807, 808 (ex *Maire*, l.e.). Plant cultivated at Carqueiranne by E. Jahandiez, fl. Aug. 1931, *Bot. Inst. Univ. Alger.* 4869 (formol, type).

ANGLO-EGYPTIAN SUDAN. Kordofan Province : Nuba Mts., beneath scrubby bushes, fl., *J. Robbie* (spirit).

The figure on the accompanying plate was drawn from a specimen preserved in spirit and presented to Kew by Mr. J. Robbie. A feature of interest is the 6-angled stem, 4-angled stems being the general rule. No specific importance however can be attached to this character, as Mr. Robbie states that although the original plant was 6-angled, the plants left in the same pot were either 5-angled at the base and 4-angled

at the apex or completely 4-angled, and plants raised from the 6-angled parent all possessed 4-angled stems.

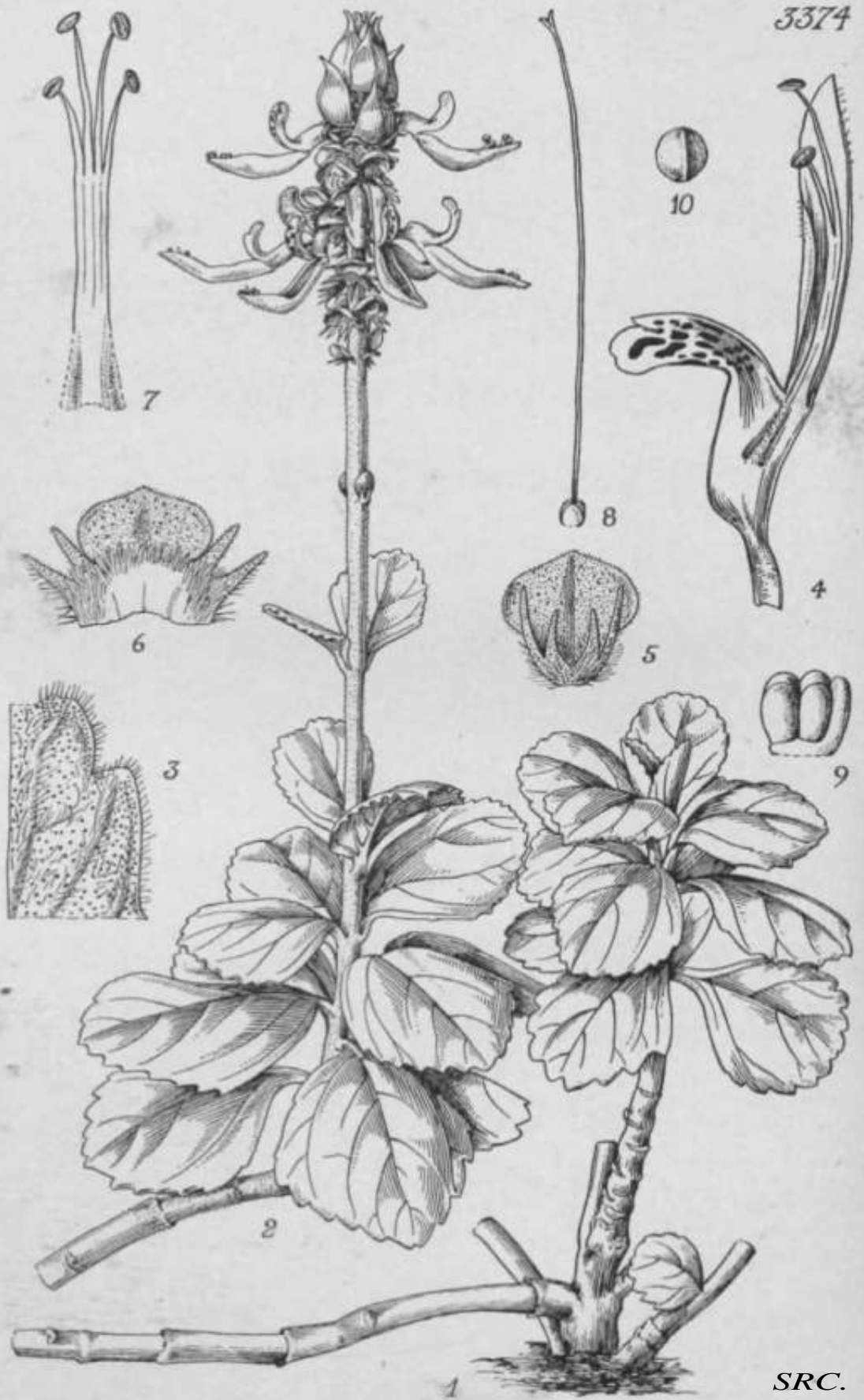
The "Ango" Group (White and Sloane, l.e. p. 161), to which *Caratuma venenosa* belongs, is a difficult and imperfectly known one. The general appearance of most of the species is very similar, especially as regards the stems, and they are distinguished only by slight differences in the form of the corolla and corona. These differences are sometimes almost impossible to detect in dried material and it is essential to have either fresh or spirit specimens when dealing with the group. *C. venenosa* is most closely allied to *C. Hesperidum* Maire, *C. commutata* A. Berger and *C. Decaisneana* (Lem.) N. E. Br., but differs from all three in having a longer and broader corolla-tube in which the loosely-fitting corona is almost completely sunk, whereas in the other species the corona completely fills the corolla-tube and protrudes from it. Another point of distinction is the existence of a definite line of demarcation between the corolla-limb and the tube, which is not found in the other species.

The colour notes given by the collectors, Mr. Robbie and Mr. Corkhill, and by Dr. René Maire, who first described the species, do not exactly correspond, so they are quoted here in full. Messrs. Robbie and Corkhill say:—" (a) Corolla liver-coloured inside, cream outside. (b) Corolla-lobes deep liver-coloured, cup light green shaded red with a definite line of demarcation between." Dr. Maire says :—" Corolla-tube within faintly purple-brown, outside greyish-green, faintly suffused with chestnut, and marked with blackish-purple spots ; limb inside blackish purple, outside faintly chestnut spotted with purple-brown."

*C. venenosa* is known only from two widely separated localities : the Hoggar Mts., Sahara and the Nuba Mts., Sudan. These two plants are not absolutely identical, but differ slightly in the coronal structure, the outer corona pockets of the Sahara specimen being emarginate, whereas those from the Nuba Mts. are entire. This character, however, does not seem to warrant specific or even varietal separation.

E. A. BRUCE.

FIG. 1, plant, *natural size.*; 2, calyx from outside, x 4; 3, corolla-lobe and part of tube from within, x 3; 4, gynostegium from above with cut edge of corolla-tube, x 4; 5, gynostegium from outside, x 4; 6, median section of gynostegium, x 4; 7, pair of pollinia, x 24.



TABULA 3374.

COLEUS COMOSUS *Hochst. ex Gürke.*

LABIATAE. Subtribus PLECTRANTHINAE.

*C. comosus* *Hochst. ex Gürke* in Engl. Jahrb. xix. 212 (1894); Baker in Dyer, Fl. Trop. Afr. v. 426 (1900), partim; hic redescriptus. *C. spicatus* Benth. sec. A. Rich. Tent. Fl. Abyss, ii. 183 (1851), partim, non Benth. (1831). *C. caninus* Vatke in Linnaea, xxxvii. 318 (1871-3), partim, non (Roth) Vatke.—Affinis *C. sjneato* Benth., a quo caulibus haud patenter hirsutis, foliis brevius petiolatis, inflorescentiis brevibus, floribus multo majoribus recedit.

*Herba* perennis, aromatica, basi ramosa, circiter 22 cm. alta, caules alios et foliatis et floriferos alios tantum foliatis emittens. *Caules* teretes, basin versus plus minusve carnosi, cicatricibus foliorum prominentibus, inferne decumbentes, superne erecti, basi 5-6 mm. diametro, pallide brunnei, papilloso et glandulis aurantiacis parce induti, nodis inter petiolos sparse villosa-ciliatis; cicatrices foliorum approximatae, transverse semi-ellipticae, 1-1\*5 mm. altae, 3-3\*5 mm. latae; caulium partes hornotinae foliatae, virides, densius glandulosae et papillosae, internodiis 0\*5-1\*2 cm. longis (internodio supremo 2\*5 cm. longo). *Folia* opposita, petiolata; petiolus 3-5 mm. longus, supra planus; lamina late obovata vel elliptica, 1-5-3\*2 cm. longa et lata, apice rotundata, inferne in basin cuneatim angustata et integra, superne crenato-dentata, utrinque viscida, supra grosse pubescentia, subtus parcius pubescentia praesertim in nervis et marginem versus, glandulis aurantiacis praesertim juxta marginem punctata; costa et nervi laterales supra impressi, subtus valde prominentes. *Inflorescentia* 4<5 cm. longa, compacta, verticillastris plerumque 6-floris; bractee oppositae, imbricatae, mox deciduae, ovatae, 1\*2-1-4 cm. longae, 0\*9 cm. latae, concavae, superne leviter carinatae, caudato-acuminatae, decorae, inferne griseo-albidae, superne intense purpureae acumine viridi, margine et carina irregulariter ciliatae, extra papillosae, par-cissime aurantiaco-glandulosae, intus glabrae; bractee infimae 2 cm. a ceteris remotae, albido-virides, ceteris angustiores; pedicelli erecti, brevissimi, rhachi appressi. *Calyx* bilabiatus, viridi-purpureus; tubus brevissimus, 2-2-5 mm. longus, glandulosus, extra pilis albidis patulis multicellularibus instructus, intus fauce villis lilacinis clausus; lobi utrinque glandulosi et papilloso; lobus posticus transverse ellipticus, 4 mm. longus, 6 mm. latus; laterales late subulati, 4 mm. longi; antichi lateralibus similes, 3 mm. longi. *Corolla* 2\*5 cm. longa, patens; tubi pars inferior cylindrica, 5 mm. longa, intus basi villosa, pars superior compressa cylindrica, postice ampliata, 4-5 mm. longa, circiter 3\*5 mm. diametro; labium posticum recurvum, plus minusve rectangulare, circiter 8 mm. longum et 3 mm. latum, marginibus incurvis, intense purpureo-maculatum, superne leviter 4-lobum, lobis



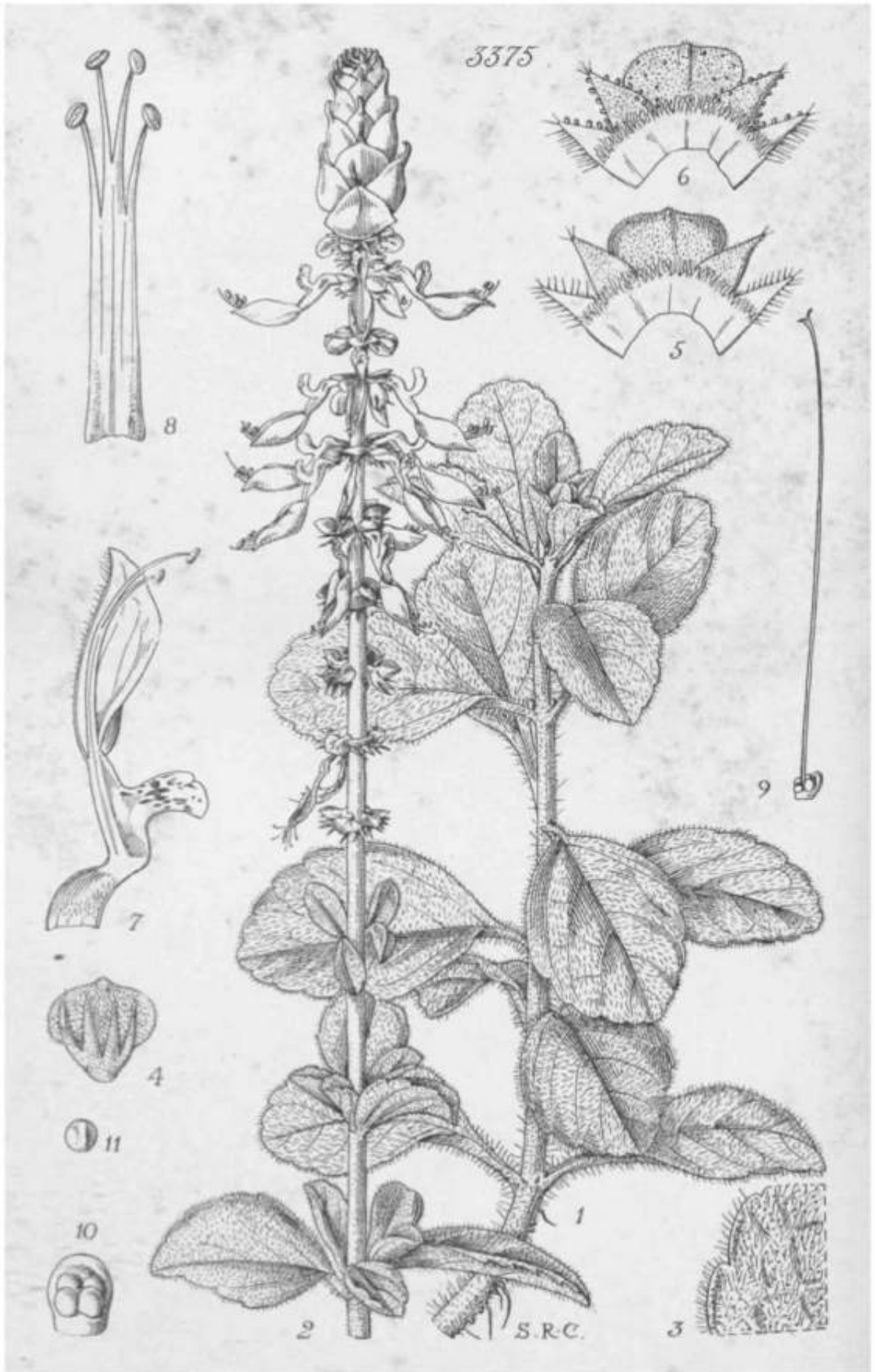
posticis majoribus et latioribus 2-5 mm. longis, lobis lateralibus minimis 1 mm. longis ovato-deltoideis subacutis ; labium anticum patens, anguste cymbiforme, integrum, circiter 1 • 7 cm. longum, 0 • 3 cm. profundum, albido-caeruleum, apicem versus intus intense caeruleum, extra superne glandulosum et pills paucis patulis instructum. *Stamina* labium anticum haud superantia, filamentis parte superiore excepta in tubum antice apertum connatis ; antherae 1 mm. longae. *Ovarium* glabrum, disco in glandulam subquadratum leviter concavam 1 mm. longam vix 1 mm. latam antice producto ; stylus gracilis, circiter 2 cm. longus, glaber. *Nuculae* subtrigoniae, 1-7 mm. longae et latae, fusco-brunneae, glabrae.

ABYSSINIA. Mt. Aber, near Jenausa, June 1840, *Schimper* 1328 (type in Paris. Herb.); *Schimper* 63 ; Province of Shiré, *Quartin Dillon* s.n. (Herb. Paris.). Cultivated in Koyal Botanic Garden, Edinburgh (193/37).

The accompanying plate was drawn from a plant cultivated in the Royal Botanic Garden, Edinburgh, and sent to Kew for identification. *Coleus comosus* Hochst. ex Gürke is closely allied to an Indian species *C spicatus* Benth., from which it differs in having shorter inflorescences, larger flowers and a distinctive indumentum. This latter is one of the most interesting features of the species, many varied types being represented. The most conspicuous of these are the golden glands, which are scattered on the stem, bracts, calyx and lower surface of the leaves, where they form a dense narrow band along the margin. The specific epithet, *comosus*, refers to the apical crown of whitish purple-tipped bracts, which in the early stages completely envelop the young flowers and give the plant the appearance of having a number of compact quadrangular white spikes.—E. A. BRUCE.

FIG. 1, base of plant, *natural size*; 2, flowering branch, *natural size* ; 3, portion of lower surface of leaf, showing glands, x 3; 4, corolla, median section, x 3; 5, calyx, x 3 ; 6, calyx, opened out, x 3 ; 7, staminal sheath, flattened out, x 3 ; 8, gynoecium, x 3 ; 9, ovary and disk, x 12 ; 10, nutlet, x 3.

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TABULA 3375.

**COLEUS PENTHERI** *Giirke*.

LABIATAE. Subtribus PLECTRANTHINAE.

*C. Pentheri* *Giirke* in Ann. Nat. Hofmus. Wien, xx. 48 (1905); Cooke in Dyer, Fl. Cap. v. pars. i. 289 (1910); affinis *C. spicato* Benth., a quo verticillastris magis distantibus, floribus multo majoribus recedit.

*Herba* perennis, suberecta, aromatica, ramosa, usque ad 1 m. alta. *Caules* teretes, plus minusve carnosii, basi circiter 1 cm. diametro, inferne pallide brunnei, superne rubro-tincti, pilis mollibus glanduloso-capitatis patenter hirsuti, breviter glanduloso-pilosi, glandulis aurantiacis induti; internodia 2-5 cm. longa. *Folia* opposita, petiolata; petiolus 0.5-1.5 cm. longus, supra canaliculatus, ubique breviter pilosus, subtus marginibusque molliter hirsutus, aurantiaco-glandulosus; lamina elliptica usque obovata, 2-5 cm. longa, 1.6-3.7 cm. lata, superne plerumque rotundata, inferne in basin late cuneato-angustata et integra, superne haud profunde crenata, supra viscida, albo-glandulosa, parce longe pubescentia, subtus in nervis pilosa, glandulis aurantiacis ubique sed juxta marginem densius punctata; costa et nervi laterales venulaeque supra impressi, subtus valde prominentes. *Inflorescentia* sub anthesi 8-10 cm. longa (sub fructu elongata), verticillastris 0.6-1 cm. inter se distantibus plerumque 6-floris; bractee oppositae, imbricatae, mox deciduae, late ovatae, decorae, 1-4 cm. longae, 1 cm. latae, profunde concavae, superne carinatae, caudato-acuminatae, albae, margine et carina virides, irregulariter ciliatae, acumine 0.4 cm. longo atro-purpureo apice viridi, extra parce pubescentes et aurantiaco-glandulosae, intus glabrae; pedicelli breves, erecti, rhachi appressi. *Calyx* bilabiatus, viscidus, glandulosus, saturate viridis, tubo albido-viridi; tubus brevis, campanulatus, 2-5 mm. longus, 3 mm. latus, intus fauce villis lilacinis clausus; lobus posticus transverse ellipticus, 3-5 mm. longus, 5 mm. latus, apiculatus; laterales anguste triangulares, circiter 2.5 mm. longi, acuti, setuloso-apiculati, glanduloso-ciliati; antici similes, 2 mm. longi, utrinque pectinato-ciliati vel latere postico plus minusve glanduloso-ciliati. *Corolla* circiter 2.4 cm. longa, patens, viscida; tubi pars inferior cylindrica, 5 mm. longa, intus basi pubescens; pars superior prorsum flexa, postice gibbosa, 4 mm. longa, circiter 3 mm. diametro; labium posticum recurvum, plus minusve rectangulare, 5 mm. longum, 4 mm. latum, pallide albido-lilacinum et purpureo-maculatum, superne leviter 4-lobum, lobis posticis oblique et transverse oblongis 1 mm. longis 2 mm. latis, lobis lateralibus ovato-deltaideis apice rotundatis 0.7 mm. longis; labium anticum patens, profunde cymbiforme, integrum, circiter 1.2 cm. longum, 0.5 cm. profundum, lilacinum, apice acutum, paullo recurvum, extra superne glandulosum et parce pilosum. *Stamina* paullum exserta, filamentis circiter 2 cm. longis

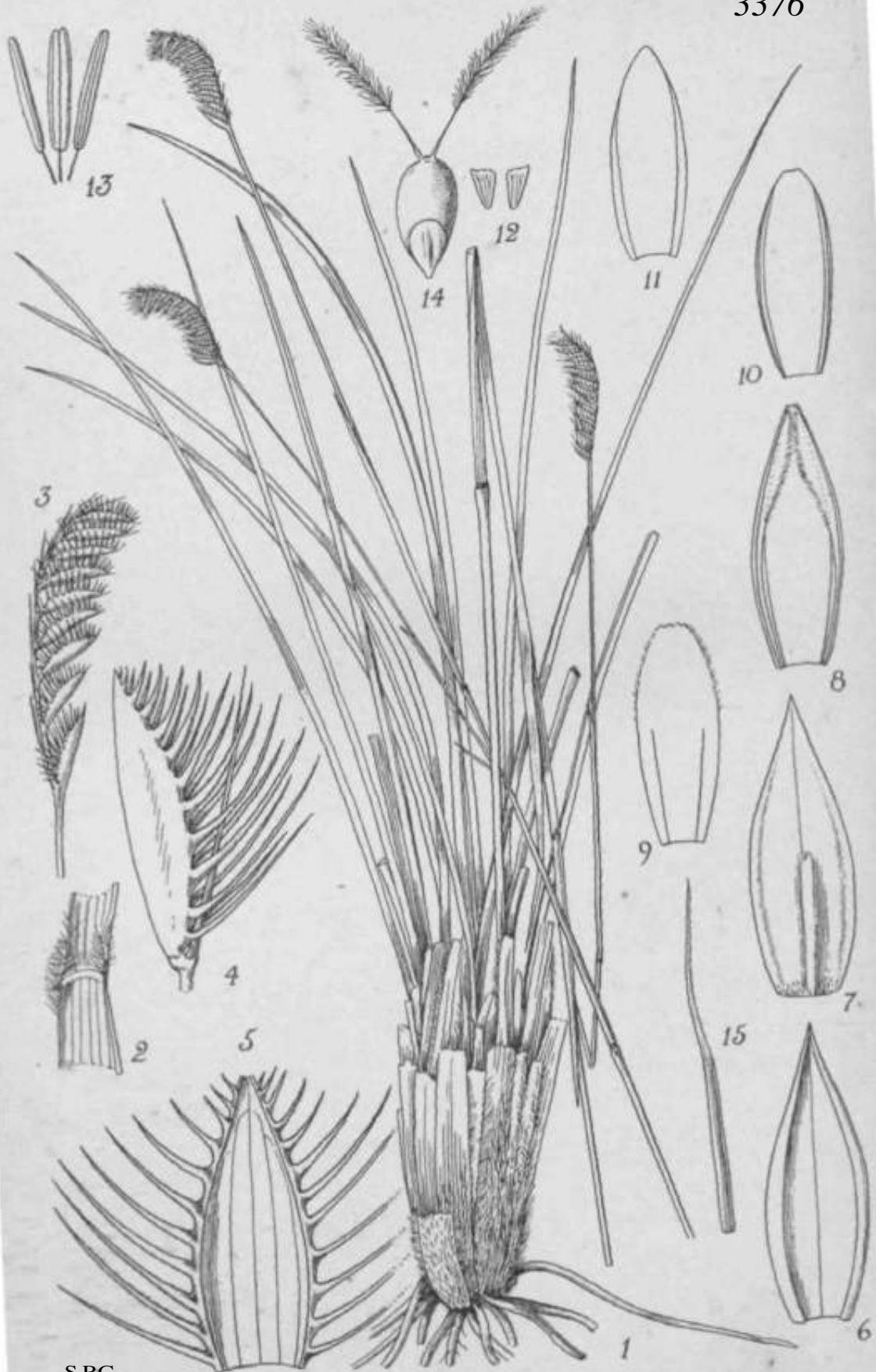
parte § superiore excepta in tubum antice apertum connatis ; antherae vix 1 mm. longae. *Ovarium* glabrum, disco in glandulam subquadratam flavidam leviter concavam 1 mm. longam et latam ovarium superantem antice producto ; stylus gracilis, 2-5 cm. longus, glaber. *Nuculae* compresse ellipsoideae, 1\*5 mm. longae et latae, atro-brunneae, glabrae.

SOUTHERN RHODESIA. Plumtree, 1368 m., 17 Feb. 1922, *Eyles* 3293 :—aromatic herb, stems yellow to red, inflorescence purple, viscid. Plumtree, *Eyles* 8548.

UNION OF SOUTH AFRICA. Cape Colony : Peddie Division, Breakfast Vley, *Krook in PL Penther*. 1716 (type in Vienna Naturhist. Hofmuseum). East London Division, near Kintza river mouth, 15 m., *Galpin* 6554. Natal Province : Byrne, *Wood* 3199. Moor river, 540-810 m., *Wood* 4340. Transvaal Province : near Barberton, 810 m., *Thorncroft* 109 ; near Lydenburg, *Atherstone*; Barberton, mountain ravines, 810 m., *Galpin* 968. Locality unknown, cultivated at Royal Botanic Gardens, Kew, *Miss Wilman* (entry no. 491/32).

This plate was prepared from a living plant cultivated in the Royal Botanic Gardens, Kew, originally received from Miss Wilman of the MacGregor Museum, Kimberley. *Coleus Pentheri* is a straggling, aromatic plant, with "spikes" of lilac-purple flowers, crowned with four closely imbricate rows of conspicuous whitish, dark-tipped bracts. It is closely allied to an Indian species, *C. spicatus* Benth., from which it may be at once distinguished by its larger flowers and laxer inflorescences. It also approaches *C. comosus* Hochst. ex Gürke, but differs in its straggling habit, softly hirsute stems and narrowly triangular lateral and anterior calyx-lobes. *C. Pentheri*, like *C. comosus*, bears various types of hairs and glands.—E. A. BRUCE.

FIG. 1, young leafy shoot, *natural size*; 2, flowering branch, *natural size*; 3, portion of lower surface of leaf, showing glands, x 2; 4, calyx, x 3; 5, calyx, opened out, x 4; 6, calyx of another flower, opened out, showing marginal hairs replaced by glands, x 4; 7, corolla, median section, x 3; 8, staminal sheath, flattened out, x 4; 9, gynoeceura, x 3; 10, ovary and disk, x 8; 11, nutlet, x 3.



## TABULA 3376.

### EREMOCHIJOA ERIOFODA C. E. Hubbard.

GRAMINEAE. Tribus ANDROPOGONEAE.

*E. eriopoda* C. E. Hubbard, species nova; ab *E. ciliatifolia* Hack, culmis ramosis, vaginis basalibus dense sericeo-lanuginosis, laminis angustioribus rigidioribus conduplicatis fere glabris, racemis curvatis, spiculis et glumae inferioris setis longioribus distinguenda.

*Gramen* perenne, dense caespitosum, usque ad 70 cm. altum; innovationes intravaginales, basi incrassatae. *Culmi* erecti, graciles, rigidi, 3-4-nodes, superne ramosi, ramulis erectis gracillimis sparse pilosis demum glabris, ceterum glabri, laeves. *Foliorum vaginae* basales latae, striatae, basin versus vel omnino pilis longis sericeis dense lanuginosae, marginibus dense ciliatae, ore molliter villosae, juveniles flavidae, ceterae angustae, glabrae vel raro nodibus sparse villosae, laeves; ligulae truncatae, membranaceae, glabrae, 0-2-0-7 mm. longae; laminae anguste lineares, obtusae, usque ad 22 cm. longae, arete conduplicatae, explanatae 2-5-4 mm. latae, rigidae, strictae vel curvatae, pone ligulam villosae vel superiores omnino glabrae, laeves, marginibus cartilagineis. *Eacemi* leviter arcuati, 1-5-2-5 cm. longi, crassiusculi, pallide fusci; rhacheos internodia 1 - 5-2 mm. longa, laevia, apice leviter incrassata. *Spiculae sessiles* 4-6 mm. longae, inferiores oblique et superiores horizontaliter patentibus; callus sparse puberulus. *Gluma inferior* dorso convexa, elliptico-ovata (explanata), obtusa vel subacuta, glabra, laevis, inter carinas 5-6-nervis, coriacea, carinis setis subulatis patentibus strictis vel leviter curvatis rigidis asperulis usque ad 4 mm. longis pectinata; gluma superior elliptica, acuta, basi puberula, 3-nervis, tenuiter coriacea, costa media infra medium alata, ala apice auriculata. *Anthoedum inferum*: lemma oblongum vel late ellipticum, obtusum, usque ad 4-6 mm. longum, tenuiter membranaceum, 2-nerve, ciliolatum; palea lemmati similis sed obovato-elliptica et usque ad 4 mm. longa. *Anthoedum superum*: lemma oblongum vel elliptico-oblongum, obtusum, usque ad 4 mm. longum, tenuiter membranaceum, 2-nerve, glabrum; palea lemmati similis sed enervis; antherae 2 mm. longae. *Pedicelli* setiformes, 4\*5-6-5 mm. longi, minute scaberuli.

SIAM. Ubon: Muang Sāmsip, in saline sand, c. 100 m., 26 Jan. 1924, Kerr 8354 (type).

FRENCH INDO-CHINA. Cochin-China, Pierre.

The specimens collected by Pierre in Cochin-China were included under *Eremochloa ciliaris* (L.) Merrill var. *genuina* A. Camus in Lecomte, Fl. Indo-Chine, vii. 291 (1922). They differ from *E. ciliaris* by their densely hairy basal leaf-sheaths, stouter racemes, larger spikelets, longer bristles of the lower glume and longer bristle-tipped pedicels.

*Eremochloa eriopoda* has been compared with *E. ciliatifolia* Hack, on account of certain characters common to both, such as the wingless lower glume, the winged midrib of the upper glume and the setiform pedicels. The new species, nevertheless, shows just as many resemblances to other members of the genus, but from all of these it may be distinguished readily by the densely hairy basal leaf-sheaths, the longer bristles of the lower glume, and especially by the longer bristle-tipped pedicels.

In most species of *Eremochloa* Biise the pedicelled spikelet is suppressed, only the pedicel being present. The latter varies considerably in shape and size ; it is usually more or less swollen and acute, and ranges from linear-lanceolate to broadly lanceolate, oblanceolate or oblong in outline. In *E. ciliatifolia* and *E. eriopoda*, however, the pedicel is very narrow at the base and tapers gradually into a fine bristle (fig. 15). Hackel (DC. Monogr. Phan. vi. 265 : 1889) considered this bristle in *E. ciliatifolia* to be the 1-glumed rudiment of the pedicelled spikelet. This interpretation may or may not be correct, but neither in *E. ciliatifolia* nor in *E. eriopoda* is there a line of demarcation between the pedicel and bristle such as one might expect if the latter was the rudiment of a spikelet. In a specimen of *Eremochloa* from N.S. Wales (*McKie 704*), however, in which the pedicelled spikelets are represented either by minute glume-like rudiments or by fully developed spikelets, the line of junction between the pedicel and spikelets is well marked.

C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, junction of sheath and blade to show ligule, x 2 ; 3, raceme, x 2 ; 4, sessile spikelet and pedicel; 5, lower glume ; 6, upper glume, front view; 7, upper glume, back view; 8, lower lemma; 9, lower palea; 10, upper lemma; 11, upper palea; 12, lodicules; 13, stamens; 14, immature caryopsis ; 15, pedicel. Figs. 4-15, x 8.

J371





## TABULA 3377.

### HIBISCUS BOBNEËNSIS *Airy-Shaw.*

MALVACEAE. Tribus HIBISCEAE.

**H. (Azanza) bomeënsis** *Airy-Shaw*; species nova, *H. floccoso* Mast. affinis, a quo habitu graciliore, foliis acuminatis, stipulis brevioribus, floribus minoribus in paniculas aphyllas dispositis, involucelli bracteolis fere liberis, calyce duplo vel triplo brevioris tomentello nee floccoso, petalis albidis, capsula longe villosa-setosa abunde differt.

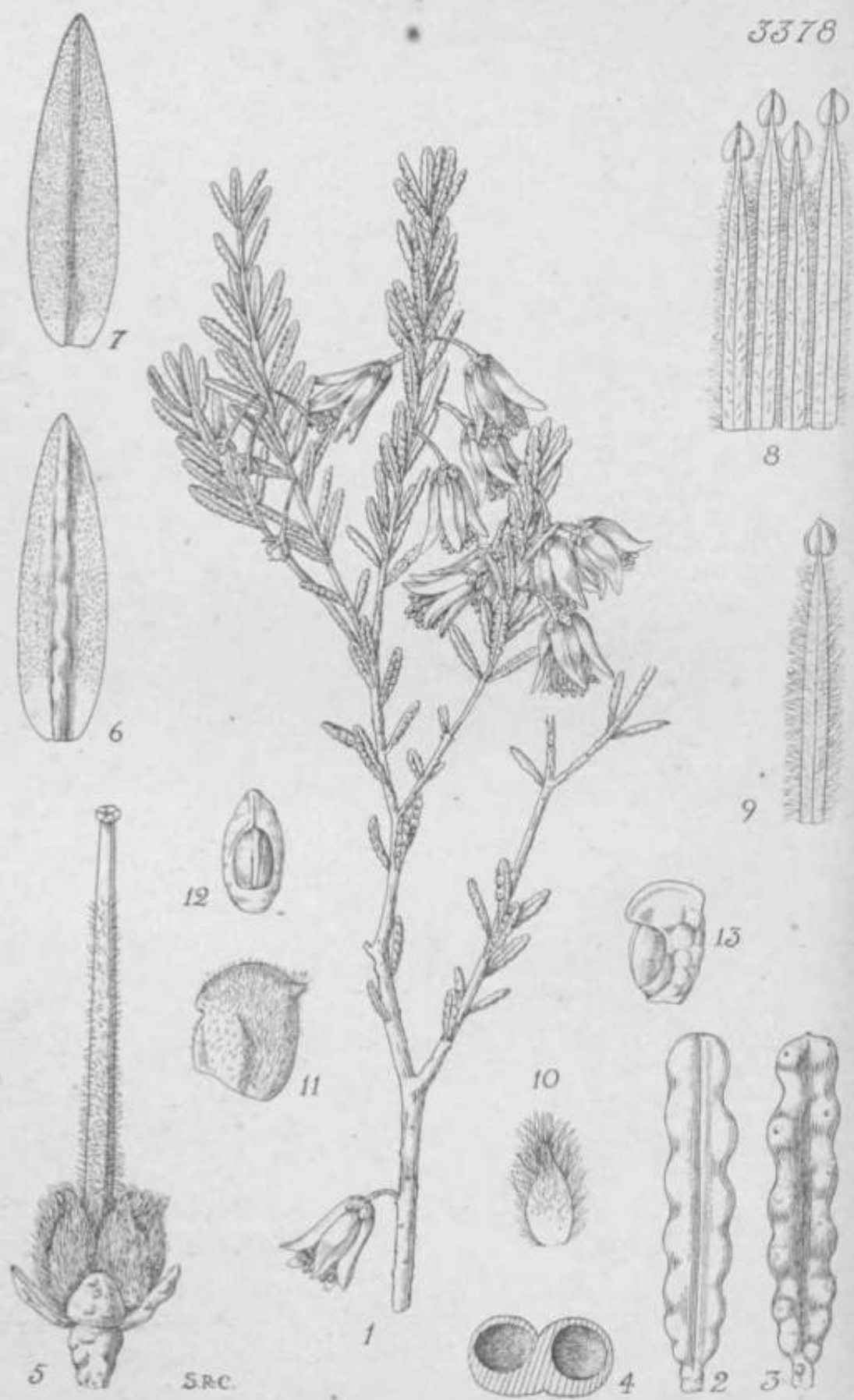
*Arbor* 28 m. alta. *Ramuli* teretes, usque 6 mm. diametro, cortice subpurpureo-brunneo minute cinereo-puberulo mox glabrescente lenticellis parvis prominentibus in series longitudinales dispositis notato. *Folia* populnea, latissime ovata, 10-17 cm. longa, 8-15 cm. lata, basi leviter cordata vel truncata, rarius latissime cuneata, apice acuminata, acuta, irregulariter inciso-lobulato-crenulata, chartacea, siccitate purpurascens-brunnea, supra glaberrima, subtus pilis stellatis majusculis 3-4-radiatis valde dissitis instructa et insuper aliis minimis multi-radiatis etiam sub lente saepe haud conspicuis undique conspersa; nervi supra plani vel prominuli, subtus prominentes, basales 3-jugi, laterales (e costa orti) 5-6-jugi, basales secundarii patentes, basales primarii et laterales patuli, subrecti, leviter sursum arcuati, prope marginem irregulariter anastomosantes, basales primarii secundarios circiter 6 e latere exteriori emittentes; nervuli graciles, prominuli, inter nervos subscalariformiter dispositi, prope marginem huic subparalleli ramulosque in sinus inter crenaturas et in crenaturas emarginatas emittentes; petioli teretes, subrecti, 1\*5—11 cm. longi, pilis majusculis parce conspersi vel subglabri, fusco-purpurascens; stipulae subreniformes, patentes, 5-6 mm. latae, rigidae, caducae ("floralibus" exceptis), cicatricibus transversis conspicuis fulvo-pubescenti-marginatis. *Inflorescentia* paniculata: rami primarii inferiores foliis suffulti, superiores et secundarii aphylli et ebracteati sed plerumque stipulis binis persistentibus conspicuis suffulti; rami primarii 10-28 cm. longi, patuli, adscendentes, parce ramosi vel fere simplices, secundarii 10-13 cm. longi, simplices, omnes minutissime cinereo-puberulis, plus minus striati, lenticellati. *Pedunculi* recti, subrecti, rigidi, 1\*5-3-8 cm. longi, apice conspicue abrupte expansi et 3-4 mm. lati, plerumque 1-flori, persistentes; pedicelli 5-9 mm. longi, valde striati, apice in torum 4-5 mm. diametro expansi, dense cinereo-tomentelli, caduci; stipulae "florales" ovato-reniformes vel suborbiculares, 3-5 mm. diametro, purpurascens, basi fulvo-villosae, patentes vel deflexae; bracteae ut videtur nullae. *Involucri bracteolae* 7-9, e pedicelli apicis expansi margine ortae, brevissime connatae vel fere liberae, spatulato-ovatae, 6-8 mm. longae, 3-5 mm. latae, acutae, demum patentes vel reflexae, lateribus deflexis, apice recurvo, siccitate purpurascens, utrinque dense minute stellato-puberulae speciem cinereo-pulverulentam praebentes, basi utrinque longius fulvo-pubescentes. *Calyx* campanulatus, 1-5-2 cm. longus,

1\*5 cm. diametro, usque ad tertiam partem 5-lobus, 2-3 mm. supra basin 5-6 mm. latam subito ventricosus, extra densissime cinereo-subfulvo-tomentellus, intus basi dense fulvo-villosus ceterum glaber, 15-nervius, lobis stricte deltoideis 6-7 mm. longis subacuminatis acutis intus apice marginibusque tomentellis. *Petala* suboblique oblanceolata, usque 6-5 cm. longa et 2-2 cm. lata, inferne in tubum glabrum 5 mm. longum connata tuboque staminali adnata, deinde per 5 mm. erecta et rigida et (marginibus villosis exceptis) subglabra, deinde abrupte patentia, extra inferne breviter dense stellato-tomentosa superne insuper longe fulvo-pubescentia, intus minute dissite puberula apicem versus glabrescentia, circiter 20-nervia, nervis dorso prominulis, virescenti-alba roseo-tincta. *Tubus staminalis* usque 5-5 cm. longus, superne leviter curvatus, striatus, basi villosus, superne glabrescens, dimidio superiore antherifer, apice in lacinias 5 subulatas 4-7 mm. longas divisus; antherae reniformes, 1 mm. latae, circiter 1 mm. stipitatae. *Ovarium* conico-ovoideum, circiter 7 mm. longum et 4 mm. diametro, acutum, longe hirsutum, 5-loculare, loculis circiter 7-ovulatis, ovulis curvato-obovoideis vel subreniformibus castaneis in mucilagine immersis. *Stylus* stamina breviter superans, apice 5-ramosus, ramis patentibus; stigmata reniformi-capitata, 1.5-2 mm. diametro. *Capsula* subglobosa vel oblato-obovoidea, circiter 1-7 cm. diametro, longe dense fulvo-setosa, valvis secedentibus 7 mm. latis in rostrum acutum 4 mm. longum productis.

SARAWAK. Dulit Trail, primary forest on bank of torrent, under 300 m., 30 Aug. 1932, *Native Collector* (Oxford Univ. Exped.) 1541: "Tree, 28 m. high. Fls. greenish white, tinged with pink."

This very distinct species is the first endemic *Hibiscus* to be described from Borneo. A leafless paniculate inflorescence and reflexed bracteoles are found, elsewhere in the genus, apparently only in *H. scandens* Roxb. (Bengal, Burma, Andamans) and *H. macrogonus* Baill. (Madagascar) respectively, species differing widely in other respects. *H. decaspermus* Koord. et Val., from Java, has rather similar involucre bracteoles and white petals, but differs in its smaller, more shortly petiolate, subentire leaves, solitary axillary flowers and few ovules. That the true affinity of *H. borneensis* is with *H. floccosus* Mast. (Malay Peninsula) is evident from the shape, texture, venation and indumentum of the leaves, the nature of the stipules, the branching of the inflorescence, the shape, colour and indumentum of the involucre bracteoles (almost exactly like the free part in *H. floccosus*), and the shape and indumentum of the petals.—H. K. AIRY-SHAW.

FIG. 1, leaf, *natural size*; 2, hairs from leaf, x 8; 3, indumentum of bracteole, lower surface, x 8; 4, the same, upper surface, x 8; 5, upper portion of inflorescence, showing bud and persistent "floral" stipules, *natural size*; 6, the same, showing expanded flower, *natural size*; 7, portion of calyx from within, *natural size*; 8, longitudinal section of flower (calyx-lobes, petals and stamens removed), x 2; 9, androecium, apex of style, and stigma, from bud, x 2; 10, anthers, showing occasionally branched filament, x 8; 11, ovary, x 8; 12, young capsule, enclosed in fruiting calyx, *natural size*; 13, dehiscent capsule (calyx removed), *natural size*; 14, seeds (? immature), x 12.



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## TABULA 3378.

### EBIOSTEMON COCCINETTS O. A. Gardn.

RUTACEAE. Tribus BORONIEAE.

**E. coccineus** C. A. Gardn.; species nova, floribus nutantibus, staminibus elongatis ab omnibus congeneribus perdistincta.

*Frutex*, 1 m. haud attingens, ramulis erectis foliatis, praeter folia glaber. *Ramuli* ut folia et pedunculi tuberculati. *Folia* breviter petiolata, lineari-oblonga, basin versus angustata, apice obtusa, glanduloso-appendiculata, 5-8 mm. longa, 1\*5-2\*5 mm. lata, supra canaliculata, subtus sulcata, pinnatim toruloso-tuberculata, tuberculis glandulas singulas gerentibus. *Pedunculi* axillares, recurvi, circiter 8 mm. longi, tuberculati, calycem versus incrassati. *Flores* 5-meri. *Sepala* ovata usque deltoideo-ovata, 1\*5 mm. longa, medio incrassata et tuberculata, marginibus tenuia, exteriora glabra vel ciliolata, interiora ciliata. *Petala* erecta, lanceolata, 1-1\*1 cm. longa, 3-5 mm. lata, subacuta, carinata, coccinea, pilis reflexis pubescentia, intus densius. *Stamina* 10; filamenta valde applanata, petala aequantia vel ea leviter superantia, sepalina petalinis paullo longiora, apice satis abrupte contracta, coccinea, dense albo-ciliata. *Carpelkt* 5, conspicue patule rostrata, dense albo-hirsuta, rostro incluso 2 mm. longa; stylus crassiusculus, stamina petalina aequans, coccinea, sparse pubescens; ovula 2, superposita. *Cocci* breviter rostrati, endocarpio cartilagineo. *Semina* brunnea, plus minusve rugosa.

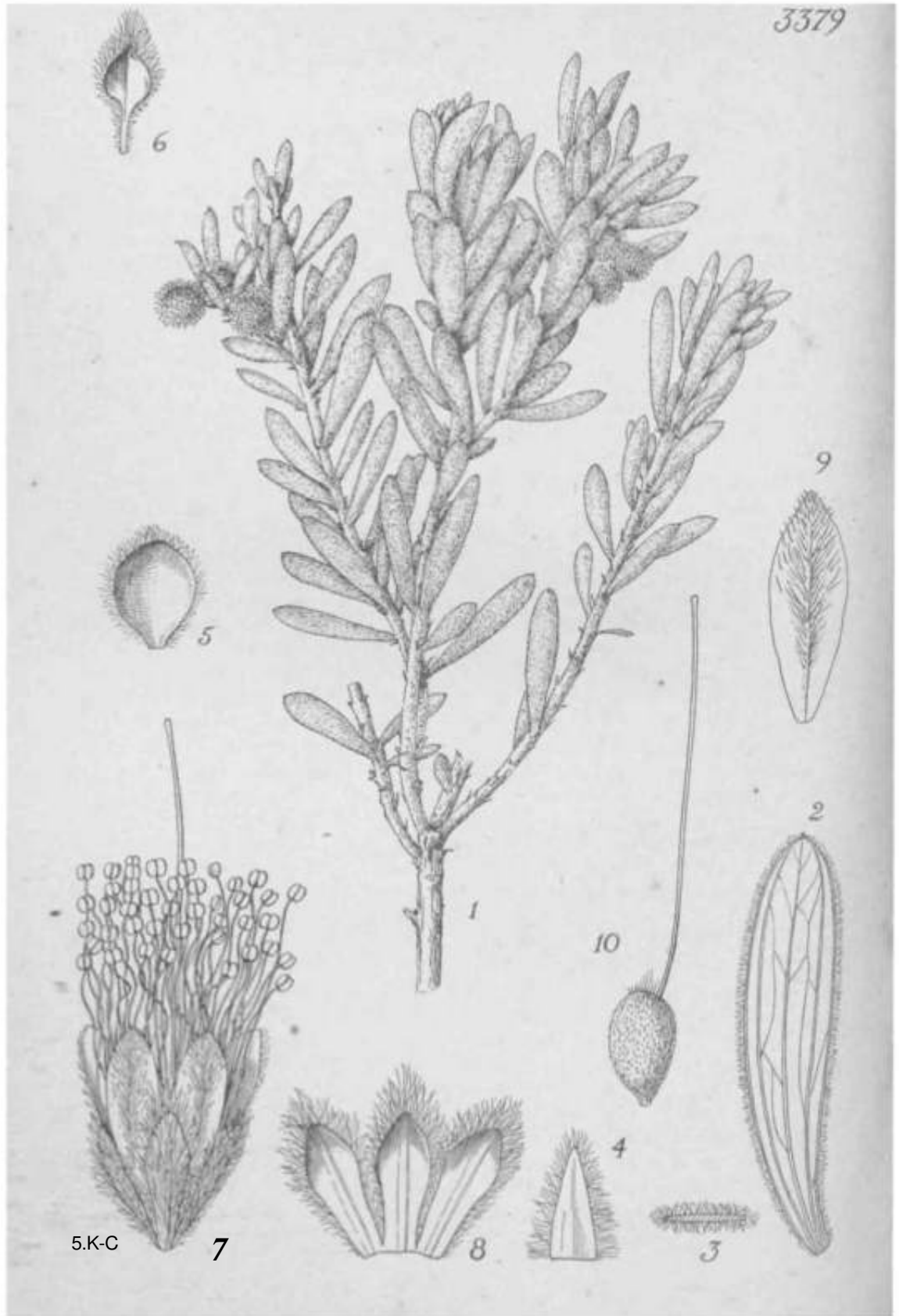
WESTERN AUSTRALIA. Coolgardie District, near Koorarawalyee, 80 miles west of Coolgardie, fl. Sept. 1931, W. E. Blackall 936.

The long narrow petals of this species, and the equally long stamens, remove it from any species yet described. *E. tomentellus* Diels from the same district has tuberculate leaves, but they are smaller and minutely tomentose, and the petals are much shorter and spreading, whereas in *E. coccineus* they are almost connivent.

This striking plant adds yet another *Eriostemon* to the Eremaean flora of Western Australia. It inhabits the extensive tract of sand-heath which extends from Boorabbin to Southern Cross, an area which has produced interesting species within the present century.

• C. A. GARDNER.

FIG. 1, flowering branch, *natural size*; 2, upper surface of leaf, x 4; 3, lower surface of leaf, x 4; 4, transverse section of leaf, x 8; 5, calyx and gynoecium, x 6; 6, petal from outside, x 4; 7, petal from inside, x 4; 8, part of androecium, from outside, x 4; 9, stamen, from inside, x 4; 10, immature carpel, from inside, x 6; 11, mature carpel, lateral view, x 4; 12, endocarp and seed, from within, x 4; 13, the same, lateral view, x 4; 14, seed.



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## TABULA 3379.

### ACACIA LANXJGINOSA C. A. Gardn.

LEGUMINOSAE. Tribus ACACIEAE.

*A. lanuginosa* C. A. Gardn.; species nova, *A. ixiophyllae* Benth. peraffinis, sed phyllodii nervis paucioribus, stipularum forma, lana densa ramos et phyllodia obtegente differt; ab *A. deflexa* Maiden et Blakely phyllodiis multo longioribus forma dissimilibus, indumento multo spissiore, nervis minus prominentibus, sepalis liberis tenuioribus recedit.

*Frutex* intricatim ramosus, circiter 1 m. altus; rami patuli vel ascendentes, crispule lanati, phyllodiorum delapsorum cicatricibus notati. *Phyllodia* patentia usque erecta, crebra, irregulariter disposita, plus minusve falcata, oblongo-ob lanceolata, in basin sensim angustata, vix petiolata, ex apice obtusa breviter brunneo-mucronata, 1.5-2.3 cm. longa, 4-6 mm. lata, utrinque aequae crispule lanata, indumento innovationum aureo mox albo demum griseo, trinervia, nervis impressis inconspicuis, nervis secundariis irregulariter anastomosantibus; glandula punctiformis, in phyllodii margine superiore 25 mm. supra basin sita; stipulae plus minusve persistentes, oblique lanceolatae, brunneae, ciliatae. *Pedunculi* axillares, solitarii, 3-4 mm. longi, crassiusculi, lanati, basi bracteati; bractee parvae, ovato-orbiculatae, concavae; bracteolae ovatae vel ovato-ellipticae, petiolatae, brunneae, dorso lanatae. *Flores* pentameri. *Sepala* libera, cuneato-spathulata, apice deltoidea, circiter 1-4 mm. longa, extus pilosa. *Petala* libera, late oblanceolata, 2 mm. longa, 0-6 mm. lata, extus sericeo-pilosa, costa prominente. *Ovarium* breviter stipitatum, obovoideum, apice excepto minute granulatum, glabrum; stylus oblique affixus, stamina superans, flexuosus. *Legumen* ignotum.

WESTERN AUSTRALIA. Coolgardie District: Mount Holland, between Southern Cross and Ravensthorpe, growing in gravelly clay soil with *Eucalyptus eremophila* Maiden and *E. oleosa* F. Muell, fl. Sept. 1929, C. A. Gardner 2046a.

The number of Australian Acacias with woolly phyllodes is small, including only *A. lachnophylla* F. Muell., *A. chrysopoda* Maiden et Blakely, *A. Kingiana* Maiden et Blakely and *A. deflexa* Maiden et Blakely. The species described here differs from all of these in its much denser and closer woolly indumentum, which is quite persistent, whereas in the others it tends to disappear with age. *A. lanuginosa* belongs to the *Plurinerves*, *Nervosae*, and has its closest affinity in *A. ixiophylla* Benth., from which it differs in its indumentum—*A. ixiophylla* having glabrous or glutinous phyllodia, very slightly pubescent—shape of the phyllodia, solitary peduncles with woolly vestiture, and hairy bracts and bracteoles. *A. chrysopoda* Maiden et Blakely, which

**this species most** closely resembles in habit, appearance, and vestiture, especially in the golden hairs of the younger phyllodia, belongs to the *Vninerves*.

The habit of this new species is also rather unusual for a Western Australia *Acacia* ; its densely crowded spreading and intricate branches, together with its flannel-like phyllodia, give it something of the appearance of *Eremophila subfloccosa* Benth., a species which inhabits the same area.—C. A. GARDNER.

**FIG. 1, flowering branch, natural size; 2, phyllode, with indumentum removed showing nervation and gland, x 3; 3, transverse section of phyllode, x 3; 4, stipule, from inside, x 8; 5, bract, from inside, x 8; 6, bracteole, from inside, x 8; 7, flower, x 16; 8, three sepals, from inside, x 16; 9, petal, from outside, x 16; 10, gynoecium, x 16.**



SRC.



## TABULA 3380.

### ACACIA PfitZELIANA C. A. Gardn.

LEGUMINOSAE. Tribus ACACIEAE.

A. Pritzeliana C. A. Gardn. ; species nova, affinis A. tamminensi E. Pritzel, a qua phyllodiis bisulcatis basi contractis ut stipulae setulosis, calyce lobato setuloso, ramulis dense setulosis recedit.

*Frutex* circiter 1 m. altus, ramis divaricatis, cortice purpureo-brunneo cicatricibus petiolorum persistentium et stipulis persistentibus vel earum cicatricibus notato ; ramuli dense patenter setulosi. *Phyllodia* alterna, satis crebra, patentia, subteretia, lateraliter compressa, a latere visa oblongo-lanceolata, apice in spinulam validam 1-1\*5 mm. longam brunneam abrupte contracta, 3-5-6-5 mm. longa, 1\*3-1\*5 mm. lata, utroque latere plus minusve sulcata, dense setulosa ; glandula in basi faciei superioris phyllodii sita, punctiformis ; stipulae patentem, rigidae, spinescentes, 1\*5 mm. longae. *Pedunculi* axillares, solitarii vel bini, monocephali, 1 cm. longi, purpurascens, sparse pilosi, basi bibracteati, bracteis orbiculari-cymbiformibus pilosis 1-5 mm. longis et circiter aequilatis vel latioribus. *Capitula* circiter 20-flora ; bracteolae lineares usque lanceolatae vel oblanceolatae, tenues, plerumque denticulatae, acutae ; flores 5-meri. *Calyx* usque ad vel ultra medium lobatus ; lobi plerumque triangulari-lanceolati, saepe parte apicali lata incrassata instructi, vel forma magnitudineque in eadem inflorescentia maxime variabiles, sparse setulosi ; tubus quam lobi plerumque densius setulosus. *Petala* obovato-elliptica, apicem versus incrassata, costa vix prominente, libera vel supra basin cohaerentia. *Ovarium* breviter stipitatum, obovoideo-globosum, glabrum ; stylus gracilis, excentrice positus. *Fructus* non visus.

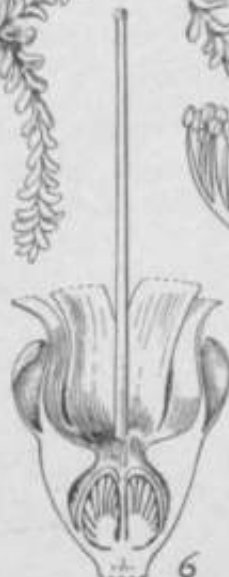
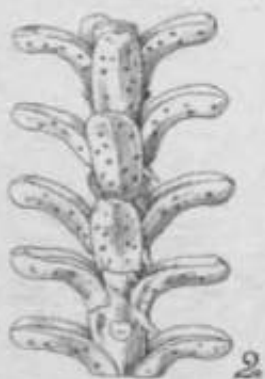
WESTERN AUSTRALIA. Coolgardie District: Salmon Gums, Aug. 1932, G. H. Burvill (type in State Herbarium, Western Australia; dupl. in Herb. Kew.); Salmon Gums, in sandy loamy soil, in woodlands of *Eucalyptus salmonophloia* F. Muell. and *E. diptera* C. Andrews, fl. May 1924, C. A. Gardner; *ibid.*, Oct. 1931, C. A. Gardner.

This distinctive plant is named in honour of Ernst Pritzel, who described many species of *Acacia* from Western Australia as a result of his explorations in company with Dr. Diels, and who still takes an active interest in the flora of that territory.

*Acacia Pritzeliana* is unique in the series *Pungentes* in having hairy subterete phyllodia and divaricate spinescent stipules. It has some features in common with *A. cedroides* Benth. of the *Brunonioideae*, but the arrangement of the phyllodia is quite different, while the stipules

and phyllodia are unlike those of any species in the *Pungentes*. On account of these characters it appears best placed next to *A. tamminensis* E. Pritzel.—C. A. GARDNER.

FIG. 1, flowering branch, *natural size*; 2, phyllode, x 8; 3, transverse section of phyllode, x 8; 4, stipules, x 8; 5, bract, x 8; 6, 7, 8, bracteoles, x 16; 9, flower, x 16; 10, calyx, opened out, x 16; 11, petal, from within, x 16; 12, gynoecium, x 16; 13, transverse section of ovary, x 16.



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TABULA 3381.

MELALEUCA AG-ATHOSMOIDES C. A. Gardn.

MYRTACEAE. Tribus LEPTOSPERMEAE.

**M. agathosmoides** C. A. Gardn.; species nova, facie similis *M. blaerifoliae* Turcz., a qua foliis oppositis, inflorescentia haud spicata, calycis basi bracteis circumdata distinguitur; a *M. thymifolia* Sm. et *M. violacea* Schau. et *M. divaricate*, Turcz. foliorum obtusorum forma differt.

*Frutex* diffusus, vix 1 m. altus, diametro duplo major. *Rand* cortice nigrescenti-griseo suberoso tecti; ramuli breves, subflexuosi, crebre foliati. *Folia* opposita, sessilia, arcuato-patentia, breviter oblonga, obtusa, basi haud angustata, 2.5-3 mm. longa, 1.3-1.5 mm. lata, minute denticulata, crassissima, supra concava, subtus convexa et superne leviter carinata, enervia. *Flares* in ligno vetere sessiles, solitarii vel glomerati; bractee paucae, imbricatae, calycis basin arete amplectentes, ovatae, obtusae, calycis tubo breviores, satis striatae. *Calycis tubus* late campanulatus, 2-5 mm. longus; lobi erecti, ovato-orbiculares, 2-5 mm. longi, concavi, rigidi, obscure striati, straminei, marginibus scariosis. *Petala* erecta, ovata, acuta, circiter 5 mm. longa, concava, satis rigida, albida vel straminea, marginibus involutis. *Staminum phalanges* 8-9 mm. longi, albi, ungue lato petala aequante filamenta 14-20 pinna-tim disposita gerente; antherae breves. *Ovarium* 3-loculare, supra medium sericeo-pilosum; ovula numerosa, supra placentam crassam congesta, erecta, linearia; stylus longus. *Fructus* breviter cylindrico-campanulatus, in cortice breviter immersus; tubus 5 mm. diametro, lobis obtuse triangularibus lignosis persistentibus coronatus.

WESTERN AUSTRALIA. Coolgardie District: Hatter's Hill, north of Ravensthorpe, in red loamy gravelly soil, fl. Sept. 1929, C. A. Gardner.

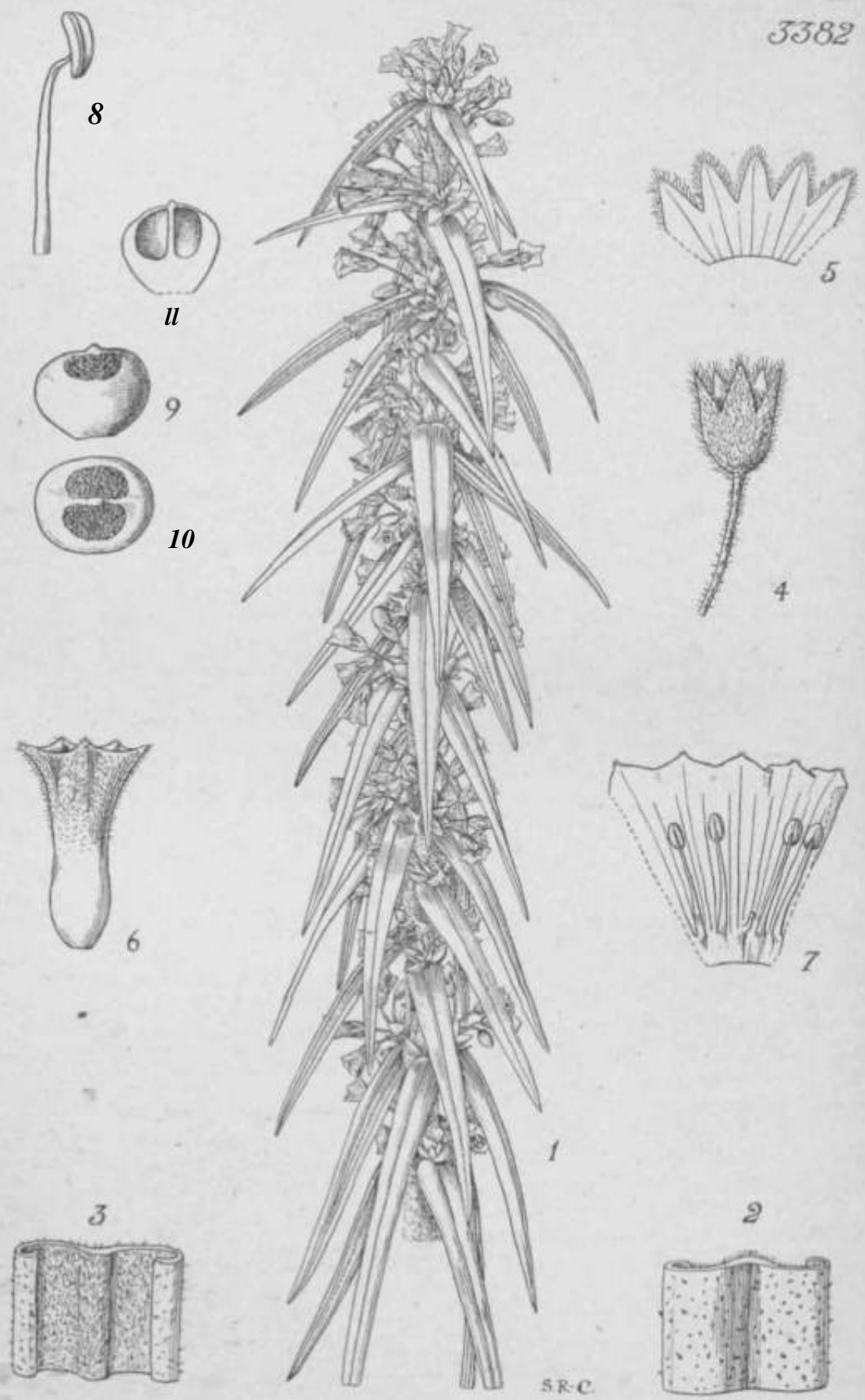
Because of its comparatively short staminal bundles and non-spicate inflorescence, this species must be excluded from the series *Callistemoneae* and placed under the series *Decussatae*, although it bears a strong resemblance to *M. blaerifolia* Turcz. of the former series. Among the *Decussatae* it has no close affinities, but seems to be best placed near *M. thymifolia* Sm., *M. violacea* Schau. and *M. divaricata* Turcz., from all of which it differs in the presence of bracts, the shape of the leaves and the colour of the flowers, as well as in habit.

*M. agathosmoides* is evidently rare, being known only from a single collection. It is a handsome shrub and more densely leafy than most species of this large genus. Its habitat lies on the northern fringe of the South-Western Australian province and the Coolgardie district of the Eremaea, a region very rich in endemic species. Most of these were first collected by James Drummond (in his fifth collection), but

the area is not even yet well known botanically. The extensive open heaths which link the Coolgardie and Eyre districts may be expected to yield a wealth of material for future collectors.

C. A. GARDNER.

FIG. 1, flowering branch, *natural size* ; 2, branchlet, x 4 ; 3, two pairs of leaves, from above, x 4 ; 4, leaf, x 6 ; 5, flower, with bracts, x 4 ; 6, longitudinal section of flower, petals and upper part of androecium removed, x 6 ; 7, petal, x 4 ; 8, staminal bundle, x 4 ; 9, ovary and base of style, x 6 ; 10, placenta and ovules, x 16 ; 11, cluster of fruits, *natural size* ; 12, longitudinal section of fruit, x 4.



S.R.C.

TABULA 3382.

ANTHOCERCIS AROMATIC A C. A. *Gardn.*

SOLANACEAE. Tribus SALPIGLOSSIEAE.

*A. aromatica* C. A. *Gardn.*; species nova, distinctissima, habitu et indumento *A. Odgersii* similis, sed multo minus ramosa, foliis multo angustioribus marginibus revolutis, antheris dithecis, corolla truncata. Ob antheras dithecas in Sect. *Euanthocerdde* locanda species, sed affinitas intima ceteris cum speciebus hujus sectionis plane nulla.

*Frutex* usque 1 m. altus, e basi ramosus, ramis erectis i simplicibus inde a basi foliosis tomento denso e pilis ramosis sistente vestitis. *Folia* sessilia, subconferta, patentia vel refleza, lineari-lanceolata usque linearia, obtuse acuminata, plerumque 2-4 cm. longa, sed in eadem planta valde varia, nunc fere 5 cm. longa, nunc vix ultra 1 cm. longa, 1-4 mm. lata, subglabra vel supra pilis rigidis breviter hispida, subtus pilis valde ramosis dense tomentosa, supra canaliculata, marginibus revolutis. *Flores* albi, in fasciculis axillaribus plerumque 4-7-natim dispositi, aut omnes longipedicellati aut 1-2 cuj usque fasciculi fere sessiles; bractee plerumque 4-7, basi cuj usque fasciculi sitae, ovatae, obtusae, concavae, tenuissimae, coloratae (? albae), margine molliter ciliatae; pedicelli in quoque fasciculo longitudine valde varii, 2-6 mm. longi, graciles, pilosi. *Calyx* 5-lobus, 3 mm. longus, usque ad medium divisus; tubus campanulatus; lobi aequales vel uno ceteris subbreviore, erecti, deltoidei, tenuiter herbacei vel subhyalini, ciliati, ut tubus pilis mollibus simplicibus pilis paucis glandulosis intermixtis vestiti. *Corolla* cylindrico-campanulata, prope medium aliquot constricta, superne infundibuliformis, breviter sinuato-lobata vel fere truncata, extra breviter pilosa, intus glabra, lineis violaceis longitudinalibus 15 notata, 5 mm. longa, apice 3 mm. lata. *Stamina* 4; filamenta prope basin corollae tubi inserta, basin versus leviter dilatata, 4 mm. longa, stamine quinto in staminodium breve dentiforme plerumque minutum redacto; antherae dithecae, primum cohaerentes, mox liberae, extrorsae, ovoideae, connectivo inconspicuo. *Ovarium* perfectum non visum, obovoideum, 2-loculare, stylo haud evoluto.

WESTERN AUSTRALIA. Coolgardie District: eight miles south of Newdegate, in sandy soil, in woodlands of *Eucalyptus Flocktoniae* Maiden and *E. kondininensis* Maiden et Blakely, close to the margin of a salt lake, fl. 14 Sept. 1926, C. A. *Gardner* 1760; Lake Cowan, Forrestania, in sandy soil, in woodlands of *Eucalyptus oleosa* F. Muell. and *E. Flocktoniae*, Sept. 1929, C. A. *Gardner* 2650 (type in State Herbarium, Western Australia; dupl. in Herb. Kew.); Lake King, in similar situations, Jan. 1935, C. A. *Gardner*.

This species may, when ripe fruit is known, be found to connect the genus *Isandra* with *Anthocercis*, for it combines the habit, inflorescence

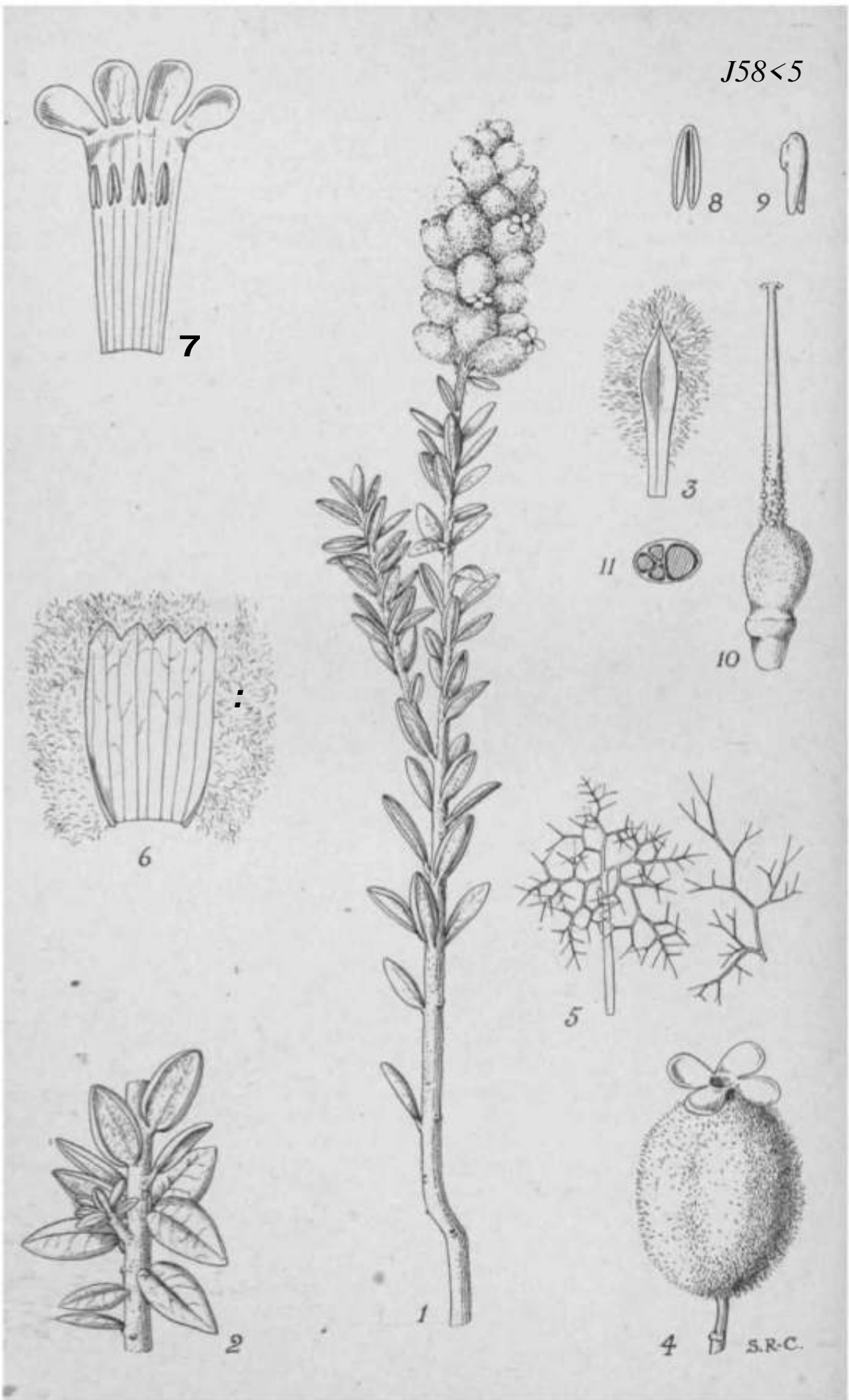
and truncate corolla of the former with the stamens of the latter. Both *Isandra* and *Anthocercis aromatica* are andromonoecious, and perfect pistils are rarely seen—in fact in the latter they are as yet unknown, although many specimens have been collected. In *Isandra*, which only occasionally bears perfect flowers, the style is elongated, but in the greater number it remains undeveloped, as in *Anthocercis aromatica*.

Among the species of *Anthocercis*, *A. aromatica* has no close affinities. It belongs, because of its 2-celled anthers, to the section *Euantkocercis*, but it has very little in common with *A. fascicuhta*, the only species of this section which has an indumentum, and corolla-lobes shorter than the tube. Among the species of sect. *Cyphanthera* it most resembles *A. Odgersii*, but the anthers are 1-celled in the latter. On the other hand, apart from the fact that it only has four perfect stamens, it has many characteristics of *Isandra Bancroftii*, but until perfect flowers or ripe fruit is obtained, it is as well to keep the species in *Anthocercis*.

Both *Isandra Bancroftii* and *Anthocercis aromatica* occur in the Coolgardie and Eastern Avon districts on alkaline soil.—C. A. GARDNER.

FIG. 1, flowering branch, *natural size*; 2, portion of upper surface of leaf, x 6; 3, lower surface of same, x 6; 4, calyx, x 4; 5, calyx, opened out, x 4; 6, corolla, x 4; 7, corolla, opened out, showing stamens and staminode, x 4; 8, stamen, x 8; 9, ovary, lateral view, x 16; 10, ovary, apical view, x 16; 11, longitudinal section of ovary, x 16.





## TABULA 3383.

### PHYSOPSIS SPICATA Turcz.

VERBENACEAE. Tribus PHYSOPSIEAE.

**P. spicata** Turcz. in Bull. Soc. Imp. Nat. Mosc. xxii. pt. 2 (no. in), 35 (1849) ; species erecta, virgata, foliis alternis, spicarum floribus distinctis nee in massam cylindricam compactis, bracteis angustis, calycibus ovoideo-globosis candidissimis.

*Frutex* erectus, virgatus, minus quam 1 m. altus ; rami erecti, pilis albis ramosis breviter dense lanato-tomentosi. *Folia* alterna vel irregulariter opposita, oblonga usque ovato-oblonga, breviter petiolata, obtusa, basi abrupte contracta, coriacea, marginibus arete revoluta, supra sparse pubescentia vel glabra, subtus dense albo-tomentosa, 6-15 mm. longa, 2-6 mm. lata ; petioli 0 • 7-2 mm. longi. *Spicae* terminales, densae, breviter pedunculatae, 3-5-4 cm. longae, 1-5 cm. latae, rhachi tomentosa, bractea sub quoque flore singula late lineari acuminata concava intus glabra extra laxe tomentosa. *Calyx* cylindricus, lana densa plumosa candidissima massam ovoideam efformante occultus, 5 mm. longus, pilis lanosis plerumque 2 mm. longis ; lobi 4, breves, triangulari-deltoidei, obtusiusculi, pilis lanosis ramosis dense ciliati, tubo intus glabro venis conspicuis anastomosantibus. *Corolla* 6\*5 mm. longa, tubo calyci subaequilongus, lobis oblongis obtusis patentibus flavis 1 • 5 mm. longis 1 mm. latis. *Stamina* 4, supra medium tubum inserta, cum lobis corollae alterna, filamentis brevissimis gracillimis, antheris dithecis, thecis dimidio inferiore liberis rimis longitudinalibus dehiscentibus, connectivo oblongo dorsali. *Ovarium* primum ovoideum, demum globosum, dimidio superiore pilosum, 4-loculare, loculis 1-ovulatis, ovulis erectis. *Stylus* excentricus, crassus, apicem versus attenuatus, sparse pubescens, breviter 2-lobus. *Fructus* ignotus.

WESTERN AUSTRALIA. Swan River, 1848, *J. Drummond* Coll. IV. n. 234 (type) ; sand heaths, Hill River, Irwin District, fl. Dec. and Jan., 1931, *C. A. Gardner* 2998.

The genus *Physopsis*, hitherto monotypic, has, in common with *Newcastlia* and most species of *Lachnostachys*, spicate inflorescences of densely woolly flowers in which the stamens are strictly isomerous with the calyx- and corolla-lobes. In both *Newcastlia* and *Lachnostachys* this number varies from 7-8, often in the same species, and sometimes on the same individual, whereas in *Physopsis* it is always 4. The species of all of these genera are psammophilous and are characteristic of both the deserts of the western centre of Australia and the temperate sand-heaths of South Western Australia, the latter being their original habitat. Indeed, with the exception of three species of *Newcastlia*, the members of the three genera, and the allied *Mallophora*, are endemic

in Western Australia, and all except the species of *Newcastlia* are peculiar to the South Western Province of that State. The densely woolly indumentum of interlocked hairs of branches, leaves and flowers is usually a feature of xerophilous plants ; it is certainly true of many of the species of the arid interior of Australia ; but, curiously enough, many species of *Lachnostachys* with exactly similar vestiture inhabit sandy spots which are often wet or swampy in the winter months of the year.—C. A. GARDNER.

FIG. 1, flowering branch, *natural size*; 2, part of another branch, with broader leaves, *natural size*; 3, bract, x 4; 4, flower, x 4; 5, branched hairs from calyx, x 20; 6, calyx, opened out, x 6; 7, corolla, opened out, x 6; 8 and 9, anthers, front and side views, x 12; 10, gynoecium, x 12; 11, transverse section of ovary, x 12.

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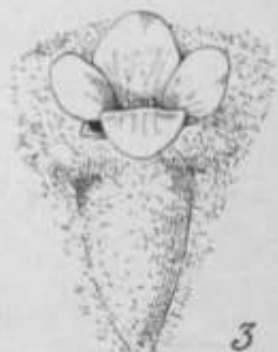
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## TABULA 3384.

### PHYSOPSIS LACHNOSTACHYA C. A. Gardn.

VERBENACEAE. Tribus PHYSOPSIEAE.

**P. lachnostachya** C. A. Gardn.; species nova, *P. spicatae* Turcz. affinis, foliis minoribus sessilibus, spicis brevioribus densioribus, bracteis latioribus rhomboideis nee linearibus, floribus minoribus, calycis lobis longioribus, antheris latioribus, stylo brevi gracili, ovario glabro distincta.

*Frutex* circiter 5 dm. altus, ramis erectis vel patentibus demum erectis, cano-tomentosis, ramulis fulvo-tomentosis. *Folia* opposita, decussata, ovato-lanceolata usque ovato-oblonga, 7-13 mm. longa, 3-5 mm. lata, sessilia, obtusa, coriacea, supra fusco-viridia, glabra, nervis obscuris, levissime 1-sulcata, marginibus valde revolutis, subtus pilis plumosis tomentosa, juniora fulva, suprema plerumque lanato-ciliata. *Spicae* terminales, cylindricae, densae, 2-3-2-8 cm. longae, 1 cm. latae, albo-lanatae, sessiles; bractee late ovatae vel ovato-orbiculares, petiolatae, 2-5 mm. longae, 3 mm. latae, extra atque marginibus lanato-plumosae, intus glabrae. *Calyx* obovoideo-tubularis vel anguste urceolatus, 3 mm. longus, extra dense lanato-plumosus, sordide albus, lobis ovato-triangularibus acutiusculis 1 mm. longis ut tubus intus glabris. *Corollae tubus* obovoideus, calyci subaequilongus, lobis semiorbicularibus vel breviter oblongis obtusis flavis glabris, tubo pilis paucis sparsis intus prope basin exceptis glabro. *Filamenta* filiformia, supra medium tubum affixa, quam antherae latae leviter longiora. *Ovarium* late obovoideum, glabrum vel superficie granulosum, 4-loculare, loculis 1-ovulatis, ovulo unico tantum maturescente (ceteris abortis) sub fructu totum ovarium implente. *Stylus* brevissimus et gracillimus, breviter bilobus.

WESTERN AUSTRALIA. Stirling District: gravelly hills between Dumbleyung and Kukerin, in sandy lateritic soil, fl. Sept., Oct. and Nov., C. A. Gardner.—C. A. GARDNER.

FIG. 1, flowering branch, natural size; 2, bract, from within, x 6; 3, flower, x 6; 4, calyx, opened out, x 6; 5, branched hairs from calyx, x 20; 6, corolla, opened out, x 6; 7, stamens, front and back views, x 12; 8, gynoecium, x 12; 9, fruiting calyx, x 6; 10, fruit, x 8.



## TABULA 3385.

### PLECTRACHNE PUNGENS (R. Br.) C. E. Hubbard.

GRAMINEAE. Tribus FESTUCEAE (sensu lato).

*P. pungens* {R. Br.) C. E. Hubbard, comb. nov. *Triraphis pungens* JR. Br. Prodr. Fl. Nov. Holl. 185 (1810) ; Benth. Fl. Austral, vii. 604 (1878), partim ; F. M. Bailey, Queensl. Fl. vi. 1910 (1902); Ewart et Davies, Fl. North. Territ. 48 (1917), partim.—Affinis *P. Schinzii* Henrard, a qua spiculis minoribus, glumis brevioribus 3-5-nerviis, lemmatibus et aristis brevioribus differt.

*Gramen* perenne, 50-80 cm. altum, dense caespitosum, caespitibus horridis, innovationibus numerosis. *Culmi* erecti, graciles, simplices vel ramosi, 2-4-nodes, rigidi, teretes, glabri, laeves. *Foliorum vaginae* nonnunquam viscosae, laeves, marginibus apicem versus ciliatae, ore late rotundato pilis erectis usque ad 6 mm. longis dense barbatae, ceterum glabrae, basales coriaceae, dense imbricatae, nitentes, demum brunneae, plus minusve carinatae vel teretes, ceterae internodiis breviores, arete appressae, teretes; ligulae ad seriem densam ciliorum redactae; laminae setaceae, valde pungentes, 10-25 cm. longae, arete involuto-complicatae, 0.5-1.3 mm. diametro, rigidae, oblique vel horizontaliter patentes, virides, basin versus nonnunquam viscosae, supra pilis minutissimis dense obtectae, subtus laeves, marginibus laxè scabridae. *Panicula* lanceolata vel anguste oblonga, contracta vel plus minusve laxa, 14-25 cm. longa; rhachis scaberula vel inferne laevis; rami solitarii, simplices, adscendentes, laxè spiculati, flexuosi, tenuiter filiformes vel capillares, scaberuli, basi pubescentes; pedicelli scaberuli, laterales 2-10 mm. longi, terminates usque ad 1.6 cm. longi. *Spiculae* oblongae vel demum obovato-oblongae, 7-12 mm. longae (aristis exclusis), pallidae. *Glumae* subaequales, lanceolato-oblongae (explanatae), acutae vel obtusae, nonnunquam mucronatae vel aristulato-acuminatae, supra medium carinatae, tenuiter papyraceae vel scariosae, niargines et apicem versus minute asperulae vel fere laeves; inferior 9-12 mm. longa, 5-nervis; superior 8-11 mm. longa, 3- raro 5-nervis. *Anthoeda* inferiora 2-4 fertilia, cetera sterilia et ad aristas fere vel omnino redacta; rhachillae internodia 1.5-2 mm. longa, glabra vel minute pubescentia; callus acutus vel subobtusus, usque ad 0.5 mm. longus, brevissime barbatus. *Lemmata fertilia* latissima (explanata), dorso rotundata, infra aristas linea transversa conspicua praedita, 2-3 mm. longa (aristis exclusis), coriacea, obscure 3-nervia, pilis brevibus appressis pubescentia; aristae erectae vel recurvatae, basi dilatatae et anguste alatae, usque ad 1 mm. latae, superne in setam tenuem attenuatae, 3-nerves, marginibus scaberulae, laterales usque ad 12 mm. et mediae usque ad 16 mm. longae. *Paleae* oblanceolato-oblongae vel anguste oblongae, obtusae vel truncatae, demum fissae, 3-3.5 mm. longae, bicarinatae, glabrae, carina supra medium scaberulae vel •

laeves, supra duas partes inferiores coriaceas abrupte tenuiores et delicate hyalinae. *Antherae* 2-3-5 mm. longae.

QUEENSLAND. Burke District: island in the Gulf of Carpentaria, *Brown* 6247 (Herb. Kew., Herb. Mus. Brit., Herb. Berol.).

NORTHERN TERRITORY. Port Darwin, *Schultz* s.n. (Herb. Kew.); *ibid.*, 16 Nov. 1869, *Schultz* 654 (Herb. Berol.).

var. **callosum** *C. E. Hubbard*; varietas nova, lemmatibus infra aristas costa transversa callosa praeditis, costa plerumque ad margines lemmatis in auriculis callosis carinas paleae amplectentibus producta, paleis 4-5 mm. longis infra medium coriaceis supra abrupte tenuioribus et hyalinis a typo recedens.

QUEENSLAND. Burke District: Settlement Creek, sandstone ridges, Feb. 1923, *Brass* 315 (Herb. Kew., Herb. Brisban.).

NORTHERN TERRITORY. Victoria River, May 1856, *Mueller*; Sea (Ellesmere) Range, Dec. 1855, *Mueller*.

WESTERN AUSTRALIA. East Kimberley: King River, Oct. 1906, *Fitzgerald* 1669 (K. 287) (Herb. Kew., Herb. Perth.).

Specimens of this variety were referred to *Triraphis pungens* R. Br. by *Mueller* (Fragm. Phyt. Austral, viii. 108: 1873), *Bentham* (Fl. Austral, vii. 604: 1878), *Ewart and Davies* (Fl. North. Territ. 48: 1917), and *Fitzgerald* (in Journ. Roy. Soc. W. Austral, iii. 116: 1918).

The genus *Plectrachne* *Henrard* (in Vierteljahrsschr. Nat. Ges. Zürich, lxxiv. 132: 1929)—based on a single species, *P. Schinzii* *Henrard*, from the Northern Territory of Australia—is now known to comprise about twelve species, an account of which will be published elsewhere. Several of these species \* were included under *Triraphis* R. Br. by *Bentham* (Fl. Austral, vii. 603: 1878) and other botanists.

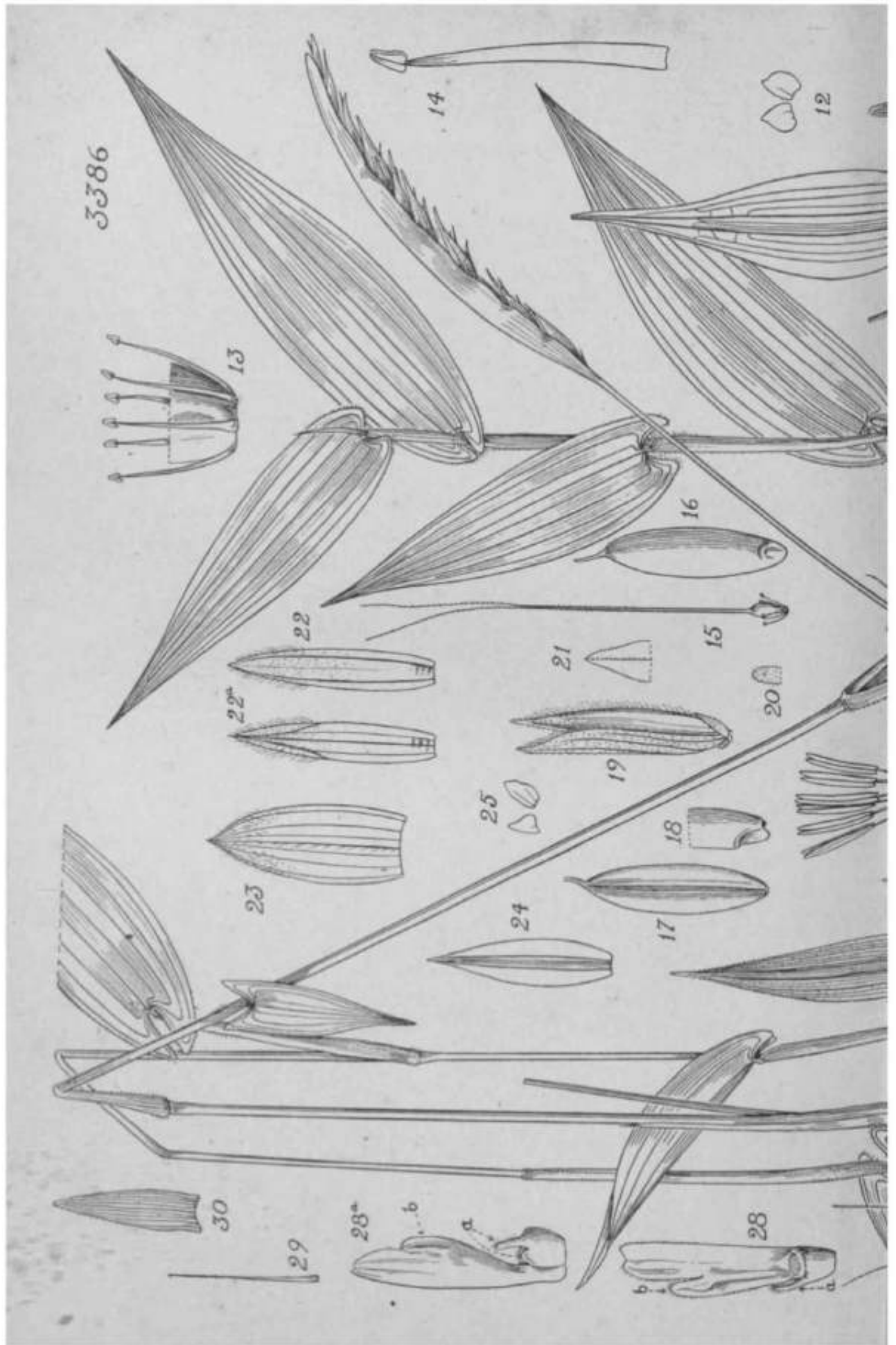
C. E. HUBBARD.

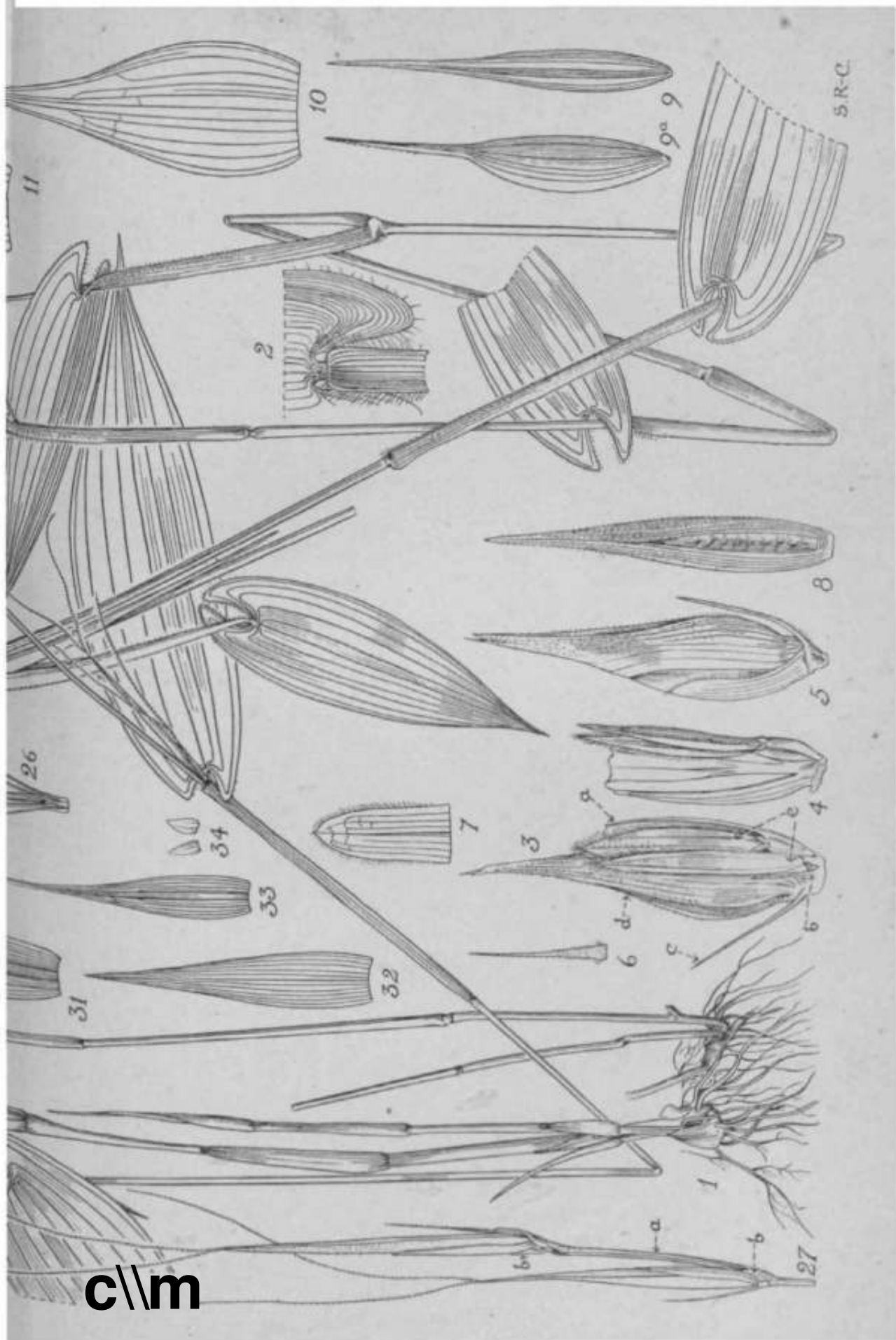
FIG. 1, part of plant, *natural size*; 2 and 3, junction of leaf-blade and sheath, to show ligule and bearded mouth of sheath, x 6; 4, spikelet, x 4; 5, lower glume, x 6; 6, upper glume, x 6; 7, floret and internode of rhachilla, lateral view, x 4; 8, lemma flattened, x 6; 9, palea, x 6; 10, lodicules, x 8; 11, flower, x 8; 12, sterile florets, X 4.

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\* ***Plectrachne bromoides*** (*F. Muell.*) *C. E. Hubbard*, comb. nov. (*Triraphis bromoides* *F. Muell.*). ***Plectrachne danthonioides*** (*F. Muell.*) *C. E. Hubbard*, comb. nov. (*Triraphis danthonioides* *F. Muell.*). ***Plectrachne rigidissima*** (*Pilger*) *C. E. Hubbard*, comb. nov. (*Triraphis rigidissima* *Pilger*).







c\\m

## TABULA 3386.

### PHYI/LORACHIS SAGITTATA *Trimen.*

GBAMINEAE. Tribus PHYLLOBACHIEAE.

**Phyllorachis** *Trimen* in Journ. Bot. xvii. 354 (1879); Benth. in Journ. Linn. Soc, Bot. xix. 50 (1881), et in Benth. et Hook. f. Gen. Pl. iii. 1078, 1108 (1883); Hack, in Engl. et Prantl, Nat. Pflanzenf. ii. Abt. 2, 38 (1887) et True Grasses, 72, 83 (1896); Baillon, Hist. Pl. xii. 311 (1894); Rendle in Cat. Afr. PL Welw. ii. 256 (1899); Chase in Proc. Biol. Soc. Wash. xxiv. 108 (1911); Stapf et Hubbard in Prain, Fl. Trop. Afr. ix. 1089 (1934); Pilger in Notizbl. Bot. Gart. Berlin, xii. 701 (1935); genus *Humbertochloae* A. Camus et Stapf affinis, sed inflorescentiis bisexualibus, racemis 3-4-spiculatis, rhachilla supra anthoecium superum haud producta, spiculae femineae lemmate infero dorso sulcato diftert.

*Spiculae* unisexuales, heteromorphae, masculae et femineae numerosae in rhachibus secundariis dilatatis inflorescentiarum earundem secundarum terminalium, femineae nonnunquam in inflorescentia paucispiculata in axillis vaginarum superiorum ortae; rhachilla supra glumas et inter anthoecia continua, supra anthoecium superum haud producta; anthoecia 2, infero ad lemma redacto, supero in spiculis femineis \$ staminibus vestigialibus in spiculis masculis <\$ ovario vestigiali.

**Inflorescentiae terminatae** :—*Spiculae muticae, abaxiales, in rhachibus* secundariis persistentes, subsessiles vel brevissime pedicellatae, in racemis spiciformibus imbricatis alternis secundis brevibus 3-4-spiculatis (spicula infima \$, ceteris (?) dispositae, racemis sessilibus adaxialibus in costa media incrassata rhacheos primariae spathiformis plicatae foliaceae lato-alatae ortis maturitate basi disarticulantibus. *Spiculae femineae* basi racemorum subsessiles, masculis multo majores, a latere visae oblique lanceolatae, acutae. *Glumae* spicula multo breviores; inferior subulata vel setiformis, rigida, enervis; superior carinata, ovato-oblonga vel oblonga (explanata), plus minusve acuta, tertiam vel dimidiam partem spiculae aequans, firme membranacea, 5-9-nervis. *Anthoecium inferum*: lemma anthoecium superum fere amplectens, late lanceolatum vel ellipticum (explanatum), spiculae aequilongum vel ea paullo brevius, dorso longitudinaliter sulcatum, incrassatum, rigidissimum, multinerve. *Anthoecium superum*: lemma a latere visum oblongo-lanceolatum, oblique rostrato-acuminatum, elliptico-ovatum vel ovatum (explanatum), apice obtusum vel acutum, spiculae aequilongum, dorso inferne obtuse carinatum, marginibus incurvis, tenuiter coriaceum, 11-17-nervis, nervis superne anastomosantibus, laeve vel fere laeve; palea lanceolata, acuminata, lemmati subaequilongae, tenuiter coriacea, 8-12-nervis, inter nervos duos primarios dorso longitudinaliter leviter sulcata. *Lodiculae* 2, hyalinae. *Stamina* 6, vestigialia. *Ovarium* glabrum; styli terminales, connati; stigmata 2, breviter plumosa, ex apice anthoecii exserta. *Caryopsis* elliptico-oblonga, inter lemma et paleam libera, leviter sulcata; embryo **parva** r

hilum lineare, caryopsi aequilongum. *Spiculae masculae* brevissime pedicellatae, a latere visae lanceolato-oblongae vel anguste oblongae. *Glumae* spicula multo breviores, inaequales; inferior brevissima, ovata vel oblonga, rigida, enervis; superior anguste ovata, acuta, tertiam partem spiculae aequans vel paullo brevior, membranacea, 1-nervis. *Anthoecium inferum*: lemma oblongo-lanceolatum vel oblongum, obtusum vel acutum, spiculae aequilongum vel ea paullo brevius, dorso plus minusve applanatum, marginibus angustis inflexis, coriaceum, 3-nerve, nervis lateralibus prominentibus. *Anthoecium superum*: lemma oblongum vel oblongo-ovatum (explanatum), subacutum, spiculae aequilongum, acute carinatum, marginibus inflexis, tenuiter coriaceum, 5-7-nerve; palea elliptica vel oblonga (explanata), acuta, lemmati subaequilonga, tenuiter coriacea, 2-nervis. *Lodiculae* 2, hyalinae. *Stamina* 6; antherae lineari-oblongae. *Ovarium* vestigiale.

*Inflorescentiae axillares* secundae, 1-2-spiculatae, in pedunculis gracillimis ortae. *Spiculae* muticae, abaxiales, anguste lanceolatae, acuminatae, iis inflorescentiarum terminalium plerumque multo longiores, in rhachibus secundariis brevibus racemi secundi 1-spiculati brevissime pedicellatae. *Glumae* spicula multo breviores; inferior setiformis, rigida; superior lanceolato-oblonga (explanata), subacuta, dimidiam partem spiculae aequans vel paullo brevior, multinervis, firme membranacea. *Anthoecium inferum*: lemma anthoecium superum amplectens, lanceolatum (explanatum), acutum, spiculae aequilongum, herbaceo-coriaceum, multinerve. *Anthoecium superum*: lemma lanceolatum (explanatum), acuminatum, acutum, spiculae aequilongum, tenuiter coriaceum, marginibus inflexis, 13-nerve; palea lemmati similis, sed 10-nervis; stamina vestigialia 6; stigmata longissima.

*Gramina* perennia; culmi graciles, teretes, superne ramosi, multinodes; ligulae ad seriem ciliorum brevissimorum redactae; laminae brevissime petiolatae, patentes vel demum deflexae, latae, asymmetricae, basi auriculatae, multinerves; inflorescentiae terminatae spiciformes, racemos usque 20 gerentes, erectae; rhachis primaria herbacea, tenuiter multinervosa, alis latis tenuibus racemos plus minusve amplectentibus; racemi contigui; rhachis secundaria indurata, supra spiculas producta, basi spiculae vestigium setiforme vel sub ula turn inter spiculam femineam et masculam et in margine supra basin spiculam masculam unam (raro duas) gerens; inflorescentiae axillares rhachi gracillima praeditae; rhachis secundaria eis inflorescentiae terminalis similis, sed minor et basi spiculae vestigia minuta duo et spiculam femineam gerens.

Species 1, Africae tropicae australis incola.

*P. sagittata* Trimen in Journ. Bot. xvii. 355, t. 205 (1879); Durand et Schinz, Consp. Fl. Afr. v. 787 (1894); Rendle in Cat. Afr. PL Welw. ii. 256 (1899); Stapf et Hubbard in Prain, FL Trop. Afr. ix. 1089 (1934); Pilger in Notizbl. Bot. Gart. Berlin, xii. 701 (1935).

*Innovationes* extravaginales, cataphyllis brevibus stramineis coriacejs gerentes. *Culmi* erecti vel basi geniculati, 70-105 cm. alti, graciles,

rigidiusculi, supra medium ramosi, 7-10-nodes, laeves, glabri vel nodos et inflorescentiam versus pubescentes. *Foliorum vaginae* internodiis demum breviores, teretes vel superne carinatae, striatae, marginibus ciliatae, ceterum glabrae et laeves vel pilis brevibus e tuberculis ortis sparse hispidulae vel laxissime tuberculatae; pseudo-petioli 1-1.5 mm. longi; laminae late lanceolatae vel oblongo-lanceolatae, acuminatae, apice acutae vel subacutae, basi auriculatae, auriculis obtusis vel acutis usque ad 1 cm. longis, 4-12 cm. longae, usque ad 2-5 cm. latae, glabrae vel basi sparse ciliatae, in nervis primariis (7-9) nonnunquam sparsissime tuberculatae vel minute spinuliferae, marginibus spinuloso-scabridae, tenuissime nervosae. *Inflorescentiae terminales* usque ad 12 cm. longae, strictae vel leviter curvatae; rhachis primaria usque ad 9 mm. lata (explanata), viridis, glabra vel costa media pubescens, laevis; racemi 12-20; rhachis secundaria dorso leviter convexa vel plana, oblonga, truncata, apice minute lobata, 7-8 mm. longa, 2-3 mm. lata, dorso scaberula vel laevis, basi spiculae vestigium setiforme scaberulum  $0.5^3$  mm. longum gerens. *Spiculae femineae* 10-16 mm. longae; gluma inferior 1-3-6 mm. longa, scaberula vel basi hispidula; gluma superior 4-6 mm. longa, marginibus ciliolata; lemma anthoecii inferi supra basin obscure scaberulum vel scabridum et minute spinuliferum atque tuberculatum, dorso inter nervos nonnunquam rugulosum; lemma anthoecii superi glabrum et laeve vel carina apicem versus scabridum; stamina vestigialia 1.5 mm. longa; caryopsis 5.5-7 mm. longa. *Spiculae masculae* 6-8 mm. longae; pedicelli 0.5-1 mm. longi; gluma inferior usque ad 0.5 mm. longa; gluma superior 1.5-2.5 mm. longa; lemma anthoecii inferi scaberulum vel apicem versus spinuloso-ciliolatum; lemma anthoecii superi carina rigide ciliolatum, apicem versus scabridum; antherae 3 mm. longae. *Inflorescentiae axillares*: pedunculus pubescens, circiter 3-6 cm. longus; rhachis primaria angustissime alata, usque ad 2-5 cm. longa, 1 mm. lata (explanata), dorso pubescens, supra spiculam terminalem usque ad 5 mm. producta; rhachis secundaria 2-3 mm. longa. *Spiculae* 9-25 mm. longae; gluma inferior 1-5-11 mm. longa, scaberula; gluma superior 6-5-11 mm. longa, ciliolata, 15-nervis; lemma anthoecii inferi superne tuberculatum et scabro-hispidulum, circiter 19-nerve; lemma anthoecii superi apicem versus scabridum et tuberculatum; stigmata usque ad 3 cm. longa.

ANGOLA. Pungo Andongo; in sandy woods on the larger island of Calemba, in the River Cuanza, March 1857, *Welwitsch* 7399 (Herb. Mus. Brit.).

TANGANYIKA TERRITORY. Lindi District: 130 km. west of Lindi, 450 m., in bamboo wood, near water, 19 April 1935, *Schlieben* 6305 (Herb. Berol. et Herb. Kew.).

PORTUGUESE EAST AFRICA. Lions Creek, 300 m., 8 April 1898, *Schlechter* 12211 (Herb. Berol.).

*Phyllorachis* \* has been assigned to various tribes of the *Gramineae* by the few botanists who have had material available for study. General

• Spelt *Phyllorrhachis* by Bentham (Journ. Linn. Soc. Bot. xix. 50: 1881), and *Phyllorrhachis* by Stapf (Prain, Fl. Trop. Afr. ix. 16: 1917).

Munro, to whom Trimen sent fragments for examination, was inclined to place it in the *Chlorideae* as "somewhat approaching *Spartina* in its style and large loose caryopsis." Trimen, on the other hand, although agreeing with this proposal, suggested that it bore certain resemblances to the *Pkalarideae* and *Olyreae*. A few years later, Bentham, in his paper on the *Gramineae* (Journ. Linn. Soc, Bot. xix. 50 : 1881) and in his account of the family in the *Genera Plantarum* (iii. 1078, 1108 : 1883), referred *Phyllorachis* to the *Paniceae*, placing it in his *Chamaeraphis* group—a miscellaneous collection of genera comprising *Echino-laena*, *Chamaeraphis*, *Spartina*, *Xerochloa*, *Stenotaphrum* and *Thuarea*. It was also treated as a member of the *Paniceae* by Hackel (Engl. u. Prantl, Nat. Pflanzenf. ii. Abt. 2, 38 : 1887) and by Chase (Proc. Biol. Soc. Wash. xxiv. 108 : 1911), who grouped it with other genera possessing heteromorphous or unisexual spikelets. In his enumeration of Welwitsch's Angolan grasses (Cat. Afr. PL Welw. ii. 256 : 1899), Rendle included *Phyllorachis* with *Olyra* and *Leptaspis* in the *Phareae*, being influenced no doubt by its habit and unisexual spikelets. Stapf had occasion to study *Phyllorachis* when preparing the key to the genera of tropical African grasses, but apparently he had for examination only the fragments previously dissected by Munro and Trimen. From a comparison of *Phyllorachis* with *Trachys*, Stapf came to the conclusion that the two genera should be associated, and accordingly in his key to the genera of the *Paniceae* (Prain, FL Trop. Afr. ix. 16 : 1917) he placed *Phyllorachis* in the subordinate group *Trachydastrae*. When the generic description of *Phyllorachis* was prepared for the *Flora of Tropical Africa* (ix. 1089 : 1934), another raceme from Welwitsch's plant was available for dissection. This permitted a more complete account of the genus to be published, especially in regard to the structure and sexes of the spikelets and the number of stamens. Since then Schlieben has collected excellent material of the genus in Tanganyika Territory, enabling Pilger (Notizbl. Bot. Gart. Berlin, xii. 701 : 1935) to confirm and add to the description given in the *Flora*. From Schlieben's specimens the accompanying plate has been prepared, a complete plant having been presented to Kew by the Director of the Berlin Herbarium. It has been possible now to make a detailed study of the male and female spikelets in all stages of development and to compare them with those of the closely related genus *Humbertochloa*, a species of which is figured in the next plate (tab. 3387).

\* When describing *Phyllorachis* nearly sixty years ago, Trimen stated that its affinities were by no means obvious. The same remark might be made to-day regarding it and *Humbertochloa*, for the question of their relationship to other grass genera is still a matter of conjecture. It is true that they offer resemblances in habit or in structure to genera in the various tribes to which they have been referred, but such similarities either are merely superficial, or appear to be examples of parallel development. In such a natural family as the *Gramineae*, it would seem unwise to place absolute reliance on external morphological resemblances, for it frequently happens that species with similar facies differ considerably in their anatomy and cytology (e.g. species of *Poa*

and *Eragrostis*). Thus, although *Phyllorachis* and *Humbertochloa* have been included usually in the tribe *Panicaceae*, because of certain resemblances in spikelet structure, the anatomy of their leaf-blades is of the festucoid \* (not panicoid) type (type II of Avdulov) and their caryopses contain compound instead of simple starch grains. For these and other reasons mentioned below, it has been found necessary to place *Phyllorachis* and *Humbertochloa* in a new tribe *Phyllorachieae*.

*Phyllorachieae* C. E. Hubbard, tribus nova. Gramina perennia ; culmi rigidi, superne ramosi et foliati; ligulae ad seriem ciliorum redactae ; foliorum laminae brevissime petiolatae, late lanceolatae, oblongo-lanceolatae, elliptico-ovatae vel oblongo-ellipticae, basi auriculatae ; inflorescentiae spiciformes, secundae ; rhachis primaria spathiformis, lato-alata, plicata, racemos paucispiculatos secundos maturitate basi disarticulantes gerens et plus minusve amplectens ; spiculae unisexuales, heteromorphae, muticae, femineae masculis multo majores ; glumae lemmatibus multo breviores ; anthoecia 2, infero ad lemma redacto, supero vel § staminibus vestigialibus vel <J ovario vestigiali; lemma anthoecii inferi in spicula feminea rigidissimum, incrassatum, anthoecio supero plus minusve amplectens ; lemma anthoecii superi tenuiter coriaceum vel chartaceum ; lodiculae 2 ; ovarium glabrum ; styli connati; stigmata 2, plumosa ; stamina 6-4 (? rarissime 3) ; caryopsis inter lemma et palea libera ; hilum lineare, caryopsi aequilongum.— Genera 2 : *Phyllorachis* Trimen (typus); *Humbertochloa* A. Camus et Stapf.

The more important differences separating the *Phyllorachieae* from the *Panicaceae* are tabulated below :—

PHYLLORACHIEAE.	PANICEAE.
1. Spikelets unisexual, heteromorphous.	1. Spikelets usually bisexual and similar.
2. Lower lemma of the female spikelet rigid and thickened, firmer than that of the upper floret.	2. Lower lemma usually thinner than the upper, rarely similar in texture.
3. Stamens 6-4 (? very rarely 3).	3. Stamens 3 or less.
4. Rhachilla sometimes produced beyond the upper floret.	4. Rhachilla usually not produced beyond the upper floret.
5. Caryopsis with a linear hilum equalling it in length.	5. Caryopsis usually with a punctiform or small basal hilum.
6. Starch grains compound.	6. Starch grains simple.
7. Leaf-blades with festucoid type of anatomy.	7. Leaf-blades with panicoid type of anatomy.

The tribe *Panicaceae*, as accepted here, excludes a number of genera with unisexual spikelets which were placed in it by Bentham (Gen. PL iii. 1078). Several of these genera are now referred to the *Olyreae*

\* See Prat in Ann. Sci. Nat., Bot. Sér. 10, xviii. 181 (1936), and Avdulov in Bull. Appl. Bot. Genet. & Pl.-Breed., Leningrad, Suppl. 44, 35 (1931).

(*Olyra*, *Raddia*, *Lithachne*) and the remainder to the *Pkareae* (*Pharus*, *Leptaspis*). The only genus retained in the *Paniceae*, with the spikelets definitely unisexual, is *Spinifex*, in which the male and female spikelets are borne on different plants. *Spinifex* is typically panicoid in other respects, and may be distinguished from the *Phylhrachieae* by its narrow leaf-blades, by its inflorescence and by characters nos. 2-7 listed above. The *Olyreae* and *Phareae* are readily separable from the *Phyllorachieae* by their strictly 1-flowered spikelets, whilst the former tribe also differs in the glumes exceeding the lemma in the female spikelets, and the latter in the nervation of its leaf-blades, paniculate inflorescence, and trifold style.

The lower lemma in *Phyllorachis* and *Humbertochha* becomes very hard and rigid when dry, especially in the female spikelets, where it tightly embraces and protects the upper floret. In the majority of the *Paniceae* the lower lemma remains membranous whilst the upper becomes indurated. There are a few exceptions to this rule, however, in which both lemmas are similar in texture (e.g. *Isachne* spp.) or where the lower is firmer than the upper (e.g. *Trachys*). *Trachys* is a genus of creeping maritime grasses which was grouped with *Phyllorachis* by Stapf. It differs from the genera of the *Phyllorachieae* in habit, and by its articulated primary rhachis, densely clustered and hermaphrodite spikelets, paleate lower floret, 3 anthers, and small basal hilum of the caryopsis.

In all the florets of *Phyllorachis* so far examined, the number of stamens—perfect or vestigial—is 6, whereas in *Humbertochha Greenwayi* one stamen is occasionally suppressed. When describing *Humbertochha bambusiuscula*, A. Camus gave 3 as the number of stamens in that species and used it as a character for distinguishing her new genus from *Phyllorachis*. Several years ago, during a comparison of the two genera for Mile. Camus, male and female spikelets of *Humbertochha bambusiuscula* were dissected and a note was made that they contained respectively 3 perfect or 3 vestigial stamens. . There is a possibility, however, that in the male spikelet 2 stamens adhered very closely and were counted as 1, whilst in the female spikelet the vestigial stamens are so very small and delicate that it is difficult to remove them from the base of the ovary and a mistake might easily have been made regarding their number. Further spikelets from the same material (*Perrier de la Bdthie* 12817) have now been examined ; in one female spikelet 5 vestigial stamens and in each of two male spikelets from separate racemes 4 staminal filaments have been discovered. Similarly, in a specimen collected by Humbert (no. 12365), 4 stamens were found in each of 7 male spikelets taken from 2 racemes. From this investigation the writer has come to the conclusion that the number of stamens per floret in *H. bambusiuscula* is usually 4 or more.

The prolongation of the rhachilla beyond the upper floret is well developed in the female spikelets of both species of *Humbertochha*, and indicates that the upper floret is not terminal. In the *Paniceae*, on the other hand, only three examples are known to the writer in which



the rhachilla appears to be produced beyond the upper floret. In the genus *Oryzidium* and in one spikelet of a species of *Isachne*, a genus not typical of the *Paniceae*, a minute prolongation has been noticed. In the third example, *Pennisetum setaceum* (Forsk.) Chiov., a bristle somewhat resembling one of the involucreal bristles is found quite frequently at the base of the lemma, but *not* arising between the lemma and palea as in *Humbertochloa*. It is very probable that this structure is not analogous to the prolongation of the rhachilla in other grasses.

The hilum in the caryopsis of most genera of grasses, and sometimes in whole tribes, is remarkably uniform in shape and size. For example, in the *Oryzeae*, *Olyreae*, *Phareae*, *Hordeae* (sensu stricto), *Streptochaeteae* and *Lygeae*, it is linear and equal in length to the caryopsis, as in the *Phyllorachieae*. On the other hand, in the *Paniceae*, it is basal, and punctiform or usually very small, except in *Acroceras* where it may be linear and about half the length of or rarely as long as the caryopsis. Similarly, the type of starch grain \* contained in the caryopsis is characteristic of whole tribes. In the *Paniceae*, *Maydeae*, *Hordeae* (sensu stricto), etc., for example, the starch grains are simple, whereas in the *Oryzeae*, *Phyllorachieae*, etc., they are composed of numerous angular granules. In *Phyllorachis* they are somewhat similar to those of *Oryza*, but the individual granules are smaller.

The palea in the *Gramineae* is typically 2-nerved, but in a number of genera and species it deviates from this type and may or may not possess a midrib or a varying number of lateral nerves. Thus, although the paleas are mostly 2-nerved in *Humbertochloa*, 3-nerved paleas in the male spikelets and 4-6-nerved paleas in the female spikelets have been noticed, whilst in *Phyllorachis* the palea is 2-nerved in the male spikelets and 8-12-nerved in the female spikelets. In those cases where the number of nerves was 4 or more, 2 nerves were found to be more prominent than the remainder and correspond to the 2 keel nerves of the normal palea.

The racemes of both *Phyllorachis* and *Humbertochloa* have suffered considerable reduction, not only in the number and sexes of their spikelets, but probably also in length. The most complete raceme examined was found in a series taken from a male inflorescence of *H. bambusiuscula*. The axis of this raceme (secondary rhachis) bore a cluster of 3 male spikelets at its base and one spikelet on its margin higher up. There were also present on the margins some minute vestiges of spikelets. In the next of the series the median basal spikelet and the upper lateral spikelet had been replaced by minute brown vestiges of spikelets. In the third stage of reduction (tab. 3387, fig. 18) the second spikelet of the basal cluster had disappeared, leaving only 1 male spikelet and 2 vestigial spikelets (tab. 3387, fig. 18, a) at its side. This type of raceme is comparable with that found in the female inflorescence (tab. 3387, fig. 5) of *Humbertochloa* where the solitary male spikelet is replaced by a functionally female one (fig. 5, d)

\* See Avdulov in Bull. Appl. Bot. Genet. & Pl.-Breed., Leningrad, Suppl. 44, 14-28(1931).

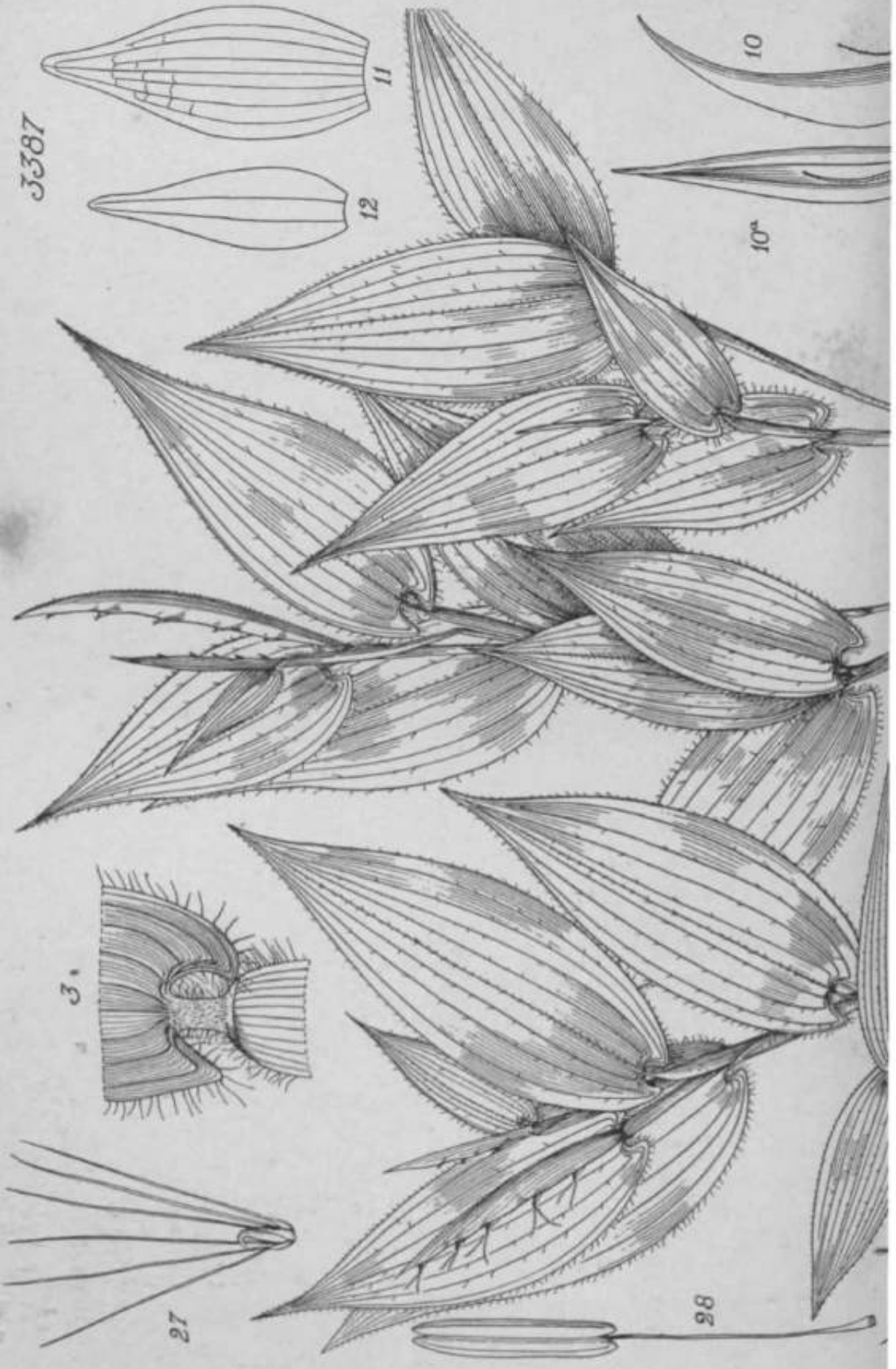
and the 2 vestigial spikelets are represented by fine bristles at its side (fig. 5, b). In *Phyllorachis* there are 2 spikelets at the base of each raceme (tab. 3386, fig. 3), 1 male (fig. 3, e) and the other female (fig. 3, d). Between these 2 spikelets there is a short bristle or projection (fig. 3, b), which is the vestige of the median spikelet of the basal cluster. Thus the raceme in *Phyllorachis* is comparable with the second example from the male inflorescence of *Humbertochloa bambusiuscula* mentioned above, in which the median basal spikelet had disappeared.

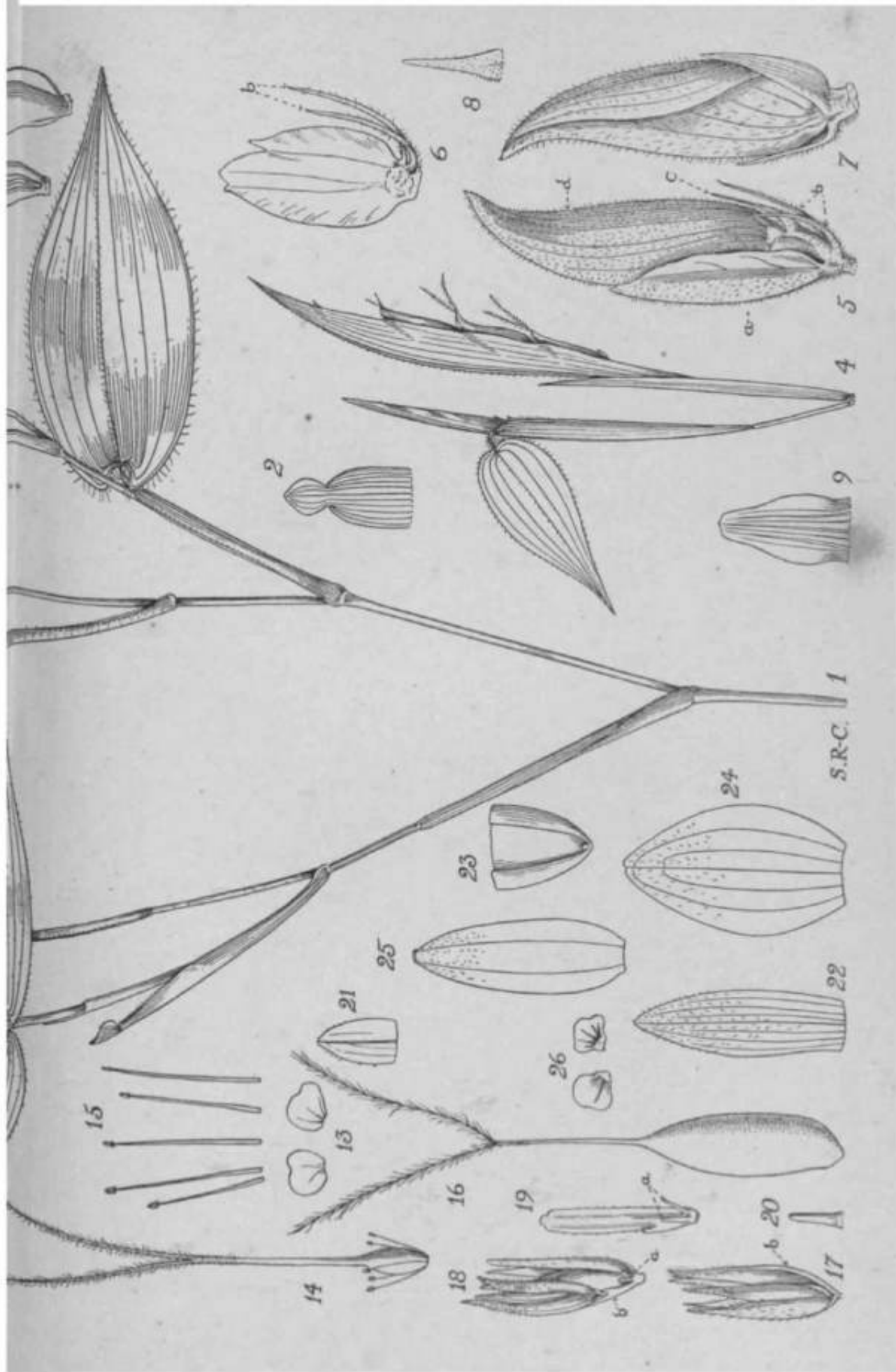
The axillary inflorescences of *Phyllorachis* (fig. 27) present a number of interesting features. In the material examined they are borne on slender peduncles from the uppermost leaf-sheaths of only the stouter culms. They consist usually of 2 racemes, each of which bears a solitary female spikelet. The upper part of the spikelets, especially the terminal one, projects to a varying amount from the leaf-sheath, or the lower spikelet may be more or less enclosed by it. The axis of the inflorescence (fig. 27, a, = primary rhachis) is slender, very narrowly winged and produced a short distance beyond the insertion of the terminal raceme. Each raceme possesses a short flattened axis (fig. 27, b, 28, 28a = secondary rhachis), bearing at its base a functionally female spikelet and the minute vestiges of 2 spikelets (fig. 28a, a), and sometimes a third vestigial spikelet (b) on the margin higher up. The stigmas are exceptionally long, especially those of the lower spikelet, which may have to project from the leaf-sheath in order to secure pollination.

It is possible that when the forest undergrowth of tropical Africa and Madagascar has been investigated more thoroughly, other genera of broad-leaved grasses will be discovered which may throw light on the evolution and affinities of *Phyllorachis* and *Humbertochloa*. Meanwhile the two genera might be placed near the *Oryzaceae*, with which they have several characters in common, such as the compound starch grains, the elongated linear hilum, and 4-6 stamens.—C. E. HUBBARD.

FIG. 1, plant, *natural size*; 2, basal portion of leaf-blade, pseudo-petiole, ligule and apex of leaf-sheath, x 2; 3, raceme, showing secondary rhachis (a), vestigial epikelet (b), lower glume (c) and lower lemma (d) of female spikelet, and two male spikelets (e), x 4; 4, secondary rhachis and one male spikelet, x 4; 5, female spikelet, x 4; 6-18, details of female spikelet:—6, lower glume, x 4; 7, upper glume, flattened, x 4; 8, dorsal view of lower lemma, x 4; 9 and 9a, side and front views of upper floret, x 4; 10, upper lemma, flattened, x 4; 11, palea, flattened, x 4; 12, lodicules, x 4; 13, base of ovary and vestigial stamens, x 16; 14, vestigial stamen, x 40; 15, pistil and vestigial stamens, x 4; 16 and 17, dorsal and ventral views of caryopsis to show embryo and hilum, x 4; 18, basal portion of caryopsis, showing embryo in side view, x 4; 19, male spikelet, x 4; 20-26, details of male spikelet:—20, lower glume, x 8; 21, upper glume, x 4; 22 and 22a, lower lemma, front and flattened views, x 4; 23, upper lemma, flattened, x 4; 24, palea, flattened, x 4; 25, lodicules, x 4; 26, stamens and vestigial pistil, x 4; 27, axillary inflorescence, showing primary rhachis (a), secondary rhachis (b), and two spikelets, x 2; 28 and 28a, front and side views of secondary rhachis, showing vestigial spikelets at the base (a) and on one side (b), x 10; 29-34, details of axillary spikelet:—29, lower glume, x 2; 30, upper glume, flattened, x 2; 31, lower lemma, flattened, x 2; 32, upper lemma, flattened, x 2; 33, palea, flattened, x 2; 34, lodicules, x 2.

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TABULA 3387.

HUMBERTOCHLOA GREENWAYI C. E. Hubbard.

GRAMINEAE. Tribus PHYLLORACHIEAE.

*Humbertochloa* A. Camus et Stapf ex A. Camus in Bull. Soc. Bot. France, lxxxi. 467 (1934); genus *Phyllhrachi* Trimen affinis, sed inflorescentiis unisexualibus, racemis femineis 1-spiculatis et masculis 1—4-spiculatis, rhachilla supra anthoecium superum producta, spiculae femineae lemmate infero dorso rotundato differt.

*Spiculae* unisexuales, heteromorphae, femineae et masculae in rhachibus secundariis dilatatis inflorescentiarum secundarum terminalium diversarum et femineae raro in inflorescentia paucispiculata in axillis vaginarum superiorum ortae; rhachilla supra glumas et inter anthoecia continua, in spiculis femineis supra anthoecium superum in setam tenuissimam producta et in spiculis masculis nonnunquam minutissime producta; anthoecia 2, infero ad lemma redacto, supero in spiculis femineis \$ staminibus vestigialibus, in spiculis masculis \$ ovario vestigiali.

*Inflorescentiae terminales*:—*Spiculae* muticae, abaxiales, in rhachibus secundariis persistentes, subsessiles vel brevissime pedicellatae, in racemis spiciformibus secundis brevibus dispositae, racemis subsessilibus 1-4-spiculatis imbricatis alternis adaxialibus in costa media incrassata rhacheos primariae spathiformis plicatae foliaceae lato-alatae ortis maturitate basi disarticulantibus. *Spiculae femineae* basi racemorum solitariae, masculis multo majores, asymmetricae, a latere visae oblique lanceolatae vel lanceolato-oblongae vel oblongo-ovatae. *Glumae* spicula multo breviores, inaequales; inferior brevior, subulata, rigida, enervis; superior carinata, lanceolato- vel ovato-oblonga (explanata), obtusa vel truncata, membranacea, 5-7-nervis. *Anthoecium inferum*: lemma anthoecium superum amplectens, arete convolutum, explanatum latissimum, spiculae subaequilongum, dorso rotundatum, incrassatum, rigidissimum, multinerve. *Anthoecium superum*: lemma lanceolatum (explanatum), acuminatum, dorso rotundatum, marginibus inflexis, inferiori aequilongum vel eo paullo longius, tenuiter coriaceum, obscure 7-11-nerve, nervis superne anastomosantibus, laeve; palea lanceolata, lemmate brevior, tenuiter coriacea, plerumque 2-nervis. *Lodiculae* 2, hyalinae. *Stamina* 6-3, vestigialia. *Ovarium* glabrum; styli terminales, connati, superne puberuli; stigmata 2, plumosa, ex apice anthoecii exserta. *Caryopsis* subellipsoidea, sulcata; embryo parva; hilum lineare, caryopsi aequilongum. *Spiculae masculae* in racemos 1-4-spiculatos dispositae, imbricatae, a latere visae oblongae vel lanceolato-oblongae. *Glumae* spicula multo breviores, inaequales; inferior brevissima, subulata, rigida, enervis; superior ovata vel elliptica, truncata vel obtusa, tertiam partem spiculae aequans, 1-3-nervis. *Anthoecium inferum*: lemma oblongum vel elliptico-oblongum, obtusum

vel truncatum, spiculae aequilongum vel ea paullo brevius, coriaceum, 3-7-nerve. *Anthoecium superum* : lemma ovatum vel oblongo-ovatum (explanatum), subacutum vel obtusum, spiculae aequilongum, chartaceum, 5-7-nerve; palea oblonga vel elliptico-oblonga (explanata), lemmati aequilonga, chartacea, plerumque 2-nervis. *Lodiculae* 2, latissimae. *Stamina* 6-3; antherae anguste oblongae. *Ovarium* vestigiale.

*Inflorescentiae axillares* (teste A. Camus) raras; spiculae longe pedunculatae; glumae iis spicularum ceterarum tenuiores et angustiores.

*Gramina* perennia; culmi plus minusve graciles, teretes, superne ramosi et foliati; vaginae inferiores elaminatae vel laminis brevissimis praeditae; ligulae brevissimae, truncatae, ciliolatae; laminae brevissime petiolatae, patentes, latae, asymmetricae, basi auriculatae, multinerves; inflorescentiae terminatae spiciformes, racemos 3-9 gerentes, femineae masculis longiores et latiores, solitariae vel masculae et femineae ramos eiusdem culmi terminantes; rhachis primaria herbacea, tenuiter multinervosa, alis latis tenuibus racemos amplectentibus; racemi contigui; rhachis secundaria indurata, supra spiculas producta, basi in racemis femineis spicularum vestigia 2 setiformia et spiculam femineam solitariam et basi in racemis masculis spiculas vel tres masculas vel duos masculas tertiam intermediam vestigialem setiformem vel unam masculam duos vestigiales gerens.

Species 2, Territorii Tanganyikae et insulae Madagascariae incolae. Typus: *H. bambusiuscula* A. Camus et Stapf.

Foliorum laminae 3-9 cm. longae, 1-3 cm. latae; inflorescentiae terminatae femineae 4-7 cm. longae . . . 1. *H. Greenwayi*.  
Foliorum laminae 2-5 cm. longae, 1-4-1-8 cm. latae; inflorescentiae terminatae femineae 1-5-3\*3 cm. longae . . . 2. *H. bambusiuscula*.

1. *H. Greenwayi* C. E. Hubbard, species nova (t. 3387).

*Culmi* graciliusculi, erecti, usque ad 1 m. alti, rigidi, plurinodes, supra medium divaricato-ramosi et foliati, minute pubescentes (praecipue nodos versus) et pilis longioribus et tuberculis minutis ortis sparse dispositis praediti vel glabrescentes et sparsissime tuberculati, internodiis inferioribus elongatis nudatis. *Foliorum vaginae* internodiis demum breviores, teretes vel superne carinatae, tenuiter striatae, juveniles minute pubescentes, ceterae pilis et tuberculis ortis sparsissime hirsutae et marginibus ciliatae, vel marginibus exceptis glabrae, plerumque purpureae, demum deciduae, inferiores laminis usque ad 2 mm. longis praeditae vel elaminatae; ligulae ad seriem ciliatorum brevissimorum redactae; pseudo-petioli circiter 2 mm. longi; laminae oblique elliptico-ovatae vel oblongo-ellipticae, acute acuminatae, basi contractae et auriculatae, auriculis latis obtusis 3-6 mm. longis, 3-9 cm. longae, 1-3 cm. latae, siccitate firme papyraceae, purpurascens vel virides, marginibus ciliatae, in nervis primariis (7-9) pilis paucis et tuberculis

ortis praeditae et supra costa media minute pubescentes, ceterum glabrae, vel omnino glabrescentes, margines versus nonnunquam scaberulae, tenuissime nervosae. *Injlorescentiae terminates femineae* 4-7 cm. longae, strictae vel demum leviter curvatae; pedunculus gracillimus, puberulus, 1-5-3 cm. longus; rhachis primaria angustissime elliptica et 8-10 mm. lata (explanata), viridis vel purpureo-tincta, carina puberula, ceterum glabra, marginibus scaberula; racemi 4-6; rhachis secundaria dorso convexa, elliptica (explanata), apice minute lobata, 6 mm. longa, 3-5 mm. lata, coriacea, laevis, dorso obscure puberula, basi spicularum vestigia duo setiformia stricta vel flexuosa 2-5-3\*5 mm. longa gerens. *Spiculae femineae* oblique oblongo-ovatae, apice acuminatae et leviter recurvatae, 10-11 mm. longae; gluma inferior obtusa, 2-3 mm. longa, dorso obscure puberula; gluma superior oblongo-ovata (explanata), 4 mm. longa, glabra; lemma anthoecii inferi minute pubescens, circiter 17-19-nerve, dorso infra apicem nonnunquam tuberculatum; lemma anthoecii superi apice rotundato-obtusum, 9-9\*5 mm. longum, glabrum; palea 7-7\*5 mm. longa; stamina vestigialia 5-6, 1-2 mm. longa; caryopsis 6 mm. longa; rhachilla 1 • 5-4 mm. producta. *Injlorescentiae terminates masculae* 2-5-3 cm. longae, strictae, vel demum leviter curvatae; pedunculus gracillimus, usque ad 5 cm. longus, pubescens; rhachis primaria angustissime elliptica et 4-5 mm. lata (explanata), viridis vel purpureo-tincta, carina puberula, ceterum glabra, marginibus minute scaberula; racemi 7-9; rhachis secundaria applanata, anguste oblonga vel elliptico-oblonga, 2-2\*5 mm. longa, basi spicularum vestigia (1-2) 0\*4-0-8 mm. longa nonnunquam gerens. *Spiculae masculae* 4-5 mm. longae; gluma inferior obtusa, 0\*5-1 mm. longa, glabra; gluma superior elliptico-ovata vel ovata, 1\*2-1\*8 mm. longa, supra medium ciliolata vel glabra; lemma anthoecii inferi subobtusum, 3\*5-4\*5 mm. longum, superne minute hispidulum vel scabridum; lemma anthoecii superi 3 • 8-4 • 5 mm. longum, apicem versus minute hispidulum; palea anguste truncata, 3\*8-4-5 mm. longa, apice ciliolata; stamina 5-6; antherae 2-2-5 mm. longae; rhachilla minutissime producta. *Injlorescentiae axillares nullae.*

TANGANYIKA TERRITORY. Pugu Hills: Kiserawe, c. 300 m., growing with *Olyra latifolia* in dense shade of secondary evergreen forest, pale red sandy soil, 1 Aug. 1937, *Greenway* 4991.

2. **H. bambusiuscula** A. Camus et Stapf ex A. Camus in Bull. Soc. Bot. France, lxxxii. 470, figs. 1-8 (1934).

MADAGASCAR. Ravines of the bay of Bombetoke, shady calcareous rocks, *Perrier de la Bdthie* 11057 (ex A. Camus); Tsingy du Bemaraha, calcareous rocks, 200 m., *Léandri* 966 (ex A. Camus); damp places on the Fiherena, *Perrier de la Bdthie* 12817; east of Tsivory, near Anadabolava, undergrowth of forest, c. 250 m., *Humbert* 12200 (ex A. Camus); middle valley of Mandrare, near Anadabolava, steep banks of river below gallery forest, alluvial soil, Dec. 1933, *Humbert* 12365.

The species of *Humbertochloa* are low bamboo-like forest grasses with slender rigid hollow culms, which are loosely branched and very leafy in the upper part. There is a considerable decrease in the size of the leaf-blades towards the base of the plant, where they may be very small or sometimes suppressed. As in *Phyllorachis*, the blades are auricled at the base and contracted into an extremely short pseudo-petiole. This type of leaf-blade is of comparatively uncommon occurrence in the *Gramineae* and is found mainly in the *Paniceae* and *Andropogoneae*.

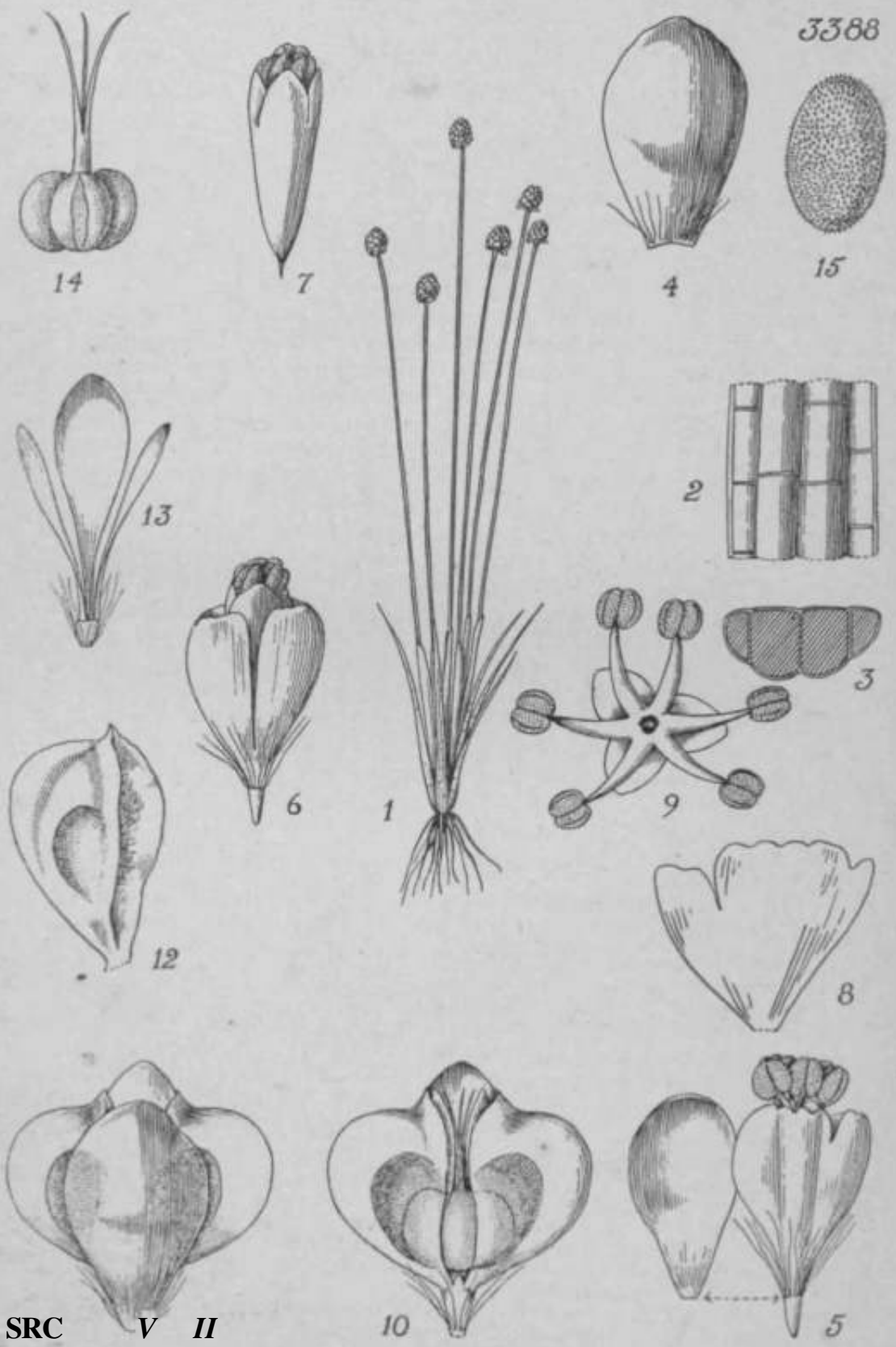
It has been suggested that *Humbertochloa* has affinities with *Thuarea* and that these two genera and *Phyllorachis* had a common origin. This theory is supported only by the fact that the spikelets are borne on a foliaceous widened rhachis. The species of *Thuarea* occupy a very different habitat, being found on maritime sands in the Mascarene Islands, Indo-Malayan Region, Northern Australia and Polynesia. They differ from *Phyllorachis* and *Humbertochloa* in the following respects :—low creeping habit, short linear to lanceolate leaf-blades, spathe-like uppermost leaf-sheath partially embracing the inflorescence, adaxial spikelets, male lower floret, membranous lower lemma, 3 anthers in each floret, caryopsis with an oblong hilum about half its length. *Thuarea* appears to have a close affinity with *Brachiaria*, both genera possessing secund spikes or spike-like racemes and, what is more important, *adaxial* spikelets. *Thuarea* differs from *Brachiaria* in the lower one or two spikelets being hermaphrodite and the remainder male. These male spikelets finally disarticulate from the rhachis and the latter becomes dilated and folded over the hermaphrodite spikelets.

For further notes on *Humbertochloa* and its relationship to *Phyllorachis* the reader is referred to tab. 3386.—C. E. HUBBARD.

FIG. 1, upper part of plant, *natural size* ; 2, reduced leaf-blade from lower part of culm, x 5 ; 3, basal portion of leaf-blade, pseudo-petiole, ligule and apex of leaf-sheath, x 4 ; 4, male and female inflorescences, x 1\*5 ; 5, raceme from female inflorescence, showing secondary rhachis (a), two vestigial spikelets (b), lower glume (c) and lower lemma (d) of female spikelet, x 5 ; 6, secondary rhachis (flattened) and vestigial spikelets (b), x 5 ; 7, female spikelet, x 5 ; 8-16, details of female spikelet:—8, lower glume, x 5 ; 9, upper glume, flattened, x 5 ; 10 and 10a, upper floret, showing prolongation of rhachilla, x 5 ; 11, upper lemma, flattened, x 5 ; 12, palea, flattened, x 5 ; 13, lodicules, x 5 ; 14, pistil and vestigial stamens, x 5 ; 15, vestigial stamens, x 12 ; 16, immature caryopsis, x 5 ; 17 and 18, racemes from male inflorescence, showing two vestigial spikelets (a) and secondary rhachis (b), x 5 ; 19, secondary rhachis and vestigial spikelets (a), x 8 ; 20-28, details of male spikelet:—20, lower glume, x 8 ; 21, upper glume, x 8 ; 22, lower lemma, flattened, x 8 ; 23, base of upper floret, showing minute prolongation of rhachilla, x 12 ; 24, upper lemma, flattened, x 8 ; 25, palea, flattened, x 8 ; 26, lodicules, x 8 ; 27, filaments and vestigial pistil, x 12 ; 28, stamen, x 12.



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## TABULA 3388.

### ERIOCAULON STRICTUM *Milne-Redhead.*

#### ERIOCAULACEAE.

*E. strictum* *Milne-Redhead*; species nova, ab *E. Buchanani* Buhl, capitulis minoribus, bracteis flores subtendentibus apice rotundatis, florum  $\$$  sepalis 2 distinguenda.

*Herba* annua, caespitosa. *Caulis* brevissimus. *Folia* linearia vel subulata, superne filiformia, apice acutissima, usque 3 cm. longa et 1 mm. diametro, mox marcescentia, glabra. *Pedunculi* 4-6, stricte erecti, teretes, 6-9 cm. longi, glabri; vaginae leviter inflatae, foliaceae, superne oblique fissae et pedunculis adhaerentes, 2-2\*5 cm. longae, glabrae. *Capitula* subsphaerica, circiter 3 mm. diametro, viridi-grisea, monoica, floribus  $\$$  exterioribus; bractee involucrantes latissime obovatae, concavae, apice rotundatae, inferne cuneatae, usque 1 • 3 mm. longae et latae, glabrae, stramineae; bractee flores subtendentes obovatae, leviter concavae, apice rotundatae, inferne cuneatae, circiter 1\*3 mm. longae et 0\*8 mm. latae, glabrae, superne stramineae. *Flores*  $\langle$  $\$$ :—sepala apice in spatham inflatam antice flssam connata, circiter 1 mm. longa, hyalina; stipes circiter 0 \* 7 mm. longus; petala 0 vel minuta; stamina 6; filamenta inaequalia. *Flores*  $\$$ :—pedicelli breves, basi albo-hirsuti; sepala 2, libera, breviter et profunde cymbiformia, late carinata, valde compressa, circiter 1\*1 mm. longa, 0\*8 mm. lata, hyalina, superne grisea; stipes brevis; petala 3, libera, inaequalia; petala lateralia oblanceolato-spathulata, circiter 0-8 mm. longa, hyalina; petalum anticum oblanceolatum, circiter 1\*2 mm. longum, hyalinum, superne griseum; ovarium 3-lobatum, circiter 0\*3 mm. longum; stylus 1-2 mm. longus; rami 3, 0-6 mm. longi. *Semina* 3, ellipsoidea, 0\*4 mm. longa, reticulata, reticulis papillosis.

TANGANYIKA TERRITORY. Mafia Island, Kilindoni, where wet-season lagoons are now drying up, forming a 15 cm. high growth with *Utricularia* spp., *Polygala* spp., *Cyperaceae* and *Gramineae*, 6 Aug. 1936, *Fitzgerald* 5213/3.

*Eriocaulon strictum* is probably allied to *E. Buchanani* Ruhl., from which it differs, not only in size and in width of leaf, but in possessing only two sepals in the female flowers, the third sepal being represented by a minute tooth-like rudiment (see fig. 10). The petals of the male flowers of *E. strictum* are variable in size and are often unequal.

E. MILNE-REDHEAD.

FIG. 1, plant, *natural size*; 2, part of leaf (whole width), x 20; 3, cross-section of leaf, x 20; 4, involucreal bract, x 20; 5, floral bract and  $\langle$  $\$$  flower showing hairs from surface of receptacle, posterior view, x 20; 6,  $\langle$ J flower, anterior view, x 20; 7, (J flower with calyx removed, x 20; 8, calyx of  $\mathcal{E}$  flower opened out, x 20; 9, (J flower with calyx removed, from above, x 20; 10, floral bract and  $\$$  flower, x 20; ] 1,  $\$$  flower, posterior view, x 20; 12, sepal of  $\$$  $\rangle$  flower, x 20; 13, petals of  $\$$  flower, posterior view, x 20; 14, gynoecium, x 20; 15, seed, x 40.

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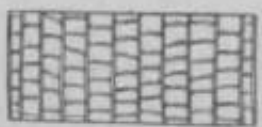
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## TABULA 3389.

### ERIOCATJiION AITNUXJM *Milne-Redhead.*

#### ERIOCAULACEAE.

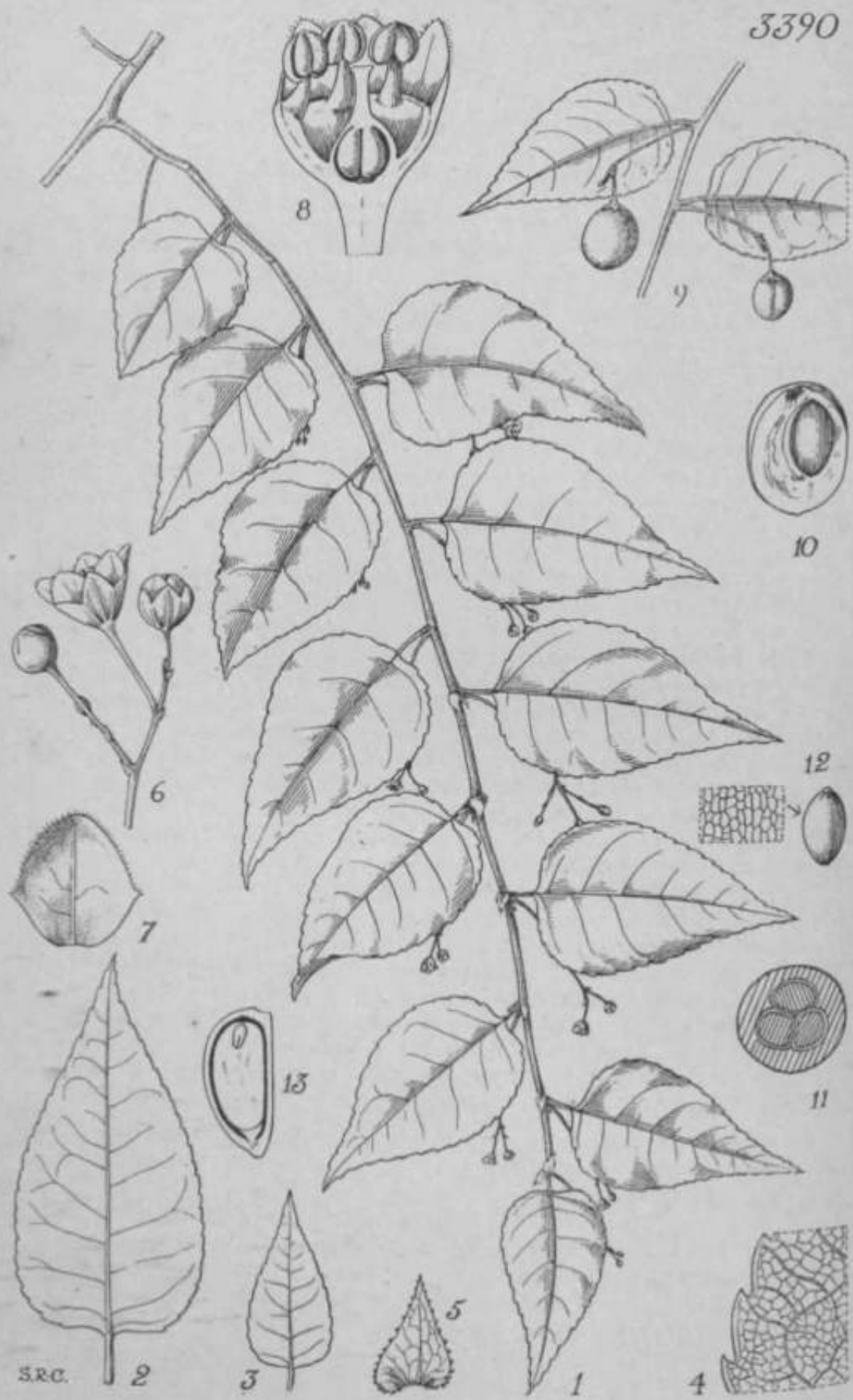
**E. annum** *Milne-Redhead*; species nova, ab *E. truncate* Ham. ex Mart, sepalis florum <J semper liberis, et ab *E. truncate*\* var. *malaccensi* Hook. f. floribus majoribus, bracteis flores subtendentibus bracteis involucrentibus aequilongis differt.

*Herba* annua, caespitosa. *Caulis* brevissimus. *Folia* perpauca, linearia, vel lanceolato-linearia, superne angustata, acuta, usque 4 cm. longa et 5 mm. lata, multinervosa, glabra. *Pedunculi* numerosi, teretes, minute costati, 2-5-5 cm. longi, glabri; vaginae valde inflatae, foliaceae, superne conspicue oblique fissae, apice acutae, striatulae, folia aequantes, glabrae. *Capitula* hemisphaerica, circiter 5 mm. diametro, albido-straminea, monoeca, floribus \$ exterioribus; bractee involucrentes obovatae, apice rotundatae, 2\*5 mm. longae, 1-5 mm. latae, albido-stramineae, glabrae; bractee flores subtendentes obovatae, basi cuneatae, apice rotundatae, leviter concavae, 2-25 mm. longae, 1-5 mm. latae, albido-stramineae, glabrae. *Flores* <J:—sepala 2, libera, cymbiformia, ecarinata, circiter 1-5 mm. longa, hyalina, glabra; stipes circiter 1-5 mm. longus; petala 2, deltoidea, minuta, albo-hirsuta; stamina circiter 5, filamentis inaequalibus. *Flores* \$:—sepala 2, lineari-lanceolata, ecarinata, circiter 1-75 mm. longa, hyalina, glabra; stipes brevis; petala 3, aequalia, libera, linearia, circiter 2 mm. longa, hyalina, parce albo-hirsuta; ovarium 2- vel 3-lobatum, circiter 0-5 mm. diametro; stylus 2 mm. longus; rami 3, 1-5 mm. longi. *Semina* 3 vel 2, eliipsoidea, 0-5 mm. longa, longitudinaliter lineata, glabra.

TANGANYIKA TERRITORY. Mafia Island, Dawe Simba—Ndaagoni, locally common in black sandy soil, with *Xyris* spp., *Cyperaceae*, *Scrophulariaceae*, in open wet places surrounding fresh-water ponds, alt. c. 9 m., 4 Oct. 1937, *Greenway* 5389 :—a short-lived annual tussock herb with small white heads of flowers.

No close ally of this species is known from the African continent, its affinities being with an Indian species, *Eriocaulon truncatum* Ham. ex Mart. As the characters given in the differential diagnosis hold good for all the material of *E. truncatum* which I have been able to examine, I have decided to consider *E. annum* specifically distinct, although superficially the two species are strikingly similar.—E. MILNE-REDHEAD.

FIG. 1, plant, *natural size*; 2, part of leaf (whole width), x 8; 3, capitula from below, x 4; 4, involucrent bract, x 12; 5, floral bract, x 20; 6, <J flower, x 20; 7, o\* flower with sepals removed, from above, x 30; 8, \$ flower, x 20; 9, seed, x 40.



S.R.C.

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## TABULA 3390.

### GEREARDINA EYLESIANA *Milne-Redhead*.

FLACOURTIACEAE (?). Tribus HOMALIEAE (?).

*G. Eylesiana Milne-Redhead*; species nova, a *G. foliosa* Oliv. habitu graciliore, foliis ovatis acuminatis basi latis, floribus minoribus, ovario glabro facile distinguenda.

*Frutex* sempervirens, gracilis, leviter ramosus. *Ramuli* vagantes, tenues, plus minusve recti, foliosi, pilis brevibus crispulis densiuscule induti. *Folia* stipulata, petiolata, late ovata vel lanceolata, acuminata vel acuta, basi  $\pm$  cordata, truncata vel late cuneata, 2 cm. longa et 1\*8 cm. lata vel 2\*5 cm. longa et 1 cm. lata usque 4-5 cm. longa et 3 cm. lata vel 5\*2 cm. longa et 2\*7 cm. lata, margine crenata vel crenato-serrata, tenuiter chartacea, utrinque glabra; costa supra leviter sulcata, subtus prominula; nervi laterales utrinque circiter 7, supra inconspicui, subtus prominuli, siccitate conspicui; nervi ultimi valde reticulati, supra inconspicui, subtus conspicui; petioli 4-7 mm. longi, pilis brevibus crispulis induti vel plus minusve glabri; stipulae foliaceae, deltoideae, acutae vel acuminatae, basi truncatae vel leviter auriculatae, usque 3 mm. longae et 2 mm. latae, margine glanduloso-crenatae, glabrescentes. *Cymae* axillares, pedunculatae, pauciflorae; pedunculus rectus, gracilis, circiter 15 mm. longus, glaber vel basi puberulus; pedunculi partiales breves, puberuli; bractee minutae, ovatae, glabrae sed minute ciliatae; pedicelli 3-5 mm. longi, glabri, basi articulati. *Calyx* plus minusve cupularis, circiter 2 mm. diametro, glaber; lobi 5, deltoideo-ovati, minute ciliati. *Petala* late ovata, circiter 1 mm. lata, glabra, margine inferne glabra, superne minute ciliata. *Stamina* 5, petalis opposita; filamenta anguste conica, circiter 0 - 5 mm. longa; antherae 0-5 mm. diametro. *Discus* tubum calycis implens, obscure pentagonus. *Ovarium* in discob leviter immersum, ovoideum, glabrum, circiter 0-5 mm. altum, uniloculare; stylus erectus, anguste cylindricus, circiter 0\*5 mm. longus; stigma minute bifidum; ovula 4, placentis 2 apicem versus loculi sitis affixa, pendula, anatropa. *Fructus* pendulus, carnosus, ovoideo-ellipsoideus, circiter 8 mm. longus et 6 mm. latus, unilocularis, 1-4-spermus. *Semina* ellipsoidea vel plano-convexa, circiter 5 mm. longa; testa glabra, membranacea, aurantiaco-brunnea, minute reticulata; rhaphe conspicua, aurantiaca; albumen carnosum, copiosum; embryo minutus, rectus.

PORTUGUESE EAST AFRICA. Moribane District. Chimanmani Mountains, 1200 m., 2 March 1907, *H. H. Johnson* 231 :—straggling plant with white flowers.

SOUTHERN RHODESIA. Inyanga District. Inyanga, 1800 m., Aug. 1920, *Eyles* 7201. Nyangombe River, Inyanga, Oct. 1934, *Eyles* 7943:—scrambling climber with few flowers. Inyanga, 1600 m., 7 Jan. 1937; *Pardy* in *Herb. Eyles*. 8797.—fruit resembles that of *Rhamnus Zeyheri*. Nyumkombe valley forest, Inyanga, Oct. 1934,

*Gilliland* 880 :—scandent climbing plant. Stapleford Forest Reserve, on the margin of a small patch of forest containing *Myrsine melanophleos* R. Br., *Macaranga mellifera* Prain, *Maesa rufescens* A. DC, *Polyscias malosana* Harms, *PkilUpia hexandra* S. Moore, etc., 13 May 1937, *McGregor* 57/37 (type). Stapleford Forest Reserve, 2 March 1938, *Pardy* s.n.:—fruits found after long search, bright red.

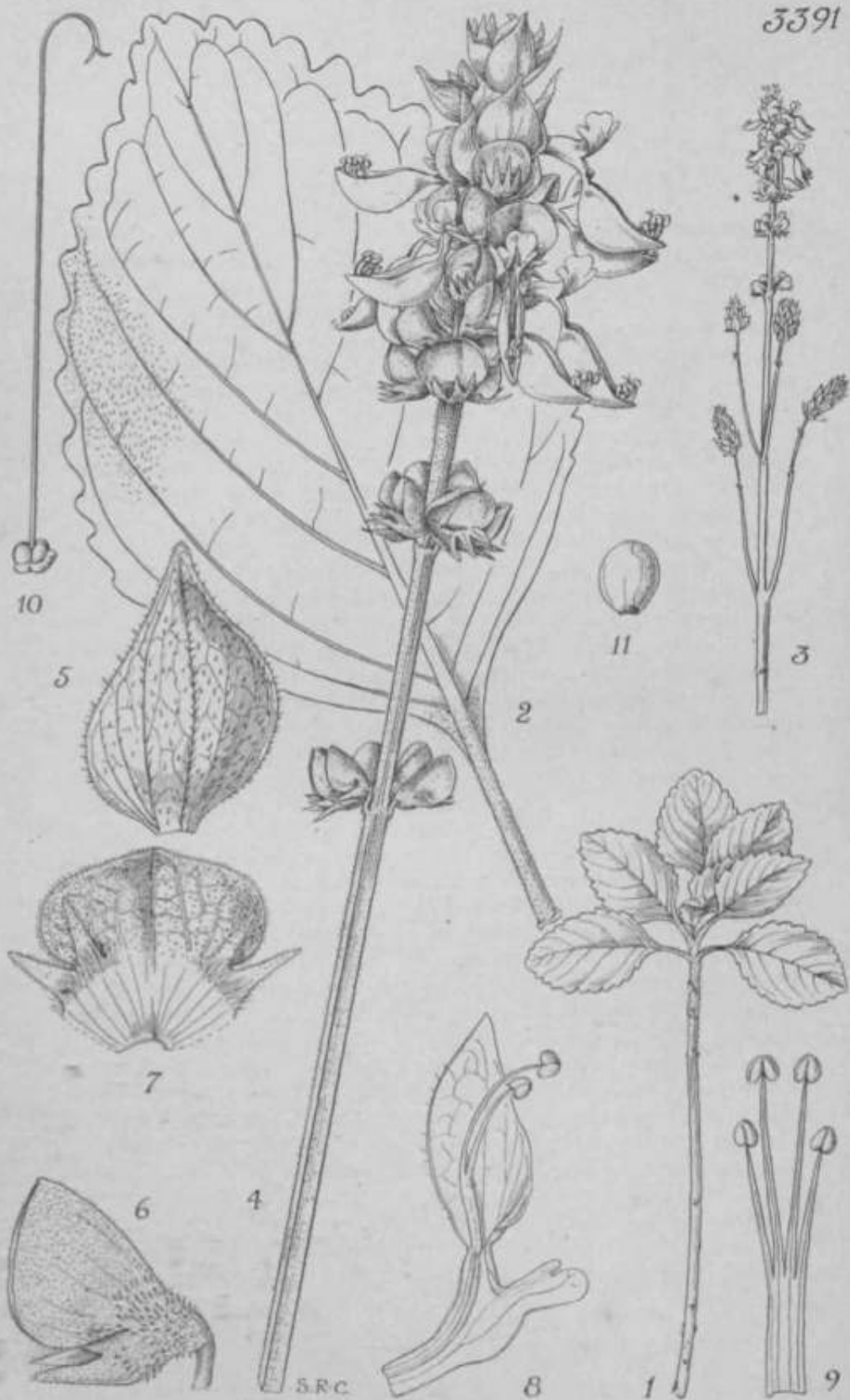
The discovery of a second species of this hitherto monotypic genus is of considerable interest. *G. Eylesiana*, whilst agreeing in all generic characters with *G. foliosa* Oliv., differs from it in habit and facies, and in fact the two species might appear to the casual observer to be unrelated. *G. Eylesiana* is a weak scrambling shrub with horizontal or somewhat pendulous branches, and more or less ovate acuminate leaves variable both in shape and size, whilst *G. foliosa* is a small tree or shrub, with stiff erect densely leafy branches and oblanceolate leaves.

The known range of *Gerrardina* is greatly extended northwards by the inclusion of this second species, and now reaches the Inyanga Highlands in Southern Rhodesia, which is well within the tropics. It may be mentioned that *G. foliosa* extends from Port St. John in the Cape Province of South Africa through Natal to the Barberton District of the Transvaal. The taxonomic position of the genus is doubtful, and is being further investigated. In the meantime it is provisionally retained in the *Flacourtiaceae*.

The species is named in honour of the late Mr. F. Eyles, of the Queen Victoria Memorial Museum, Salisbury, Southern Rhodesia, who first drew my attention to it. Mr. Eyles has forwarded several gatherings of it to Kew, and it was at his request that Mr. A. A. Pardy and Mr. G. M. McGregor gathered the abundant material on which this description and illustration are based.

Mr. McGregor, who has collected the plant in the Stapleford Forest Reserve, writes : " The Stapleford Forest Reserve is on the Anglo-Portuguese Border some 20 miles north of Umtali. The areas being planted lie between elevations of 5100 ft. and 6500 ft. The rainfall is about 70-80 in., which falls mainly from November to March, but rain is recorded throughout the year, and in the winter months is chiefly in the form of mists. *Gerrardina Eylesiana* is a shrub with scrambling habit. It averages 4-8 ft., but elongated branches spread over surrounding vegetation and often give the appearance of a climber. It is an undershrub and is found in and on the margins of patches of forest which occur on cool aspects or in sheltered ravines and in eroded areas (dongas). On a newly constructed path through *Phillipia* and *Indigofera* scrub growth, *Gerrardina Eylesiana* had been cut back and had coppiced freely."—E. MILNE-REDHEAD.

FIG. 1, flowering branchlet, *natural size*; 2 and 3, leaves, *natural size*; 4, lower surface and margin of leaf, x 4; 5, stipule, x 4; 6, inflorescence, x 4; 7, petal,  $\times < 12$ ; 8, longitudinal section of flower (petals removed), x 12; 9, portion of branchlet, with mature fruits, *natural size*; 10, longitudinal section of a 1-seeded fruit, x 2; 11, diagrammatic transverse section of a 3-seeded fruit, x 2; 12, seed, and surface of testa, x 24; 13, longitudinal section of seed, x 4.





## TABULA 3391.

### COLEUS GBANDICALYX E. A. Bruce.

LABIATAE. Subtribus PLECTBANTHINAE.

*C. groiicalyx* E. A. Bruce; species nova, affinis *C. spicato* Benth., a quo calyce multo majore, lobo postico latissime cordato-ovato, foliis majoribus grosse crenatis recedit.

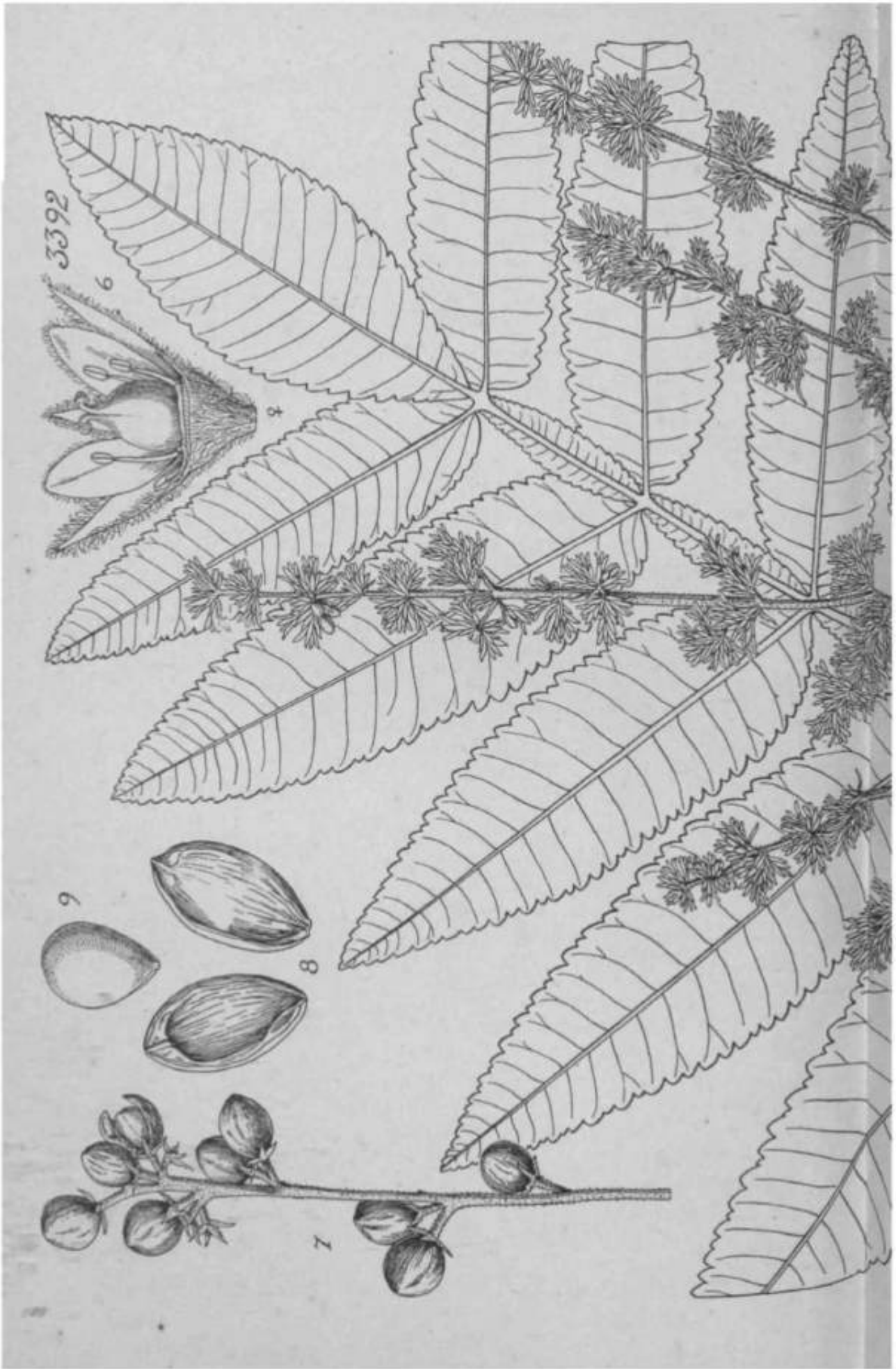
*Herba* perennis, erecta, viscida, ramosa, 1-2-1-8 m. alta, caules alios et floriferos et foliatos (foliis plerumque caducis) alios foliatos tantum emittens. *Caules foliati* simplices, subteretes, plus minusve carnosii vel lignosi, basi 4-6 mm. diametro, costati, apice foliati, ceterum denudati, cicatricibus foliorum transverse semi-ellipticis 3-4 mm. latis 1-3 cm. distantibus, breviter glanduloso-papilloso et pilis brunneis patulis multicellularibus hirsuti, apicem versus densius; *caules floriferi* ramosi, quadrangulares, internodiis 6-8 cm. distantibus, pilis albis inflatis glanduloso-capitatis patentibus densiuscule hirti. *Folia* inferiora majora, longe petiolata; petiolus 2-3 cm. longus, hirsutus; lamina elliptica vel ovato-elliptica, 8-14 cm. longa, 5-8 cm. lata, apice rotundata vel subacuta, inferne in basin cuneato-angustata et integra, superne grosse crenata, utrinsecus (nervis praesertim) pilis albis parce hirsuta et subtus glandulis aurantiacis parce induta; nervi laterales utrinsecus circiter 6, sub angulum 30° adscendentes; folia superiora minora, subsessilia, oblongo-ovata vel anguste obovata, 4-5 cm. longa, circiter 2 cm. lata, crenato-dentata, ceterum ut folia majora. *Inflorescentia* compacta, sub anthesi 3-8 cm. longa (statu fructifero usque 12 cm.), verticillastris plerumque 6-floris infimis distantibus; bracteae oppositae, imbricatae, mox deciduae, purpureae, late ovatae, circiter 1-2 cm. longae, 0-9 cm. latae, caudato-acuminatae, extra parce papillosae, intus glabrae; pedicelli breves, erecti, rhachi appressi. *Calyx* bilabiatus, purpureus vel saturate caeruleus, margine praesertim glandulosus et papillosus; tubus circiter 3 mm. longus, late campanulatus, extra pilis albidis patulis instructus, intus glaber; lobus posticus latissime cordato-ovatus, apice subacutus, basi cordatus, 4 mm. longus, 10 mm. latus, intus prominenter nervoso-reticulatus; lobi laterales anguste triangulares, 2-3 mm. longi, 1 mm. lati, apice acuti; antici similes. *Corolla* 2-4 cm. longa, patens, cyanea, parce papillosa et glandulosa, demum glabrescens; tubi pars inferior cylindrica, 5 mm. longa; pars superior prorsum flexa, 4 mm. longa, fauce circiter 4 mm. diametro, glabra; labium posticum plus minusve erectum, subquadrangulare, circiter 5 mm. longum et latum, superne leviter 4-lobum, lobis posticis late ovatis 1 mm. longis vix 2 mm. latis apice rotundatis, lateralibus angustioribus; labium anticum patens, anguste cymbiforme, integrum, 1-2 cm. longum, 0-5 cm. altum, apice obtusum. *Stamina* exserta; filamenta circiter 1 - 3 cm. longa, compressa, triente infimo in tubum antice apertum connata; antherae 1-1-5 mm. longae.

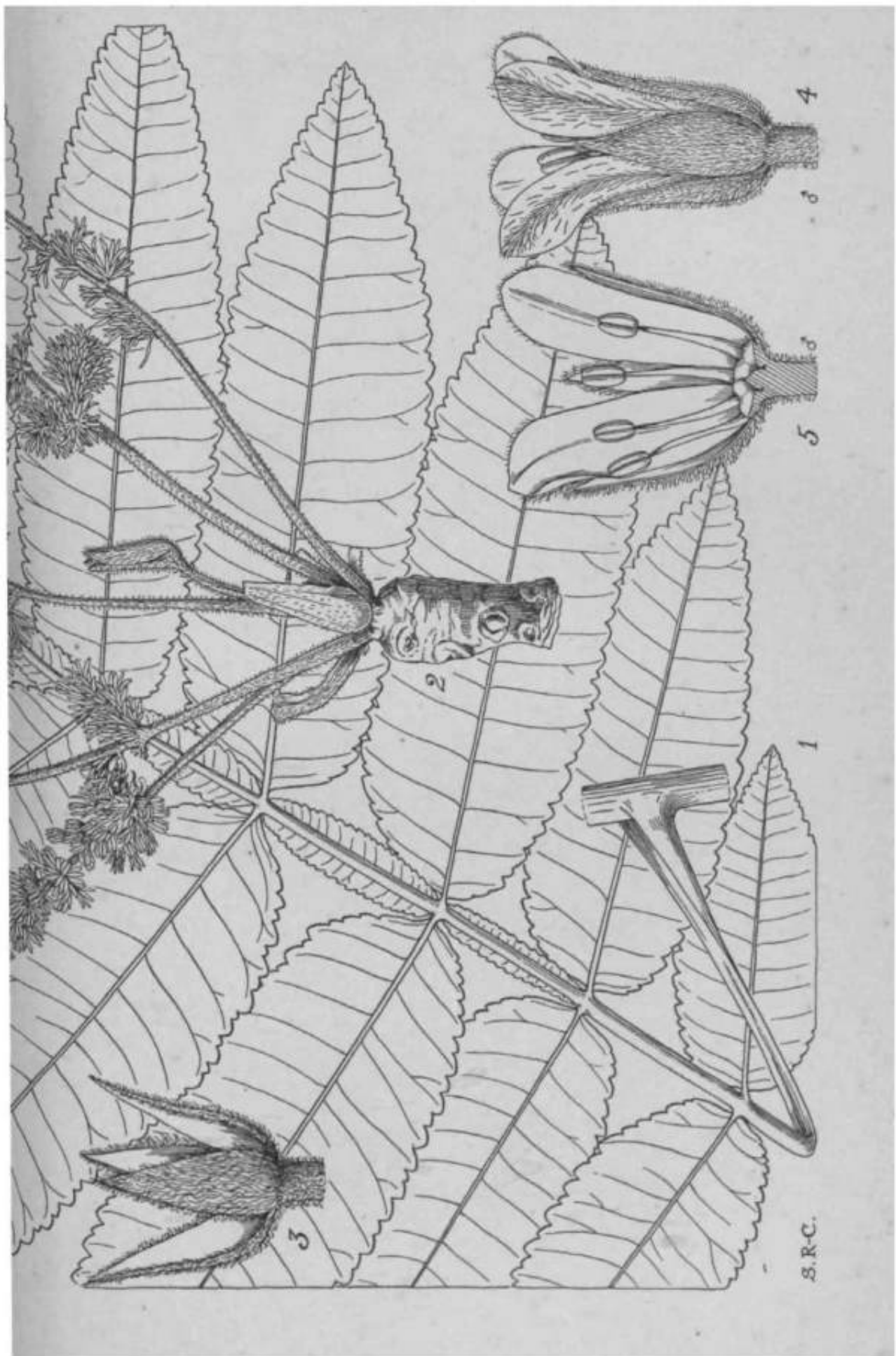
*Ovarium* glabrum, disco in glandulam oblongam 1-5 mm. longam ovarium superantem antice producto ; stylus gracilis, 2 • 7 cm. longus, glaber. *Nuculae* compresso-sphaericae, 2\*5 mm. diametro, brunneae, glabrae.

ANGLO-EGYPTIAN SUDAN. Lomul eng, Imatong Mts., 2400 m., 29 Dec. 1935, A. S. Thomas 1800 (type):—on the edge of the forest; an occasional, viscid herb, 1\*2 m. high, with purple bracts and calyx, and bright blue corolla. Mt. Kinelti, Imatong Mts., 2700 m., 11 Feb. 1929, *Chipp* 91 :—a succulent bush 1-8 m. high in the ravines, calyx dark blue. Imatong Mts., without precise locality, 3000 m., 12 Feb. 1936, *Johnston* 1482.

The accompanying plate was drawn from dried material, so that the exact pose of the flowers is conjectural. The most striking character of *Coleus grandicalyx*, as the specific epithet suggests, is the large purple calyx with its very broad upper lip (fig. 6). In the fruiting stage the dense "spikes" formed by the closely appressed whorls of the calyces must be a conspicuous feature. As in other species of *Coleus*, many varied types of indumentum are here present.—E. A. BRUCE.

FIG. 1, leafy shoot, x £; 2, leaf, upper surface, *natural size*; 3, flowering shoot, x i; 4, portion of flowering shoot, *natural size*; 5, bract, outer surface, x 3; 6, calyx, x 3; 7, calyx, opened out, x 3; 8, corolla, median section, x 2; 9, staminal sheath, flattened out, x 3; 10, gynoecium, x 3; 11, nutlet, x 4.





## TABULA 3392.

### BURS ERA HINTONI *Bullock*.

BITRSERACEAE. Tribus BURSEREAE.

**B. Hintoni** *Bullock* in Kew Bull. 1936, 366, et I.e. 1937, 450, et I.e. 1938, 166.—Species magnifica, aromatica, ramulis valde crassis, foliis magnis pinnatis, foliolis 6-10-jugis magnis grosse subdupliciter crenato-serratis, rhachi late serrato-alata, inflorescentiis inter eas specierum mexicanarum maximis distincta; a *B. excelsa* (H.B.K.) Engl. ramis crassioribus, foliis inflorescentiisque multo majoribus facile distinguenda.

*Frutex* vel *arbor*, 3-12 m. altus; ramuli valde crassi, apicem versus 1-1.5 cm. diametro; terminales laeves, internodiis elongatis, primum satis dense hirsuto-pilosi, demum glabri; laterales internodiis valde abbreviatis, cicatricibus foliorum et inflorescentiarum delapsorum rugosi; cortex laevis, glauco-ruber vel griseus. *Folia* imparipinnata, pro genere maxima, in apice ramulorum congesta vel secus ramulos terminales elongatos alterna, petiolis usque ad 14 cm. longis basin versus vaginato-ampliatis, interstitiis inter juga oblanceolato- vel lanceolato-alatis usque ad 5 cm. longis et 1-5 cm. latis marginibus serrato-crenatis, tota (petiolo incluso) usque ad 50 cm. longa et 20 cm. lata, juniora supra velutino-pubescentia, subtus tomentosa, adulta utraque pagina satis dense piloso-pubescentia (sed supra plus minusve nitida); foliola 6-10-juga, lateralia subsessilia, late lanceolata vel oblongo-lanceolata, apice acuta, basi rotundata et saepe inaequilateralia, usque ad 16 cm. longa et 7 cm. lata, inferiora minora; foliolum terminate plus minusve rhombico-ovatum, vel subellipticum, apice acutum, basi cuneatum, usque ad 17 cm. longum et 8 cm. latum; omnia marginibus grosse subacute subdupliciter crenato-serrata, subtus nervis lateralibus (utrinsecus 16-22) venulisque prominenter reticulata. *Thyrsi* pro genere maximi, ex axillis perularum orti, satis dense molliterque pilosi, toti circiter 20 cm. longi et usque ad 5 cm. lati; pedunculi 4-9 cm. longi sed interdum breviores; bractae lineares vel filiformes, usque ad 1 cm. longae sed saepe minores; rami primarii satis distantes, multi-ramosi; flores tetrameri, dense congesti. *Flores masculi*: sepala 4, lanceolata vel ovato-lanceolata, acuta, 2\*5-5 mm. longa, leviter inaequalia, extra pilosa; petala 4, oblonga vel apicem versus leviter spathuliformia, apice rotundata, circiter 5 mm. longa, sepalis longiora vel leviter breviora, extra leviter pilosa; stamina 8, filamentis subaequalibus subulato-filiformibus circiter 2 mm. longis, antheris oblongis 0\*6-1 mm. longis; discus annularis, carnosus, crenatus; pistillodium parvum. *Flores feminei*: sepala atque petala masculis similia, sed petala praesertim saepe minora; staminodia 8, parva, inaequalia, filamentis filiformibus, antheris sterilibus instructa; ovarium ovoideo-globosum, circiter 2 mm. longum, glabrum; stylus biramosus, ramis

0\*5 mm. longis apice stigmatibus capitatis coronatis. *Flores herniaphroditi* non visi. *Drupae* obovoideo-ellipsoideae, circiter 1-3 cm. longae et 8 mm. diametro, demum dehiscentes, valvis 2 aequalibus prius quam semina delapsis. *Semina* subobovoidea, compressa, 8-9 mm. longa, 6 mm. lata, plerumque arillo aurantiaco omnino induta, sed interdum apice testa nigra leviter exserta.

MEXICO. District of Temascaltepec, State of Mexico : Bejucos, 610 m., May 1933 (fl.), *Hinton* 3952, "shrub 4 m., fesi used for incense" ; San Lucas, July 1933 (fl., young fr.), *Hinton* 4298, "shrub 3 m." ; Cañitas, Nov. 1934 (fr.), *Hinton* 6991 (type), "tree 6 m. high, range 600-1400 m., not found below Bejucos" ; *ibid.*, May 1935 (fl., young fr.), *Hinton* 11U, "tree 8 m." ; *ibid.*, Oct. 1936 (fr.), *Hinton* 9957, "from the same tree as the type-specimen" ; Villa Neda, May 1935 (fl.), *Hinton* 7794; Limones, June 1935 (young fr.), *Hinton* 7889, "tree 6 m." District of Mina, State of Guerrero: Placeres—Calavera, 500 m., July 1936 (sterile), *Hinton* 9108, "a young tree, 6 m. high, resinous" ; Placeres—Puerta, 720 m., July 1936 (sterile), *Hinton* 9130, "a tree 10 m. high, 30 cm. diameter" ; *ibid.*, 650 m., July 1936 (fr.), *Hinton* 9136, "a tree 7 m. high, bark smooth and grey" ; Manchón, 1250 m., Aug. 1936 (fr.), *Hinton* 9246, "a spreading tree 12 m. high, frequent by streams and in barrancas from about 600 m. up to 1300 m.; this tree taken as [ecological] type of the locality ; the ripe fruit falls at a touch" ; *ibid.*, 1150 m., April 1937 (fl.), *Hinton* 10071, "a tree 10 m. high" ; *ibid.*, May 1937 (fl., young fr.), *Hinton* 10440, "same tree as No. 9246" ; Carriceras, 1100 m., April 1937 (fl.), *Hinton* 10091, "a tree 12 m. high" ; Sta. Ana, 1100 m., April 1937 (fl.), *Hinton* 10114, "a tree 5 m. high."

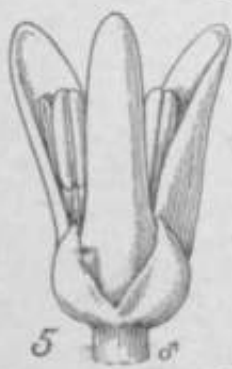
The above description is based on that given in Kew Bull. 1936, 366, a few minor alterations having been found necessary after examination of the more extensive material now available. Various notes on the species will be found under the three references given above.

Viable seeds were received from Mr. Hinton in the autumn of 1935, and although these germinated freely, the conditions at Kew caused damping off, and only one seedling survived. This is now (Aug. 1938) ^ vigorous plant about 6 inches high. The leaves are comparatively small, but otherwise quite normal. The older ones are only 3-foliolate, but younger ones now developing are 7-foliolate.

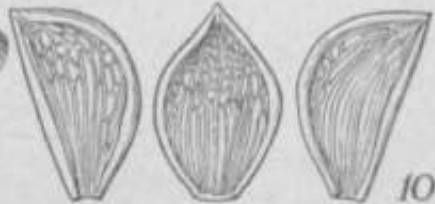
*Bursera Hintoni* probably takes first place in the genus for leaf-size ; the inflorescence also is large and of characteristic form, the lateral branches being somewhat distant, repeatedly branched, and very densely floriferous.—A. A. BULLOCK.

FIG. 1, leaf from a long shoot, x f; 2, short shoot with inflorescences, *natural size*; 3, calyx of a male flower, x 8; 4, male flower, showing outer surface of petals, x 8; 5, male flower in longitudinal section, showing inner surface of petals and stamens, x 8; 6, female flower, one sepal, two petals and staminodes removed to show the gynoecium, x 8; 7, infructescence, *natural size*; 8, valves of a drupe, from inside, x 2; 9, seed, x 2.

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## TABULA 3393.

### BURSERA TRIMERA *Bullock.*

#### BURSERACEAE. Tribus BURSEREAE.

**B. trimera** *Bullock* in Kew Bull. 1936, 379, et I.e. 1937, 452, et I.e. 1938, 168.—Species *B. subtrifoliatae* Rose affinis, sed foliis oblongis vel obovato-oblongatis longioribus, marginibus fere ad basin profundius serrato-crenatis, nervis lateralibus parallelis manifestis numerosioribus, petiolis plerumque longioribus satis distincta.

*Frutex vel arbor* parva, 1-5-6 m. altus, glaberrimus; truncus cortice papyraceo exfoliato indutus; rami ramulique pro rata graciles, 2-5 mm. diametro, striati, laterales abbreviati. *Folia* digitatim trifoliolata vel rarius unifoliolata, in apice ramulorum abbreviatorum congesta vel secus ramulos elongatos steriles alterna; petioli circiter 1 cm. longi; foliola terminalia subsessilia vel brevissime petiolulata, oblonga vel saepius obovato-oblongata, usque ad 3 cm. longa et 1-5 cm. lata (plerumque minora), apice rotundata vel subacuta, basi cuneata, marginibus serrato-crenatis, nervis lateralibus parallelis approximatis utrinsecus 10-14 cum costa manifestis; foliola lateralia subsessilia, terminali similia, sed plerumque paullo minora et saepe basin versus inaequalitalia, hic etiam margine superiore integra. *Flores masculi* tantum visi, trimeri, ex axillis foliorum apice ramulorum solitarii vel 2-3-natim orti, saepius prius quam folia producti; pedicelli obsoleti vel brevissimi vel usque ad 1 mm. longi; bractee bracteolaeque verosimiliter nullae. *Calyx* 3-partitus, sepalis ovato-triangularibus obtusis vel subacutis vix 1 mm. longis marginibus undulato-crenatis. *Petala* 3, latissime elliptica, apice rotundata, fere 2-5 mm. longa, 2 mm. lata, marginibus incurvis, rigida, adscendentia et paullo divergentia. *Stamina* 6, filamentis filiformibus vix 1 mm. longis, antheris oblongo-ellipsoideis 1 mm. longis vel paullo longioribus. *Discus* carnosus, plano-concavus, 3-lobato-crenatus, lobis apice emarginatis. *Drupae* trigonae, ambitu oblique ovatae, apice acutae, demum 3-valvatae, valvis inaequalibus intus striatis superne reticulatis. *Semina* trigona, latere dorsali convexa, lateribus ventralibus planis, arillo pallido induta.

MEXICO. District of Temascaltepec, State of Mexico: Nanchititla, April 1933 (fl.), *Hinton* 3765, "a tree 4 m. high, with white flowers"; Calera, May 1935 (fl.), *Hinton* 7743. Mai Paso, District of Huetamo, State of Michoacán, May 1935 (fl.), *Hinton* 7765. State of Guerrero: Santa Bárbara, District of Coyuca, June 1935 (fl.), *Hinton* 7590; Pungarabato, District of Coyuca, April 1934 (fl.), *Hinton* 5943, 5997; *ibid.*, July 1934 (fr.), *Hinton* 6262 (type); *ibid.*, June 1934 (fl.), *Hinton* 6934; *ibid.*, Jan. 1935, *Hinton* 7245; *ibid.*, May 1935 (fl.), *Hinton* 7759; *ibid.*, June 1935 (fl., fr.), *Hinton* 7848: Placeres—Cameron, District of Mina, 450 m., July 1936 (sterile), *Hinton* 9083, "a tree



4 m. high " ; Cigarillo, District of Mina, 500 m., July 1936 (fr.), *Hinton* 9106, " a tree 4 m. high, frequent here, in woods " ; Placeres—Calavera, District of Mina, 500 m., July 1936 (fr.), *Hinton* 9107, " a spreading tree 5 m. high, rather frequent here, on wooded hills " ; Calavera, District of Mina, 450 m., Nov. 1936 (fr.), *Hinton* 9819 (from the same tree as no. 9107), " a spreading tree 5 m. high ; the gum is said to be poisonous ; wood pliable " ; Placeres, District of Mina, April 1937 (fl.), *Hinton* 10061, " a tree 4 m. high, with white flowers."

Notes on this species will be found under the three references given above ; the description is taken, with very little alteration, from Kew Bull. 1936, 379. Although trimery is characteristic of a major group of species of *Bursera* (see Bullock in Kew Bull. 1936, 352), the epithet *trimera* was used for this species because it was the first one in which the writer observed it. The character had not previously been used for diagnostic purposes.—A. A. BULLOCK.

FIG. 1, leafy sterile shoot, showing unifoliolate and trifoliolate leaves, *natural size*; 2, leafless flowering branch, *natural size*; 3, leafy fruiting branch, *natural size*; 4, leafless fruiting branch with dehiscent drupes, *natural size*; 5, male flower, x 8 ; 6, calyx of male flower, x 8 ; 7, male flower in longitudinal section, x 8 ; 8, disk and lower part of filaments, from above, x 8 ; 9, dehiscent drupe, x 3; 10, valves of a drupe, from inside, x 3; 11, seed, ventral view, x 3.

JJ94



## TABULA 3394.

### BUBSEBA HETERESTHES *Bullock.*

#### BuBSEBACEAE. Tribus BUBSEBEAE.

**B. heteresthes** *Bullock* in Kew Bull. 1937, 454, et I.e. 1938, 166.—Species a *B. penicillata* (Sessé et Moc. ex DC.) Engl. foliis 3- vel 5-foliolatis (foliolis nunquam numerosioribus) longius petiolatis, foliolis majoribus indumento breviori fere velutino recedit; a *B. coyucensi* *Bullock* foliolis majoribus dentibus marginalibus obtusis minus profundis, indumento multo breviori differt; ab omnibus speciebus petiolis pedunculisque glabris sed foliolis dense pilosis valde distincta.

*Arbor*, 6-10 m. alta ; rami ramulique glaberrimi, demum satis crassi, cortice rubro-brunneo et longitudinaliter lineato. *Folia* secus ramulos elongatos distanter alterna vel nonnunquam in apice ramulorum lateralium abbreviatorum congesta; petioli glaberrimi, usque ad 7 cm. longi; foliola 3, digitatim disposita, vel 5, pinnatim disposita et interstitio inter juga late serrato-alato ; foliolum terminale haud petiolulatum, ovatum vel lanceolatum, usque ad 11 cm. longum et 5 cm. latum, apice acuminatum, basi rotundatum ; foliola lateralia sessilia, ovata vel late ovato-lanceolata, usque ad 11 cm. longa et 5 cm. lata, apice acuminata, basi rotundata, parum inaequilateralia, inferiora (in foliis 5-foliolatis) leviter majora ; omnia (cum ala interstitiali) utrinque (subtus densius) pilis brevibus molliter velutina, marginibus obtuse serratis. *Inflorescentiae* pyramidales, laxe thyrsoidae, totae circiter 10 cm. longae, ex axillis perularum ortae, demum velut e basi ramulorum hornotinorum 2—4-natim verticillatae visae, glandulis minutis stipitatis sparse praeditae ; pedunculi glabri, usque ad 5 cm. longi, ramis suboppositis 3-5-floris vel superne unifloris, bracteis anguste lineari-lanceolatis vel subulatis inferioribus usque ad 9 mm. longis pilosis et stipitato-glandulosis superioribus gradatim minoribus, bracteolis nullis, pedicellis 5-10 mm. longis. *Flores* tetrameri, ut videtur unisexuales, feminei tantum visi. *Calyx* parvus, ad annulum inaequaliter 4-dentatum redactus, dentibus triangularibus usque ad 0-5 mm. longis leviter ciliatis. *Pet ala* 4, oblonga vel levissime spatulata, 3 mm. longa, 1 mm. lata vel paullo latiora, apice rotundata vel subacuta, extra (linea media praesertim) leviter pilosa. *Staminodia* 8, valde heteromorpha, petalis aequilonga vel iis breviora, petaloidea vel filamentis subulatis et antheris abortivis praedita, vel altero latere abortivo-antherifera altero latere petaloidea. *Discus* tenuis, planus. *Ovarium* ovoideum, 1 mm. altum et fere 1 mm. diametro, glabrum; styli 2, coaliti, apicem versus divergentes, stigmatibus capitatis coronati. *Drupae* obovoideae, 8 mm. altae, 5-6 mm. diametro, glabrae, demum valvis 2 dehiscentes. *Semina* lenticuliformia, 3-5 mm. diametro, dimidio inferiore arillo luteo-rubro induta ; arillus carnosus, cupuliformis, lateraliter cuspidato-rostratus ; testa nigra.

MEXICO. District of Temascaltepec, State of Mexico: Cafiitas, May 1935 (fl., young fr.), *Hinton* 7812 (type); *ibid.*, in a barranca, Oct. 1936 (fr.), *Hinton* 9958. District of Mina, State of Guerrero: Placeres—Camerón, 450 m., July 1936 (young fr.), *Hinton* 9084; Placeres, 450 m., July 1936 (young fr.), *Hinton* 9044; Placeres—Cigarillo, 400 m., Sept. 1936 (fr.), *Hinton* 9348; Cigarillo, in the arroyo Viscaina, April 1937 (sterile), *Hinton* 10055 ; *ibid.*, July 1937 (sterile), *Hinton* 10526 ; Puerto de Oro, 500 m., July 1937 (fr.), *Hinton* 10529.

The writer has nothing to add to the notes given in *Eew Bull.* 1937, 455.—A. A. BULLOCK.

FIG. 1, branch with inflorescence and young leaves, *natural size*; 2, female flower, x 8; 3 and 4, female flowers in longitudinal section, showing variation in the staminodes, x 8; 5, infructescence, *natural size*; 6, valves of the drupe, from inside, x 2; 7, seed, x 2.

3395



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## TABULA 3395.

### BURSERA TECOMACA (DC.) Standl.

#### BIJRSEACEAE. THbus BURSEREAE.

**B. Tecomaca** (DC.) Standl. in Publ. Field Mus. Nat. Hist. Chicago, Bot. Ser. iv. 217 (1929); Bullock in Kew Bull. 1936, 377, et I.e. 1937, 451, et I.e. 1938, 168. *Amyris Tecomaca* DC. in DC. Prodr. ii. 82 (1825); Alph. DC. Calq. Dess. Fl. Mex. t. 195 (1875); Engl. in DC. Monogr. iv. 59 (1883), sub spp. dub. *Elaphrium Tecomaca* (DC.) Standl. in Contrib. U.S. Nat. Herb, xxiii. 550 (1923), quoad syn. typ. *Bursera Kerberi* Engl. in DC. Monogr. iv. 41 (1883), et in Engl. et Prantl, Nat. Pflanzenfam. in. iv. 249 (1896), et I.e. 2 Aufl. xixA. 425 (1931); S. Wats, in Proc. Amer. Acad. xxii. 402 (1887); Urbina, Cat. Pl. Mex. 39 (1897). *Terebinthus Kerberi* (Engl.) Rose in Contrib. U.S. Nat. Herb. x. 119 (1906). *Elaphrium Kerberi* (Engl.) Rose in N. Amer. Fl. xxv. 247 (1911); Standl. in Contrib. U.S. Nat. Herb, xxiii. 546 (1923). *Amyris silvatica* Sesse et Moc. PL Nov. Hisp. ed. 2, 53 (1888), et Fl. Mex. ed. % 93 (1894), non Jacq. (1763).—Species distinctissima, foliis longe petiolatis semper trifoliolatis glaberrimis, foliolis apice abrupte cuspidatis vel caudatis, inflorescentiis laxe thyrsoides demum pendentibus.

*Arbor* 2-8 m. alta, glaberrima, resinosa, fragrans; cortex papyraceus, saturate brunneo-ruber, trunco cortice pallidiore exfoliato induto. *Rami* floriferi internodiis brevissimis praediti, cicatricibus foliorum et inflorescentiarum delapsorum rugosi vel corrugati; rami vegetativi internodiis plus minusve elongatis praediti, laeves vel lenticellis parvis parce obtecti. *Folia* in apice ramorum conferta, vel secus ramulos elongatos alterna, semper digitatim trifoliolata, petiolis gracilibus pro genere elongatis usque ad 8-5 cm. longis sed plerumque 6-7 cm. longis; foliolum terminale ellipticum vel oblongum vel interdum fere obovatum vel late oblanceolatum, 5-8 cm. longum, plerumque 2-3 cm. latum sed nonnunquam usque ad 4 cm. latum, apice abrupte cuspidatum vel satis longe caudatum, basi acutum vel cuneatum, marginibus serratum interdum irregulariter grosse dentatum; foliola lateralia terminali similia, sed manifeste minora; omnia foliola costa et nervis lateralibus (utrinsecus circiter 20 fere patentibus vel late adscendentibus subparallelis) manifestis, concoloria, interdum (praesertim juniora) resinonitida. *Inflorescentiae* in apice ramorum abbreviatorum ex axillis foliorum (vel perularum) juniorum ortae, breviter thyrsoides; pedunculi usque ad 3 cm. longi; bractae minutae, subulatae, scariosae, mox deciduae; bracteolae minutissimae vel obsoletae; pedicelli gracillimi, 3-5 mm. longae. *Flores masculi* pentameri vel rarius tetramer; calycis tubus vix 1 mm. altus, obconicus, dentibus oblongis acutis parvis coronatus; petala elliptico-oblonga, apice cucullata, marginibus incurvis, primum suberecta, demum patentia vel reflexa; stamina 10 vel 8, filamentis subulato-nliformibus, antheris lineari-oblongis

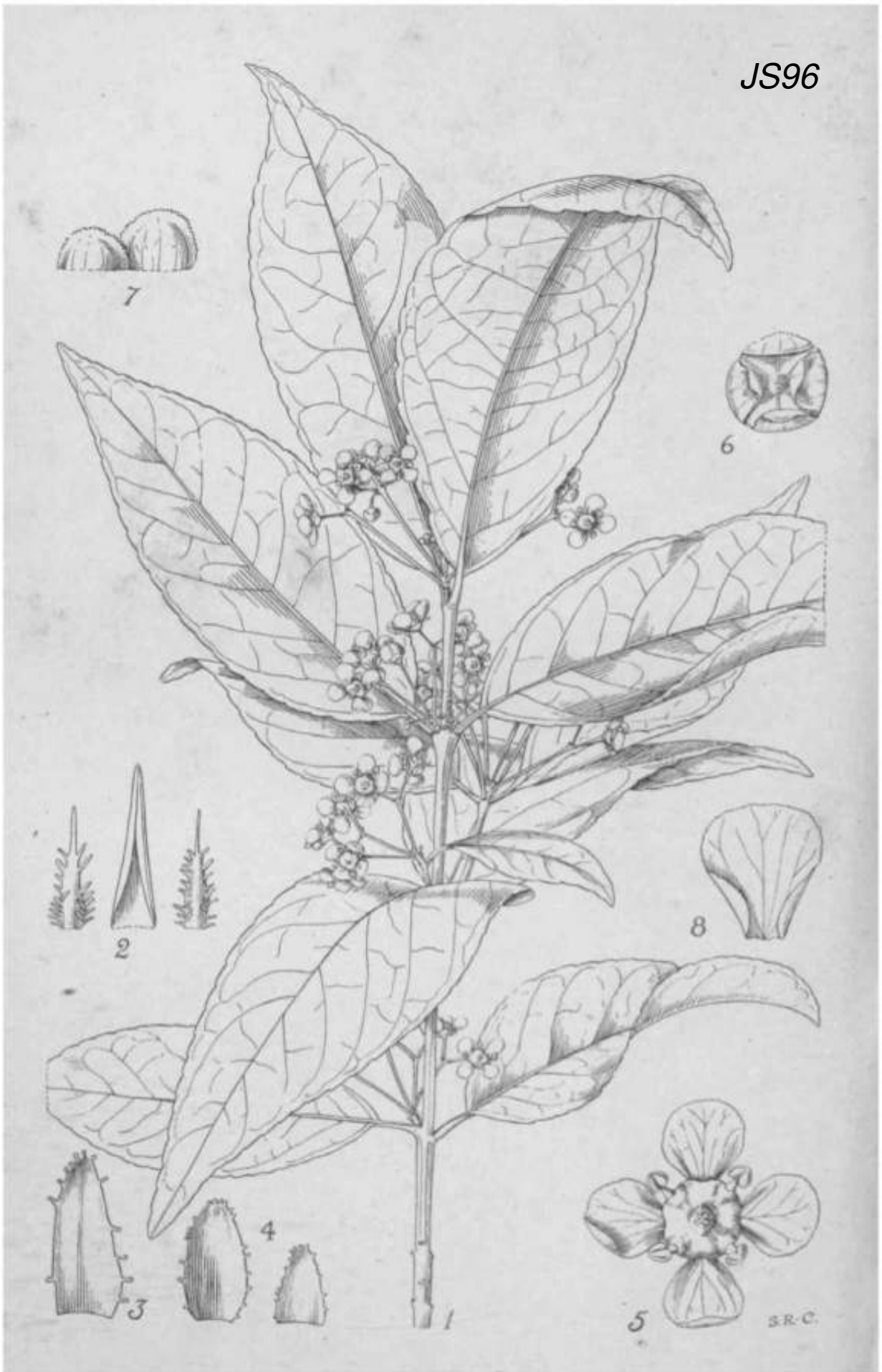
1-75 mm. longis; discus cupuliformis, carnosus, 10- vel 8-crenatus, calycis tubo adnatus; ovarium nullum vel minutissimum. *Flores feminei* trimeri; calycis tubus brevissimus, dentibus triangularibus inter se distantibus; petala semper 3, nunquam patentia vel reflexa; stamina ad staminodia redacta, haud fertilia; discus carnosus, annularis, irregulariter crenatus; ovarium globosum, 1-1 • 1 mm. diametro; stylus 0-3 mm. longus, apice stigmatate capitato trilobato coronatus. *Drupae* circiter 7 mm. longae et 4 mm. latae, demum valvis 3 inaequalibus intus reticulatis dehiscentes. *Semina* trigona, circiter 5 mm. longa et 3\*5-4 mm. lata, latere dorsali convexo, lateribus ventralibus planis, arilodio pallido induta.

MEXICO. State of Jalisco: Tequila, on dry rocky hills, Oct. 1893 (fr.), *Pringle* 4531; *ibid.*, Aug.-Sept. 1886, *Palmer* 423, "a tree with few branches, about 16 ft. high, and a foot in diameter, with loose bronzy papyraceous bark." District of Temascaltepec, State of Mexico: Volcán, 1450 m., June 1932 (fl. ?), *Hinton* 738; Acatitlán, June 1934 (fr.), *Hinton* 6192, "tree 3 m., sweet-smelling"; Ixtapán, Dec. 1934 (ft.), *Hinton* 7158, "tree 8 m."; *ibid.*, in a barranca, May 1935 (fl. J), *Hinton* 7819, "2-5 m. high"; Cafiitas, Jan. 1935 (fr.), *Hinton* 7295, "tree 8 m. high"; *ibid.*, May 1935 (fl. <J), *Hinton* 7775, "4 m. high"; Cañitas—Salitre, Jan. 1935 (fr.), *Hinton* 7300, "2 m. high"; Vigas, May 1935 (fl. #), *Hinton* 7815. District of Mina, State of Guerrero: Placeres—Camerón, 500 m., July 1936 (fr.), *Hinton* 9086, "spreading tree, 6 m."; Vacas, 900 m., Aug. 1936 (fr.), *Hinton* 9276, "spreading tree, 6 m., frequent"; Placeres—Cigarillo, 400 m., Nov. 1936 (fr.), *Hinton* 9793, "tree 5 m., leaves falling"; Calavera, 500 m., in a barranca, April 1937 (fr.), *Hinton* 10066, "tree 6 m."; Mesa Queisle, May 1937 (fl. cJ), *Hinton* 10414, "tree 4 m."; Manchón, May 1937 (fl. <J), *Hinton* 10429, "tree 6 m."

Notes on this species, and the writer's reasons for differing from Standley's identification, will be found in the Kew Bulletin, under the references cited above.—A. A. BULLOCK.

FIG. 1, branch with male inflorescences and leaves, *natural size*; 2, male flower in longitudinal section, showing petals, stamens and cupular disk, x 8; 3, calyx of a male flower, x 8; 4, branch with female inflorescences and leaves, *natural size*; 5, female flower, one petal removed, to show the gynoeceum and abortive stamens, x 8; 6, gynoeceum and disk, x 8; 7, abortive stamen from a female flower, x 8; 8, branch with infructescences, *natural size*; 9, valves of a drupe, from inside, x 3; 10, seed, ventral view, x 3.

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## TABULA 3396.

### EUONYMUS COBYMBOSUS *Sprague et Bullock.*

CELASTRACEAE. Tribus CELASTREAE.

*E. corymbosus* *Sprague et Bullock*; species nova, a congeneribus mexicanis cymis in corymbos terminates et axillares dispositis distinguenda.

*Arbor*, ut videtur sempervirens, statura ignota. *Rami* ramulique graciles, internodiis circiter 1-75 mm. diametro 20 cm. infra apicem, quadrangulares vel demum subteretes, glabri, glauci; internodia infrafoliaria, 1-2 cm. longa. *Folia* elliptico-lanceolata, basi rotundata usque subcuneata, apice sensim acute vel obtuse acuminata, 4\*5-8 cm. longa, 1\*5-^3 cm. lata, crenato-serrata, utrinque glabra, subconcoloria, pallide viridia; nervi laterales oblique arcuati, utrinque 7-8; petioli 3-5 mm. longi, supra canaliculati; stipulae deciduae, subulatae, 1-1\*3 mm. longae, scariosae, brunneae, glandulis longistipitatis ciliae. *Cymae* 3-5-7-florae, in axillis bractearum maxime caducarum stipularum ortae, circiter senae in corymbos terminates et axillares aggregatae; bractee cymas suffulcientes late subulatae, 1-2 mm. longae, sub anthesi delapsae, superne nonnunquam recurvae, marginibus inflexis integris; stipulae bractearum suffulcientium difformes, saepius triangulari-subulatae, vix 1 mm. longae, irregulariter fimbriatae, basi cicatrice bractee conjunctae; internodia bractearum suffulcientium 1-2\*5 mm. longa; pedunculi quadrangulares, basi ipsa et apicem versus expansi, 0\*8-1\*8 cm. longi, apice bibracteati; bractee ovato-oblongae vel triangulari-oblongae, haud 1 mm. longae, irregulariter glanduloso-ciliatae, stipulis similibus sed minoribus; pedicelli circiter 5 mm. longi, laterales interdum bibracteolati, ceteri nudi. *Flores* tetrameri, ut videtur pallide virides. *Sepala* semiorbicularia, circiter 2 mm. lata, membranacea, sub anthesi revoluta, minute papillato-ciliolata. *Petala* patentia, ovato- vel elliptico-orbicularia, 3-4 mm. longa, 3-3\*25 mm. lata, minute papillato-ciliolata, marginibus infra medium valde incurvis ita ut petala primo visu oblonga videantur. *Discus* carnosus, quadratus, 4-lobatus, 2\*5 mm. diametro, lobis pulviniformibus. *Filamenta* erecta, circiter 0\*6 mm. longa, medio circiter 0\*3 mm. lata, sursum angustata, disci lobo juxta marginem inserta; antherae depressodeltoideae, 0-8 mm. latae, acute apiculatae. *Ovarium* ultra medium in disco immersum, parte libera quadrata umboniformi circiter 0\*8 mm. diametro; stigmata 4, sessilia, primum arcuatim conniventia demum divergentia. *Ovula* pro loculo 2. *Capsula* ignota.

MEXICO. State of Mexico: Rincón Mine, District of Temascaltepec, fl. 14-28 Feb. 1932, *Hinton* 244, 325 (typus in Herb. Kew.).

The genus *Euonymus* has a typically boreal distribution, with the greatest concentration of species in the Far East, particularly in China.

It is well represented in India, Indo-China and the Malay Archipelago, and reaches its southernmost limit in Australia, where a single species, *E. australianus* F. Muell., is endemic in Queensland. Three species are common to Europe and the Near East, namely, *E. europaeus* L., *E. latifolius* Scop, and *E. verrucosus* Scop., one of which, *E. latifolius*, is found also in Algeria ; and four are endemic in the Near East.

Seven species are known from the New World, four being represented in the United States, two of these ranging from Canada to Florida. The remaining three are endemic in Central Mexico, namely, *E. meocicanus* Benth., discovered by Hartweg in 1838 in mountains near Huasca, Hidalgo ; *E. acuminatus* Benth., collected by Hartweg at Llano verde, Oaxaca ; and *E. corymbosus*, discovered by Mr. Hinton in 1932 in the Temascaltepec District of Mexico. Each of the Mexican species is known only from the original collection, and none had been seen by Standley (Trees and Shrubs of Mexico, 678 : 1923), which suggests that they are very restricted in their distribution.

The usual type of inflorescence found in *Euonymus* is an *intercalary* \* one, in which the cymes arise in the axils of bracts on the lower part of each year's growth, the upper part bearing one or more pairs of foliage-leaves. These leaves are already developed at the time of expansion of the flowers. In *E. corymbosus* the inflorescence appears to be fundamentally of the same type, to which three of the axes seen by us actually conform. The development of each annual axis seems, however, to take place usually in two stages : in the first stage only the lower (floral) part of the axis, usually 0.5-1 cm. in length, is produced ; this bears 2-3 pairs of cymes subtended by small subulate bracts, separated by very short internodes, the whole forming a corymb of cymes. Judging from the presence, on older parts of the axes, of similar crowded cicatrices of cymes, the axis of the corymb later in the season elongates and produces 1-2 pairs of foliage-leaves, separated by internodes 1-2 cm. long. On the other hand, the possibility cannot be excluded that, in at least some cases, the formation of a terminal corymb stops the growth of the main axis, in which case any further vegetative growth would be axillary, and result in the "dichotomous" type of branching so characteristic of *Viburnum Lantana* L. This question can be settled only by observation of the annual growth in the field.

T. A. SPRAGUE and A. A. BULLOCK.

FIG. 1, flowering branch showing cicatrices of former inflorescences on the lowest and uppermost "internodes" between foliage-leaves, *natural size* ; 2, bract subtending a peduncle, and its two stipules, x 12 ; 3, bract subtending a pedicel, x 24 ; 4, stipules of the same, x 24 ; 5, flower from above, x 4 ; 6, back of flower showing the reflexed Bepals, x 6 ; 7, sepals flattened, outside view, x 6 ; 8, petal, outside view, x 6.

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\* Journ. Linn. Soc, Bot. xlii. 556 (1914).



## TABULA 3397.

### PARATHESIS MA CRONE MA *Bullock*.

MYRSINACEAE. Tribus MYRSINEAE.

*P. macronema* *Bullock*; species nova, inter species inflorescentiis axillaribus gaudentes filamentis filiformibus quam antherae duplo longioribus distinctissima.

*Frutex* 1-5-4 m. altus; rami novelli ferrugineo-tomentelli, mox glabrati. *Folia* alterna, petiolata, tenuiter herbacea, anguste elliptica vel lanceolato-elliptica vel oblanceolato-elliptica, 6-10 cm. longa, 1-5-3-5 cm. lata, apice obtuse cuspidata vel breviter acuminata, basi cuneata, integra vel obscurissime irregulariter crenulata, nervis lateralibus utrinsecus circiter 20 subtus subprominulis, matura utrinque glabra vel subtus leviter ferrugineo-pilosula, punctis lineisque resinosis aurantiacis pellucidis dense notata; petioli circiter 1 cm. longi. *Inflorescentiae* pyramidato-paniculatae, multiflorae, ex axillis vel leviter supra axillas foliorum superiorum ortae; pedunculi 3 • 5<sup>^</sup>5 cm. longi; bractee inferiores subfoliaceae, spathuliformes vel lineari-oblanceolatae, circiter 1 cm. longae, 2 mm. latae, glabrae, lineis aurantiacis resinosis pellucidis notatae, superiores gradatim minores, ultimae minutae, subulato-filiformes; rami inflorescentiarum racemose dispositi, superne gradatim breviores; pedicelli gracillimi, 5-6 mm. longi, glabri. *Flores* roseo-albi, pentameri, corymbose dispositi. *Sepala* basi connata, triangulari-lanceolata, 1 mm. longa, 0\*25 mm. lata, lineis resinosis longitudinaliter brunneo-striata, glabra. *Petala* basi connata, triangulari-lineararia, 6-6\*5 mm. longa, basin versus 1 mm. lata, apice subacuta vel obtusa, sub anthesin revoluta, lineis resinosis longitudinaliter striata, extra levissime, intus densissime papilloso-tomentefla, marginibus pib's brevibus retrorsis ciliata. *Filamenta* siccitate laete purpurea, lineararia, 3 mm. longa, basi ipsa in annulum corouae adnatum connata, dimidio inferiore pilis paucis brevissimis obtecta; antherae laete luteae, lanceolatae, 1 • 5 mm. longae, apice plerumque cuspidatae, basi sagittatae, paulo supra basin dorsifixae, connectivo punctis resinosis elongatis superpositis utroque margine 1-3 dorsaliter notato. *Ovarium* ovoideo-globosum, 0\*75 mm. diametro, glabrum sed punctis lineisque resinosis densissime notatum; ovula uniseriata, circiter 8, in placenta immersa; stylus filiformis, 5 mm. longus, apicem versus sensim .attenuatus, basin versus pilis brevissimis paucis obtectus, dimidio inferiore tantum lineis resinosis longitudinaliter striatus. *Fructus* globosus vel depresso-globosus, usque ad 7 mm. diametro, punctis lineisque resinosis dense notatus.

MEXICO. State of Guerrero: Banco, District of Montes de Oca, Oct. 1937 (fl., fr.), *Hinton* 10803 (typus), "shrub 4 m., fl. pinkish white"; E!o Porvenir, 950 m., March 1899 (fl.), *Langlassé* 967, "arbrisseau, l'5m., fleurs blanc rosâtre."

This plant is chiefly remarkable for its comparatively long filaments, which in the dried state are bright purple in colour, in striking contrast with the bright yellow anthers. The resin glands on each side of the connective, just above the insertion of the anther, also appear to be characteristic.—A. A. BULLOCK.

FIG. 1, flowering stem, *natural size*; 2, flower, x 6; 3, calyx and gynoecium, x 12; 4 and 5, stamens, dorsal and ventral views, x 12; 6, placenta with ovules, x 24; 7, part of an infructescence, *natural size*.



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## TABULA 3398.

### PARATHESIS TETRAMEEA *Bullock.*

MYRSINACEAE. Tribus MYRSINEAE.

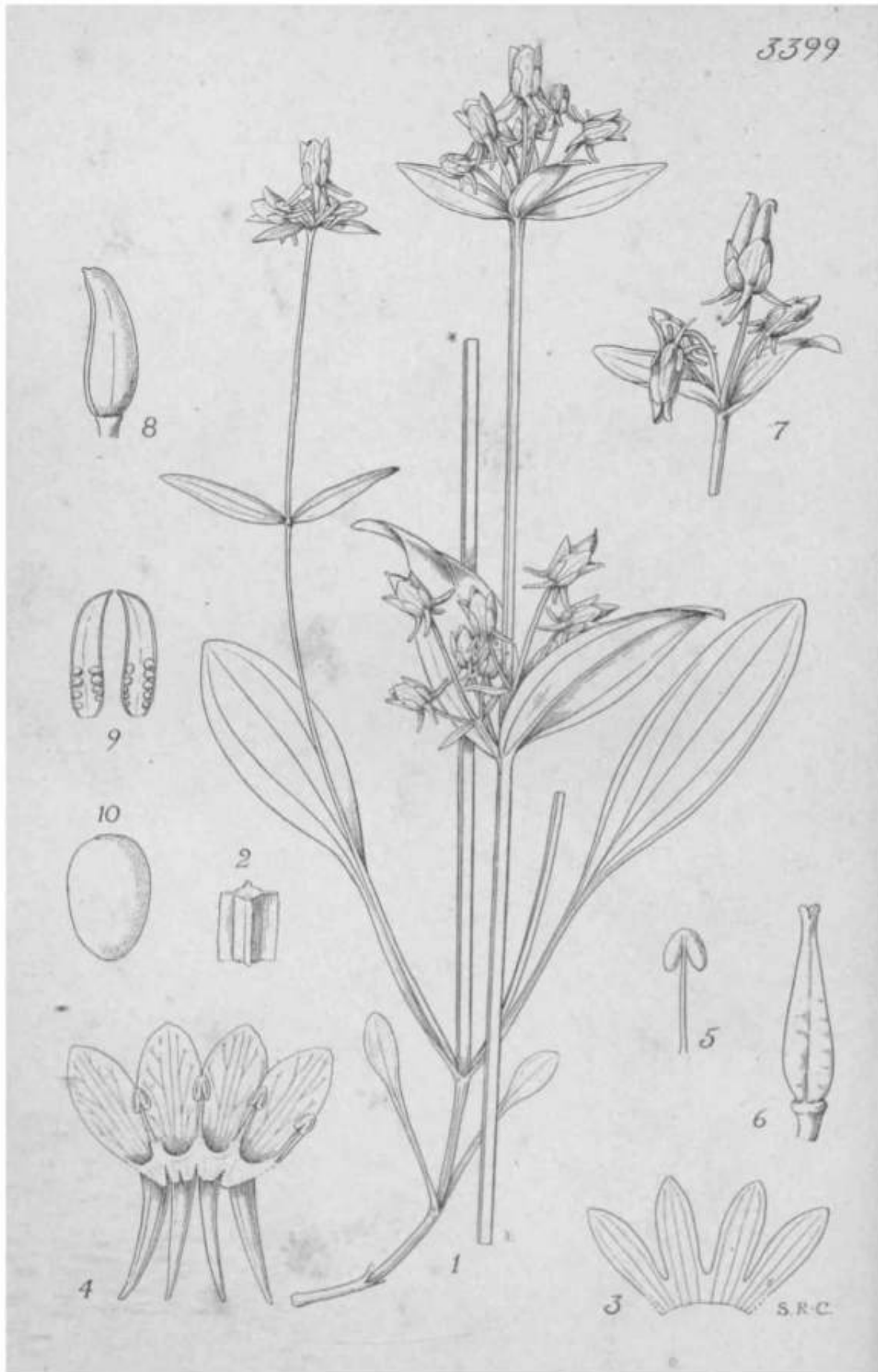
*P. tetramera* *Bullock*; species nova, inter congeneres foliis pro rata parvis, inflorescentiis terminalibus paucifloris, floribus tetrameris distinctissima.

*Arbor*, 2 m. alta (fide *Hinton*) ; rami ramulique glabri, lineis resinosis dense notati. *Folia* elliptica vel lanceolato-elliptica vel oblanceolato-elliptica vel interdum ovata vel obovata, usque ad 7\*5 cm. longa et 3 cm. lata, sed saepius minora, apice acute vel obtuse breviter cuspidata vel acuminata, basin versus in petiolum circiter 7 mm. longum cuneatim angustata, integra, utrinque glabra, punctis lineisque minutis pellucidis dense notata, nervis lateralibus utrinsecus circiter 20 subtus prominulis. *Inflorescentiae* terminales, paniculatae, circiter 5 cm. longae, pro genere pauciflorae ; rami inferiores circiter 2\*5 cm. longi, ex axillis bractearum foliis similium orti; bracteae superiores gradatim minores ; pedicelli 6—7 mm. longi. *Flores* tetrameri, secus ramos inflorescentiarum 3-5-natim corymboso-dispositi, vel interdum solitarii, ex axillis bractearum parvarum orti. *Sepala* basi connata, triangularia, vix 1 mm. longa, 0-5 mm. lata, obtusa vel subacuta, punctis resinosis notata, extra leviter papillato-puberula, sicca plus minusve naviculiformia. *Petala* basi connata, lineari-oblonga, 6 mm. longa, apicem versus leviter angustata, apice rotundata, lineis resinosis longitudinaliter striata, extra leviter, intus dense papilloso-tomentella. *Stamina* ima basi in anulum corollae adnatum connata; filamenta crassa, applanata, 2 • 5 mm. longa, 0 - 75 mm. lata, lineis resinosis notata, glabra ; antherae laete luteae, lanceolatae, 3-5 mm. longae, 1-25 mm. latae, apice obtusae nee cuspidato-appendiculatae, connectivo resinoso-glanduloso, thecis interdum basin versus glandula resinosa extra munitis. *Ovarium* ellipsoideum, 1 mm. longum, 0 - 75 mm. diametro, apice sparse papillato-puberula ; stylus 3-5 mm. longus, linearis, apice attenuatus, basin versus levissime papillato-puberula, lineis resinosis striatus ; ovula 8, uniseriata, in placenta immersa. *Fructus* ruber, globosus, 6 mm. diametro, apice apiculatus, dense resinoso-punctatus.

MEXICO. State of Guerrero : Pasión, District of Montes de Oca, 600 m., in oak forest, 6 Oct. 1937 (fr.), *Hinton* 10769 ; *ibid.*, 8 Oct. 1937 (fl., fr.), *Hinton* 10779 (typus).

This species is remarkable in having tetramerous flowers, since all species of *Parathesis* hitherto described are constantly pentamerous. The relatively small and few-flowered inflorescences also serve to distinguish it from all other species.—A. A. BULLOCK.

FIG. 1, flowering branch, *natural size* ; 2, flower, x 6 ; 3, calyx and gynoecium, x 125 ; 4, stamen, ventral view, x 6 ; 5, placenta with ovules, x 16 ; 6, the same, in longitudinal section, x 16 ; 7, infructescence, *natural size* ; 8, fruit in longitudinal section, x 3 ; 9, seed, x 12.





## TABULA 3399.

### HALENIA HINTONI *Bullock.*

GENTIANACEAE. Tribus SWERTIEAE.

**H.** (§ *Haleniastrum*) **Hintoni** *Bullock* ; species nova, *H. Pringlei* Eobins. et Seaton peraffinis, sed habitu elatiore, omnibus partibus majoribus, foliis caulinis latoribus haud linearibus, floribus longius pedicellatis, calycis lobis oblongis vel oblongo-spathulatis latoribus marginibus minute papillatis, corollae calcaribus longioribus tenuioribus differt.

*Herba*, perennis vel biennis, usque ad 30 cm. alta. *Caules* simplices, vel ex axillis foliorum caulinarum inferiorum ramis 2 oppositis praediti, quadrangulati, angulis anguste alatis ; intemodia inferiora 2-5 circiter 0.5-2 cm. longa; intemodia superiora 1-3 multo longiora, usque ad 17 cm. longa. *Folia* haud rosulata, inferiora longe petiolata, spathulata usque oblanceolata, lamina usque ad 4-5 cm. longa et 1-5 cm. lata apice rotundata, basi in petiolum usque ad 3 • 5 cm. longum alatum decurrentia, sed saepe minora et infima valde redacta et plerumque cataphyllaria ; folia superiora (supra intemodia longiora) sessilia, oblanceolato-elliptica vel elliptica vel plus minusve lanceolata, usque ad 3 cm. longa et 1 cm. lata, apice acuta vel obtusa vel interdum rotundata, basin versus angustata ; folia omnia tenuiter membranacea, trinervia vel interdum quinquenervia. *Flores* albi, tetrameri, in cymas terminates et axillares 3-7-floras pseudo-umbellatim dispositi; pedunculi obsoleti vel usque ad 1 cm. longi; pedicelli satis crassi, tetragoni, angulis alati, 0.5-1 • 5 cm. longi; flos terminalis ceteris paullo major et longius pedicellatus ; bractee 2, oppositae, foliis sessilibus similes sed minores, involucram efformantes. *Calyx* fere ad basin lobatus ; lobi erecti, oblongi vel oblongo-spathulati, 4 mm. longi, 1 • 5 mm. lata, apice rotundati, marginibus minute papillati, trinervii; squamellae nullae. *Corolla* sub anthesi circiter 6 mm. longa, statu fructifero leviter accreta, tetragono-cupuliformis ; lobi erecti, semi-ovati, 2-3 mm. longi, 2-2.5 mm. lati, saepe apice ipso abrupte brevissime apiculati, ceterum late rotundati; tubus 3-4 mm. longus, 1 mm. supra basin 4-calcarati; calcaria circiter 5 mm. longa, acuta, tenuia, patenter declinata. *Stamina* inclusa, inter calcaria inserta ; filamenta linearia, circiter 1.5 mm. longa ; antherae reniformi-sagittatae, vix 1 mm. longae ; thecae 0.5 mm. latae. *Ovarium* ambitu anguste lanceolatum, circiter 4-4.5 mm. longum; stigmata truncata, 0.3 mm. longa et lata. *Capsula* membranacea, usque ad 1-2 cm. longa, 4 mm. lata, apicem versus saepe arcuata, apice ipso apiculata, dimidio inferiore seminifera ; valvae apice demum abrupte recurvae. *Semina* circiter 16-20, ovoidea, circiter 1.5 mm. longa et 1 mm. diametro, laevia, pallide lutea.

.MEXICO. Cumbre Trojes, District of Temascaltepec, State of Mexico, in *Pinus* and *Alnus* forest, 8 Sept. 1935, *Hinton* 8273.

Four species of *Halenia* have been collected by Mr. G. B. Hinton in Mexico, one of which, *H. Hintoni*, could not be identified by means of Miss C. K. Allen's monograph of the American species in Ann. Miss. Bot. Gard. xx. 119-222, tt. 8-12 (1933). In view of the great variability exhibited by *H. Pringlei* Robins, et Seaton, and discussed briefly by Allen (op. cit. 160), it was at first thought that *H. Hintoni* might be included in it, but the differences mentioned in the diagnosis seem to justify specific separation.

The appearance of the rootstock suggests that *H. Hintoni* is either a biennial or a perennial. It probably flowers in the second season, and in some cases at any rate basal lateral buds seem to persist to produce flowering shoots in the third and following seasons.

The other species of *Halenia* collected by Mr. Hinton present some points of interest, and it may be useful to enumerate them here. The first two belong to Sect. *Haleniastrum* Allen, and the third to Sect. *Swertiella* Allen.

1. *H. Pringlei* Robins, et Seaton in Proc. Amer. Acad. xxviii. 113 (1893) ; Allen in Ann. Miss. Bot. Gard. xx. 160 (1933).

MEXICO. Las Cruces, District of Temascaltepec, State of Mexico, 3320 m., in marshy meadow, 24 May 1932, *Hinton* 787.

This was previously represented at Kew by Pringle's numbers 4209 (type number) and 13121, collected in what may be the same locality (Sierra de las Cruces) as Hinton's, during the month of August. Hinton's specimen, consisting of several flowering plants, shows the spurs very well developed, whereas in Pringle's specimens they are obsolescent or absent. This agrees with Allen's observation (i.e.) that plants flowering early in the season have spurred corollas, whilst late season specimens very rarely have spurs.

2. *H. plantaginea* (H.B.K.) Griseb. Gen. et Sp. Gent. 327 (1839); Allen, op. cit. 175, incl. forma *grandiflora* Allen. *Swertia plantaginea* H.B.K. Nov. Gen. et Sp. iii. 175 (1819).

MEXICO. District of Temascaltepec, State of Mexico : Las Cruces, 3350 m., in mixed pine and fir forest, 13 July 1932, *Hinton* 1034 ; Crucero Agua Blanca, 3170 in., on the llano, 1 Sept. 1933, *Hinton* 4623.

This species is well represented at Kew, and the variation in flower-size and in the vigour of the plant as a whole seems to be continuous. Hence Allen's forma *grandiflora* can hardly be maintained. *H. plantaginea* is very like *H. Hintoni* in habit and general appearance, but is at once distinguished by the incurved corolla-spurs.

3. *H. brevicornis* (H.B.K.) G. Don, Gen. Syst. iv. 177 (1838); Allen, op. cit. 140-146 et 147. *Swertia brevicornis* H.B.K. Nov. Gen., et Sp. iii. 174 (1819).

MEXICO. District of Temascaltepec, State of Mexico : Tequesquipán, 2800 m., on a grassy hill, 28 Oct. 1932, *Hinton* 2316 ; Timbres, 14 Dec. 1932, *Hinton* 3045 ; Sierrita, 29 Sept. 1935, *Hinton* 8311 ; Mesón Viejo, 11 Oct. 1935, *Hinton* 8345.

var. **latifolia** {*Cham, et Schlecht.*} Allen, op. cit. 141. *Swertia parviflora* var. *latifolia* Cham, et Schlecht. in *Linnaea*, v. 122 (1830).

MEXICO. Nanchititla, District of Temascaltepec, State of Mexico, in Pine forest, 16 Dec. 1933, *Hinton* 5354.

var. **multiflora** (*Benth.*) Allen, op. cit. 142. *H. multiflora* Benth. *PI. Hartw.* 24 (1839).

MEXICO. District of Temascaltepec, State of Mexico : Ocotepc, about 1500 m., on a hill, 9 Dec. 1932, *Hinton* 2905 ; Pungarancho, 25 Nov. 1933, *Hinton* 5257 ; Pilas, 1500 m., 22 Oct. 1936, *Hinton* 9886.

The type of *H. brevicornis* was collected by Humboldt and Bonpland in the vicinity of Quito, and the same collectors found *H. parviflora* (H.B.K.) G. Don, which is now regarded as conspecific, in the State of Guanajuato, Mexico. The species and its varieties range from Northern Mexico to Peru, the development of the corolla-spurs apparently being greatest in the more northerly part of the area.

The spurred varieties admitted by Allen are var. *multiflora* (Benth.) Allen, var. *divergens* Allen,- and var. *chihuahuāensis* Allen. Of these, the last is confined to Chihuahua, the second occurs in Michoacán and Vera Cruz, whilst the first occurs in San Luis Potosí, Zacatecas, Jalisco, Mexico, Guerrero and Oaxaca. I have been unable to separate these three varieties satisfactorily (though the specimens at Kew are not so numerous as those examined by Allen), and am of opinion that they represent a continuously variable taxonomic entity, which passes almost imperceptibly into var. *latifolia* (Cham, et Schlecht.) Allen. Mr. Hinton's specimens which I have identified with this last variety show, on the same plant, flowers entirely devoid of external spurs, others in which the spur is represented by a tubercle, and still others which have spurs at least as well developed as in typical specimens of var. *multiflora*.

*H. brevicornis* (type) is characterized by Allen as having linear leaves and the corolla without external spurs, and Mr. Hinton's numbers 2316 and 3045 agree with this at least as regards the leaves and the majority of the flowers. In some of the flowers, however, spurs are represented by distinct tubercles, as in some flowers of var. *latifolia*.

In view of the seasonal variation in the corolla-spurs observed by Allen in *H. Pringlei* (*vide supra*) it seems likely that ecological work on the *H. brevicornis* complex would reveal even more continuous variation than is shown by herbarium specimens, and render unnecessary the use of varietal names.

The unspurred varieties admitted by Allen are :—var. *latifolia* (Cham. et Schlecht.) Allen, from Vera Cruz, Puebla, Morelas, Tlaxcala, Mexico,

Michoacán, and also from Sonora (*Gentry 2099*, det. Standley); var. *micranthella* (Briq.) Allen from Hidalgo and Mexico ; var. *ovata* Allen from Tepic ; and var. *Tuerckheimii* (Briq.) Allen from Guatemala. *H. brevicornis* (type) is recorded by Allen from San Luis Potosi, Vera Cruz, Guanajuato, Puebla, Mexico, Chiapas, Costa Rica, Nicaragua, Venezuela, Colombia, Ecuador and Peru.

Of the unspurred varieties, only var. *micranthella* and var. *latifolia* are represented at Kew. Var. *micranthella* seems to be no more than a depauperate form, but the broad leaves of var. *latifolia* give it a distinct appearance.

There seems to be a case for transferring certain species from Sect. *Swertiella* to Sect. *Haleniastrum* and vice versa. *H. alata* (Mart, et Gal.) Hemsl. is apparently more closely allied to *H. Pringlei* than to *H. brevicornis*, and should accordingly be placed in Sect. *Haleniastrum*. On the other hand the Costa Rican *H. rhyacophila* Allen seems better placed in Sect. *Swertiella*.—A. A. BULLOCK.

FIG. 1, flowering plant, *natural size*; 2, portion of pedicel, x 12; 3, calyx, opened, inside view, x 4; 4, corolla, opened out, inside view, x 4; 5, stamen, outside view, x 6; 6, gynoecium, x 6; 7, infructescence, *natural size*; 8, immature capsule, x 2; 9, the same, split open, x 2; 10, seed, x 12.

3400



2



3



11



10



9



5



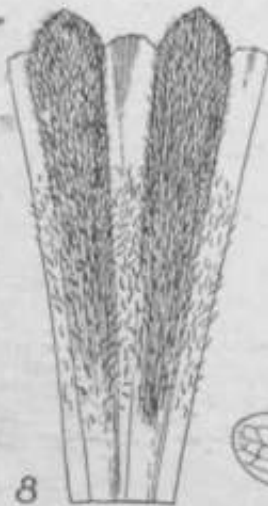
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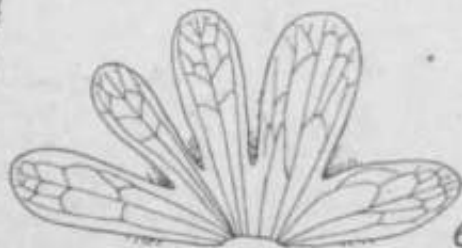
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12



8



6



7

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## TABULA 3400.

### COMBERA MINIMA *Sandwith.*

#### SOLANACEAE. Subtribus NICOTIANINAE.

**C. minima** *Sandwith*, nom. nov. *Nicotiana* ? *minima* Philippi in *Linnaea*, xxxiii. 198 (1864); *PL Vase. Chilens.* 225 (1881); non *N. minima* Molina (1782). *Petunia minima* (Phil.) Reiche, *Fl. Chile*, v. 393 (1910); R. E. Fries in *Svensk. Vet. Akad. Handl.* xlv. no. 5, p. 68 (1911).—A *C. paradoxa* *Sandwith* inter alia indumento, forma calycis, corolla longiore statim distinguenda.

*Herba* perennis, humilis, radice caules ut videtur complures flexuosos emittente; caules inferne cicatricibus vel foliis emarcidis obtecti, 1\*2 mm. diametro, superne apicem versus supraterraneum per 0-5-2 cm. tantum dense rosulatum foliati. *Folia* eis *C. paradoxae* similia, longitudine tota 4-9 mm., lamina 2'5-4\*5 mm. lata, saepe (magis quam in *C. paradoxa*) in petiolum sensim late attenuata, carnosa, glabra, integra. *Flores* in apice ramulorum brevissimorum axillarium lateralium inter folia rosulata solitarii, sessiles; folia summa bracteoliformia, anguste spathulato-oblonga, pilis hyalinis simplicibus paucis raris ciliata, vel glabra. *Calycis* tubus campanulatus, circiter 2 mm. longus, extra parcissime albo-pilosus; lobi spathulato-oblongi vel fere oblongi, obtusi, rotundati, usque ad 4 mm. longi, 1-75-2-3 mm. lati, dimidio inferiore pilis hyalinis simplicibus ciliati, sub lente laxo venosoreticulati. *Corolla* anguste infundibuliformis vel hypocrateriformis, limbo siccitate erecto vel expanso et 9 mm. diametro, hoc incluso 1-3 cm. longa, tubo (basi excepta) lobisque limbi extra pilis albis multicellularibus debilibus crispulis copiose vestitis; tubus verus circiter 1 cm. longus, extra nonnunquam sub lobis longitudinaliter late nigrescenti-caeruleo-vittatus; lobi subspathulato-oblongi, apicem versus attenuati, obtuse acuti, circiter 3 mm. longi atque 1-75 mm. lati, extra siccitate nigrescenti-caerulei, pilis membranaceis albis glabris sese brevioribus connexi. *Stamina* circiter 5\*5 mm. supra corollae basin affixa, filamentis liberis glabris 4-5 mm. longis, sub insertione per 2 mm. longitudinaliter albo-pilosa; antherae circiter 0-8 mm. longae atque latae, minute apiculatae. *Discus* brevis, inconspicuus, glaber, circiter 0-4 mm. altus. *Ovarium* ovoideo-subglobosum, glabrum, 1\*6 mm. longum, 1\*3-1-75 mm. diametro; stylus 5 mm. longus, stigmatibus obscure bilobulatis; ovula generis. *Capsula* ovoideo-subglobosa, circiter 3 mm. longa atque 2-5 mm. diametro; semina (immatura) transverse oblonga, reticulatione generis typica creberrima, 1-4 mm. longa, brunnea.

CHILE. Prov. Valdivia: Cordillera de Ranco, in crevices of rocks in exposed places, 5000 ft., *Pearce* sine no. (typus in *Herb. Kew.*; phot, coll. typ. in *Herb. Kew.* e mus. Santiago de Chile donata).

When the genus *Combera* was described from the Argentine material of *C. paradoxa* (see Hook. Ic. PL, t. 3325, 1936), it was realized, from the evidence both of the description and of the habitat, that Philippi's mysterious *Nicotiana minima* might possibly bear some relationship to it. The taxonomy and literature of this plant were discussed, but in the absence of specimens the writer was compelled to weigh the descriptions of Philippi and Reiche—which gave an ambiguous picture of the corolla-limb—with a photograph of the type in the Museo Nacional de Historia Natural, Santiago de Chile. Since then specimens of the type collection have been discovered on a Kew Herbarium sheet which had been laid at random into the cover of the genus *Bouchetia*. The material agrees with the photograph of the type and fits the descriptions of Philippi and Keiche, and there can be no doubt that it represents the original collection of *N. minima* Phil.

The examination following this welcome discovery convinces the writer that Philippi's plant is a member of the genus *Combera*. Not only are the habit and leaf-form almost identical with those of *C. paradoxa*, but the peculiar character of the corolla-limb is faithfully reproduced and completely contradicts Philippi's description ("albida, plicis violaceis"). The true lobes are blackish-blue on the outer surface as in *C. paradoxa* and are separated by white plaits; on the other hand the dark colour of these lobes does not show on the inner surface of the material examined. The position of the flowers is interesting and shows that the description of the inflorescence of *Combera* will require emendation after examination of far more material than is at present available. The flowers, instead of being axillary and crowded at the apex of the main branches, and each subtended by 2 bracteoles, as in *C. paradoxa*, are terminal on extremely short leafy lateral short-shoots, and apparently ebracteolate.

Since Philippi's *Nicotiana minima* is a later homonym of *N. minima* Molina (*Nierembergia minima* (Mol.) I. M. Johnst.), the epithet cannot be used for a new combination when the species is transferred to *Combera*. But the same epithet may legitimately be employed for a new name within this genus, since no other exists. The binomial *Combera minima* is therefore proposed, to date from the publication of this plate, the type being the Pearce material in the Kew Herbarium.

*Combera minima* is distinguished at a glance from *C. paradoxa* by the shape of the calyx-lobes and by the much larger corolla. But there are many other differences. The branched white multicellular hairs of *C. paradoxa* are represented by simple hairs in *C. minima*, while the dense glandular indumentum of parts of the calyx and corolla of *C. paradoxa* is completely absent. The stamens are inserted higher in *C. minima*, and there are conspicuous lines of hairs descending from the points of insertion, whereas in *C. paradoxa* it is the dilated portion of the filament immediately above the point of insertion which is hairy. Again, the style is longer in *C. minima*, while the disk appears to be much shorter and less conspicuous than in *C. paradoxa*. The apparent absence of conspicuous colouring on the inner surface of the corolla-

lobes of *C. minima* has **already been** mentioned, but further evidence on this point is needed.

Another collection of *Combera* has recently been made far away in Southern Chile, by *Anastasio Piri6n* (no. 3447, Feb. 1934), and is deposited in the Gray Herbarium. The locality was on the international highway east of Puerto Aysen, Territory of Aysen. The material, which is fragmentary, has been examined by the writer and resembles *C. paradoxa* in the shape of the calyx-lobes, and *C. minima* in the absence of glandular pubescence except for a few gland-tipped hairs on the outer surface of the corolla-lobes. The long multicellular hairs are mostly simple, and the dimensions of the floral parts exceed those of *C. paradoxa*, the style being strikingly longer. Mention is made of this collection, not merely in order to bring the history of *Combera* up to date, but also to indicate the wide distribution of this genus and the possible existence, on the one hand, of other species or, on the other, of considerable variability in such characters as indumentum and dimensions of floral parts.—N. Y. SANDWICH.

FIG. 1, portions of plant, *natural size* ; 2, leaf, lower surface, x 6; 3, a terminal leaf of a branchlet, x 6; 4, hairs on margin of terminal leaf, x 24; 5, calyx seen from outside, x 4; 6, calyx from outside, opened out, showing venation, x 4; 7, corolla from within, showing stamens, x 4; 8, part of exterior of corolla, x 4; 9, gynoecium and disk, x 6; 10, longitudinal section of ovary and disk, x 6; 11, immature capsule, x 6; 12, immature seed, x 12.

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