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2. Notes from the University Herbarium, Cambridge.

3. Herbarium Floræ Cantabrigiensis a W. T. STEARN et J. S. GILMOUR editum. Decades I.–II.

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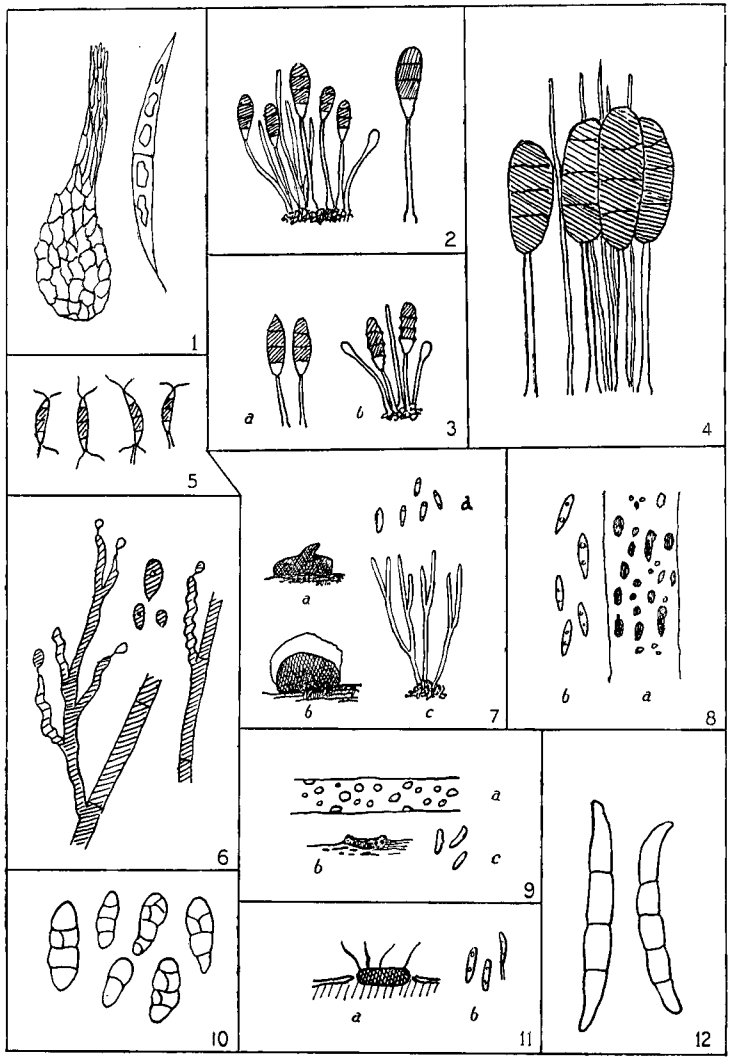
CORRIGENDA.

P. 133, line 11 from bottom, *for* **zimbabwense** *read* **zimbabwensis.**
P. 137, line 1, for *Milanjiana* read *milanjiana*.
P. 254, middle of page, for **Burtil** read **Burttii.**



W. B. G. del.

NEW OR NOTEWORTHY FUNGI.

THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

NEW OR NOTEWORTHY FUNGI.—PART XII.

By W. B. GROVE, M.A.

(PLATE 599.)

CŒLOMYCETES (continued from vol. lxviii. p. 297).

MYCORHYNCHUS Sacc. Syll. xviii. 418 (1906).

Pycnidia subglobose, ending above in a subulate beak, rather soft, bright-coloured. *Spores* fusoid-bacillar, acute, 1-septate, hyaline, gradually attenuated downwards into a cuspidate seta.

It is a *Sphæronæmella* with narrow elongate spores.

462. MYCORHYNCHUS MARCHALII Mig. iii. pt. 4, 477.

Rhynchomyces Marchalii Sacc. & March. Champ. Copr. 28. Sacc. Syll. x. 411. All. vii. 314. Died. 701, 690, f. 9.

Pycnidia in very crowded groups or even connate, superficial or nearly so, tawny or ochraceous-yellow, 200–300 μ in total height, ovoid or subglobose below and 50–70 μ broad, tapering upwards into a long subulate beak which measures 100–150$\times$ 10–25 μ; texture of venter composed of ochreous, translucent, loosely arranged, wide, parenchymatous cells, those of the beak similar but elongated, vermiform, longitudinally arranged, and $\pm$parallel. *Spores* fusoid, tapering and very acute above, acuminate below, where they end in a seta or bristle-like point (up to 10 μ long) which is sometimes turned to one side, colourless, pluri- or multiguttulate, at length 1-septate about the middle, 50–70$\times$6 μ, enveloped in a little mucus and clinging together in groups of from two to ten when they emerge into water. (Pl. 599, fig. 1.)

On horse-dung, Walton, Liverpool (*W. G. Travis*, no. 179); April. With it was *Geotrichum candidum* Link.

Saccardo's specimens were found on fox-dung in the Ardennes.

He thought that the seta might be a kind of "basidium" or pedicel. The dimensions of the Liverpool fungus were, on the whole, slightly smaller than those given by Saccardo. As the spores emerge from the ostiole, one by one, in water, each glides by the side of the previous one, clinging to it and by degrees forming a kind of whitish globule. The base of the pycnidium is surrounded by sparse ochreous hyphæ. The cells of the venter were often convexly protuberant and made the outer surface uneven.

There can be no doubt that Mr. Travis's specimens are identical with the species described by Saccardo and figured by Diedicke. But, while looking at them in water under the microscope, one could not avoid suspecting that they were possibly an ascomycete with dissolved asci; the spores behaved exactly as those of many pyrenomycetes do. They continually recalled to mind *Eleutheromyces longisporus* Phill. & Plowr. in Grevill. xiii. 78 (*Rhynchonectria* v. Höhn. 1903; Sacc. Syll. xvii. 798. *Eleutherosphæra* Grove, in Journ. Bot. 1907, p. 171, pl. 485. f. 3) on the plasmodium of a myxomycete. If this *Mycorhynchus* is not the *Eleutherosphæra* itself with vanished asci, it must be a pycnidial (naked-spored) stage of that pyrenomycete or of some closely allied species. The agreement in general appearance and in details is too strong to permit one to entertain the slightest doubt.

PIROSTOMA Fr. Summ. Veg. Scand. 395
(leviter emendatum).

Pycnidia scutiform, roundish or oblong, thick-walled, pierced by a pore, at length seceding. *Spores* fusoid or ellipsoid, continuous, olivaceous.

A genus resembling *Leptothyrium*, except for its coloured spores.

463. PIROSTOMA VIRIDISPORUM Grove, in Kew Bull. 1921, 147. fig. 6 *b*.

Phoma viridispora Cooke in Herb. Sacc. Syll. iii. 165.

Pycnidia amphigenous, round or (when mature) oblong, up to 1 mm. across, ±aggregated, sometimes in long series, inky-black, raised in the centre and opening by a large torn pore, at length seceding; texture of loose round dark cells which are not compacted into a pseudoparenchyma. *Spores* lanceolate-fusoid, acute at both ends, greenish olive, often furnished with one or two (or more) guttules, 9–12×2·5–3 μ; sporophores linear, as long as the spore. (Pl. 599, fig. 8.)

On dry dead leaves of *Phormium tenax*, New Zealand (Herb. Cooke, *T. Kirk*, nos. 206! & 328!). On the same, Polperro and Lelant, Cornwall; spring and summer.

This saprophyte has obviously been introduced into this country with the plant. It bears a considerable resemblance to *Pirostoma Farnetianum* Pollacci, on *Pandanus* (see Pollacci, in Atti Ist. Bot. Pavia, 1897, v. 195, pl. 7. ff. 11, 15, 16; and Sacc. Syll. xiv. 996). The genus *Pirostoma* was founded by Fries upon what Diedicke says (p. 724) was only "hyphal crusts without spores" on *Phragmites*. This is not necessarily true, but, however that may be, the genus can be maintained (in spite of what von Höhnel says in Fragm. zur Myk. 539) for the present species and any others that possess similar characters. As usual in Leptostromataceæ, the pycnidial mass (or tissue) occupies the epidermal cells and devours their contents. It was Dr. Rhodes who suggested to me that the fungus which I had found in such abundance in Cornwall was identical with Cooke's so-called *Phoma*. On the Cornish plants (exactly as it does on the leaves from New Zealand) *Physalospora Phormii* Schröt. occurs in company with the *Pirostoma*.

DICTYOTHYRIUM, gen. nov. e Leptostromataceis.

Pycnidia subcutanea, imperfecta, erumpentia, atra, subcarbonacea. *Sporulæ* ±oblongæ, hyalinæ, pluriseptato-muriformes.

Est quasi *Camarosporium* peridii integri expers, sporulisque hyalinis præditum. *Phomopses* in mentem revocat, saltem quod ad peridium attinet.

464. **Dictyothyrium Betulæ,** sp. nov.

Pycnidia sparsa, scutiformia, ovalia, convexa, cuticulâ solâ tecta, atra, nitida, 300–500 μ diam., halone brunneolo e mycelii hyphis efformato circumfusa, contextu e cellulis minimis brunneis rotundatis ±prosenchymaticis laxiusculis conflato. *Sporulæ* obovatæ v. soleiformes, absolute hyalinæ, apice rotundatæ, basi vix attenuatæ, primo 1-septatæ, dein 3–4-septatæ, loculis 1–3 tandem septo obliquo v. longitudinali instructis, quandoque subconstrictæ (præsertim ad septum medianum), 15–22×5·5–8 μ, pedicellis non visis. (Pl. 599, fig. 10.)

Hab. in cortice juniore *Betulæ albæ*; Thurstaston Common, Wirral, Cheshire (*W. G. Travis*); Julio.

Though this species agrees very well in the character of its spores with Tassi's *Hyalothyridium* (Sacc. Syll. xvi. 955), it does not, like that, possess a perfect all-round peridium as a *Camarosporium* does, but like the incomplete *Phomopses* has a pycnidial wall above, but merely an olivaceous proliferous stratum below. The halo is formed by filaments of the mycelium which lie between the cuticle and the underlying tissue. As there are no specimens of *Hyalothyridium* at Kew, the relation between the two genera must be left in suspense. Three species of Tassi's

genus have been described—on *Viburnum*, *Rhus*, and *Populus*, respectively.

465. **Excipula Serratulæ,** comb. nov.

Phoma Serratulæ Allesch. Allg. Bot. Zeitschr. 1895, no. 3. Raben. Krypt. Fl. vi. 321. Sacc. Syll. xi. 490. Died. 174. Mig. 79. Petrak, Fung. Pol. exs. no. 480 !.

Pycnidia gregarious, covered by the epidermis, round or oval, black, somewhat shining, attaining a size of about 250× 180 μ, collapsing and becoming almost saucer-shaped, opening by a large pore 40–50 μ wide, incurved round the edge of the pore and disclosing a round pallid or yellowish disc ; texture parenchymatous, thickish, dark brown, with cells 5–9 μ wide. *Spores* cylindrical, often slightly curved, obtuse at both ends, hyaline, 5–7×1–1·5 μ (8–10×2 μ, Allesch.). (Pl. 599, fig. 9.)

On dry dead stems of *Serratula tinctoria* of the previous year, Defford Common, Worcs (*Rhodes*, no. 3776) ; Aug.–Nov.

There can be little doubt that this species should be ranged among the Excipulaceæ ; it is not at all like a *Phoma*, as at present understood. It might very well be what Fries called *Excipula integerrima* (Syst. Myc. ii. 596). Petrak's specimens (*supra*) were gathered in May, on dead stems of the previous year. When Dr. Rhodes kept a number of stems, gathered in November, in a damp place until the following April, the pycnidial mass, which was at first closely compacted, became loosened and full of oil-drops, but no traces of the production of asci could be found, although the appearance suggested the coming on of that stage. At a later date, fresh gatherings showed a *Leptosphæria* (? *dumetorum* Niessl) on the stems, the *Excipula* having disappeared.

HAINESIA Ell. & Sacc. Syll. iii. 698.

Pustules immersed, but soon erumpent, minute, pulvinate, bright-coloured, most often yellowish or reddish, growing on leaves. *Spores* oblong, or suballantoid, or fusoid, continuous, hyaline, produced at the apex or sides of filiform, fasciculate, often branched pedicels.

466. **Hainesia subtecta,** comb. nov.

Fusarium subtectum Rob. in Desm. Ann. Sci. Nat. ser. 3, iii. 358 (1845). Sacc. Syll. iv. 724. Lindau, ix. 544.

Hymenula Psammæ Oud. in Ned. Kruidk. Arch. ser. 3, i. 532 (1898). Sacc. Syll. xvi. 1094. Lindau, ix. 415.

Pustules scattered, immersed, covered by the epidermis, then opening by a wide pore, at length almost superficial, flatly pulvinate, roundish, up to 250 μ or more in diameter. *Spores* broadly oval, acute at both ends, straight, singly colourless, but in mass of a pleasant pinkish red, biguttulate or eguttulate, 5–7×2–3 μ ; sporophores fasciculate, rod-shaped, or linear, nearly straight, simple, obtuse, colourless, about 12–14×2 μ.

On the outer surface of rolled-in dead leaves of *Psamma arenaria*, Mochras, Merioneth (*Rhodes*) ; Newgale Bay and Tenby Burrows, Pembr. (*Rhodes*). Penzance and Perranporth, Cornw. ; July–August.

When quite mature, the fungus consists apparently of nothing but a little heap of pinkish rose-coloured spores, which have oozed out through the pore and are lying on the surface of the leaf.

It was Dr. Rhodes who suggested to me that the description of *Fusarium subtectum* Desm., as recorded on dead leaves of *Psamma arenaria* among the dunes of Holland, Belgium, and France (Lindau, *l. c.*), was applicable to the specimens which I had previously placed under *Hainesia*. On comparison of them with the published exsiccata of Desmazières, this suggestion proved to be correct. But the species cannot possibly be placed in *Fusarium* ; the spores are perfectly formed beneath the epidermis while it is still unbroken, and it is only afterwards that they ooze through the pore and come to lie upon the surface of the leaf.

This species seems to be allied to *Hainesia Rubi* (West.) Sacc. Syll. iii. 699, but the other species placed in this genus by authors differ widely. As *Fusarium subtectum* it is excellently well figured by Wollenweber in his 'Fusaria autographice delineata,' no. 481 ! See, however, von Höhnel in Mitth. Bot. Lab. Techn. Hochschule in Wien, iv. 73–4 (1927), and in Hedwigia, lx. 164 (1919).

HYALOCERAS Dur. & Mont. Flore Algér. 587 (1846). Sacc. Syll. iii. 783.

Pustules subepidermal, then erumpent, convex, black. *Spores* oblong, with two or more transverse septa, ±smoky-olive, with a hyaline seta at the apex. *Sporophores* filiform, colourless.

467. HYALOCERAS COMPTUM Died. 879, f. 8.

Pestalozzia (*Monochætia*) *compta* Sacc. Syll. iii. 798 ; Fung. Ital. 1116.

Monochætia compta All. vii. 672, with fig. Mig. 592, pl. 86. ff. 8–10.

Var. RAMULICOLA Berl. & Bres. Microm. Trident. p. 81. Sacc. Syll. x. 493. All. vii. 673.

Pustules gregarious, angular or roundish, black, subprominent, about 300 μ wide, covered, then bursting the epidermis irregularly. *Spores* elliptic-fusoid, 11–14×3·5–4 μ, 3-septate, the two end-cells both hyaline, the middle ones brownish, furnished at the acute apex with a long (up to 20 μ) curvulous or rarely hooked hyaline seta ; sporophores about as long as or longer than the spore, rather straight, filiform, colourless, 1·5–2 μ wide.

On a dead stem of a cultivated Rose (? *Rosa rugosa*), Salcombe, Devon ; April.

The sporophore and the seta were both of nearly the same width, and looked very similar until the spore was seen *in situ*. This species has a very close resemblance to *Coryneopsis microsticta* (B. & Br.) Grove in fact, when the bristle has dropped off, the two spores could hardly be distinguished, except that in the latter the apical cell is not hyaline. They may be more closely related than is at present suspected. It was von Höhnel who first showed that *Monochætia* (Sacc. Syll. iii. 797, 1884) was identical with the previously described *Hyaloceras*.

DIPLOCERAS Sacc. Syll. x. 484 (as subgenus).

Pustules flat, covered, hardly prominent, small, black. *Spores* oblong, with two or more septa, fuliginous with the end-cells hyaline, and provided with two curved hyaline bristles at both the apex and the base. *Sporophores* filiform, hyaline.

468. DIPLOCERAS HYPERICINUM Died. 887, f. 17.

Pestalozzia hypericina Cesati, in Klotzsch, Herb. Myc. ii. 64.

Hyaloceras hypericinum Sacc. Syll. x. 485. All. vii. 707. Mig. 597.

Forming " brownish spots on the upper side of the leaves," but on the stems these are not or only faintly visible. *Pustules* scattered, minute, remaining covered, opening by a fissure. *Spores* cylindric-oblong, ±curved, obtuse at both ends, 14–16× 3–4 μ, 3-septate, the end-cells hyaline and small, the two median cells yellowish, provided at each end with two curved diverging deciduous bristles 9–12 μ long, and seated on filiform pedicels, 1·5–2 μ wide, but only half as long as the spore. (Pl. 599, fig. 5.)

On dead stems of *Hypericum pulchrum*, near Garth Ferry, Anglesea (*Rhodes*, no. 3104); July 1927. On dead stems of *H. perforatum*, near Ram's Wood, Haverfordwest, Pembr. (*Rhodes*, no. 3707 B); August 1928. On the latter it was accompanied by *Metasphæria ocellata* Sacc.

469. TRULLULA PAPILLATA Sacc. Syll. iii. 733. All. vii. 551. Died. 814. Mig. 556.

Hormococcus papillatus Preuss, Fung. Hoy. 305 (in Linnæa, xxvi. 716).

Pustules erumpent, ovate, papillate or at first convex, horny, very black and shining, up to 500 μ diam., then flat and patellate as the contents swell; when moistened these contents form a highly gelatinous and rose-coloured or sometimes nearly colourless mass, which bursts forth and finally assumes the shape of a disc. *Spores* exceedingly copious, cylindrical, occasionally faintly curved, very obtuse at both ends, continuous, singly colourless, biguttulate, 3·5–4×1 μ, at first catenulate, springing from the apices of the pedicels; each pedicel repeatedly branched, elongated, filiform, eseptate, colourless, densely fasciculate, up to 50×1–1·5 μ, rising from a thick ruddy-olivaceous, minutely parenchymatous, basal stratum. (Pl. 599, fig. 7.)

On bleached, decaying grass-culms, and bits of wood and herbaceous stems, lying on the sea-shore above high-water mark, mouth of the Alt, Lancs (*W. G. Travis*); Sept.

This is one of the species which Saccardo (*l. c.* p. 731) calls " perithecioid "; the spore-mass is surrounded by a flat margin of olivaceous filaments, and when dry both these and the spore-mass look equally black and simulate a shining perithecium. When the fungus is compressed in water, a large number of oily drops ooze out of the mass; *cf.* Preuss's " cum plurimis guttulis oleosis." If Preuss's words meant that the spores of his species were multiguttulate, as Allescher supposed, then my identification might be wrong, but that is not their correct interpretation. In some respects these specimens remind one of *Patellina italichroma* Speg., but the colours are different, and the margin, at least when dry, is not of a different colour from the disc; moreover, the hyphæ are repeatedly branched.

(To be continued.)

CONTRIBUTIONS FROM THE UNIVERSITY HERBARIUM, CAMBRIDGE.—NOTES ON THE FLORA OF THE AZORES.

By T. G. TUTIN AND E. F. WARBURG.

THE following notes are intended as a supplement to Trelease's 'Botanical Observations on the Azores' in the 8th Annual Report of the Missouri Botanical Garden, 1897, which gives a complete list of the plants known from the Azores at that date.

Since then these islands have been visited by H. B. Guppy (see 'Plants, Seeds, and Currents in the West Indies and Azores') and G. C. Druce (see Journ. Bot. 1911).

The present notes contain the results of a visit from the end of June to the beginning of August 1929 to the islands of Pico, São Jorge, Fayal, Terciera, and San Miguel, the two last being visited for a few hours only. They include also a few records from specimens already in the Herbaria at Kew and Cambridge.

In the following list when the name of an island is given alone it indicates that the species is first recorded from that island by us; when previously unpublished records by other collectors are given, the name of the collector is placed in brackets after that of the island. In a few cases, where doubt exists as to the correct identification of certain plants by previous authors, all the islands from which we have seen specimens are cited.

Such cases are indicated in the list. The marginal references are to the pages of Trelease's book, whose general arrangement is retained. Our specimens are in the Cambridge University Herbarium.

We desire to record our great indebtedness to the Director of the Missouri Botanic Garden for the loan of many specimens, to Mr. J. Fraser for identifying the Mints, Mr. H. W. Pugsley for *Fumaria*, Rev. H. J. Riddelsdell for *Rubus* ; Messrs. A. J. Wilmott, J. S. L. Gilmour, H. Gilbert-Carter, and the authorities at Kew for much kind help.

P. 91. RANUNCULUS CORTUSÆFOLIUS Willd. (*R. grandifolius* Lowe, *R. megaphyllus* Steud.). A very variable species occurring also in Madeira and the Canaries. The form commonly found in the Azores has thick, very rounded, shallowly lobed leaves, about 8 cm. in diameter, and the whole plant is very hairy.

R. REPENS L. São Jorge.

P. 92. FUMARIA MURALIS Sonder. Mr. Pugsley has seen the specimens in the Cambridge Herbarium and pronounces them all to be this species, although some were labelled *F. Borœi* by Watson.

P. 93. MATTHIOLA INCANA R. Br. São Jorge.

CARDAMINE CALDEIRARUM Guthn. São Jorge.

P. 95. RAPISTRUM RUGOSUM All. São Jorge.

P. 96. RESEDA MEDIA Lag. San Miguel (Hunt) specimens in Herb. Cantab. Discredited by Trelease.

VIOLA PALUSTRIS L. Pico ("not recently collected," Trelease). São Jorge.

PITTOSPORUM UNDULATUM Vent. Pico, Fayal, São Jorge, Terciera, San Miguel. Generally common in the woods up to about 1500 ft.

P. 97. SILENE GALLICA L. São Jorge.

S. MARITIMA With. Pico. The only other specimens we have seen are from Flores (Watson). We have seen no *S. vulgaris* Garcke from the islands.

P. 98. **Cerastium vagans** Lowe, var. nov. **ciliatum** Tutin & Warburg. São Jorge, on the N. coast near Coubres.

A typo differt foliis margine ciliatis ; inflorescentia floribus paucioribus. Typus in Herb. Cantab. Endemic in the Azores.

SAGINA PROCUMBENS L. Pico.

P. 99. SPERGULARIA AZORICA (Kindb.) Lebel. This species, endemic in the Azores, is closely allied to *S. macrorhiza* Heynh., from which it differs in having pyriform, not round, seeds, capsule equalling, not shorter than, the calyx, and stipules ovate, not lanceolate. *S. macrorhiza* does not appear to occur in the Azores.

The European plant, which has been identified with *S. azorica* and figured as such in Coste's 'Flore de France,' is not this species.

HYPERICUM FOLIOSUM Dryand. São Jorge.

P. 100. H. PERFORATUM L. Pico.

P. 103. RUTA BRACTEOSA DC. São Jorge. We have seen no specimens of *R. chalepensis* L. from the Azores.

RHAMNUS LATIFOLIA L'Hérit. Pico.

RHUS CORIARIA L. São Jorge.

SPARTIUM JUNCEUM L. São Jorge.

P. 104. ULEX EUROPÆUS L. São Jorge.

CYTISUS CANDICANS Lam. Pico.

P. 106. TRIFOLIUM REPENS L. São Jorge.

T. RESUPINATUM L. San Miguel.

P. 107. LOTUS ULIGINOSUS Schk. São Jorge, Pico.

P. 108. ORNITHOPUS EBRACTEATUS Brot. São Jorge.

VICIA HIRSUTA S. Gray. São Jorge.

V. ATROPURPUREA Desf. São Jorge.

P. 109. PRUNUS AVIUM L. Fayal (Watson).

P. 110. RUBUS HOCHSTETTORUM Seubert. São Jorge, Pico, Flores (Watson).

FRAGARIA VESCA L. São Jorge.

POTENTILLA ERECTA Hampe. São Jorge.

—— —— var. INSIGNIS Domin. Collected by Druce on San Miguel ; Flores (Watson). All the specimens we have seen from other islands and the ones we collected on San Miguel do not belong to this endemic variety, but to the type.

P. 111. ALCHEMILLA ARVENSIS Scop. Pico, São Jorge.

BRYOPHYLLUM CALYCINUM Salisb. Pico.

P. 112. COTYLEDON HORIZONTALIS Guss. São Jorge, Pico, Terciera.

P. 112. CALLITRICHE STAGNALIS Scop. We have seen no specimens of the type.

—— —— var. SERPYLLIFOLIA Kütz. Pico, São Jorge.

? C. VERNALIS Kütz. San Miguel (Hunt). One rather inadequate specimen, probably this species, is in the Cambridge Herbarium.

P. 113. LYTHRUM HYSSOPIFOLIA L. São Jorge.

L. GRAEFFERI Tenore. Fayal (Watson).

EPILOBIUM PARVIFLORUM Schreb. San Miguel (Hunt).

E. OBSCURUM Schreb. Pico, São Jorge.

P. 114. DROSANTHEMUM CANDENS Schwartes. Fayal. A Mesembryanthemum escaped from cultivation. Determined by Mr. N. E. Brown.

HYDROCOTYLE VULGARIS L. Pico.

P. 115. APIUM GRAVEOLENS L. São Jorge.

AMMI SEUBERTIANUM Benth. & Hook. f. São Jorge.

P. 117. FŒNICULUM VULGARE Mill. São Jorge.

DAUCUS CAROTA L. São Jorge.

THAPSIA DECIPIENS Hook. fil. (*Melanoselinum decipiens* Schrad. & Wendl.). Fayal, in the Caldeira; Pico, hills behind Lages. A young plant was found by Watson in the Caldeira, but was subsequently rejected by him. Found by us in flower and fruit in August. Previously believed to be endemic in Madeira.

HEDERA CANARIENSIS Willd. São Jorge.

P. 118. VIBURNUM TINUS var. SUBCORDATUM Trelease. Pico.

Rubia peregrina var. nov. **azorica** Tutin & Warburg. Pico.

A typo (var. *genuina* Lge.) differt foliis linearispathulatis obtusis mucronatisque, 1–3·5 cm. longis, 2–3 mm. latis. Typus in Herb. Cantab. Pico (Tutin & Warburg).

The Azores form is very constant and differs from all the European forms. It is nearest to *R. peregrina* var. *angustifolia* Gren. & Godr. (*R. angustifolia* L.), but differs in the leaves being broadest near the apex, and not gradually narrowed to it. We have seen specimens from San Miguel (Hunt) and Fayal (Watson).

GALIUM PALUSTRE L. São Jorge.

P. 119. SCABIOSA NITENS Roem. & Sch. São Jorge, Pico.

Trelease also records *S. maritima* L., but we have seen no specimens from the islands.

P. 120. SOLIDAGO SEMPERVIRENS L. São Jorge.

BELLIS AZORICA Hochst. São Jorge.

P. 121. FILAGO GALLICA L. Pico (Watson).

GNAPHALIUM LUTEO-ALBUM L. São Jorge.

P. 122. ANTHEMIS NOBILIS var. AUREA DC. São Jorge.

GALINSOGA PARVIFLORA Cav. Terciera. New to the Azores. A widespread weed.

GAILLARDIA ARISTATA Pursh. Pico. New to the Azores. A North American plant found growing as a weed in a maize-field near São Mattheus.

P. 124. SENECIO MALVÆFOLIUS DC. Pico, São Jorge. Endemic in the Azores, the Madeiran *S. auritus* L'Hérit. (*S. maderensis* DC.) being a distinct species.

P. 125. TOLPIS FRUTICOSA Schrank. São Jorge. Leaves vary in the Azores from repand-dentate or pinnatifid, as in the Madeiran specimens, to quite entire.

P. 126. PICRIS ECHIOIDES L. Pico.

P. RIGENS Benth. & Hook. f. (*Microderis rigens* Hochst.). This has been recorded from Pico, but we were unable to find it there, and have seen no specimens from this island. *P. filii* Benth. & Hook. f., though not previously recorded from Pico, was found commonly there, so *P. rigens* may have been reported in error.

P. FILII Benth. & Hook. f. Pico, São Jorge.

CREPIS VIRENS L. Pico.

P. 127. TARAXACUM OFFICINALE Weber. Pico. By roadsides and at a height of about 5000 ft. Rare.

LACTUCA WATSONIANA Trelease. The doubtful record from Fayal was confirmed. We also found a few plants in one small crater on Pico. This appears to be one of the rarest endemic species and flowers very late, probably about the end of August.

P. 128. CAMPANULA VIDALII Watson. São Jorge. On the cliffs near Calheta and Coubres. It is very unlikely to have been introduced in these places.

P. 129. VACCINIUM CYLINDRACEUM Smith. São Jorge.

CALLUNA VULGARIS Salisb. São Jorge.

ERICA AZORICA Hochst. São Jorge.

P. 130. **Dabœcia azorica** Tutin & Warburg, sp. nov. Fayal, Pico, probably also Flores and Terceira, but we have seen no specimens from these islands.

D. polifoliæ affinis. Habitus procumbens, ramulis erectis brevibus confertisque. *Folia* ovata 5–7 mm. longa, 2–4 mm. lata, nervo minus prominente quam in *D. polifolia*, supra obscure viridia et parce glandulosa, subtus niveo-tomentosa. Pedunculi, pedicelli, sepala, ovariumque majus glandulosi quam in *D. polifolia* ; pedicelli glandium breviores. *Corolla* globoso-ovoidea, urceolata, 7–9 mm. longa, coccinea non purpurea. Capsulam maturam seminaque non visimus. Typus in Herb. Cantab. Pico (Tutin & Warburg).

Differs from *D. polifolia* in its habit, smaller, proportionately broader leaves, and the shape, size, and colour of the flowers.

STATICE LIMONIUM subsp. MACROCLADA Boiss. San Miguel (Hunt). We have seen no specimens from the other islands. The inflorescence is rather more compact than usual in subsp. *macroclada*.

LYSIMACHIA AZORICA Hornem. São Jorge.

ANAGALLIS ARVENSIS L. São Jorge.

A. CŒRULEA Lam. São Jorge.

P. 131. A. TENELLA L. São Jorge. Common in the turf, 2000–3000 ft.

MYRSINE AFRICANA var. RETUSA DC. São Jorge.

NOTELÆA EXCELSA Webb. São Jorge.

P. 132. GOMPHOCARPUS FRUTICOSUS R. Br. Pico.

ERYTHRÆA CENTAURIUM Pers. São Jorge.

E. SCILLOIDES (Linn. fil.) Chaub. (*E. Massoni* Sweet ex Watson). Differs from the European *E. portensis* (Brot.) Hoffm. & Link in the narrower obovate-elliptic leaves of the barren shoots (in *E. portensis* they are almost orbicular) and the white flowers with narrower petals.

P. 133. HELIOTROPIUM CURASSAVICUM L. San Miguel. On the seashore at Ponta Delgada. A widespread weed new to the Azores.

CYNOGLOSSUM PICTUM Sol. Pico.

MYOSOTIS MARITIMA Hochst. Formerly believed to be endemic in the Azores, but given as occurring near Gibraltar in Wolley-Dod's 'Flora.' It may, however, be introduced there.

P. 133. IPOMŒA CARNOSA R. Br. Pico. Near Magdalena, separated by about four miles of sea from its only other Azorean locality.

SOLANUM SODOMEUM L. Terciera. New to the Azores.

P. 135. PHYSALIS PERUVIANA L. Pico, São Jorge.

P. 136. "VERBASCUM SPURIUM." The plant identified by Trelease with this is not identical with European specimens of the hybrid. It may be a new species, but the material is insufficient. We have seen specimens from Terciera (Trelease), S. Miguel (Hunt). A similar plant occurs in Madeira.

LINARIA CIRRHOSA Willd. Pico, near São Mattheus. Recorded from Terciera by Seubert, doubted by Watson and Trelease.

P. 137. SCROPHULARIA SCORODONIA L. Pico.

SIBTHORPIA AFRICANA L. São Jorge, Pico (Watson).

S. europea L. does not seem to occur in the Azores. *S. africana* differs from *S. europea* in having larger more rugose leaves with more crenations which are shallower. Flowers smaller, green-red with sepals just exceeding the petals and the top of the ovary and base of the style densely hairy.

DIGITALIS PURPUREA L. Pico, above Magdalena, rare, but apparently native.

P. 138. VERONICA OFFICINALIS L. São Jorge.

V. SERPYLLIFOLIA L. São Jorge.

OROBANCHE MINOR Suth. São Jorge. On the cliff near Coubres. New to the Azores.

(To be continued.)

CENTENARY OF ROBERT BROWN'S DISCOVERY OF THE NUCLEUS.—EXHIBIT AT NATURAL HISTORY MUSEUM.

IN commemoration of the centenary of the discovery of the nucleus of the plant by Robert Brown, first Keeper of Botany in the British Museum, a temporary exhibit has been arranged in the Central Hall of the British Museum (Natural History).

The exhibit includes several documents of historical interest. The first is a testimonial to Brown when 16 years old :—

"I hereby certify that Rob. Brown Son to the Revd. Mr James Brown Minister of the Gospel at Montrose attended the First mathematical Class in the Marischal College of Aberdeen Session

1788–9 and that I was satisfied with his application to his studies and the general propriety of his conduct as a student.

" ROBERT HAMILTON.

" Marischal College.
" 2 April 1789."

Brown did not take a medical degree, but joined the Fifeshire Regiment of Fencibles when it was raised in 1795. His commission (Oct. 20, 1794) is shown with the name " Thomas Brown, Gent." A warrant exhibited shows that he was appointed Surgeon's Mate in the same regiment, June 1st, 1795. The regiment was stationed in Ireland, but Brown was deputed for recruiting service in the Midlands, and two of his recruiting accounts from Wolverhampton, 1799, are exhibited. While he was in England he made use of Sir Joseph Banks's library.

A page of the diary (which he kept from 1800 to 1803) shows the entry " On the morning of the 17th. [Dec.] I received a letter from Sir Jos: Banks offering to recommend me to the situation of naturalist in an expedition fitting out to explore the unknown parts of New Holland. I answer his letter by return of post and I accept his offer. The same day got my memorial drawn out for leave of absence." (A copy of his reply to Sir Joseph Banks is shown.) The page also gives an account of Brown's journey to London and the way in which he spent his time before he sailed with Captain M. Flinders in H.M.S. ' Investigator.'

A copy of Brown's will is of interest, as the clause appears :—

" To the Right Honourable Sir Joseph Banks K B, I give and bequeath all the specimens in Natural History Journals or Remarks which I may collect and make during the Voyage of Discovery on which I am now about to embark, as far as the Lords of the Admiralty shall be pleas'd to consider such Specimens Journals and Remarks as at my disposal."

Following Flinders's map of his voyage there are shown : a specimen of *Banksia speciosa*, Brown's original description of this, and Ferdinand Bauer's finished drawing, which give some idea of the botany of the expedition ; Brown's copy of his ' Prodromus Florae Novae Hollandae et Insulae Van Diemen,' one of the most remarkable systematic botanical works.

Among the original exhibits are notes by Brown on the discovery of the so-called Brownian movements (1827) and on the discovery of the nucleus (1831). A note by Dollond gives a confirmation of Brown's discovery (1831) of the circulation of protoplasm.

The first of these notes reads :—

" June 12 1827. [*Clarkia.*]

" The grains of Pollen are subsphaerical or orbiculato-lenticular with 3 equidistant more pellucid and slightly projecting points so that they are obtusely triangular.

" I have not yet been able to satisfy myself that there is a double membrane.

" The fovilla or granules fill the whole orbicular disk but do not extend to the projecting angles. They are not sphaerical but oblong or nearly cylindrical, and the particles have a manifest motion. This motion is only visible to my lens which magnifies 370 times. The motion is obscure but yet certain. It consists in an apparent contraction and extension. I have not observed it in all the particles of a group but only in a small number and those usually the longest in form, for in this respect there are slight differences among them. These particles when in motion are often observed as it were contracted or slightly concave on the middle of one side and they change their relative position in such a manner as cannot be explained on the supposal of evaporation of the water.

" June 13 1837.

" I find the motion in some cases as brisk as that of the analogous infusory animalcules.

" I can see the granules in motion that is changing their relative positions in the entire grain of Pollen.

" The foregoing observations are made on the Pollen of Antheræ before dehiscence, and long before expansion of the flower.

" In the expanded flower and after dehiscence of Antheræ these oblong or cylindrical particles are disolved a very few only remaining and these without visible motion—the contents of the grain being the fluid composed chiefly of or containing many Monades in motion.

The note on the discovery of the nucleus reads :—

" 13 June 1831. [*Cypripedium spectabile.*]

" Having seen yesterday in thin transverse slices of the columnar genitalium the form and position of the wart-like areole first, seen in the Epidermis I repeated my examination to-day.

" It appears that each cell has on some point generally I think on its inner side a spherule or at least orbicular corpuscule which may be depressed of a light green colour, and to a lens of 1/20 of an inch manifestly granular either on surface or contents the granules very minute and light green. Similar corpuscules are observable in transverse thin slices of the stem."

It is well known that Robert Brown inherited Sir Joseph Banks's collections with a reversion to the nation. A copy of the codicil to the will is exhibited ; it was the one which Brown used in ascertaining his legal position in the event of the transference of the collection to the custody of the Trustees of the British Museum as allowed for in the will.

Brown was awarded a civil pension of £200 a year in 1843.

The letter conferring this is shown; it was apparently Humboldt who approached Sir Robert Peel with a view to Brown's circumstances being considered.

Brown received many honours. A slip in his writing shows that when he was elected a foreign associate of the Institut de France he received 29 out of 47 votes. Amongst the other nine candidates was Michael Faraday, who received no votes.

Brown's dissecting-microscope and microscope are also exhibited. The microscope, which agrees with his description of the one with which he made his epoch-making discoveries, is surprisingly simple, being little more than a dissecting-microscope, after the style of Bate's modification of Ellis's "Aquatic Microscope."—J. RAMSBOTTOM.

OBITUARIES.

JOHN ISAAC BRIQUET

(1870–1931).

NEWS of the death of Dr. John Briquet at his home in Geneva on October 26 after a short illness came as a great shock to his many friends in the botanical world. For more than thirty years he had been the chief organiser of the successive attempts to formulate a code of rules of botanical nomenclature which should be acceptable to the various schools of theory and practice, and the crowning effort at Cambridge in August 1930, where at last unanimity was reached, was a fitting consummation of his years of strenuous work.

In 1892 a tentative but abortive effort to come to some agreement based on the code of Rules drawn up by Alphonse de Candolle at Geneva in 1867 was made at the Genoa Congress, and an account of the proceedings of this Congress appeared in the 'Journal de Genève' (of October 6) from the pen of Dr. Briquet. The appointment of an International Commission of Botanical Nomenclature at the International Botanical Congress of Paris in 1900, with Briquet as Rapporteur Général, marked the beginning of an organised attempt to achieve unanimity. Briquet at once set to work on the preparation of the 'Texte Synoptique,' a detailed exposition of the De Candollean code and proposed amendments and alterations, followed by a critical *précis* of the recommendations of the Commission. These supplied the basis for discussion at the Vienna Congress in 1905, where, through a busy and difficult week, Briquet, under the genial chairmanship of Professor Flahault, was the guiding spirit. Widely divergent views were represented among the delegates, and discussion was often warm, but Briquet's knowledge of detail, and his tact, combined with facility of expression in the three principal languages rendered possible the tabulation of the

set of Rules which under his editorship formed the well-known Vienna code of Rules published in 1906. Some additions, mainly dealing with the Cellular Cryptogams, were made at the Brussels Congress in 1910, Briquet still continuing to act as Rapporteur. It was hoped that the projected Congress in London in 1915 would see the completion of the task. But we were otherwise occupied in 1915. Nothing was attempted at the next Congress, that of Ithaca in 1926, beyond a general discussion, at which an International Commission was again appointed to prepare for the Congress of 1930. Once again the task of organizing fell on Briquet, a task which became the more onerous as it was decided not merely to complete the code of the Rules as issued after the Brussels Congress but to reconsider them generally. A full report of the discussions, prepared by the Rapporteur, has recently been published in the 'General Report of the Proceedings of the Cambridge Congress.' Since the Congress, Briquet had been preparing the new edition of the Rules, the publication of which has been eagerly awaited. His sudden and fatal illness is a tragic disaster.

Briquet's name will always be intimately associated with nomenclature, but this represents only part of his botanical interests. When, in 1891, he gained the Dr. ès Sciences at Geneva University his thesis was a monograph of the genus *Galeopsis*. This was awarded a prize by the Belgian Academy, and was published in the 'Recueil des Mémoires couronnés par l'Académie des Sciences, Lettres et Beaux-arts de Belgique.' It was the first of his many publications on the family Labiatæ, which included the monograph in Engler and Prantl's 'Pflanzenfamilien.' He also made a special study of Verbenaceæ and other allied families. In an appreciation of Briquet's life and work in the 'Journal de Genève' of October 28 (to which we are indebted for some of the facts mentioned here) his Assistant, Dr. B. P. G. Hochreutiner, comments on the diversity of his botanical publications, which numbered about four hundred. Anatomy, morphology, and biology were combined with taxonomic investigations. The results of many of his botanical studies were published in the 'Annuaire du Conservatoire et du Jardin Botaniques de Genève,' which he started in 1897 and edited continuously until his death—since 1922 it has appeared under the name 'Candollea.'

His two earliest publications, on the flora of the Lemanian Alps (1889) and of Savoy and the Franco-Swiss Jura (1890), displayed an interest in the Alpine flora and the geographical distribution of its components which he retained throughout his life. He also continued, with François Cavillier, Emile Burnat's 'Flore des Alpes Maritimes,' editing vols. v., vi., and vii. (1913–31). Vol. vii., 'Composées Cynaroidées,' was issued in August last. Another important floristic work was his

' Prodrome de la flore Corse,' the result of a number of botanical visits to the island—a critical taxonomic monograph of its vegetation.

Briquet was born in Geneva, March 13, 1870. During boyhood he paid visits to Scotland, where he had family connections, and Germany. After gaining the " baccalauréat ès lettres "—with distinction in Latin—at Geneva University, he joined the Faculty of Sciences, studying under Thury and Jean Mueller (Argoviensis) and also receiving help and encouragement from the veteran Alphonse de Candolle. In 1889 he went to Berlin to take courses in Plant Anatomy under Schwendener and Systematics and Plant Geography under Engler. In 1890 he returned to Geneva and became assistant to Mueller, and, on the death of his chief in 1896, Director of the Conservatoire Botanique, better known to botanists as the Delessert Herbarium, which was then still installed in the small building erected on the foundation of the Conservatoire in 1824. The present commodious establishment, with its botanic garden, to which the Herbarium was transferred in 1904, and which has been enriched by Emile Burnat's extensive European collections and, more recently, the classic De Candolle Herbarium and Library, is a monument to Briquet's constructive energy and organising power.

Among the many marks of recognition of his services to botany were the honorary foreign membership of our own Linnean Society (1923), the D.Sc., *honoris causa*, of Cambridge University conferred at the International Botanical Congress in 1930, and the honorary foreign membership of the American Academy of Arts and Sciences.

In Briquet's untimely death—he was only 61—botany loses a versatile and virile servant, and his country a devoted patriot and citizen. And many will regret the passing of a good friend. To Madame Briquet and her children we tender our heartfelt sympathy in their grievous loss.—A. B. RENDLE.

EDWARD STEP

(1855–1931).

A VERY large circle of nature-lovers will have read with regret of the death of Mr. Edward Step on the 8th November last. Step held a unique position in the sphere of Natural History, and did for the present age what the Rev. C. A. Johns and a few others had attempted for an earlier generation. He was equally a botanist, an entomologist, and a conchologist; and he dealt with his subjects from a broad standpoint, freely utilising his own observations. He was an indefatigable worker, and spared no pains to attain accuracy in all that he wrote, with the result

that a specialist in any of his subjects will find that he made remarkably few mistakes. This accuracy lends to his books a value that is often wanting in popular works.

Step was a Londoner, born on November 11, 1855. At the age of 14 he began work with a firm of publishers, Messrs. Strahan & Co., and from that time onwards he was engaged almost continuously by publishers until he left the firm of Hutchinson & Co. at the beginning of the Great War. At an early age he was attracted to Natural History, and about 1872 he became a member of the then newly formed South London Entomological Society and of the Lambeth Field Club. His first publications were botanical, ' Easy Lessons in Botany ' and ' Plant Life, Popular Papers on the Phenomena of Botany ' appearing in 1880, when he was only 25. For some years in the 'nineties Step lived and worked at Portscatho, in Cornwall, and in 1895–96 he produced what is perhaps his best-known botanical book, ' Wayside and Woodland Blossoms,' which has gone through several editions. After the first edition, this book was illustrated from excellent drawings executed by his eldest daughter. A continuous succession of works on Natural History, many of them botanical, followed nearly to the time of Step's death. Among these may be mentioned, as of special botanical interest, ' Wayside and Woodland Trees,' an admirable book in which he gave illustrations of individual trees of each species as seen in summer and in winter; and ' Wild Flowers Month by Month,' most attractively written and profusely illustrated from the author's photographs, many of which are remarkably good.

At the time of his death Step was a Fellow of the Linnean Society, which he had joined in 1896, as well as of the South London Entomological Society, and he was President of the British Empire Naturalists' Association. Until the autumn of 1930 he not only regularly attended the Societies' meetings, but he was able to participate in long Natural History rambles, in which he was much sought as an ideal leader or companion. He never showed greater pleasure than when some younger rambler revealed to him that he had been led to the pursuit of Natural History through the study of Step's books. A notable feature of Step's character was his consistent modesty and his strong reluctance ever to appear as an authority on any branch of the science of which he knew so much.

His remains were cremated at Norwood Cemetery, where many of his friends assembled to pay their last tribute to his memory. He leaves a widow, with one son and three daughters.—H. W. PUGSLEY.

ABSTRACTS OF PAPERS OF INTEREST TO STUDENTS OF THE BRITISH FLORA.

STUDIES OF EQUISETA IN EUROPEAN HERBARIA.—John H. Schaffner (American Fern Journal, xxi. pp. 90–102, 1 pl., 1931) gives the results of his study of the material in British and Continental Herbaria.

Equisetum Moorei Newm., which is considered a full species, is made to include *E. hiemale* var. *Schleicheri* Milde and *E. occidentale* Hy. Samuelsson's suggestion that it is a hybrid (*E. hiemale*×*ramosissimum*) is not accepted. The range of *E. trachyodon* A. Br., to which are referred *E. hiemale* var. *Doellii* Milde, *E. Mackaii* Newm., and *E. variegatum* var. *Jesupi* A. A. Eaton, is extended to Greenland and North America, and the suggestion of a possible hybrid origin is rejected. The author uses the name *E. fluviatile* Linn., instead of *E. limosum* Linn., because it has priority of position and because Pollich in 1777 adopted it in preference to *E. limosum* Linn. Of varieties in general he says, "The whole *Equisetum* problem has also been greatly confused by a ridiculous multiplication of varietal names which in most cases at least represent nothing but ordinary fluctuations."

Apparently Dr. Schaffner has seen British examples of *E. ramosissimum* Desf., for on p. 91 he states, "*E. ramosissimum* extends from the Azores and the British Isles to Japan and through eastern Africa to Cape Colony."—A. H. G. ALSTON.

THE VIOLA SPECIES OF DENMARK.—J. Clausen (Botanisk Tidsskrift, lxi. pp. 317–335, cum tab.) gives an interesting account, in English, of the species of *Viola* occurring in Denmark. The following is an abridged summary of his arrangement of the species :—

SECT. I. MELANIUM Ging. Style capitate, hollow, stipules large and foliaceous, often divided; lateral petals turned upwards.
a. Grandifloræ.
1. V. TRICOLOR L. Chromosomes, $n=13$.
Subsp. *genuina* Wittr.; cultivated grass-fields. Subsp. *maritima* (Schweigg.); dunes along the coast.
b. Parvifloræ.
2. V. ARVENSIS Murr., $n=17$.

SECT. II. NOMINIUM Ging. Style non-capitate, stigma exserted from it on a papilla; stipules small, often scarious, non-divided, but often fimbriate; lateral petals turned downwards or horizontal.
A. Subsection Rostellatæ Boiss.
Caulescentes.
Axillifloræ.
Rosulantes Borbas.
Grandifoliæ.—3. V. SILVESTRIS Reichb., $n=10$; 4. V. RIVINIANA L., $n=20$.
Parvifoliæ.—4*a*. V. RUPESTRIS Schmidt, $n=10$.
Arosulatæ Borbas.—5. V. CANINA L., $n=20$; 6. V. PERSICIFOLIA Roth, $n=10$.

Rhizomatifloræ.
Mirabiles.—7. V. MIRABILIS L.
Repentes Kupffer.—8. V. ULIGINOSA Bess.
Scapigeræ W. Beckr.
Eflagellatæ Kittel.—9. V. HIRTA L., $n=10$.
Flagellatæ Kittel.—10. V. ODORATA L., $n=10$.
B. Subsection Plagiostigma Godr.
11. V. EPIPSILA Ledeb., $n=12$; 12. V. PALUSTRIS L., $n=24$.

V. epipsila Ledeb. is sometimes confounded with *V. palustris* L. *V. epipsila* has two cordate reniform leaves and larger flowers. In typical plants the bracts are placed above the middle of the scape, and the underside of the leaves, especially along the nerves, is sparingly hirsute with short appressed hairs, and the petals are darker bluish purple. *V. palustris* has 2–6 round reniform leaves, and smaller flowers, corolla more pale reddish-coloured, and the type glabrous with bracts below the middle of the scapes. —E. G. B.

THE TRUE ZANNICHELLIA GIBBEROSA Rchb.—L'Abbé Fournier (Bull. Soc. Bot. Fr. lxxviii. pp. 292–295 (1831) states that the difficulty in determining the forms of *Zannichellia* has led to different and contradictory interpretations. The conclusions arrived at by the author are that the collective species *Z. palustris* L. includes at least four subspecies which he differentiates in the following manner :—

A. Female flowers sessile.
Carpels sessile or subsessile.—*Z. peltata* Bertol.
Carpels stipitate, arising from the stem at the base of the leaves.—*Z. gibberosa* Rchb.
B. Female flowers pedicellate.
Carpels sessile.—*Z. dentata* Willd.
Carpels stipitate.—*Z. pedicellata* Fries.

Students of this genus should consult Reichenbach, 'Plantæ Criticæ,' viii., 'Icones,' vii. pl. xvii., and the 'Flora excursoria,' also Graebner in Kirchner, Loew, Schroeter, 'Lebensgeschichte der Blutenpflanzen Mitteleuropas,' i. p. 509 (1908), and Ascherson and Graebner's 'Synopsis.'—E. G. B.

SOME SPECIES OF BROMUS AND THEIR HYBRIDS by A. de Cugnac and A. Camus in Bull. Soc. Bot. Fr. lxxviii. pp. 327–341, cum tabs.—The authors in this paper deal in the first instance with the systematic value of *Bromus maximus* Desf. and the relations of *Bromus rigidus* Roth and *B. Gussonei* Parl. to this species. They then deal with the distribution and nature of *B. rigidus* and *B. Gussonei* and give careful comparative diagnoses of *B. rigidus*, *B. Gussonei*, and *B. sterilis*.

A new variety, *B. rigidus* var. *gracilis* A. de Cugnac. is described with the following diagnosis :—

Panicle oblong, narrow, secund, 18–22 cm. long, branches

pilose, erect, lower 1–4 cm. long. Spicules 5·5–10 cm. long, 4–6-flowered. Sterile glumes scabrid, fertile 5–6 cm. long, scabrid. Loire-Inf.: La Baule.

A new hybrid is described between *B. madritensis* and *B. sterilis*×*B. Fischeri* A. de Cugnac & A. Camus. Its leading features are as follows :—

Annual. Culm erect, above puberulous. Vaginæ striate. Ligule ovate, laciniate. Panicle ovate, lax, 14–15 cm. long, 10–12 cm. broad. Spicules 4–5 cm. long, 8–10–15-flowered. Sterile glumes unequal, lower 1-nerved, upper 2-nerved, fertile glume 3–3·5 cm. long (awn included). Pale oblong, base attenuate, 9 mm. long, margin ciliate. Stamens 2.

Two other intermediate forms are described :—

F. permadritensis A. de Cugnac & A. Camus—*B. madritensis* > *sterilis*. Panicle dense, branches 1·5–2·5 cm. long. Spicules 5 cm. long, 7–12-fld.

F. persterilis A. de Cugnac & A. Camus—*B. sterilis* > *madritensis*. Panicle lax, branches patulous, 4–10 cm. long. Spicules 5–8-flowered. Very near *sterilis*, distinguished by villose spicules and branches.—E. G. B.

THE BRITISH BRYOLOGICAL SOCIETY.

This Society held its Annual Meeting and Excursion at Harlech, Merionethshire, from August 15 to 22, 1931. The Meeting was attended by about forty-nine members and friends, and the excursions were carried out without serious weather interruption. Nearly half the members went on to Llanberis for a further week and explored Snowdonia in fine weather.

For the first excursion cars took the members to the entrance of Cwm Bychan, whence a walk led past Llyn Cwm Bychan and up through the rocky wood, then through the pass, Bwlch Tyddiad, by the famous Roman Steps towards Rhinog Fawr, a few reaching the mountain top. This district is very rich in bryophytes. Next day a drive through Barmouth led to the classical ground of Tyn-y-Groes, where many good plants were found in the wooded glen. Another drive was to Ceunant Llenyrch, whence the path to the Falls was a struggle through six feet high bracken. Later on in the day Hir Ynys was visited, the "Long Island" being a great mass of greenstone rising out of a flat marsh, where interesting mosses grow. Next day Mochras sand-hills were visited—a most interesting area for flowering plants as well as for bryophytes; *Centunculus minimus* was there in quantity. Then the Artro Valley and Nantcol Ravine were explored, a wooded rocky gorge. Coming up to Harlech some members stopped at Dolgelly and climbed Cader Idris, where two new records for Merioneth were added,

viz., *Herberta adunca* and *Ptilidium ciliare* var. *inundatum*. On the return journey some members visited Llyn Cae, Cader Idris, and found *Lophozia heterocolpa*, new to the county, and *Lophozia longidens*, a second record only, on rocks and walls respectively.

Both Merioneth and Carnarvon have been worked intensively for so many years that very few new records could be expected, but in Tyn-y-Groes (48*) *Grimmia subsquarrosa*, *Leptoscyphus cuneifolius*, and *Cololejeunea microscopica* were found.

Only a very small selection of the rare plants seen can be recorded here. In Cwm Bychan *Sphagnum* **americanum*, *Austini* var. *imbricatum* and forms of *S. rubellum*, *quinquefarium*, *amblyphyllum* var. *mesophyllum*, and *aquatile* var. *intortum*. Several species of *Andreæa*, *Campylopus atrovirens* vars. *muticus* and *gracilis*, *Leptodontium recurvifolium*, *Philonotis Wilsoni*, *Fontinalis Dixoni*, *Pterogonium gracile* var. *harlacense*, *Marsupella Pearsoni*, *Gymnocolea acutiloba*, *Sphenolobus Pearsoni*, *Mylia Taylori*, c.fr.

Roadsides near Barmouth :—*Grimmia arenaria* and *Stirtoni*, *Coscinodon cribrosus*, *Tortula canescens*, *Riccia nigrella*. At Tyn-y-Groes :—*Campylopus flexuosus* var. *zonatus*, and *C. setifolius*, *Hylocomium umbratum*, *Jamesoniella subapicalis*, *Sphenolobus exsectus* and *Hellerianus*, *Harpanthus scutatus*, *Harpalejeunea ovata*. Mochras sand-hills :—*Amblyodon dealbatus*, *Bryum pendulum*, *Warneum*, *calophyllum*, *Marrattii*, *lacustris*, and *inclinatum*, *Aneura incurvata*, *Moerckia Flotowiana*, and *Petalophyllum Ralfsii*.

Ceunant Llenyrch :—*Grimmia retracta* (obtused leaf form) and *Hartmani*, *Eurhynchium myosuroides* var. *rivulare*, *Nowellia curvifolia*, *Adelanthus decipiens*, and *Cephalozia leucantha*.

Hir Ynys :—*Hedwigia imberbis*. Artro Valley :—*Barbula rigidula*, *Grimmia retracta*, *Ulota crispa*, *Bruchii*, and *Ludwigii*, *Thuidium delicatulum*, *Sematophyllum micans*, *Philonotis fontana* var. *ampliretis*, *Eurhynchium myosuroides* var., *Hypnum eugyrium*, *Metzgeria furcata* var. *fruticulosa*, *Fossombronia Wondraczeki*, *Harpanthus scutatus*, *Plagiochila punctata*, and *spinulosa* var. *inermis*, *Cephalozia media* var. *pallida*, *Madotheca Porella*.

Around Snowdon :—**Ditrichum tenuifolium* and *zonatum*, *Campylopus Schwarzii*, *Glyphomitrium Daviesii*, *Encalypta commutata* c.fr., *Grimmia conferta*, *elongata*, *atrata*, *Œdipodium Griffithianum*, *Webera polymorpha*, *Hypnum crista-castrensis*, *Gymnomitrium concinnatum*, *adustum*, and *alpinum* var. **heterophyllum*, *Marsupella Stableri* and *Sprucei*, *Scapania ornithopodioides* and **Frullania germana*, the latter in Cwm Clogwyn on rocks.

The Annual Meeting was held on August 18, and after the usual business it was decided to hold the next Meeting and Excursion in Somerset for Exmoor, during the week after Easter 1932.—Eleonora Armitage.

SHORT NOTES.

STAMINODAL FORM OF ERICA TETRALIX L. IN CORNWALL.—In October 1929 I visited a heathy common near Truro. On this common *Calluna vulgaris* (with a few white-flowered plants), *Erica cinerea*, *ciliaris*, *ciliaris* × *Tetralix* (a few), and *Tetralix* (with its white-flowered variety fairly common in one corner) are present, all the type-forms being abundant. As it was so late in the season there were very few flowers in evidence, and these were chiefly *ciliaris*, so I had to select my plants by the foliage. All I brought home did fairly well last year, and I was astonished at the curious heads of one of the plants of *Tetralix*, which appeared at first to be green with black spots. As these heads developed, the rich purple styles and stamens came into view as a curling mass of minute red threads, amongst which the pistils stood out of a paler purple. In every case the corolla was to all appearance entirely absent. All the heads on this plant were of this nature, and I distributed several amongst botanical friends. This year's flowering was awaited with much interest, and the plant again *began* with the same abnormal heads, but subsequently bore about as many normal ones, and another plant, which had not flowered in 1929, owing no doubt to the transplanting, exhibited the same peculiarity, but in this case some heads were normal, some quite abnormal, and some intermediate, the flowers of these last having corollas of various degrees of development or none at all.

Dr. Rendle informs me that the phenomenon is a case of conversion of the corolla into stamens, and has been described and illustrated by Costerus ('Archives Néerlandaises,' xxiv. 141 (1890)), who also found various degrees of conversion. It is interesting that this freak has now been recorded from this country as well as Holland, and botanists will do well to look for it in other counties.—C. NICHOLSON, Tresillian, Cornwall.

BRITISH VERONICAS OF THE AGRESTIS GROUP.—Perhaps a zealous field-botanist may be allowed to emphasize the importance and great usefulness of the above paper by Dr. E. Drabble and Mr. J. E. Little (Journ. Bot., July and August last) which was illustrated so carefully by the latter's daughter.

Those who have not yet done so will do well to make the necessary corrections in the several quoted books on the British flora by different authors; for some of the errors go back from 1930, through the various editions of Smith's 'English Botany' to 1790; and "Bentham and Fitch," "Fitch and Smith," "Babington," and "Hooker" all need attention.

Owners of British herbaria have doubtless examined the Speedwells of this group in the light of this valuable short monograph. When I did so, I found I had no *V. agrestis*, formerly thought almost ubiquitous, except a few specimens sent by Mr. Little. Nor have I succeeded in finding this weed growing anywhere during the past season. But in often hunting for it this paper has enabled me to get, in fine series for distribution, the three named varieties of *V. persica*. All came from N. Somerset, and the most striking is var. *Corrensiana* Lehm., of which a second and larger gathering in flower and fruit near Bath, as late as November 7, indicates the curious and irregular serration of the leaves, and also in the strongest shoots, some of which were twenty inches long, a marked rosette of leaves and flower-buds at the top.

Few plants of any one species could be more dissimilar in outward appearance than these stout examples of var. *Corrensiana* with their doubly crenate-serrate broad leaves and the slender, upright, small-leaved and -flowered var. *Kochiana* Godr., collected in June by a railway-siding at Portishead.—H. S. THOMPSON.

UNUSUAL HABITATS FOR AGARICS.—The following unusual habitats for certain common agarics seem worthy of record. It is generally known that some species are apparently restricted to given hosts. Occasionally, however, the experience of years is interrupted by finding an odd specimen. A few examples of this have been noted on forays of the British Mycological Society and listed in their 'Transactions.'

In November 1930, in Dr. Rendle's garden at Fetcham, Surrey, we found *Armillaria mucida* on a log of horse-chestnut. So far as I am aware, the experience of British mycologists is that this fungus is restricted to beech. There are Continental records of an occasional occurrence on trees other than beech, but I have found no record of horse-chestnut.

Several times during the past four years I have found *Dædalea quercina* on beech-stumps at Oxted, Surrey. This is the only British record I know of this fungus on any tree but oak, though there are a few foreign records including beech.

This autumn Mr. K. St. G. Cartwright, Mr. W. P. K. Findlay, and myself found large numbers of the fruit-bodies of *Lactarius rufus* on old stumps of pine at Oxshott, Surrey. The stumps were left after the felling during the war and by now are merely punk-wood below a strangely hard upper surface. *L. rufus* is a common terrestrial pine-wood species.

On the Students' Foray of the British Mycological Society at Virginia Water, Surrey, we came across a beech with a wound about ten feet from the ground. Out of the dead wood *Armillaria mucida* was growing typically, but within an inch or two were the fruit-bodies of *Pholita spectabilis*, a species common in the district on partly decayed pine-stumps.—J. RAMSBOTTOM.

VOLVARIA MURINELLA Quélet.—On Mickleham Downs, Surrey, early in October last, I met with two isolated examples of a small grey *Volvaria* which was new to me and is not described in any of our English books on the higher fungi. I subsequently found it described in Ricken's and Quélet's books as a fungus of Germany and France. The description is as follows :—*Cap* ½ inch across, campanulate to convex, grey, shaggy at first from the shining fibrils with which it is covered, dry, not viscid. *Stem* $1\frac{1}{4} \times \frac{1}{16}$ inch, shining white, slightly flexuous, equal, striatulate, slightly twisted. *Volva* white, glabrous, 3–4-lobed. *Gills* remote from stem, ventricose, white to rose-pink. Inodorous. These characters easily distinguish it from *V. parvula* (*V. pusilla*), the only small *Volvaria* hitherto included in our fungus-books.—WM. WATSON.

MYOSOTIS SYLVATICA IN OXFORDSHIRE ETC.—With reference to some of the interesting field-notes supplied by the Rev. H. J. Riddelsdell on p. 309 (Journ. Bot. 1931), he makes mention of *Œnanthe pimpinelloides* L. in the Second Edition of the 'Oxfordshire Flora.' I did not mean to throw special doubt on it as a Gloucestershire plant, in face of its being included for both divisions of the county in the two editions of 'Topographical Botany,' but I agree that it would have been better to have made it clear that it was a general statement. I had hoped to have given a tabular list of the occurrence or non-occurrence of species in the bordering counties, but it is expensive to print, and, in view of such a list being given in the recently published 'Flora of Buckinghamshire,' it was omitted from the 'Flora of Oxfordshire,' In the 'Flora of Bucks,' among the counties which were selected for comparison, two only were shown to have *Œnanthe pimpinelloides* (one is Wilts, the other Gloster), and that without any qualification. Moreover, Gloster also is given unquestioned for *Œ. pimpinelloides* in the 'Oxfordshire Flora,' ed. 1, 1886.

Apium repens (not *nodiflorum*) is the species I made a suggestion about a "creeping peduncled form," and it is not mentioned under *A. nodiflorum*, under which, if I thought it belonged to *nodiflorum*, it would have been given. Both are kept distinct species, despite their great range of variation.

It is pleasing to know that *Cuscuta europæa* still maintains its situation by the Thames, where I noticed it in 1884, and it is recorded from those counties in the first editions of the Oxford and Berkshire Floras.

Myosotis sylvatica scarcely needed recording again, since it is in Brit. Ex. Cl. Rep. for 1930, p. 518, for, although given by Riddelsdell as a N. C. R., it was introduced to Great Tew with *Potentilla fruticosa* (which I saw there recently) and other northern plants by the late Mr. Boulton in the "'seventies." It is duly recorded in the 'Flora of Oxfordshire,' p. 296, where it is said to be "completely naturalized." I sent it to the B. E. C. with its history (see Rep. 1912, 270). It is native in Berkshire, and one was always hoping to find it in a native habitat in Oxfordshire, which, like Northamptonshire, only possesses it as an introduced species.—G. CLARIDGE DRUCE.

RUBUS NOTES.—There is an interesting lot of brambles in the grounds of the Zoo at Whipsnade, Beds, v.c. 30. Besides commoner forms, I saw *R. polyanthemus* Lindeb., *R. echinatus* Lindl., and *R. dasyphyllus* Rog. There were one or two escapes of cultivated forms ; and also three native *Rubi* new to the county : (1) a curious and very robust bush closely allied to *R. Godroni* Lec. & Lam., (2) *R. pubescens* Whe & Nees, var. *subinermis* Rog. (magnificent bushes, mostly in full exposure), and (3) *R. lasioclados* Focke var. *angustifolius* Rog., in very small quantity. I was allowed, by the kind permission of the authorities, to gather specimens.

Near Brighton, E. Sussex, v.c. 14, there is a good patch of *R. thyrsiger* Bab. ; and in both v.c.'s 13 and 14, on the downs near Brighton, *R. carpinifolius* Whe & Nees, and *R. pallidus* Whe & Nees.—H. J. RIDDELSDELL.

STACHYS GERMANICA L.—This species is uncertain in appearance, and from time to time is announced as extinct or nearly extinct. It is thus worth recording that in August 1931 I counted some 60 or 70 plants in one of its old localities, which for some years past I had searched in vain.—H. J. RIDDELSDELL.

REVIEWS.

Flore des Alpes Maritimes. Par EMILE BURNAT, continuée par JOHN BRIQUET et FRANÇOIS CAVILLIER. Vol. VII. *Composées Cynaroidées.* Large 8vo, pp. 311. Conservatoire Botanique de Genève, 1930. Price 30 fr. suisses.

IT is nearly forty years since the late M. Burnat issued the first volume of his 'Flora' (1892), which is described as a 'Catalogue raisonné des plantes vasculaires qui croissent spontanément dans la chaîne des Alpes Maritimes.' Three other volumes followed, the fourth (1906) carrying the work to the end of the polypetalous Dicotyledons. In 1913 François Cavillier, Curator of the Burnat Herbarium, provided a Supplement (vol. v. pt. 1) to the first four volumes, and in 1915, with Dr. Briquet, continued the 'Flora,' vol. v. pt. 2 dealing with the families Rubiaceæ to Compositæ ; vol. vi., continuing the Compositæ, by the same authors, appeared in 1916 and 1917.

A sad interest attaches to the present volume, which was issued shortly before Dr. Briquet's death. The lapse of fourteen

years since the appearance of the preceding volume was explained in a letter to the writer, "We have been obliged to interrupt the work for a long time because the best of our time was taken up by the 'digestion' of the Candollean library and collections. I hope that the next volumes will be published more rapidly." Dr. Briquet continues, "As you know, this work is not a descriptive catalogue in the ordinary sense of the word, but rather a series of elaborated monographs." This estimate by one of the authors is sustained by the volume now before us. It is a record of the intensive study in the field of the flora of the Alpes Maritimes combined with a critical investigation of the literature and a careful and detailed taxonomic presentation. In 1902 Briquet published his 'Monographie des Centaurées des Alpes Maritimes.' The treatment of *Centaurea* in the present volume not only takes into account the work of Hayek, Gugler, and others during the interval that has elapsed, but precises the numerous subspecies and varieties into which the seventeen species recognised are subdivided. No less than 122 pages are devoted to this genus. The account of the monotypic genus *Berardia* Villars (*B. lanuginosa* Fiori) endemic in the South-West Alps, includes a description of its morphology and carpology and a discussion of its affinities. The authors disagree with the position assigned to it by O. Hoffmann as a member of the Mutisieæ, a tribe foreign to Europe, and maintain that its characters place it incontestably in the Cynareæ-Carduineæ, where it was originally placed by its author, and also by Bentham and Hooker in their 'Genera Plantarum.'

The enumeration includes 70 species, 30 subspecies, and 15 hybrids. It is much to be regretted that Dr. Briquet's personal knowledge of the flora of the Alpes Maritimes will not be available for the completion of the work, but we sincerely hope that it will not be allowed to remain unfinished.—A. B. R.

Symbolæ Sinicæ. VII. *Anthophyta.* By HEINRICH HANDEL-MAZZETTI. Lief. 2. 8vo, pp. 211–450, with 9 text-figs. and 4 pls. Julius Springer: Vienna, 1931. Price R.M. 49.60.

THE second part of the enumeration of the Flowering Plants collected during the expedition to South-West China, 1914–18, under the auspices of the Vienna Academy of Sciences, continues the account of the Archichlamydeous families of Dicotyledons, from Euphorbiaceæ to Pittosporaceæ. These include the Ranales, Cruciferæ and allied families, Violaceæ, Begoniaceæ, Theaceæ, Guttiferæ, Crassulaceæ, and Saxifragaceæ.

The author has done his work very thoroughly, synonymy is quoted, and critical notes are frequent. Dr. Mazetti is making a valuable contribution to Chinese taxonomy. A large number of new species are described; thus 15 pages are devoted to the genus *Aconitum*, including the descriptions of six new species. It would have been helpful if brief definitions of the new species had been included; for while a description of half to three-quarters of a page serves to "describe" the species, a few lines emphasizing the salient characters are a boon to working taxonomists. The author is not always happy in his use of abbreviations:—Hand.Mzt., Hce (Hance), Siebd. (Siebold), Sitzgsanz. Ak.W.W., Pflzr.(Pflanzenreich) are cases in point. The few text-figures are generally helpful, but the four plates are too crowded with figures, some of which are of little value.

The section on Anthophyta is expected to occupy in all five parts.

Flowers of Grass. By ROBERT FISHER, Canon of York. Sm. 8vo. Pp. 47, figs. 28. Wheldon & Wesley.: London, 1931. Price 2*s*.

THIS is intended merely as a handbook for those who, having so far ignored grasses as being difficult to study, may yet be tempted to make a beginning towards knowing their names. With such a praiseworthy purpose, it is a pity that a praiseworthy booklet has not been produced, for one is needed. Mr. Rayner, in his Foreword, thinks that this will be welcomed for its stimulus in remedying the neglect of this most important and interesting family, but frankly I doubt it. The figures are crudely drawn and badly labelled. The same space filled with well-selected, properly labelled, good drawings would have been a tremendous help to the beginner.

The text consists of a short explanation of the grass flower and inflorescence, two pages of abbreviations, two explanatory of terms, seventeen of keys, fourteen of a list of British grasses with truncated descriptions or notes, and an index of English names.

The keys are three. The first has the inflorescence characters primary, the second has awns primary, the third the number of flowers in each spikelet. Once the abbreviations are mastered, the keys should assist rapid elimination of wrong names, since essential characters are reduced to the minimum. Identification is continued by the use of the list, where more information is given—*e. g.*, "infl. spk.-like or plu.-like pan.; spkts. 1 fl.; awns of gl. ter.; gl. and pa. awned." But I should recommend the use of Fitch and Smith's 'Illustrations to the British Flora' as an extra verification of the name.—A. J. W.

Die Pilze Mitteleuropas, Band I. *Die Röhrlinge* (*Boletaceæ*), by FRANZ KALLENBACH (Leipzig: W. Klinkhardt), continues its leisurely course and Parts 9, 10, and 11 have appeared. The same general praise and criticisms apply to these as to previous numbers. There are nine plates (six coloured) and 24 pages

of text in the three parts; the three uncoloured plates give photographs of habitat, pores and anatomical figures. The species treated in the text and coloured plates are *Boletus parasiticus*, *B. pinicola* sp. nov., *B. porphyroporus*, *Boletinus cavipes*, *Boletus bovinus*, and *B. tridentinus*.

Boletus parasiticus.—This, the only parasitic species of *Boletus* so far as is known, is unmistakable. In this country, though not infrequent, it appears to be sporadic and in some years is not met with. Thus a record is quoted "Kew Garden (abundant—Berkeley)"; I do not recollect having seen it there in over ten years' collecting. The fungus was unusually abundant in an oak-hornbeam wood (Sherard's Wood, Herts) in 1914, when, in company with Professor E. J. Salisbury, I saw it there lining a path for several hundred yards; practically every *Scleroderma* was parasitized.

Boletus pinicola.—This is the form previously described by Kallenbach as *B. sulphureus* f. *silvestris*. It is readily distinguishable from *B. sulphureus* by its reddish golden-brown colour and by its lignicolous habit. Two drawings of *B. sulphureus* are given for comparison. This is a rare species with us, generally considered as confined to the north Scottish pine-woods, though it occurs in Surrey (Oxshott).

Boletus porphyroporus.—This is the only species with purple spores, and Bataille proposed the genus *Phœoporus* for its reception. It appears to be becoming more common in this country. Kallenbach remarks on the fact that this fungus stains paper bluish green. I have noticed this also in *B. versicolor*.

Boletinus cavipes.—This species is exceedingly rare with us, though it is so characteristic that it is easily recognised even in the dried state.

Boletus bovinus.—Some of the figures on the plate of this fungus are redder than I have seen in this very common species, and the characteristic white margin is not so clearly marked as one would expect. A footnote states that A. B. Hatch, working in Melin's laboratory, has shown that this species is a mycorrhizal fungus of pine. This result confirms what could be deduced from the general distribution of both tree and fungus, for the association is as close as any that is met with in field-work.

Boletus tridentinus.—This species was described by Bresadola, who at the same time gave a very poor figure. The present plate, which shows the fungus in its various stages, is consequently all the more valuable. To my mind, there can be no doubt that the fungus is the same as our *B. aurantioporus* Howse. I had occasionally seen the British species up to 1924, when it occurred in plenty in several places in southern England. The first specimens I saw that year were brought to me by Mr. E. H. J. Corner, who had noticed the well-marked ring, particularly in the younger stages. The following year I visited the Abbé Bresadola, and among the specimens on his working-table were what were characteristic *B. aurantioporus*, but which he said was typical full-grown *B. tridentinus*. I have seen the fungus most years since, always with a well-marked veil or ring when young and always under larch. The name *Boletus aurantioporus* (1883) should therefore be replaced in our fungus-flora by *B. tridentinus* (1881).—J. R.

Glossary of Botanical Terms commonly used in Range Research. Compiled by W. A. Dayton. United States Department of Agriculture, Miscellaneous Publication No. 110. Washington, D.C., 1931.

In this small octavo pamphlet of 40 pages, Mr. Dayton supplies a useful glossary of terms commonly used in floristic work, and including also some of the more common terms used in plant ecology, physiology, and other phases of botany, as well as a few of the more common abbreviations and symbols. A number of the terms are illustrated by 76 small text-figures. It has been compiled primarily for use in connection with the important western floras and other botanical publications which contain no glossaries, but should find a wider use especially among amateur botanists.

BOOK-NOTES, NEWS, Etc.

Linnean Society of London.—At the General Meeting of November 19, 1931, the President, Prof. F. E. Weiss, F.R.S., announced that there were four vacancies in the List of Foreign Members, due to the deaths of Dr. John Isaac Briquet, Prof. Louis Dollo, Dr. Hans Oscar Juel, and Prof. Richard Wettstein von Westersheim.

The evening was devoted to a series of papers commemorating the discovery of the nucleus of the vegetable cell, which was announced by Robert Brown at the meetings of the Linnean Society on November 1 and 15, 1831. Mr. J. Ramsbottom opened with an account of the career of Robert Brown and his botanical researches, and Mr. N. B. Kinnear followed with an account of Brown's zoological collecting during the voyage of the 'Investigator.' Mr. S. Savage then gave a sketch of Brown as an official of the Linnean Society. After the President had read and commented on that portion of Brown's paper dealing with the discovery of the nucleus, Lt.-Col. J. Stephenson dealt with the relation of Brown's discovery to the history of the Cell Theory.

At the General Meeting on December 3, ten new Fellows were elected. Miss R. E. Dowling read a paper entitled "*Orobanche minor* on Unusual Hosts" and Mr. Geoffrey Tandy gave a lecture illustrated with lantern-slides, photographs, and specimens obtained on his recent visit, entitled "Shore Biology in Florida."

FUNGI PATHOGENIC TO MAN.—Mr. J. Ramsbottom contributes a well-written and informative chapter on this subject to vol. viii. of 'A System of Bacteriology in relation to Medicine,' prepared under the auspices of the Medical Research Council and published by H.M. Stationery Office. A concise account of the principles of classification of Fungi, their biological phenomena, technique, and nomenclature, is followed by a systematic arrangement of the genera and species of the different fungal groups, with indications of their pathogenic action. Occasionally a detailed account of a fungus is given to serve as a pattern of the type of diagnosis which should prove satisfactory.

ORCHIDACEÆ OF HONGKONG, PART V.—In the September number (vol. ii. no. 3) of the 'Hong Kong Naturalist,' Dr. G. A. C. Herklots continues his account of the Orchids of the island. Three species of *Habenaria* and *Spathoglottis pubescens* Lindl. are described and very fully illustrated. A. H. Crook contributes some notes on alien plants which have become introduced into the Colony.

COMMITTEE ON BOTANICAL NOMENCLATURE.—A fully representative International Committee with a small Executive Committee was appointed at the International Botanical Congress of August 1930. We are pleased to hear that Prof. H. Harms, of the Botanic Garden and Museum, Berlin, has consented to act as Secretary to the Executive Committee. Prof. Harms has been Vice-Rapporteur of the Section on Nomenclature and has prepared the German draft of the various editions of the "Rules." His experience of the work of the section since the Vienna Congress in 1905 and his wide knowledge of the details of botanical nomenclature will be a great asset in the work of the Committee.

ROYAL MEDAL.—At the Annual Meeting of the Royal Society on St. Andrew's Day, November 30, Prof. W. H. Lang, F.R.S., Barker Professor of Cryptogamic Botany, University of Manchester, was awarded a Royal Medal for his work on the anatomy and morphology of the fern-like fossils of the Old Red Sandstone.

At the same meeting Prof. A. G. Tansley, Sherardian Professor of Botany, Oxford University, was elected Member of Council.

NEW OR NOTEWORTHY FUNGI.—PART XII. (*concluded*).

BY W. B. GROVE, M.A.

(Continued from p. 7.)

SEPTOTRULLULA von Höhn. Fragm. z. Myk. 1903, p. 39. Sacc. Syll. xviii. 487.

Pustules emergent, pulvinate, blackish. *Spores* concatenate, ±elliptic-fusoid or even oval, but truncate at the ends when in contact, transversely septate, at length pale olivaceous; sporophores crowded, cylindrical, colourless.

470. SEPTOTRULLULA BACILLIGERA v. Höhn. *l. c.* 40. Mig. 591.

Var. **cambrica** Grove & Rhodes, var. nov., *sporulis evolutioribus.*

Pustules minute, scattered, pulvinate, black, 200–250 μ diam. *Spores* fusoid, oval, or even ovate, connected in chains and then truncate at the junctions, basipetally formed, the lowest one fusoid and colourless, the next above 1-septate and faintly coloured, the older ones pale fuliginous, oval, and generally 3-septate; afterwards, especially when they have become separated, they are ±obovate and 4–5-septate, 20–32×5–8 μ; sporophores cylindrical, simple, colourless, up to 20 μ long, 2 μ broad.

On the upper portions of dead twigs of *Alnus*, Cwm Llwch, Brecknock (*Grove & Rhodes*, no. 3978 B); May 1929.

There can be no doubt that the two species described by von Höhnel (*l. c.*), *S. bacilligera* and *S. peridermalis*, are only younger states of which this Welsh form is the highest development. It may be that this further advance is due to the extremely moist conditions in which the var. *cambrica* was growing.

CORYNEOPSIS, gen. nov. e Melanconieis.

Acervuli subepidermici, mox erumpentes. *Sporulæ* iis *Hendersoniæ* simillimæ, at sporophoris elongatis ±filiformibus, persistentibus, e strato prolifero crasso oriundis suffultæ. Sporularum acervulus peridio tenuissimo aut nullo superiore parte tegitur.

This genus is formed to include a number of species which have been placed by various authors, on the one hand, in *Coryneum* and, on the other, in *Hendersonia*. They resemble *Coryneum* in having, normally and usually, only a basal proliferous stratum, with either no upper pycnidial wall or only a very slight one; but the spores lie in a cavity of the host-tissue, and thus appear at first sight as if they were those of a *Hendersonia*,

which they resemble in form and colouring. A true *Coryneum* produces its spores, not within a peridium, but from the upper surface of a *convex* basal layer which was at first subepidermal, in this respect resembling *Vermicularia* (that is to say, a real *Vermicularia*, not a *Colletotrichum*, which approaches it in appearance, but has a different mode of development). But the spores of a typical *Coryneum* have a peculiar aspect, owing to the thick-walled square loculi, which are occupied by remarkably squarish and mucoid guttules, quite different from the globose oil-guttules of *Coryneopsis* or *Hendersonia*.

Besides the absence or near-absence of a peridium *, the chief point that serves to distinguish *Coryneopsis* from *Hendersonia* is that, in the former, the proliferous stratum is firm and has a thickness of several (often eight or more) cells, while the pedicels arising from it partake of the same firm character and are therefore more permanent than they ever are in *Hendersonia*. On that account the spores are to be seen attached by their pedicels to the underlying tissue *in large numbers*, and not merely occasionally as happens in most species of *Hendersonia*.

Coryneum microstictum B. & Br. has often been taken on hasty examination for a *Hendersonia*. It will find its natural place in the new genus, in which we may include

Coryneopsis microsticta (*Coryneum* B. & Br.) (see Pl. 599, fig. 3),

Coryneopsis foliicola (*Coryneum* Fckl.),

to which must be added

Coryneopsis Corni-albæ (*Coryneum* Sacc.) (Pl. 599, fig. 2), and

Coryneopsis Tamaricis (*Hendersonia* Mig.) (Pl. 599, fig. 4),

of which descriptions are given below.

Very probably we may add to these *Hendersonia Rosæ* Kickx, *H. Vitis* Died., *H. Peckii* Clinton, *H. canina* Brun., *H. platypus* E. & E., *H. Rubi* with its var. *Rubi-idæi*, *H. pyricola* Sacc., *H. Henriquesiana* Sacc. & Roum., *H. ichthyospora* Sacc., *H. longipes* B. & C., and *Coryneum ruborum* Oud., as well as some forms of *H. sarmentorum* West., the var. *β laurinum* of *Coryneum microstictum*, and, finally, Saccardo's species *C. affine* and *C. Tecomæ*. Some of these, however, still await further investigation.

471. Coryneopsis Corni-albæ, comb. nov.

Coryneum Corni-albæ Sacc. Syll. iii. 774. All. vii. 647. Died. p. 873, p. 870, f. 3. Mig. 586.

* It is true that the formation of a peridium can take place in varying degrees according to the local conditions of growth (as happens in other genera), but in such cases the spores, the spore-pedicels, and the nature of the proliferous stratum can and often do remain unchanged, so that no confusion need arise to a careful observer.

Hendersonia vagans var. *Corni* Grove, in Journ. Bot. 1922, 81.

Pustules densely gregarious, at first covered by the epidermis which is afterwards conically raised and burst at the whitish vertex, finally pulvinate, black, up to 500 μ diam. *Spores* oblong-fusoid, somewhat rounded above, pointed below, 15–20× 6–8 μ, 3-septate, not constricted, clear yellowish, the end-cells at first paler, all afterwards becoming darker; pedicels ±persistent, colourless, filiform, about 1 μ wide, as long as or longer than the spore. (Pl. 599, fig. 2.)

On dead branches of *Cornus alba*, Hadzor Hall, Worcs (*Rhodes*, no. 4437 c); March.

Distinguished from *Hendersonia Fiedleri* by the total or nearly total want of a pycnidium; the spores spring erect from a basal proliferous stratum. The spores also are longer and wider, and the septa are thicker; also the filiform pedicels can always be found, on looking for them, springing in dense array from the pale olivaceous basal layer. The epidermis is elevated by the mass of spores, which ultimately exude from a pore at the apex and simulate the black papilla of a pycnidium.

472. Coryneopsis Tamaricis, comb. nov.

Hendersonia Tamaricis Mig. 359, pl. 45, ff. 4–8 (*non* Cooke, in Grevill. xiv. 5).

Pustules densely scattered or aggregated, occasionally confluent, up to 500 μ diam., at first covered by the periderm, which is elevated in a little dome and fissured. *Spores* oblong-oval, obtusely rounded at both ends, straight or slightly curved, 3-septate, the terminal loculi often longer than the two middle ones, hardly or not at all constricted, evenly dark brown, eguttulate, somewhat opaque, at length 28–36×12–13 μ; sporophores long, crowded, colourless, somewhat gelatinous but persistent, nearly equal, up to 45 μ long, 2–3 μ broad, rising from a rather dark, large-celled, proliferous stratum which forms the base of the pustule. *Paraphyses* (?) long, filiform. (Pl. 599, fig. 4.)

On dead twigs of *Tamarix gallica*, on the shore near Barmouth, Mer. (*Rhodes*, no. 4339); Guernsey (*Rhodes*). On twigs of the same, Herne Bay, Kent; August, September.

The spores had 1–3 septa, and they could become coloured before they developed septa. When the fungus is old, the dome of the periderm splits away, and finally leaves a "foveola" or pit, which may be oblong and reach 750×500 μ, lined at the bottom with a sunken dead-black mass. Migula's figure, quoted above, represents the form of the fungus very accurately—but are not his "paraphyses" simply pedicels deprived of their spores and afterwards grown longer?

HYPHOMYCETES.

473. CYLINDROCEPHALUM STELLATUM Sacc. Syll. iv. 64.
Cephalosporium stellatum Harz, Hyphom. 31, pl. 2, f. 5.

Var. **claviforme,** var. nov., *conidiis clavato-cylindricis.*

Pure white. *Sterile hyphæ* delicate, creeping; fertile, erect, simple, eseptate, gregarious, but not at first crowded, 50–65×1–1·25 μ, each bearing at the summit a radiating whorl of 3–6 horizontally placed spores. *Conidia* cylindric-clavate, rounded above, pointed below, eseptate, hyaline, 15–20×2–3 μ.

On horse-dung, Walton, Liverpool (*W. G. Travis*). In the typical *C. stellatum* (Harz) the spores were 6–15 in each head, cylindrical, and only 5 μ long.

474. POLYSCYTALUM SERICEUM Sacc. Syll. iv. 38; Fung. Ital. pl. 59. Lindau, viii. 75.

Tufts pure white, pulvinate, silky, 1–2 mm. across. *Hyphæ* erect, much branched, the main hypha faintly granular-verrucose externally, the others quite smooth, all perfectly colourless; most of the axils are rectangular, main hypha 3 μ diam., the upper ones 2 μ; every branch ends in a long chain of conidia. *Conidia* perfectly cylindrical, quite straight, hyaline, biguttulate, 12–15×1 μ.

On acorn-cups of *Quercus Ilex,* Hadzor Hall, Worcs (*Rhodes*); March. On leaves of the same, Heythrop Park, Oxon, November (size of spores exactly the same).

The guttules, placed at the extreme ends of the spores, make them look a little wider than the middle part; hence Saccardo said the spores are dilated at the ends. Some of the final branches of the hyphæ were somewhat ampulliform, swollen in the middle, with an acute tip.

STREPTOTHRIX Corda, Anleitung, 43.

Fertile hyphæ ±erect, the branchlets often parallel to the main branch, all the branches spirally twisted. *Conidia* globose or ovoid, seated at first each singly at the end of a branch, but afterwards appearing (falsely) pleurogenous, sessile or stipitellate, fuscous.

475. STREPTOTHRIX FUSCA Corda, Prachtflora, 27, pl. 13. Sacc. Syll. iv. 283; xiv. 1072. Lindau, viii. 670, with fig.
Monosporium curvatum Bon. Handbuch, 96, f. 115.

Tufts fuscous, gregarious, at length effused for some distance. *Fertile hyphæ* nearly straight, with distant septa, dark, externally granular here and there; branches smooth, irregular, spirally twisted, a little paler and with fewer septa; ultimate branchlets alternate, short, erect, and ±parallel to the branch, eseptate, all much spirally twisted, paler towards the apex. *Conidia* ellipsoid-obovate, fuscous, 1-guttulate, at first terminal, each supported on the apex of a short very slender filiform pedicel. (Pl. 599, fig. 6.)

On thin dead shoots of *Rubus,* Minwear Woods, Pembr. (*Rhodes*); August.

At first sight, to the unaided eye, it looks very like a *Torula.* Hyphæ about 4 μ wide, all except the main hypha spirally flexuose. Conidia mostly obovate or even somewhat pyriform when mature, with one guttule which was always nearer the broader extremity. The "axillary" appearance (Corda) of many of the spores is due to the cymose growth of the branchlets. This species has been found in Bohemia, South Russia, and North America.

476. FUSARIUM SPHÆRIÆ Fckl. Symb. Myc. 370, pl. 1. f. 38; Fung. Rhen. no. 212. Sacc. Syll. iv. 708; Atti Venet.-Trent. Sc. nat. ii. 236, pl. 17, f. 12 (Myc. Ven. Spec.). Bubák, in Bull. Herb. Boiss. ser. 2, vi. 488. Lindau, Pilze, ix. 534, 819–20.

Sporodochia minute, compact, dingy white or colourless, waxy, shining, formed of a mass of very minute parenchymatous cells on which the spores grow in dense clusters almost without conidiophores, or the conidiophores may be racemosely branched. *Conidia* cylindric or elongate-fusoid, straight or very slightly bent, colourless, with a few small guttules, soon 3-septate, hardly ever constricted, ends tapering, but blunt and often turned a little to one side, one or more of the upper cells often somewhat broader than the lower ones so that the spore is somewhat clavate upwards, ultimately 4- or 5-septate, 50–62×4·5–6 μ. (Pl. 599, fig. 12.)

On the ostioles of *Leptosphæria Doliolum,* growing on old stems of *Urtica dioica,* Gt. Haywood, Staffs (*Rhodes & Grove*); August. Emerging in long tendrils from the ostioles of a *Fusicoccum* on *Acer,* Heythrop Park, Oxon, November.

This rare species is recorded abroad in a similar position on *Leptosphæria,* and also on *Valsaria insitiva* on *Ulmus* and on *V. rubricosa* on *Coronilla Emerus.* According to Wollenweber (in Ann. Myc. 1917, 8 & 43; Fusar. aut. delin. no. 58 !), it belongs to *Hypomyces Leptosphæriæ* Wollen. (*Nectria Leptosphæriæ* Niessl, var. *microspora* Wollen., see Sacc. Syll. ix. 964).

CHÆTOSTROMA Corda, in Sturm's Deutsch. Fl. ii. 122.

Sporodochium discoid or pulvinate, black, surrounded by black bristles. *Conidia* ovoid or subfusoid, rarely subglobose, growing (occasionally in chains) on the apex of rod-like sporophores.

477. CHÆTOSTROMA HOLOSCHŒNI Passer. in Rendic. R. Accad. Lincei, Roma, ser. 4, vii. 51 (1891). Sacc. Syll. x. 736. Lindau, Pilze, ix. 625.

Sporodochia globose-pulvinate, dark olive, then perfectly black, 200–250 μ diam., surrounded by a few unequal deep olive-green setæ, which are stiff, rather obtuse, thick-walled, with few or no septa, and measure 100–250 × 7–9 μ. *Conidia* very abundant, cylindric-fusoid, often minutely biguttulate, olive-green, 7–8 × 2–2·5 μ; sporophores fasciculate, filiform, simple, paler than the spores and about twice as long. (Pl. 599, fig. 11.)

On rotting leaves of *Scirpus maritimus*, in a salt-marsh at Freshwater Bay West, Pembr. (*Rhodes*); August. Looks like a *Chætomella*, but a peridium is entirely wanting.

Explanation of Plate 599.

(All figures × 500, unless otherwise described.)

1. *Mycorhynchus Marchalii*. Pycnidium, × 160; spore, × 500.
2. *Coryneopsis Corni-albæ*, spores and paraphyses.
3. *Coryneopsis microsticta*. *a*, on a cultivated Rose; *b*, on *Rubus idæus* (spores in a shrivelled condition).
4. *Coryneopsis Tamaricis*, spores and paraphyses.
5. *Diploceras hypericinum*, spores.
6. *Streptothrix fusca*, hyphæ and spores.
7. *Trullula papillata*. *a*, pycnidium, × 16; *b*, the same when swelled with moisture, × 20; *c*, sporophores (diagrammatic); *d*, spores, × 500.
8. *Pirostoma viridisporum*. *a*, portion of leaf of *Phormium*, showing habit, × 2; *b*, spores, × 500.
9. *Excipula Serratulæ*. *a*, stem of *Serratula*, showing the habit, × 4; *b*, an excipulum seen in profile, × 25; *c*, spores, × 500.
10. *Dictyothyrium Betulæ*, spores.
11. *Chætostroma Holoschæni*. *a*, pycnidium in profile, × 30; *b*, spores, × 500.
12. *Fusarium Sphæriæ*, spores.

CONTRIBUTIONS FROM THE UNIVERSITY HERBARIUM, CAMBRIDGE.—NOTES ON THE FLORA OF THE AZORES.

By T. G. Tutin and E. F. Warburg.

(Concluded from p. 13.)

Pp. 139–140. Mentha (determinations by J. Fraser).

M. rotundifolia Huds. Fayal (Watson), Pico. Differs from British specimens in being less hairy on the pedicels and calyx.

M. piperita L. var. vulgaris (Sole). Pico, Flores (Watson), San Miguel (Hunt).

Differs from British specimens in having the basal joints of the hairs elongated and the terminal spike of the inflorescence sometimes contracted so as to resemble the capitate inflorescence of *M. aquatica* L.; but the hairs on the pedicels of *M. aquatica* are very much longer.

M. piperita var. subcordata Fraser. Flores (Watson).

M. piperita × rotundifolia Fraser, hyb. nov. San Miguel, T. C. Hunt (specimens 130 and 130 *a*) in Herb. Kew. and Herb. Univ. Cantab.

M. piperitæ similis foliis inferioribus longis satis rugosis et pilis pedicellorum brevibus; *M. rotundifoliæ* similis foliis superioribus brevibus latis rugosissimis reticulatisque, et inflorescentia longa et interrupta.

"Stem erect, simple or more often with a few short or long branches above the middle, pale purple (in the dried state) subglabrous in the lower part, loosely hairy about the middle, with straight or curved more or less closely reflexed hairs in the upper part, 2½–3 ft. long; internodes 2–9 cm. long, the longest on the lower half of the stem. Leaves lanceolate to oblong-lanceolate on the lower half of the stem, obtuse, rounded at the base, serrate, shortly petiolate, thinly sprinkled with hairs above, more densely hairy beneath, more or less rugose, with sunken veins above; superficies 4–5·5 × 1·5–2·3 cm.; upper leaves ovate-lanceolate, acuminate to cuspidate, acute, strongly rugose, reticulated above with sunk, and beneath with elevated veins, and hairy on the veins chiefly; superficies 2·5–3·5 × 1·6–2·3 cm.; serratures directed forward, 0·25–2 mm. long, average 1 mm.; petioles 2–5 mm. long, the lower the longer. All the leaves densely punctate with small sunk glands on both faces. Inflorescence strictly spicate when young, 6–14 cm. long, with 10–15 verticils, but the lower 4–7 already widely separated during anthesis. Bracts lanceolate, entire, attenuated into a slender point and densely punctate with glands like the leaves. Pedicels densely covered with 1–2-jointed closely deflexed hairs. Calyx-tube rather closely covered with conical, ascending, 1-jointed hairs, as are its teeth. Corolla pale purple, glandular, with a few white hairs outside in the bud stage. Stamens included.

"The primordial leaves had dropped from half the length of the stem by flowering time, but doubtless they were long, like the few remaining. I attribute the leaves and their moderate rugosity to *M. piperita*, as well as the short hairs on the pedicels, which are represented in British plants by stalked glands, but by these hairs on *M. piperita* from the Azores. The

lanceolate, finely attenuate bracts are common to typical *M. piperita* and its varieties. The broader, shorter upper leaves with strong rugosity and reticulation, as well as the great length and interrupted character of the spike, I attribute to *M. rotundifolia*."—J. FRASER.

M. ×VERTICILLATA L. var. PALUDOSA Sole (*aquatica*×*arvensis*). San Miguel (Hunt).

M. ×HIRCINA (Hall) Fraser (*aquatica*×*longifolia*) Fayal.

M. PULEGIUM L. Pico, San Miguel (Hunt). Hairier than British specimens.

P. 140. SCUTELLARIA MINOR L. Pico. Fairly common in the turf about 2000 ft. above Magdalena, and above Lages. New to the Azores.

THYMUS CÆSPITITIUS Brot. (*T. azoricus* Lodd., *T. micans* Lowe). São Jorge. Erroneously named *T. Serpyllum* var. *angustifolius* by Trelease. Occurs also in Madeira and Portugal (see Coutinho, 'Flora de Portugal,' 512).

P. 141. CALAMINTHA OFFICINALIS Moench. São Jorge.

PRUNELLA VULGARIS L. São Jorge.

P. 142. LAMIUM AMPLEXICAULE L. Terciera.

PLANTAGO LANCEOLATA L. São Jorge, Pico.

P. 143. P. CORONOPUS L. São Jorge. The form with nearly entire fleshy leaves was found, though not so commonly as the type.

LITTORELLA LACUSTRIS L. Pico, São Jorge, and Fayal. Common in the small ponds in many craters.

MIRABILIS JALAPA L. Flores (Watson).

P. 145. ATRIPLEX HASTATA var. SALINA Koch. São Jorge.

P. 146. POLYGONUM HYDROPIPEROIDES Michx. São Jorge.

RUMEX AQUATICUS L. Fayal.

P. 147. R. CONGLOMERATUS Murr. São Jorge.

P. 148. PERSEA AZORICA Seubert. São Jorge.

P. INDICA Spreng. Pico.

ARCEUTHOBIUM OXYCEDRI M. Bieb. Pico, Fayal. First recorded by Guppy from Pico, where it is locally common. On Fayal, in the Caldeira.

EUPHORBIA STYGIANA Watson. São Jorge. Local, in rocky places or among other shrubs.

P. 150. MYRICA FAYA Dryand. São Jorge.

P. 151. SALIX FRAGILIS L. São Jorge. Escaped.

POPULUS NIGRA L. São Jorge. Escaped.

SERAPIAS CORDIGERA L. São Jorge.

HABENARIA MICRANTHA Hochst. São Jorge.

H. LONGIBRACTEATA Hochst. Pico. Only two plants seen.

HEDYCHIUM GARDNERIANUM Rosc. Pico, Fayal, São Jorge. A common escape in the lower parts of the forest.

P. 153. LUZULA PURPUREO-SPLENDENS Seubert. São Jorge.

L. MULTIFLORA DC. var. CONGESTA Lej. Pico, Terciera. Fairly common between 2000 and 3000 ft. on Pico. Watson's only specimen of "*L. campestris*" at Kew (from San Miguel) is too fragmentary to judge whether it is *L. multiflora* or true *L. campestris*.

JUNCUS EFFUSUS L. São Jorge.

P. 154. J. ACUTUS L. Pico, São Jorge.

J. MARITIMUS Lam. Pico.

J. TENUIS Willd. São Jorge.

J. BUFONIUS L. Pico, São Jorge.

P. 155. COLOCASIA ANTIQUORUM Schott. Pico.

P. 156. POTAMOGETON PUSILLUS L. São Jorge.

P. POLYGONIFOLIUS Pourr. São Jorge.

P. 157. CYPERUS ESCULENTUS L. São Jorge.

C. OVULARIS Torr. Pico. On top of a dry cliff at Lages and São Mattheus. An American species not previously recorded from the Azores.

SCIRPUS SETACEUS L. Pico.

S. SAVII S. & M. (*S. cernuus* Vahl). São Jorge.

P. 158. S. FLUITANS L. São Jorge.

ELEOCHARIS PALUSTRIS R. Br. São Jorge.

E. MULTICAULIS Dietr. São Jorge.

CAREX LEERSII F. Schultz. San Miguel.

C. AZORICA Gay. São Jorge. Differs from *C. pilulifera* in having the spikes crowded at the top of the stem, the utricle biconvex and not inflated, the beak shorter, and only two stigmas. Endemic in the Azores.

C. FLAVA L. São Jorge.

P. 159. C. HOCHSTETTERIANA Gay. São Jorge.

C. MURICATA L. var. DIVULSA Wahl. Pico (Watson).

C. PENDULA Huds. Pico.

C. PUNCTATA Gaud. var. LÆVICAULIS (Hochst.) Boott. São Jorge, San Miguel (Hunt). Differs from the type in having a longer break and the peduncles of the female spikes smooth. Endemic in the Azores (see *C. punctata* Gaud. in Trelease).

C. VULCANI Hochst. São Jorge, Flores (Watson).

P. 160. SETARIA GLAUCA Beauv. São Jorge.

ANTHOXANTHUM ODORATUM L. São Jorge.

P. 161. POLYPOGON MONSPELIENSIS Desf. São Jorge, San Miguel.

SOROBOLUS INDICUS R. Br. Pico, Fayal. Growing by roadsides. A widely distributed weed of warm climates, new to the Azores.

AGROSTIS. A careful examination has been made of the ample material lent by the Missouri Botanic Garden and the specimens in Herb. Cantab. These have also been compared with European, North African, and North American specimens. This has necessitated alterations in the identification of most of the species previously recorded.

A. VERTICILLATA Vill. The specimens described by Trelease as *A. verticillata*×*castellana* are *verticillata* with a rather lax panicle agreeing closely with a specimen from Texas (Lindheimer, 558). They differ from *A simensis* Hochst. (an Abyssinian species) in the blunter, more scabrid glumes and in the absence of the awn.

A. PALUSTRIS Huds. (*A. alba* of authors). This does not appear to occur in the Azores.

A. REUTERI Boiss. Flores (Watson, Trelease), Terciera (Hochstetter). Previously unrecorded from the islands, the specimens being labelled *A. alba*.

Agrostis azorica (Hochst.) Tutin & Warburg, comb. nov. (*Deyeuxia azorica* Hochst., *Calamagrostis azorica* Steud.). Corvo (Trelease), Flores (Watson), São Jorge, Terciera (Hochstetter), San Miguel (Hunt).

This is regarded as form *e* of *A. castellana* Boiss. & Reut. by Trelease, but differs in several characters.—Leaves setaceous, rarely flat, smooth, stems ascending, geniculate. Panicle thin and lax, generally contracted, light yellow-brown and shining when dry. Glumes acute, pales subequal, upper four-toothed, the outer teeth prolonged into short bristles, awn dorsal, slightly geniculate, slender, inserted near the base. Lower pale strongly notched. Callus scarcely bearded. Endemic in the Azores.

P. 161. **Agrostis azorica** (Hochst.) Tutin & Warburg var. nov. **rigidifolia** Tutin & Warburg.

A typo discedit :—caulibus floriferis sæpe cum ramis foliaceis circa medium ; foliis longis subglaucis rigidis plerumque pungentibus.

Typus in Herb. Hort. Bot. Missouri (Flores—Trelease, no. 1064).

Agrostis congestiflora Tutin & Warburg, nom. nov. (*Deyeuxia cæspitosa* Hochst. in Seubert, Fl. Azorica ; *Calamagrostis cæspitosa* Steud.). Pico.

We have also seen specimens from Corvo, Flores, Fayal, and San Miguel.—Leaves broad and flat, stems erect, densely cæspitose. Panicle dense, brown when dry. Glumes blunt, upper pale four-toothed, the two outer teeth longer than the inner, but not bristle-like, awn slightly geniculate, slender, dorsal, inserted about the middle, lower pale 2/3 upper, nearly entire. Rather smaller and stouter than *A. azorica*. The only grass occurring on the summit of Pico (7600 ft.). Endemic in the Azores. The name *A. cæspitosa* is already occupied.

P. 162. A. CASTELLANA Boiss. & Reut. Pico, San Miguel (Hunt). Leaves broad, stems erect not cæspitose. Panicle spreading, 2 or 3 times as large as in *A. azorica* or *A. congestiflora*. Glumes acute, subequal. Pales very unequal, the lower with two small points and the upper ending in two bristles with a strongly geniculate dorsal awn. Callus strongly bearded. Generally a much larger plant than the two previous species.

Agrostis acutiglumis Tutin & Warburg, sp. nov. Pico, San Miguel (Hunt).

Habitus *Agrostidis caninæ*. *Folia* setacea levia ; ligula acuta 2–4 mm. longa. *Caules* erecti aut ascendentes 10–20 cm. alti. *Panicula* nec patens nec contracta 4–7 cm. longa, ramis brevibus. Spiculæ 2–2·5 mm. longæ. *Glumæ* subæquales fuscæ glabræ acutæ, carina serrata. *Palea* inferior tertia parte brevior quam glumæ, apice inciso aut dentato. Arista dorsalis, valde geniculata, circa medium inserta. *Palea* superior dimidio minor quam inferior late truncata. Callus barbatus.

Typus in Herb. Cantab. Pico (Tutin & Warburg). Ab *A. canina* cui facies similis est, duabus paleis discedit. Ab *A. congestiflora* glumis acutis foliis setaceis panicula laxiore. Ab *A. azorica* palea superiore truncata non valde incisa palea inferiore incisa non quadridentata bimucronataque. Ab *A. olivetorum* Godr. & Gren. statura minore, foliis setaceis, panicula breviore minus ramosa, arista longa geniculata discedit.

P. 163. GASTRIDIUM AUSTRALE Beauv. São Jorge.

LAGURUS OVATUS L. São Jorge.

HOLCUS LANATUS L. São Jorge.

P. 164. DESCHAMPSIA FOLIOSA Hack. Pico.

AVENA STERILIS L. Fayal (Watson), San Miguel (Hunt). All the specimens in the Cambridge Herbarium belong to this species, not to *A. barbata* Brot. The hairs on the flowers are orange, not white, and the two uppermost flowers in each spikelet are awnless.

ARRHENATHERUM ELATIUS Mert. & Koch (*A. avenaceum* Pal. Beauv.). São Jorge.

GAUDINIA GEMINIFLORA Gay. São Jorge, Fayal (Watson), San Miguel (Hunt).

Differs from *G. fragilis* Beauv. in its stouter more leafy flower spikes, in having the spikelets in pairs instead of solitary and in being much more pubescent. We have seen no specimens of *G. fragilis* from the Azores.

P. 165. CYNODON DACTYLON Pers. Pico.

P. 166. BRIZA MAXIMA L. São Jorge.

B. MINOR L. São Jorge.

CYNOSURUS CRISTATUS L. São Jorge.

POA TRIVIALIS L. Terciera.

P. pratensis L. does not appear to occur in the Azores. Many specimens of *Poa* were examined, but they all proved to be *P. trivialis*.

P. 167. FESTUCA BROMOIDES L. São Jorge, Fayal (Watson), Pico (Watson).

F. sciuroides Roth is generally considered to be a synonym of this, and from the original descriptions it does not seem possible to separate the two, as is done by Trelease.

F. PETRÆA Guthn. Pico, São Jorge, Fayal.

P. 168. LOLIUM PERENNE L. São Jorge.

P. 169. L. REMOTUM Schrank. Pico. New to the Azores.

HORDEUM MURINUM L. Pico.

JUNIPERUS BREVIFOLIA Antoine. São Jorge.

P. 170. HYMENOPHYLLUM UNILATERALE Bory. Pico.

TRICHOMANES SPECIOSUM Willd. São Jorge, locally in great abundance in hedge-banks at about 1500 ft.

P. 171. PTERIS ARGUTA Ait. São Jorge.

P. LONGIFOLIA L. San Miguel. New to the Azores. Perhaps escaped from cultivation.

PTERIDIUM AQUILINUM (L.) Kuhn. São Jorge.

BLECHNUM SPICANT (L.) With. São Jorge.

P. 172. ASPLENIUM MARINUM L. São Jorge.

A. LANCEOLATUM Huds. Pico.

P. 173. POLYSTICHUM FALCATUM (L. fil.) Diels. Fayal. Escaped from cultivation.

P. ACULEATUM (L.) Schott. Pico.

P. 174. DRYOPTERIS FILIX-MAS (L.) Schott. Pico.

D. SPINULOSA (Müll.) O. Ktze. Pico.

D. ÆMULA (Ait.) O. Ktze. São Jorge.

—— —— var. PRODUCTUM Lowe. San Miguel (T. C. Hunt).

POLYPODIUM VULGARE L. São Jorge.

P. 175. OSMUNDA REGALIS L. Pico, São Jorge.

CHEILANTHES FRAGRANS Webb & Bert. Pico. New to the Azores.

OPHIOGLOSSUM VULGATUM L. var. POLYPHYLLUM Wilde. Flores (H. C. Watson). Erroneously called *O. vulgatum* by Trelease.

O. LUSITANICUM L. San Miguel (T. C. Hunt). Erroneously called *O. vulgatum* var. *polyphyllum* by Trelease.

BOTRYCHIUM LUNARIA L. Pico. New to the Azores.

P. 176. LYCOPODIUM COMPLANATUM L. Pico.

L. SELAGO var. SUBERECTUM Bak. São Jorge.

P. 177. SELAGINELLA AZORICA Bak. Fayal, Pico.

P. 197. TRENTEPOHLIA AUREA Mart. Pico, São Jorge, Terciera. Particularly abundant on the bark of *Pittosporum*.

P. 207. MELAMPSORA EUPHORBIÆ Cast. on *Euphorbia azorica*. Pico. Now to the Azores.

PUCCINIA EPILOBII DC. on *Epilobium obscurum*. Pico. Now to the Azores.

P. MALVACEARUM Mont. Pico.

PHRAGMIDIUM VIOLACEUM Wint. Pico.

PUCCINIA CORONATA Corda ? on *Rhamnus latifolia*. Pico. Now to the Azores. Only the æcidial stage was found.

All the Rusts were determined by Miss Wakefield.

NILLU (*STROBILANTHES*).

By W. G. ADAM (Honorary Warden, Horton Plains Hunting Reserve, Ceylon.)

TAKING the Up-country jungles of Ceylon as a whole, they afford little pleasure to a lover of flowers; but no more magnificent blaze of colour can be seen than when—at stated intervals—the Nillu is in flower.

The varieties of Nillu are many, both in appearance, colour, shape of blossom, and growth; though nearly all are alike in the peculiarity that they flower once only in approximately twelve years. There is a mistaken belief that the flowering takes place every six years; which is caused by the fact that there are two main distinct growths of the plant in the same districts, and often in the same jungles, though in different areas. Hence, one grows and blossoms roughly six years after the other.

When Nillu has flowered, seeded, withered, and fallen, the jungle presents a desolate and half-felled appearance, nothing being left but the forest-trees and bamboo-scrub; so, until the young Nillu plants begin to shoot up again, there is little shelter for larger wild animals. Eighteen months after the Nillu seed has fallen, the seedlings show a growth of about three inches. At two and a half years, they will be eighteen inches high—and so on, until at ten years they attain their full height of eight to twelve feet. They now thicken and branch out towards the tops, for, up to that time, they will have been thin, pithy, and single-stemmed.

The first definite sign of the flowering season is the appearance of thousands of small "ground bees," which riddle the jungle-paths with underground workings in preparation for the coming honey. (This fact has not apparently been noted previously.

Local information cannot name the insects, nor will any specimens be available until the next flowering season.) This occurs in April, or some three months before the flowering begins. In the following July, the Tree-Nillu (*Strobilanthes sexennis* Nees) comes into flower, when the whole jungle turns blue with its small Canterbury-bell-like blossom. Later, the two creeping varieties, yellow and white (*S. calycinus* Nees and *S. Hookeri* Nees) vary the colour-scheme with flowers that resemble Hops. A further fortnight or so elapses before the White Bush-Nillu (*S. viscosus* And.) and the Purple Bush-Nillu (*S. pulcherrimus* And.) come into bloom. The last-named has differently shaped flowers to any of the former, somewhat resembling *Coleus malabaricus* var. *leptostachys* Hook. f., or a kind of giant nettle.

When Tree-Nillu alone is in flower, the jungle assumes the appearance of a vast garden, while, from a distance, a blue haze seems to envelop everything. The white and yellow creepers add a beautiful contrast to this; but, when the purple and white bushes come on, intermingling their colours with the others, the blaze of variegated blossom is too grandly magnificent for description. It is safe to say that no square foot of undergrowth is without at least half a dozen flowers, no three of which will be alike.

As soon as the flowering begins, millions of bees and hornets invade the jungles, seeking honey, and care has to be exercised in walking along the paths for the whole three months of blossoming. Dozens of villagers follow the bees, many of whom travel great distances and camp in the jungle for weeks to take the honey-crop. They are perfectly fearless in their methods of collecting it, and care little for stings so long as the harvest is satisfactory. While the bees are in the jungle, wild animals retire to those portions where there is no Nillu. Pigs are the first to return, to feast on the remains of fallen honey-comb; they also root out the little combs of the tiny "ground-bee"-like insect before mentioned. An occasional bear comes up from the Low-country to participate in the honey-harvest, but this is rare, and they are merely stragglers.

Following the fall of seed, come hundreds of jungle-fowl and pigeons, which can be shot on the paths easily with a pea-rifle. Later, rats come in millions, and gorge themselves to such an extent that they can be trodden upon. The latter have a particular liking for fermented seed, late in the seeding-time, which hopelessly intoxicates them. Death follows this over-indulgence, and their swollen, rotting bodies disfigure the open spaces in scores, smelling like the refuse of a brewery.

Nillu is an exceedingly adaptable and determinedly growing plant. Seed dropped in a certain year will flower correctly to time, irrespective of what has happened during its growth. On path-edges, where the plants are constantly cut back, eaten

down, or trampled upon, they will flower in a dwarf form at the same time as their fully grown brothers. Nillu prefers heavy shade under forest-trees, but, if the jungle has been felled, unless this self-accommodating plant has been thoroughly eradicated, it will grow into stunted bushes and still flower to time, though the colours are modified. In one ten acres of semi-cleared land, the writer has noted blue, white, pink, pale mauve, and deep purple flowering bushes. All resembled the White Bush-Nillu of the jungle in leaf, stem, and general aspect of flower, though the shape of the actual flowers took after the Blue Tree type. That particular jungle was felled just after a previous seeding of Blue Tree-Nillu, from whose seeds these variegated bushes seem to have grown, for there were none to fall from any other description but the creeping sorts. It was not possible to have the bushes identified at the last flowering, nor will it be so for a further four years when others under like circumstances will be available.

Young Blue Tree-Nillu is eaten sparingly by most jungle-animals, and, when full-grown, affords excellent shelter for the larger ones amongst its straight thin stems. It breaks readily, allowing easier progression than seems possible through it, even though the plants grow about six to the square foot. Nillu sap is highly poisonous to open wounds as a general rule. White Bush-Nillu is also eaten, but as it only appears on path-edges and dry spots it does not come largely into the diet of any beast. Purple Nillu is very common, and seems to be more succulent than any other, growing as it does in damper soil. The creeping varieties are only eaten very sparingly, if at all. A jungle in which they prosper is almost impossible to get through; even the worst thorns and bamboo are child's play as compared with its intertwined growth. It is generally found on the lower slopes of a hill-side, and few animals will live amongst it but barking-deer, mouse-deer, or an occasional pig.

There are reputed to be some twenty-eight varieties of Nillu, but, to the ordinary observer, those mentioned cover the necessary ground.

[An account of the flowering of *Strobilanthes* in Ceylon is given by T. Petch in the 'Annals of the Royal Botanic Gardens, Peradeniya,' ix. pp. 110–117 (1924).—Ed. Journ. Bot.]

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

New Lichens.

Arctomia muscicola A. L. Smith, sp. nov. *Thallus* gelatinosus acervatus, olivaceo-brunneus, acervulis 4–5 mm. latis, arcte adhærentibus, isidiosis globulis obsitis; stratum corticale

parenchymaticum, e serie simplice cellularum compositum; hyphæ medullæ gracilis, c. 2 μ crassæ; gonidia nostocacea cellulis subglobosis, c. 4–5 μ longis, moniliforme concatenatis. *Apothecia* rara, aut sat crebra ad 2·5 mm. lata, superposita dein immersa, disco rufo margine integro tenue; paraphyses gracilis, c. 3 μ crassæ; *asci* clavati c. 140 $\mu \times 20\,\mu$; sporæ octonæ, elongatæ, multiseptatæ (c. 10-septatæ) leniter curvulæ, utrinque attenuatæ c. 90 $\mu \times 7\,\mu$.

Hab. Ad corticem vel ad lignum vetustum super muscineas et super *Hymenophyllum*. Coll. G. Taylor, below Devil's Kantoor, Kaapsche Hoop, N. Transvaal; Jan 1, 1927.

A first record of the genus *Arctomia* for the Southern Hemisphere. It was found on dense patches on an undergrowth of mosses or more particularly on the plants of *Hymenophyllum*. It swells up when moist and dries to a dull olivaceous green with prominent crowded isidia.

Pertusaria multipuncta var. **macrospora** A. L. Smith, var. nov. Omnia ut in planta typica; thallus $k+y$ dein rubescens; *sporæ* majores usque ad 315 $\mu \times 65\,\mu$.

Hab. Ad corticem. Moidart, Invernessshire. Leg. W. West, Aug. 1907.

The specimen was included in a parcel of unnamed lichens sent to me by the late William West. It differs from the species in the much larger spores.

A. Lorrain Smith.

SHORT NOTES.

Experimental Delimitation of Species.—Dr. J. W. Gregor ('New Phytologist,' xxx. 204–217, 1931) gives an account of the results of genetical and cytological work on *Phleum pratense-alpinum* based on the ideas of Turesson, preceded and followed by criticisms of ordinary taxonomy. It appears that in addition to *P. pratense* (diploid: chromosomes, $2n=14$) there is a hexaploid plant like it, and these two are intersterile. There is *P. alpinum* (diploid: Continental) and also a tetraploid British "*P. alpinum*" ($2n=28$), and by using this latter as a bridging species it has been found possible to produce fertile intermating of all.

Of the paper one may say that, although it is a pity that some taxonomists have an insufficient knowledge of modern genetics and cytology, it is at least equally to be regretted that some geneticists have no knowledge of taxonomy. The author's statement that "a system of classification based entirely on morphological distinctions and resemblances cannot do much more than supply to its smaller units an appelation of little

or no evolutionary significance" will seem absurd to the really capable taxonomist, who from his knowledge of genetics could often predict many genetical factors within a group from a study of wild populations alone. The author forgets that apart from morphological characters there would be no genetics, for the geneticist is only formulating theoretical explanations of an observed morphological succession. The author needs to think in terms of the realities behind words. The Scotch universities generally supply a philosophic basis, which seems to be lacking in this theoretical paper. After reading it, *P. alpinum* remains an entity morphologically, distributionally, and historically distinct from *P. pratense* and from the hexaploid species which the author also identifies (? rightly) as *P. pratense*. Even if our tetraploid *P. alpinum* proves to be distinct from the Continental species, and all sorts of hybrids can be manufactured, these natural groups still exist, and I fail to see the clarification in evolutionary significance produced by the invention of a "cœnospecies *P. pratense-alpinum*." It is time that the results of Baur's work with *Antirrhinum majus* and *A. molle* were recognised as completely destructive of the sterility test for species.

All good taxonomists are anxious to use genetical, cytological, and ecological knowledge, but geneticists and cytologists have in the past been so content to work with garden material of unknown origin that to the taxonomist the results are of but slight value or utterly worthless. Certainly there is poor taxonomic work, but a comparison of the chromosome numbers as given by various workers affords at least as great diversity of opinion as any found in taxonomy. Only when geneticists and cytologists are also competent taxonomists shall we obtain useful results and good progress. Fortunately, this is now more generally recognised than formerly.—A. J. Wilmott.

A Climbing Form of Calystegia Soldanella.—Most of the text-books are definite in asserting that the Sea Bindweed shows no propensity to climb in the manner characteristic of its allies. For instance, Babington says, "stem short, procumbent"; Hooker, "never twining"; Syme, "stem not climbing or twisted upon itself"; Coste, "tiges couchées-rampantes, non volubles"; Hegi, "Stengel niederliegend, an der Spitze aufsteigend." Bentham and Hooker are exceptional in saying "stem short, prostrate and scarcely twining." It may be of interest to record the occurrence of a definitely climbing form on the east coast of Ireland, where it has been found by A. W. Stelfox of the Irish National Museum. In this form, of which I have seen abundant material, the stem is 1½–2½ feet long, and climbs freely up the stems of neighbouring plants (chiefly *Ammophila*) making about four to six convolutions and thus rising 1–1½ foot above the ground. On sand-hills at Kilgorman, N.E. of Tara Hill, Co. Wexford, this form is abundant to the exclusion of the type, and Mr. Stelfox says that a tendency to the development of spiral climbing stems may be noted in the species all along the neighbouring coast. The direction of the spiral is clockwise, as in *Calystegia sepium* and *Convolvulus arvensis*. Save for its peculiar habit and elongation of stem, the climbing form is typical, displaying no approach to its climbing allies, so that the suggestion of hybridity appears excluded. It may be known as f. *volubilis*. This would seem to be an interesting instance of the revival of an ancestral trait.—R. Lloyd Praeger.

Asplenium lanceolatum Huds. in Yorkshire.—On September 10, 1928, I saw this form growing on the masonry of a railway-arch near Goathland, North Yorks, together with *Cystopteris fragilis* Bernh. (*Journal of Botany*, 1929, 155). There is a specimen of this *Asplenium* in the British Museum Herbarium from S.W. Yorks and 'The Botanist's Guide' (1805) gives one locality for it in the north-west of the county. With these exceptions, I can find no record from Yorkshire. The railway-arch is about eight miles from the nearest point of the sea-coast.—F. Druce.

Oak and Beech Ferns at Whipsnade.—A letter from Mr. Melson Godfrey of Luton appeared in the 'News Chronicle' of August 28 last, reporting the oak and beech ferns, amongst other things, in the above locality. Can any local botanist confirm this, or was the correspondent mistaken in his identification?—C. Nicholson.

Sagina filicaulis Jord. in South Hampshire.—On July 30, 1929, I picked on an old wall at Milford-on-Sea, South Hampshire, a *Sagina* which the late C. E. Salmon determined as *S. filicaulis* Jordan. This is, I believe, a new record for vice-county 11.—I. A. Williams.

Echinops sphærocephalus L. in Kent.—On October 31st, 1931, I found *Echinops sphærocephalus* L. near Aylesford in Kent. The plant was growing in hundreds among hawthorn bushes etc. on some rough uncultivated ground adjoining a gravel-pit, and covered certainly a quarter of an acre—probably more. It also went down into the gravel-pit itself and down a bushy bank, and there was a small outlying patch some two hundred yards away, fairly near the bank of a backwater of the River Medway. One small cottage was in the neighbourhood, but the *Echinops*, though doubtless an introduction, had no appearance of being a garden outcast in this locality.

E. sphærocephalus is not recorded in Dunn's 'Alien Flora,' and in Dr. G. C. Druce's 'British Plant List,' 2nd edition, 1928,

it is only given in unstarred italics as " more or less adventive " and not naturalised. In the Aylesford locality, however, it has every appearance of being thoroughly established, and probably spreading.

Two previous records of this plant becoming established in Britain are known to me. On the 15th June, 1909, the Rev. H. J. Riddelsdell, when in the company of W. A. Shoolbred, found the plant at Beachley, Gloucestershire. Mr. Riddelsdell tells me that there were then three or four specimens (he believes) of the plant, which grew close under the cliffs by the margin of the Severn, and " by 1911 it had got tight hold and was well established, as Shoolbred told me." Mr. Riddelsdell's find was recorded in the *Journal of Botany*, 1911, 255, and elsewhere.

The other locality is at Winspit, near Swanage, where Mr. H. W. Pugsley tells me that he found *E. sphærocephalus* " naturalised in an old quarry " in August 1912. He does not, however, know whether it still persists there.

It seems clear, therefore, that this species readily establishes itself in Britain, and may well become a fully naturalised alien.

Specimens from the Beachley and Aylesford localities are in the British Museum Herbarium. Mr. Francis Druce was with me when the *Echinops* was found at Aylesford.—I. A. Williams.

Veronica Anagallis L. × Veronica aquatica Bernh.—In the *Journal of Botany*, 1929, 23, I recorded a hybrid of *Veronica Anagallis* L. and *V. aquatica* Bernh. which I found growing near Tring. In July 1929 I found a patch of very large plants of a blue-flowered *Veronica* of this group growing in water several inches deep in a ditch in the Port Meadow, Oxford. These plants were quite barren (forming no capsules) and I suspected them of being hybrids, though the presumable parents were not growing within twenty or thirty yards of them, so far as I could see. In July 1930, however, I found another patch of blue-flowered, extremely floriferous, rather small and quite barren plants, growing on a dried-up, gravelly stream-bed, at Wolvercot, near Oxford. These plants were growing among a plentiful mixed crop of *V. Anagallis* and *V. aquatica*, and were almost certainly hybrids. I have searched for this hybrid in several places where the two plants occur, but only in the two (or possibly three) instances recorded have I succeeded in finding it. I imagine, therefore, that the cross is not a very common one, for the two species frequently grow together.—I. A. Williams.

Vicia cassubica L. in Britain.—When in the vicinity of Greenhithe (Kent) on June 24, 1931, I saw this vetch growing strongly in two places in a worked-out gravel-pit on the chalk. I can find no previous record of the plant having been seen in this country. There are no British specimens in either the British

Museum or Kew Herbaria. Mr. A. J. Wilmott has kindly supplied the following particulars of the somewhat peculiar general distribution of the plant abroad. The distribution is wide in Central Europe, and the plant is scattered over Southern Scandinavia, Denmark, and many parts of Germany. It is recorded for Holland, though not for Belgium, north-western Germany, Alsace Lorraine, nor for south-western Germany, Switzerland, or any part of the Alpine massif proper. It occurs in many parts of Austria-Hungary, through the Southern Tirol to Italy, reaching Sicily. It is also widespread in the Balkan Peninsula, and reaches eastward to Central and Southern Russia, Asia Minor, Syria, and the Caucasus. There is an isolated record for Spain in a locality in the Sierra Quadarrama; but in western Central France the species appears to be wild over a considerable area of the calcareous hills.—F. Druce.

REVIEWS.

Flora of Surrey. By Charles Edgar Salmon, F.L.S. Illustrated with coloured Maps (Botanical and Geological) and Photographs of typical Plant-associations. 8vo, pp. 688. G. Bell & Sons: London, 1931. Price £2 2*s*.

The publication of this long-expected Flora will be heartily welcomed by students of British botany, representing as it does one of the most complete and informative of all our county Floras, and one which might well be taken as a model for works of the kind.

It is forty-eight years since that excellent critical botanist, the late W. H. Beeby, started to collect material for a new 'Flora of Surrey.' At the time, Beeby was living in London, and was actively engaged in business, but found opportunity to explore practically the whole of the county, and to amass a large number of plant-records, as will be seen from the frequent recurrence throughout the flora of the capital letter B., which indicates those records for which he was responsible. In 1886 Beeby visited the Shetlands, and was much interested in the plant-life of those islands. As time went on he was more and more absorbed in an intensive study of the Shetland flora, until it became the main object of his botanical work, and he decided to place the further compilation of the Surrey Flora in other hands.

He could not have been more fortunate in the choice of a successor, for no one was more fitted for the task than the late Charles Edgar Salmon, to whom he handed over the notes he had collected. Salmon was a native and lifelong resident in the county, and from boyhood, we are told, was interested in the plants of his neighbourhood. The situation of his home

(Reigate), in the heart of its eastern half, made it comparatively easy to reach most parts of the county. He had a good critical knowledge of the British Flowering Plants, coupled with a well-balanced judgment, so essential in protecting its possessor, on the one hand, from a too meticulous attention to trivial differences, and, on the other, from a disregard of important points of variation. He had, moreover, in a rare degree, that gift of tactful sympathy which ensures the ready co-operation of other workers. Salmon's time, however, was much engrossed by the claims of his profession, that of an architect, to which he was greatly devoted, and in which he was very successful. He had, too, other interests in life, and could not spare as much time as he would have liked to the Surrey Flora. More than three-quarters of the book had been completed, and the text, up to page 550, had actually been printed, when the work was cut short by the untimely death of the author on New Year's Day 1930. This sad event deprived us of one of the most amiable and most efficient of the small band of first-rate amateur British botanists.

It is always a difficult and somewhat thankless task to attempt to finish off a book which has been interrupted by the death of its author, unless, as rarely happens, one has been working for some time in close association with him. It was not easy to find a botanist at once competent and willing, and having the requisite leisure, to complete the Flora, and we must feel very grateful to Mr. W. H. Pearsall for stepping into the breach, and rendering it possible to publish the book. At the same time one cannot help a feeling of regret that the latter portion of the Flora could not have been carried out on the same scale as the rest of the book. One misses the wealth of critical notes of Salmon's work—this was, of course, unavoidable,—but the portion relating to the Monocotyledons seems to have been rather unduly curtailed. Mr. Pearsall explains the omission of some old records from the latter part as follows :—" It appeared to us pointless to occupy increasingly valuable and limited space by the reprinting of so many names of plant-stations which have long ceased to exist as such." This is, of course, the modern utilitarian view, with which the present reviewer is not in sympathy, perhaps from belonging to an older generation, with a greater veneration for the past.

Surrey, from its proximity to London and the attractiveness of its scenery, has become to a great extent a residential area, with the inevitable result that open spaces and other suitable habitats for wild plants are always in course of destruction owing to building operations, road " improvements," and municipal tidyings-up, so that a record of its native flora must be largely a matter of history rather than present fact.

The Flora is well set-out and well printed. The type is perhaps

rather small, but to have used larger founts would have made the book unwieldy. There are four excellent preliminary chapters, the first two dealing with the topography and climate of the county by Mr. W. F. Taylor, the third a very full account of its geology by Miss Margaret Crosfield, the fourth an " Outline History of Botany in Surrey " from the pen of the late Prof. G. S. Boulger, an admirable and exhaustive account of those, including some of the most illustrious British botanists, who have in one way or another been connected with Surrey botany. The pleasing portrait of the author, which appeared in this *Journal* for February 1930, forms an appropriate frontispiece, and there are eight full-page plates reproducing beautiful photographs of some of the most interesting spots in the county, and illustrating different types of habitat. These clear, well-chosen pictures present a marked contrast to so many of the " ecological " photographs, which tell us next to nothing ! Salmon never gave much attention to the large genera, *Rubus* and *Rosa*, and in connection with the former he acknowledges the help of, among others, the Rev. H. J. Riddelsdell, who overhauled the records, while the latter is dealt with in an appendix, by Lt.-Col. A. H. Wolley-Dod, entitled " Revision of the Genus *Rosa*."

The statement on the title-page " Edited by William Harrison Pearsall " is rather misleading. The word " completed " should surely have been used rather than " edited." One can scarcely be said to edit a book when the plan of it is complete and three-quarters of it are already printed.

The predecessor of the present work, Brewer's ' Flora of Surrey,' was published in 1863. A comparison of the two Floras affords an excellent index to the immense advance which has taken place in British botany within the last seventy years. The earlier work, though not below the standard of its time, consists of little more than the dry bones of plant-names and localities, while Salmon's ' Flora,' besides being much more complete as regards habitats and detailed distribution of the species, has on almost every page some note of general interest or some critical observation throwing light on lines of variation. British botany in these days is not nearly so arid a subject as it was presented to us three generations ago !

In Brewer's ' Flora ' the county was divided artificially into nine more or less equal districts, defined by well-marked boundaries. In the present work the more modern plan of separation into river-basins is adopted. Though there is a little doubt that the latter is the best method in dealing with the floras of continents, or large countries, where there are river-systems separated by well-defined mountain or hill ranges, it is a moot point whether it is equally desirable in the case of small areas like the county of Surrey, where almost the whole of it is drained by small

tributaries of the one river, the catchment basins of which are not separated by any high land. From the point of view of the distribution of species in such an area, probably divisions on geological lines would be more satisfactory.—JAMES GROVES.

International Address Book of Botanists. A Directory of Individuals and Scientific Institutions, Universities, Societies, etc., in all Parts of the World interested in the Study of Botany. 8vo, pp. xv, 605. Published for the Bentham Trustees by Baillière, Tindall & Cox: London, 1931. Price 12*s.* 6*d.*

AN International Address Book of Botanists has long been a desideratum. Dörfler's comprehensive "Botaniker-Adressbuch," the third edition of which appeared in 1909, has long been out of date, and the members of the Fifth International Congress of 1930, impressed with the need of an up-to-date directory, passed a resolution recommending its compilation, and appointed a Committee to arrange for its preparation and publication. The Committee consisted of Dr. T. F. Chipp of the Royal Botanic Gardens, Kew, Dr. L. Diels, Director of the Berlin-Dahlem Botanic Garden and Museum, and Dr. E. D. Merrill, Director-in-Chief of the New York Botanical Garden. The Preface, signed by Dr. Diels and Dr. Merrill, records the tragically sudden death of their colleague, "who had shouldered so much of the responsibility" of the work, after the Preface had been drawn up and on the eve of the publication of the MS.

The Preface, which describes the plan of the work, is repeated in English, French, and German, as is also the Index of Countries. The arrangement is by countries, alphabetically, and the entries under each country are, so far as practicable, in the language of the country, in Roman script. These entries include: (*a*) societies with their postal adresses; (*b*) institutions wholly or chiefly botanical, their addresses and departments, and educational institutions having separate botanical departments; (*c*) names of botanists, professional and amateur, their offices and qualifications, their postal addresses and special botanical interests. At the end of the book there is an index of persons.

The Committee record their appreciation of the assistance of the collaborators who have collected information for their respective countries. A grant from the Carnegie Corporation of New York and a loan from the Bentham Trustees has made it possible to publish the book at a relatively low price.

The Directory is closely but clearly printed—there is no waste of space—at a rough computation there are nearly 3000 personal entries. The collection of the material in the different countries was not an easy task, and the definition of a botanist has not been everywhere uniform. It would therefore scarcely be fair to estimate the botanical activities of a country by the number of

pages devoted to it in the Address Book. But a comparison is of some interest. The United States of America heads the list with 148 pages, next is the U.S.S.R. with 60 pages, Great Britain with North Ireland occupies 41, Germany 40, and France 20. The "special botanical interests" are very various; they are presumably entered as supplied by the individual, hence there is some lack of uniformity in expression—Filices, Pteridophyta, Pteridophytes, and Pteridology probably indicate synonymous interests.

There are certain to be omissions, doubtless due in part to lack of response by individuals: a few occur to us on looking through the list, and a correspondent writes to deprecate the omission of the National Museum, Cardiff, and University College, Leicester, both of which have separate Departments of Botany as indicated in the personal directory under the name of the responsible official. But, remembering the vast amount of work, largely pure drudgery, involved in the accumulation of so much information, which will save endless time and labour for all who call themselves botanists, we can only heartily thank the two surviving editors and their numerous collaborators, and recall once again with regret the untimely death of him who, in addition to his onerous official duties, willingly shouldered so much of the responsibility of the preparation of the work.—A. B. R.

Plant Physiology, with reference to the Green Plant. By EDWIN C. MILLER, Ph.D. 8vo, pp. xxiv, 900; 38 text-figs. McGraw-Hill Publishing Co., Ltd.: London, 1931. Price 35*s.*

THE object of Professor Miller's work is to provide an advanced text-book of plant physiology, which shall "summarize the more important findings of English, American, and Continental plant physiologists." Judged on his intention, the author has achieved no small measure of success: very many important investigations are summarized, but several, more particularly European, are omitted. In a work of this size omissions are inevitable for a limiting date must be set, but even so it is a little surprising that work on limiting factors, oxidative mechanisms, and other matters of import, of dates which fall within the author's purview are not recorded. On the other hand, much American work, which will be new to many European workers, is included, and this is a compensation. Further, the title of the work is 'Plant Physiology'; a better title would have been the 'Physiology of the Metabolic Processes of the Green Plant,' for nothing is said about all those phenomena included under the word irritability.

The book is divided into fourteen chapters, the first of which

deals with the cell, and the rest follow in a natural sequence, considering solutions and membranes, the root system, the uptake of water and salts, transpiration, the various metabolic processes, and, finally, growth. At the end of each chapter there are a number of questions on the subject-matter, a novelty in an advanced text-book, and a comprehensive bibliography. The reader is helped on his way by an excellent table of contents and by an author- and a subject-index.

The book is simply and clearly written, and it is obvious that great care has been taken not only in its preparation but also in its passage through the press, for the number of misprints is surprisingly few. The work is not the ideal text-book of plant physiology for which we all are looking and hoping that the other fellow will undertake, but it does go a long way in supplying the needs of the advanced student of botany, and for this our thanks are due to the author.—T. G. HILL.

Students' Illustrated Irish Flora.

WE are asked by the author to publish the following comments on the review of this book which appeared in the *Journal* of last August :—

" A few words of explanation and comment seem to be necessary. The reviewer appears to think that students are more likely to be confused than helped by the arrangement adopted. On this question opinions may differ. The main object of the book is to point out the chief morphological characters of the genera, to provide an easy method of identifying the commoner species, and at the same time to show in some measure how they are related to their environment. The chief desideratum is to get the student interested in the study of the wild plants. If this object is attained, he will probably pass on to the more critical study of the plants as described in one of the regular floras. Even if he proceeds no further he will at least have succeeded in emancipating himself from the ' Peter Bell ' type of mentality.

" A good deal of the criticism of the book represents merely a difference of opinion. There is nothing contradictory in the statement that '*Fumaria capreolata* is a climbing plant, while *F. officinalis* is a herb with alternate leaves.' The statement that ' such useful information as group or chapter number is omitted from the page-headings " is incorrect, as far as the names of the groups and families are concerned. The reason why the distinctive characters of the larger families are not given is that the student is assumed to have studied some elementary work on Botany in which the classification of the more important families is given."—J. ADAMS, Ottawa.

Practical Botany for Medical, Pharmaceutical, and other Students. By JAMES SMALL, D.Sc., Professor of Botany in the Queen's University of Belfast. Sm. 8vo, pp. viii, 320; 35 figs. Churchill : London, 1931. Price 10*s.* 6*d.*

THIS book is designed for use in conjunction with the author's ' Text-book of Botany ' (the second edition of which was noticed in this Journal in 1929, p. 263), " as a practical supplement and general guide to the exercises in observation, experiment, and investigation which usually accompany the study of general principles of which these exercises provide particular examples." In his text-book Prof. Small contrived to compress a very great deal of information into a comparatively small space, and the same may be said of the present volume, which follows the text-book chapter by chapter, giving detailed directions for a large number of experiments and indicating carefully the points which the student should observe. An obvious criticism would be that not enough opportunity is given to stimulate the student's own powers of observation. " Observe carefully and thoughtfully that the lamina is *broad* and *flat* and *thin* and *green* " leaves little to the student's initiative in observing the general characteristics of an ordinary leaf-blade.

Plant Hunting in the Wilds. By Capt. F. KINGDON-WARD, B.A., F.R.G.S. 8vo, pp. 79; 8 pls. Figurehead (Pioneer Series) : Adelphi, London, 1931. Price 2*s.* 6*d.*

IN this attractively produced little volume in which botany takes second place, the writer describes his adventures on some of his perilous journeys in the wilder regions of mountain Asia in search of new plants to enrich our gardens. The reader will be able to picture the general characters of the country and its vegetation and some of the manners and customs of its people from the four chapters entitled, respectively, " Guests of a Tibetan Potentate," " First through the Tsangpo Gorges," " Risky Hunting for the Rare Flower "—Rhododendrons, Primulas, etc., in the Mishmi Hills,—and " Rafting through Indo-China." Capt. Kingdon-Ward wields a fluent pen and has a pleasant style, and his description is illustrated by eight half-tone reproductions of his own photographs.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on January 7, Mr. I. H. Burkill gave an account of an experiment on the polarity of the tuber of *Tamus communis* L. When the seed germinates the cotyledon pushes out the young plant, and from the opposite side of the stem a swelling arises which grows vertically downwards and forms the characteristic perennial tuber. In many tropical species of the allied genus *Dioscorea* the

cotyledon functions in the same way, and a similar swelling acquires a vertical axis and forms an annual tuber. Each year from the upper part of the old tuber a new shoot arises and a basal swelling forms a new tuber by the side of the old one. The shoot and roots die at the end of the season of growth. But in temperate regions, as if the cost of such a complete renewal were too high, a perennial tuber is formed in species of *Dioscorea* as in *Tamus*. This perennial tuber has a symmetry which circumnutates in the same direction as the above-ground stem and increases in girth and length. Small tubers were variously mutilated and then planted horizontally instead of vertically. They showed that the tuber is much more prone to send out a shoot from the head-end than from lower down, and to produce new storage-tissue from the lower than from the higher parts ; broken tubers placed horizontally send out storage-lobes from nowhere but from the lower surface. In a previous experiment tubers of *Dioscorea alata* L. were cut transversely into sections and planted in rows in the order of their cutting from the head to the tip of the tuber. The head threw up a new shoot first and the tip last, thus indicating a distinct polarity, as in the tubers of *Tamus*. The tuber of *Tamus* is exceptional among Monocotyledons in having secondary thickening ; the regeneration above described indicates the advantage of this secondary zone of growth.

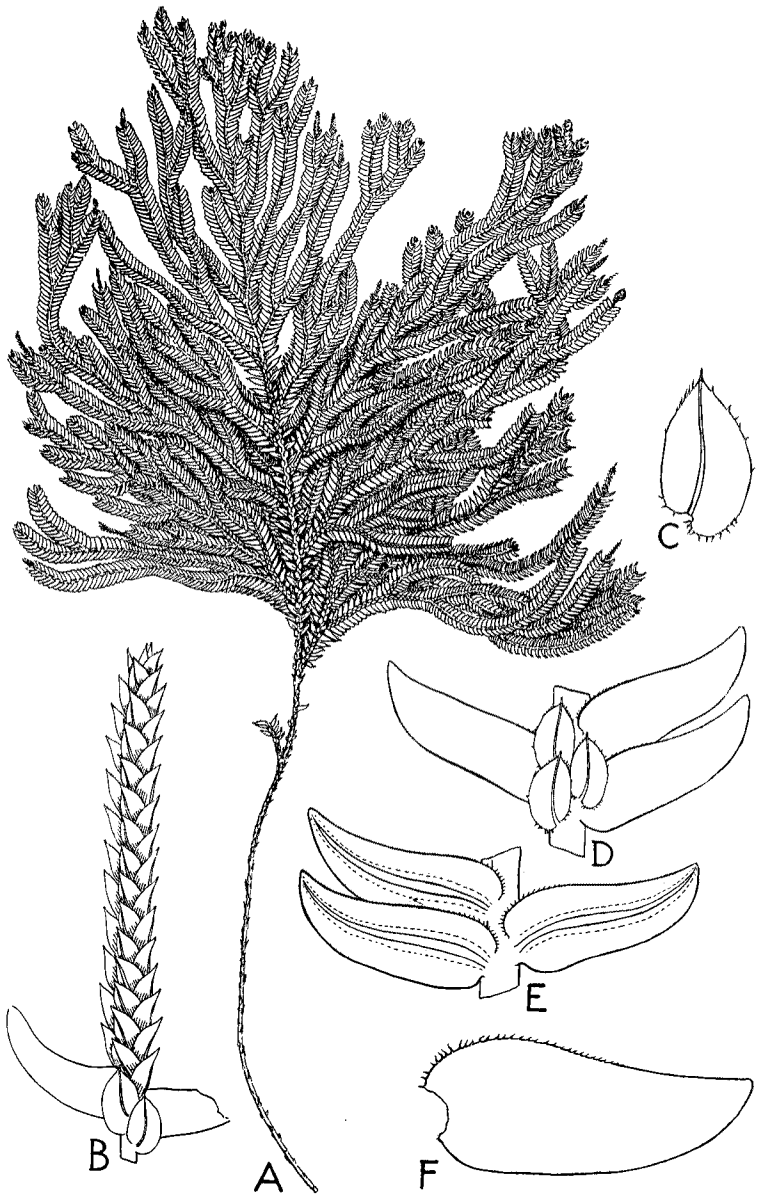
Mr. T. A. Dymes reported a long list of seeds taken from the nest of the harvesting ant, *Messor barbarus*, and showed a number of specimens.

Mr. J. L. Chaworth-Musters gave an account of an expedition to Mount Olympus made in the spring of the year. The character of the vegetation of the broad valley beneath the peak of the mountain was illustrated by a series of excellent photographic lantern-slides. Mr. A. J. Wilmott spoke on the plants collected during the expedition.

At the General Meeting of January 21, the President, Professor F. E. Weiss, showed and commented on some abnormal developments in roots of Sycamore caused by the embedding of stones and a piece of glass in the root-tissues ; he also showed a woody root with a remarkable development, in section like a Swiss roll, due to some unexplained injury.

Mr. J. T. Cunningham gave an account of his expedition to the Island of Marajó at the mouth of the Amazon for the purpose of studying the respiration-mechanism of *Lepidosiren*. The banks of the small streams, in the muddy bed of which the *Lepidosiren* lived, were fringed with a tropical vegetation of palms, bamboos, etc.

We hear with much regret of the death while on a collecting expedition in south-west China of Mr. George Forrest, who has done so much in recent years to add to our knowledge of the botany of West China, Tibet, and Burma. Some account of his work will appear in the next number of the *Journal*.



A. H. G. Alston anal. S. Burford del.

SELAGINELLA SUPERBA, SP. NOV.

NOTES ON *SELAGINELLA*.—II.

By A. H. G. ALSTON, B.A., F.L.S.

(PLATE 600.)

WHILE revising the *Selaginellæ* of the Old World I have had specimens from several Institutions on loan. Among these were some new species which I have thought advisable to describe, as the names have been written up on the sheets which were returned.

I have taken a somewhat broader view of species than did the late Dr. G. Hieronymus, which will result in the reduction of some of his species. For this reason I have been content with rather shorter descriptions, and have ignored the spore-characters on which Hieronymus based so many species, as van Alderwerelt's observations seem to show that spore-characters are, at the most, only of varietal rank.

The following institutions have sent specimens on loan, and I take this opportunity of thanking the officials in charge :— Herbarium, University of California, Berkeley, U.S.A. ; Herb. E. B. Copeland, Berkeley, U.S.A. ; Botanisches Garten und Museum, Berlin-Dahlem ; Jardin Botanique de l'Etat, Brussels ; Nanking Herbarium, China ; Universitetets Botaniske Museum, Copenhagen ; Herb. C. Christensen, Copenhagen ; Royal Botanic Garden, Edinburgh ; Instituto Botanico della R. Universita, Florence ; Jardin Botanique, Geneva ; Royal Botanic Gardens, Kew ; Botanic Gardens, Singapore ; U.S. National Herbarium, Smithsonian Institution, Washington ; Botanisches Museum der Universität, Vienna.

1. **Selaginella shakotanensis** (Franchet), comb. nov. *S. rupestris* var. *shakotanensis* Franch. ex Takeda in Tokyo Bot. Mag. xxiii. 237, t. 17 (1909).

Herba surculis prostratis, cæspitosis vel repentibus, usque ad 15 cm. longis, radicantibus (fibrillis radicalibus nigro-fuscescentibus usque ad 10 mm. longis) ; *ramis* (inferioribus surculis similibus exceptis) plerumque c. 1 cm. longis, distante pinnatis vel simplicibus, prostratis vel ascendentibus, sterilibus vel rarius apice spicam gerentibus ; surculis ramisque laxe foliosis ; *foliis* alternis sessilibus imbricatis appressis, juventute in sicco viridibus, senectute stramineo-fuscescentibus, crassiusculis, supra planis, subtus convexis et fere usque ad apicem secus lineam medianam sulcatis, anguste lineari-triangularibus, apice obtuso subito cuspidato-setigeris (setis c. 60 μ longis, c. usque ad $\frac{1}{4}$ laminæ æquantibus, hyalinis, subintegris), margine ciliatis, ciliis utrinque c. 6, 8–16 μ longis, hyalinis ; foliis seta exclusa c. 360 μ longis, basi c. 120 μ latis ; *spicis* c. 12 mm. longis tetragonis ; *sporophyllis* omnibus conformibus, anguste ovato-triangularibus, apice breviter cuspidato-setigeris.

This species is probably common in the mountains of Northern Japan. I have seen specimens from the following localities :—HOKKAIDO : SHIRIBESHI :—Shakotan, *Faurie* 9895 (Hb. Geneva !). NORTHERN HONDO : MUTSU :—Hirosaki, *Faurie* 52 (Hb. Kew ! & Geneva !). RIKUCHU :—Summit of Hayachine, *Faurie* 13551 (Hb. Geneva !) ; Hayachine, above 1500 m., *Faurie* 7262 (Hb. Mus. Brit. !), 73181 (Hb. Kew !) ; Summit of Jinju-shan, *Faurie* 13661 (Hb. Kew !) ; SHINANO :—On dry rocks in Kurokawa Valley, *Takeda* (Hb. Mus. Brit. !) ; Togakushi, *Takeda* (Hb. Edinb. !), *Sakurai* (Hb. Edinb. !, U.S. Nat. Herb. !).

2. **Selaginella limbata,** sp. nov. Species heterophylla e turma *S. uncinatæ* (Desv.) Hieron. ; *caulibus* longe repentibus gracilibus siccitate angulatis stramineis, usque ad 40 cm. longis, rhizophoros stramineos usque ad 10 cm. longos gerentibus, foliosis, distante ramosis ; ramis erectis usque ad 15 cm. longis, binatis vel singulari dispositis, c. 5 cm. inter se distantibus, parte superiore bipinnatis, parte inferiore simplicibus foliosis, parte ramosa ambitu ovata, partium inferiorum foliis parum heteromorphis inæquilateris, basi valde auriculatis, auriculis semi-facium inferiorum longioribus ; pinnis pinnatis ; pinnulis simplicibus vel furcatis, ramorum plano, foliis lateralibus inclusis, usque ad 3·5 mm. lato ; *foliis* manifeste heteromorphis, *lateralibus* contiguis c. 2 mm. longis, 1·25 mm. medio latis, integris vel apicem versus minute et distante subserrulatis, utrinque late albo-limbatis, ovato-oblongis inæquilateralibus acuminatis, semifacie superiore latiore semi-ovato basi rotundato ; semifacie inferiore semi-oblongo, basi leviter cordato ; *foliis axillaribus* oblongis abrupte acuminatis ; *foliis intermediis* imbricatis integris oblique falcato-ellipticis acuminatis, basi exteriore leviter auriculatis ; *strobilis* tetragonis brevibus c. 3 mm. longis, 2·5 mm. latis, apice ramulorum ultimorum singulis ; *sporophyllis* homomorphis æquilateralibus ovatis acuminatis integris apicem versus carinatis.

Type :—Victoria Peak, Hong-kong, *Lamont* 975 A (Hb. Mus. Brit. !). Also the following :—HONG-KONG : *C. Wright* (Hb. Kew !), *Fortune* 37 (Hb. Mus. Brit. !), *Harland* 90 (Hb. Mus. Brit. !), *F. Didrichsen* 3263 (Hb. Haun. !), *Hance* 2028 (Hb. Vindob. !) ; Victoria Peak, *Ford* 38 *a* (Hb. Kew !) ; Lan-tao Island, *Ford* 407 (Hb. Kew !). JAPAN : O-shima, on the ground in woods, *Faurie* 4653 (Hb. Mus. Brit. !, Hb. Geneva !).

In addition to the two species described here, the following species have been found in Japan and the Bonin Islands :—*S. Selaginoides* (Linn.) Link, *S. Schmidtii* Hieron., *S. tamariscina* (Beauv.) Spring, *S. helvetica* (Linn.) Link, *S. Savatieri* Bak., *S. nipponica* Franch. & Sav., *S. remotifolia* Spring, *S. uncinata* (Desv.) Spring, *S. boninensis* Bak., *S. caulescens* (Wall.) Spring, *S. Doederleinii* Hieron., *S. lutchuensis* Koidz., *S. heterostachys* Bak., and *S. longicauda* Warb.

S. integerrima (Hk. & Gr.) Spring, *S. denticulata* (Linn.) Link, *S. ornithopodioides* (Linn.) Spring, *S. Kraussiana* (Kze.) A. Br., *S. atroviridis* (Hk. & Gr.) Spring, *S. rupestris* (Linn.) Spring, *S. shensiensis* Christ, *Lycopodium circinale* Linn. (*S. Bryopteris* (Linn.) Bak.), and *S. sibirica* (Milde) Hieron. have been erroneously recorded.

S. hachijoensis appears, from Nakai's brief description, to be the same as *S. nipponica* Franch. & Sav. This brings the number of species known from Japan up to 15, but of this number several appear to be very rare—at least, in Herbaria.

3. **Selaginella trichoclada,** sp. nov. Species heterophylla e turma *S. Willdenovii* (Desv.) Baker ; caule subterete stramineo minute puberulo, subscandente usque ad 70 cm. longo, basi simplice, apicem versus 3–4-pinnatim ramoso, parte ramosa ambitu oblonga ; ramis omnibus puberulis stramineis ; ramis primariis usque ad 7 cm. inter se distantibus, regulariter ramosis ambitu deltoideo-lanceolatis, usque ad 15 cm. longis, distante foliosis, foliis leviter heteromorphis ; *foliis* axillaribus rotundatis ; ramis secundariis c. 2 cm. inter se distantibus, pinnatis, pinnulis plerumque furcatis c. 3–5 mm. latis foliis inclusis, ambitu ovato-lanceolatis crebre foliosis, foliis valde heteromorphis ; *foliis lateralibus* contiguis oblongis, c. 2 mm. longis, 1 mm. latis, integris, utrinque late albo-limbatis, inæquilateralibus leviter acuminatis, semi-facie superiore semi-oblongo-elliptico, basi auriculato, semi-facie inferiore semi-oblongo, apicem versus angustato, basi rotundato ; *foliis axillaribus* oblongo-ellipticis, basi auriculatis vel parum sagittatis ; *foliis intermediis* plus minusve sub-oppositis vix imbricatis valde inæquilateralibus semicircularibus, apice leviter acuminatis ; *strobilis* tetragonis brevibus c. 4 mm. longis, 1·25 mm. latis, apice ramulorum singule dispositis ; *sporophyllis* homomorphis æquilateralibus ovatis dilute viridibus acuminatis, basi amplexicaulibus.

Type :—CHINA : An-Hwei Province : Damp shaded bank, above Fan-Kon, Wang Shan, 700 m., *A. N. Steward* 7221 (Hb. Mus. Brit. ! Hb. Nanking !, Hb. Edinb.!, U.S. Nat. Herb. !). The following specimens have also been seen :—AN-HWEI : Wang Shan, common in woods, 500 ft., *Ching* 8677 (Hb. Nank. !, U.S. Nat. Herb. !) ; Li-Shan, N.W. Chemen, common on bank, 480 ft., *Ching* 8729 (Hb. Nank !, U.S. Nat. Herb. !).

4. **Selaginella superba,** sp. nov. (Plate 600.) Species heterophylla e turma *S. magnificæ* Warb. ; caulibus usque ad 50 cm. altis, parte inferiore subteretibus, compressis, simplicibus sordide stramineis homophyllis usque ad 20 cm. longis, parte superiore subtripinnatim ramosis, utrinque heterophyllis, ambitu ovatis ; ramis primi ordinis elliptico-lanceolatis ; ramis secundi ordinis irregulariter dichotomis ; ramulis ultimis usque ad 5 cm. longis, nonnunquam apice florem solitarium gerentibus ; *foliis* in parte

simplice caulium homomorphis elongato-triangularibus, leviter inæquilateralibus, basi ciliatis ; foliis aliis valde heteromorphis ; *foliis lateralibus* leviter imbricatis c. 4 mm. longis, 1·5 mm. latis, inæquilateralibus, semi-facie superiore semi-lanceolata, apicem versus minute denticulata, basi ciliata, semi-facie inferiore semi-oblonga, subintegra, basi nunnunquam ciliata ; *foliis axillaribus* ovato-deltoideis, basi ciliatis ; *foliis intermediis* alternis imbricatis albo-punctatis inæquilateraliter ovatis, apice breviter mucronatis, ciliolatis, basi exteriore ciliatis ; *strobilis* tetragonis, in apicibus ramulorum singuli dispositis, c. 7 mm. longis, 1·3 mm. latis.

Type :—INDO-CHINA : Lankai, 300 m., in ravine July 1899, *E. H. Wilson* 1 B (Hb. Palat. Vindob. !).

5. **Selaginella dolichoclada,** sp. nov. Species heterophylla e turma *S. inæqualifoliæ* (Hk. & Gr.) Spring ; *caulibus* basi simplicibus, parte superiore ramosis, subscandentibus siccitate purpurascentibus, c. 80 cm. altis, c. 3 mm. diametro, basin versus rhizophoros gerentibus ; ramulis ultimis longissimis usque ad 8 cm. longis alternis contiguis, c. 5 mm. latis (foliis lateralibus inclusis) ; caulium *foliis* distantibus fere abortivis ; ramulorum foliis ubique valde heteromorphis contiguis vel plus minusve imbricatis ; *foliis lateralibus* c. 3 mm. longis, 1·25 mm. latis, marginatis breviter acuminatis integris vel apice leviter serrulatis, semi-facie superiore semi-oblongo-lanceolato, basi cuneato, semi-facie inferiore semi-oblongo, basi rotundato ; *foliis axillaribus* elongato-ellipticis ; *foliis intermediis* imbricatis inæquilateralibus marginatis stomatibus albo-punctatis, apice longe acuminatis, acumine ½ laminæ fere æquante, basi exteriore cordatis ; *strobilis* apice ramulorum singuli dispositis, usque ad 1·5 cm. longis, 1·5 mm. latis ; *sporophyllis* elongato-triangularibus apice acuminatis.

Type :—TONG-KING : Forêts du Mont Bavi, près de la pagode de Dein-Tonan, *Balansa* 1994 (Hb. Kew !).

Most nearly allied to *S. Pouzolziana* (Gaud.) Spring, from which it is separated by its subscandent habit, purplish stem, and long-acuminate median leaves with sub-cordate bases.

6. **Selaginella Myosurus** (Sw.), comb. nov. *Lycopodium Myosurus* Sw. in Schrad. Journ. Bot. 1800, ii. 118 (1801) ; Hieron. in Mildbr. Deutsch. Zent.-Afr. Exped. ii. 40 (1910). *L. scandens* (Beauv.) Sw. Syn. Fil. 185, no. 63 (1806). *Stachygynandrum scandens* Beauv. Fl. d'Oware, i. 10, t. 7 (1805). *Selaginella scandens* (Beauv.) Spring in Bull. Ac. Brux. x. 226. no. 102 (1843).

There is a specimen in Herb. Mus. Brit. collected in Sierra Leone by Afzelius which is probably a duplicate of the type, though it is not labelled *L. Myosurus* Sw. It is, apparently, the only species collected by Afzelius. Hieronymus referred it to *S. scandens* as a synonym.

7. **Selaginella prætermissa,** sp. nov. Species heterophylla insignis, e turma *S. jungermannioides* (Gaud.) Spring ; *caulibus* longe repentibus gracilibus siccitate sulcatis stramineis, usque ad 35 cm. long., rhizophoros parvos nonnusquam usque ad 15 mm. longos gerentibus, foliosis, frequenter sed breviter ramosis ; ramis lateralibus usque ad 2 cm. longis breviter pinnatis ; *foliis* utrinque manifeste heteromorphis ; *foliis lateralibus* contiguis, usque ad 3 mm. longis, 2 mm. latis, oblongis, semi-facie superiore serrulata, basi ciliata, apicem versus angustata, semi-facie inferiore, semi-oblonga integra, sed apicem versus serrulata et basi plus minusve ciliata ; *foliis axillaribus* ovato-oblongis ; *foliis intermediis* leviter imbricatis late ovatis serrulatis mucronatis, basi fere cordatis ; *strobilis* tetragonis usque ad 5 mm. longis, apice ramulorum ultimorum singulis ; *sporophyllis* homomorphis elongato-triangularibus, acuminatis carinatis.

Type :—CEYLON : *Macrae* 135 (Hb. Mus. Brit. !). Also the following :—Without number, (Hb. Edinb. !) ; *Koenig* (Hb. Mus. Brit. !) ; without exact locality, *Vahl* (Hb. Haun !), 235/1, *W. Ferguson* (U.S. Nat. Herb. !).

The lateral leaves are less ciliated in Ferguson's specimen than in the type.

The only Asiatic species which resemble *S. prætermissa* are *S. Ridleyi* Bak. and *S. rivalis* Ridl. from Malaya, and an undescribed species from Burma. The lateral leaves of *S. Ridleyi* Baker are much more strongly ciliate, while *S. rivalis* Ridl. is a less branched plant with narrower median leaves.

8. **Selaginella calostachya** (Hk. & Gr.), comb. nov. *Lycopodium calostachyum* Hk. & Gr. in Hk. Bot. Misc. iii. 108 (1833). *Selaginella zeylanica* Bak. in Journ. Bot. 1885, 178,

Hooker and Greville's species does not appear to differ essentially from Baker's species. *S. Macraei* (Hk. & Gr.) Spring is closely allied, but the spikes do not taper as in *S. calostachya*. The South Indian *S. tenera* (Hk. & Gr.) Spring, to which *S. Macraei* was referred by Baker, is quite a different plant with the stem simple and almost leafless at the base. *L. calostachyum* was referred by Spring (Monogr. ii. 233) to *S. ciliaris* (Retz.) Spring, but that species is the same as *S. Belangeri* (Bory) Spring, as is shown by the type in Herb. Lund.

9. **Selaginella effusa,** sp. nov. Species heterophylla e turma *S. suberosæ* Spring ; *caule* suberecto aureo-stramineo terete, usque ad 20 cm. longo, e basi 3-pinnatim ramoso, parte ramosa ambitu ovato-oblonga, ramis primariis alternis usque ad 20 mm. inter se distantibus, ambitu lanceolatis, usque ad 10 cm. longis, dense foliosis ; ramis secundariis c. 1 cm. longis plerumque furcatis et spicas gerentibus ; *foliis* ubique heteromorphis plerumque fere contiguis ; *foliis lateralibus* fere contiguis, c. 2 mm.

longis usque ad 1·25 mm. latis, utrinque distante serrulatis ; semi-facie superiore late semi-ovata ; semi-facie inferiore semi-oblonga, basi rotundata, apice acuta ; *foliis axillaribus* ovato-ellipticis ; *foliis intermediis* plerumque distantibus ovatis serratis longe acuminatis ; strobilorum *sporophyllis* valde heteromorphis, sporophyllis dorsalibus oblongis acuminatis leviter serrulatis ; sporophyllis ventralibus ovato-triangularibus serratis valde acuminatis.

Type :—Lien-chan River, Kwang-tung, *Rev. B. C. Henry* in Herb. Hance 1080 pp. (Hb. Mus. Brit. !). Also the following specimens :—KWANG-TUNG : Wan Tong Shan, *Tak & Chow* 14512 (Hb. Nanking & Hb. Mus. Brit. !). KWANG-SI : Chu Fang Shan, *R. C. Ching* 5789 (Hb. Nanking & Hb. Mus. Brit. !).

10. **Selaginella Chingii,** sp. nov. Species heterophylla e turma *S. decipientis* Warb. ; *caulibus* usque ad 70 cm. longis pendentibus stramineo-virescentibus plus minusve angulatis, e basi rhizophoros usque ad 4 cm. longos graciles stramineo-virides gerentibus, parte inferiore simplicibus, parte superiore subtripinnatim ramosis, ubique heterophyllis ambitu lanceolatis vel lineari-lanceolatis apice nonnunquam radicantibus; ramis primi ordinis ambitu elliptico-lanceolatis usque ad 7 cm. longis, plerumque c. 3·5 cm. longis pinnatis, pinnulis furcatis vel pinnatis ; *foliis* ubique heteromorphis ; caulium foliis plerumque remotis ; ramorum foliis lateralibus contiguis ovato-oblongis inæquilateralibus subacaulibus ; semi-facie superiore semi-ovata, basi rotundata breviter ciliolata, semi-facie inferiore integra, basi cordata excepta ubi plus minusve ciliolis instructa ; *foliis axillaribus* lanceolatis ; *foliis intermediis* ovatis acuminatis, plus minusve distantibus serrulatis ; strobilorum *sporophyllis* valde heteromorphis ; sporophyllis dorsalibus ovatis denticulatis viridibus leviter acuminatis ; sporophyllis ventralibus ovato-ellipticis ciliolato-dentatis hyalinis longe aristato-acuminatis.

Type :—KWANGSI : Fan Shan, 2700 ft., on side of cave, common, *R. C. Ching* 6598 (Hb. Mus. Brit., Hb. Nanking !). The following specimens were also seen :—KWANGSI : Fan Shan, 2100 ft., at foot of cliff, common, *R. C. Ching* 6621 (Hb. Nanking & Hb. Mus. Brit. !).

This species is named after the collector Mr. R .C. Ching, who has discovered several new species in this genus.

11. **Selaginella drepanophylla,** sp. nov. Species heterophylla e turma *S. ciliaris* (Retz.) Spring ; *caule* procumbente stramineo terete c. 5 cm. longo, e basi irregulariter bipinnatim ramoso ; ramis primariis alternis plerumque usque ad 2 cm. longis, c. 5 mm. inter se distantibus ; ramulis c. 5 mm. longis frequenter strobilos gerentibus ; *foliis* ubique heteromorphis imbricatis vel subcontiguis ; *foliis lateralibus* falcato-lanceolatis supra saturate viridibus subter pallidioribus serrulatis, basi utrinque ciliatis,

apice subacutis, usque ad 3 mm. longis, 1 mm. latis ; *foliis axillaribus* elongato-triangularibus ; *foliis intermediis* imbricatis elliptico-lanceolatis ciliolatis, apice acuminatis, aristatis ; strobilorum *sporophyllis* heteromorphis ; sporophyllis dorsalibus triangulato-linearibus viridibus serrulatis ; sporophyllis ventralibus ovato-triangularibus serrulatis, hyalinis, apice breviter aristatis ; megasporæ flavidæ verrucosæ.

Type :—KWANG-SI : Fan Shan, by the cave, common in shade at foot of cliff, 2299 ft., *R. C. Ching* 6600 (Hb. Mus. Brit. & Hb. Nanking !).

This species is most nearly allied to *S. xipholepis* Bak. from Hong-kong, but it is separated by the falcate lateral leaves and ciliolate median leaves.

12. **Selaginella chætoloma,** sp. nov. Species heterophylla e turma *S. ciliaris* (Retz.) Spring ; caule procumbente pallido usque ad 15 cm. longo, e basi irregulariter ramoso, nonnusquam radicante, ramis primariis alternis ramosis, ramis primariis alternis ramosis, plerumque c. 10 mm. inter se distantibus ; ramulis ultimis usque ad 12 mm. longis ; *foliis* ubique heteromorphis fere contiguis ; *foliis lateralibus* c. 2 mm. longis, 1 mm. latis, acuminatis, apice acutis, semi-facie superiore semi-ovata margine basi ciliato, apicem versus ciliolato, semi-facie oblongo-lanceolata ciliolata ; *foliis axillaribus* minoribus lanceolatis ; *foliis intermediis* leviter imbricatis late ovatis ciliolatis acuminatis, apice aristatis ; strobilorum *sporophyllis* leviter heteromorphis ; sporophyllis leviter heteromorphis ; sporophyllis dorsalibus ovato-lanceolatis ciliolatis acuminatis ; sporophyllis ventralibus ovatis ciliolatis apice aristatis.

Type :—KWEI-CHOW : Ping-fa, in grotto, *Cavalerie* 731 (Hb. Mus. Brit. & Hb. Edinb. !). Also same collector and locality 1469 (Hb. Edinb. !).

EXPLANATION OF PLATE 600.

A. Habit, × ⅓. B. Cone, × 6. C. Median leaf, × 10. D. Small portion of branch, showing median and lateral leaves, from above, × 6. E. Ditto, showing lateral leaves, from below, × 6. F. Lateral leaf, from above, × 10.

LICHENOLOGICAL NOTES.—VI.

BY W. WATSON, D.SC.

As in former notes the records of Messrs. Jones and Knight are indicated by D. A. J. & H. H. K. respectively. The notes refer to rare or critical lichens which are often new to Great Britain, and, in almost all cases, are records for the vice-county for which the number is given.

USNEA CERATINA forma INCURVISCENS Arn. On oak-tree, Cothelstone near Taunton, v.c. 5. This is a form in which the branches are much curved. It has recently been elevated to subspecific rank by Motyka.

PARMELIA REDDENDA Stirt. Stirton's specimen has the soralia quite distinct, and there are few isidioid projections. It therefore belongs to the group of *P. dubia*, and not to the subseries of *P. rudecta*. On account of its negative reaction to C it may stand as a species.

P. SAXATILIS var. LÆVIS Nyl. is entirely without isidia, and is much less common than the isidiate form. It is quite distinct from the type, not only in the absence of isidia, but also because the reticulations of the thallus are less pronounced. On oak, Hodder's Combe, Quantocks (5). On rocks, Chesil Beach (9), Dolgelly (48), Buckden (64). It is recorded by Livens for v.c. 10 in Morey's 'Natural History of the Isle of Wight,' and Wheldon and Wilson in their 'Flora of West Lancashire' mention a plant from Hindburn Fell (60) which seems referable here. Harmand in his 'Lich. de France' includes the plant with form *munda* Schaer. Crombie (Mon. Brit. Lich. 1894) gives Killin (88) and Durris (91) as localities for *P. sulcata* var. *lævis*. His specimens are in the herbarium of the British Museum, and were placed by Lorrain Smith (Mon. Brit. Lich. 1918) under *P. omphalodes*. They are somewhat lighter in colour than typical *P. omphalodes*, but are much better placed there than with *P. sulcata*, and it is difficult to understand why Crombie placed them under *P. sulcata* unless he considered that *P. sulcata*, *P. saxatilis*, and *P. omphalodes* were scarcely worthy of specific segregation. When *lævis* is recognised as a variety of *P. saxatilis* Crombie's plants are appropriately placed with it.

P. DUBIA var. ULOPHYLLA (Ach.) Harm. differs from the type in having the raised edges of the thallus sorediate. It has been recorded previously from v.c. 5 ("Lichenological Notes.—IV.," in Journ. Bot. 1929, 76, and 'Lich. of Somerset'), and has recently been noted at Beaminster in v.c. 9.

HYPOGYMNIA PHYSODES forma VIRIDIS Wats. Lich. Som. 1930. Thallus green, almost as green as in *Parmelia caperata*. On shaded trunk of beech, Buckland St. Mary (5); on shaded trunks of firs, Llanberis (49).

Hypogymnia vittata (Ach.), comb. nov. This is given as doubtfully British in Mon. Brit. Lich. (1918). Many plants collected at various times and localities and by different collectors have been so named. Mr. Jones and I compared a large number of foreign specimens named *vittata* with British plants, and concluded that the dark margins of the laciniæ were quite as well marked and the holes (or depressions) on the under surface quite as clear in the latter as in the former. The description in Ach. Meth. (1903) 251 is as follows:—"thallo substellato laciniis supra planiusculis nigro-marginatis apice dilatatis obtusis inflatis, in saxis inter muscos." Such a plant was considered by Dr. Holl to be frequent in the Highlands of Scotland (Leight. Fl. ed. 3, 117), and he also recorded it from Dolgelly, though the habitat is given as trees. Crombie (Mon. Brit. Lich.) gives it as occurring only on the gound in alpine places at Cairntoul in v.c. 92. Wheldon and Wilson in the 'Lichens of Perthshire' recorded it from Ben Vrackie etc. in v.c. 89. I have seen specimens corresponding to Acharius's description from near Dolgelly and Barmouth (48), Cleveland (62), Ben Lawers and Killin (88), and have recently collected similar specimens from the Quantocks (5) at 1200 feet, Studland (8), and Holmsley (11). In every case where the plant has come under my personal observation in its actual habitat it was on the peaty ground, whereas typical *Hypogymnia physodes* occurred on the stems of heathers or other woody plants. Some lichenologists reserve the name *vittata* for the species as emended by Bitter, but the original description and the use of the name by all except some recent lichenologists does not appear to warrant such restriction. I have not seen a British plant corresponding to Bitter's emendation, and many foreign specimens named *vittata* are not Bitter's plant.

Platysma chlorophyllum (Humb.), comb. nov. Martinsell Hill (8, H. H. K.), Blaen Hepste (42), near Ardlui (99).

LECANORA ACTOPHILA Wedd. St. Bees, v.c. 81 (D. A. J.).

BIATORA VIRIDESCENS (Schrad.) Mann. On base of firs, Culmhead near Taunton (5). This habitat is a common one for this plant, but, as I have previously noted ("Lichenological Notes.—V."), it occurs in other situations.

BIATORA BAUSCHIANA Krb. A specimen collected by Crombie from Barcaldine (98) and labelled *Lecidea dilutiuscula* seems to belong here. Plants labelled *L. conglomerata* and *L. fuliginosa* collected by Hardy at Penmanshiel (81) are in the herbarium at Bristol University, and belong to this species. In Somerset specimens the colour of both the thallus and apothecia is variable. Typical plants occur at Culmhead near Taunton (5), but near Wiveliscombe it occurs with both the thallus and the apothecia much darker than usual. It varies from the normal form in much the same way as many dark forms of *Lecidea sylvicola* depart from the type. On North Hill, Minehead, a plant with dark apothecia was first collected in 1930. It seemed to be

in more or less orbicular and small greyish patches on soil or stone, and often associated with *Bæomyces rufus*. On account of its greyish orbicular thallus, its darker apothecia, and habitat, it seemed to be distinct from *B. bauschiana*. On May 12th of last year (1931) I examined the same area in a more intensive manner, and collected a large number of specimens of what seemed to be the same plant, a few pieces from soil but mostly on stones surrounded by soil. One portion seems to be fairly typical *B. bauschiana*, as the colour of the thallus is tawny, but most of the apothecia are dark, a few pallid ones being seen, but none yellow. The others have a thallus (usually effuse, but sometimes more or less determinate) which is less typical, being greyish. The microscopic structure of the apothecia agrees in all, the hypothecium being pale, the hymenium rarely showing any coloration and the spores being usually less than $8\times4\,\mu$, though in some of the larger apothecia (and those on soil) the size of the spore was up to $10\times5\,\mu$. There is no bluish colour in the hymenium, as in *L. sylvicola*, and the thallus is not so dark as in *L. expansa*. It may eventually be necessary to consider some of the specimens as belonging to a new species. At present, however, it seems better to regard *B. bauschiana* as a more variable species than is generally understood.

Lecidea scutellata, sp. nov. *Thallus* crustaceus crassitudine mediocris cinereo-albidus, K– C– KC– I– plus minusve determinatus et limitatus hypothallo nigro probabiliter peregrino, vel subdeterminatus, interdum tartareus et fere continuus et levis sed plerumque plus minusve rimoso-areolatus et leviter rugosus. *Apothecia* nigra subinnata usque ad sessilia interdum leviter rufescentia vel leviter cinereo-pruinosa parva 0·3–0·8 mm. plerumque concava; marginibus crassis integris aut leviter flexuosis nigris sæpe nitidis; discis nigro-fuscis vel leviter rufescentibus. *Epithecium* nigro-fuscum. *Paraphyses* subcohærentes apicibus confluentibus et sæpe nigris. *Ascus* clavatus; hymenium pallidum K– cœruleum cum iodo demum (præsertim asci) vinoso-rubrum; hypothecium tenue nigro-fuscum; sporæ octonæ simplices hyalinæ oblongæ $10–14\times5–7\,\mu$. Saxicola.

This plant is distinct from any member of the *Lecidea contigua* group, not only by the ±concave apothecia, which are occasionally slightly coloured, but also by the much thinner and paler hypothecium. The type-specimen was obtained from the siliceous rocks of a wall at Volis Hill near Taunton (5). A similar plant occurs at Greenaleigh Pt., near Minehead (5), and a plant collected by Dr. H. F. Parsons at Tonpanan (48) seem to be the same species, though the apothecia are not so markedly concave. The concave character of the apothecia is quite pronounced in the type-specimen, but is probably subject to variation, as such a character is in many other lecideoid apothecia. The plant is probably

widely distributed, and has been previously referred, either to *L. contigua* itself, as a form with ill-developed spores, or to some other member of the group.

L. RIVULOSA var. INFUSCATA Magn. Thallus dark brown, rather thick, fairly even, cracked into plane areolæ. Apothecia firmly appressed and only rising slightly above the surface of the thallus, plane, or seldom convex. Wasdale (70) collected by W. West, and now in the herbarium at Bristol University.

L. TENEBRICA Nyl. A specimen labelled *L. lugubris* collected by W. West at Malham (64) on arenaceous rock is in the Bristol University herbarium. The hyphæ have thickish walls, a character considered as important by Magnusson in distinguishing this species from *L. lygœa*.

RAMALINA FARINACEA forma PENDULINA Ach. This is a striking plant on the trunks of beeches on the Blackdown Hills near Taunton—in fact, its thalline laciniæ are so much longer and yellower than the type that a higher status than a form seems merited. It is found on other trees and is often much less distinct from the type. Exford etc. (5), Somerton (6), Studland (9).

Forma PHALERATA Ach. is usually found on trees, but may occur on stumps. Taunton (5), Cole and Shapwick (6), Wareham (9). It is recorded in Wheldon and Wilson's 'Lichens of Perthshire' from near L. Achray (87), and I have seen it at Killin in v.c. 88.

Forma MULTIFIDA Ach. has the apices of the thalline lobes divided into a large number of narrow and short laciniæ, whilst forma PERLUXURIANS Hue has the sides of the thalline lobes similarly decorated. Both these forms occur near Taunton (5), but are connected to one another and to the type by numerous intermediates.

R. CALICARIS var. LACINIATA Harm. In this variety, which occurs at Cothelstone near Taunton, the thallus has numerous narrow fastigiate branches.

R. FASTIGIATA var. ODONTATA Hue is a bushy and much-branched form, with the terminal laciniæ ending in 3–8 teeth, the apothecia being mostly lateral. On larch above Kingston (5).

R. FRAXINEA var. CALICARIFORMIS Nyl. Wareham (9). Var. SUBAMPLIATA (L.) Ach. Saunton (4).

R. BREVIUSCULA Nyl. Sennen Cove (1), Lynton (4), Hirynys near Portmadoc (48), Kirkmaiden (74).

BIATORINA CRISTATA (Leight.) A. L. Sm. On the thallus of *Lecanora atra* collected by W. G. Travis at the Lizard. This has been hitherto recorded only from Barmouth in N. Wales, where

it was parasitic on the thallus of *L. subcarnea*. Saccardo considers it to be a parasitic fungus, and puts it in the genus *Scutula*. The general characters and the absence of any blue or red coloration of the hymenium with iodine probably justify him in doing so. As the published descriptions are rather meagre, the following description of the Lizard plant is appended. Thallus none. Apothecia black, minute, ±concave and orbicular, margin thick, obtuse, and apparently ±difformed ; paraphyses ±discrete, slender, sometimes slightly thickened at apices ; hymenium tinged a yellowish brown by iodine ; hypothecium dark, but thinnish, and gradually becoming paler towards the hymenium ; asci elongate-ovate, about $30\times8\,\mu$; spores 8, simple or faintly 1-septate, $6\times2\,\mu$. If the plant is retained as a lichen, it should be put in the genus *Catillaria*.

B. EPICLADONIA (Nyl.) Arn. *Scutula epicladonia* Sacc. On *Cladonia pyxidata* var. *pocilla*, Portland (9). This has not been previously recorded from our islands. Apothecia 0·2 mm., dark, bluish-grey-pruinose ; epithecium dark greenish, minutely granulato-inspersed ; paraphyses subdiscrete to subcoherent, darker, and sometimes thickened above ; hymenial gelatine bluish, and then wine-red with iodine ; hypothecium pale brownish or almost colourless ; spores 8, faintly 1-septate, ±curved, $14\text{–}16\times3\text{–}4\,\mu$. There are some protococcoid cells beneath the hypothecium, though these are similar to those belonging to the *Cladonia* squamules. A relationship to *Biatorina* is suggested, though both Saccardo and Vouaux consider it to be a parasitic fungus, the latter placing it in the genus *Conida*.

B. CHLOROSCOTINA (Nyl.) A. L. Sm. Erwood (42, H. H. K. !), Trefriw Falls (49, a specimen collected by Leighton and put under *B. chalybeia*), Berwyn (50, D. A. J. !), Kilcrennan (97, W. G. Travis).

BUELLIA POLOSPORA (Leight.) A. L. Sm. A plant collected on bark by Wheldon and Travis from Lower Ease Gill (60) seems to belong here. The apothecia have a similar appearance to those of *B. myriocarpa*, but the spores have paler poles. There is usually a middle septum and occasionally an extra septum in the spores, but none were noticed with three septa. There is no septum shown in the figures of the spores given by Leighton in Trans. Linn. Soc. (Bot.), ser. 2, i, t. 33, figs. 4–6 (1878), otherwise the appearance of the spores in Leighton's plant and in the Lancashire specimen agree.

(To be continued.)

AFRICAN NOTES.—II.

BY A. B. RENDLE.

ON the occasion of the visit of the British Association to South Africa in 1929 I took the opportunity of collecting plants afforded by the various excursions, and also whenever possible *en route*, and at places where a stay was made. About 600 specimens in all were brought home and have been placed in the British Museum Herbarium. A general account of the trip, with some reference to the botany of the places visited, was given in this *Journal* in 1929, and some notes on the Mosses and Pteridophyta were published in 1930 (p. 117). The present notes deal with the Flowering Plants.

My thanks are due to my old friends and colleagues, Mr. E. G. Baker and the late Spencer Moore, for determinations of the Leguminosæ, and the Acanthaceæ and Compositæ respectively, and to the present members of the Staff of the British Museum Herbarium, especially to Mr. A. W. Exell for his help in determining the polypetalous Dicotyledons. As some of Mr. Moore's determinations were incomplete or doubtful I have added notes in these cases.

Small collections were made on the way out to Cape Town at Tenerife and St. Helena. These brief visits, though of great interest to a botanist, especially that to St. Helena, yielded nothing in the way of novelty. Several excursions under the guidance of the Cape botanists, during the week spent in Cape Town, gave an insight into the wonderfully rich and varied flora of the Cape Peninsula. Of special interest were a few days in the Knysna region, where the deep valleys running from the highlands to the coast shelter a rich wooded vegetation, and there are extensive forests on the foot-hills. Under the guidance of Mr. B. R. Simmons, District Forest Officer of George, the forest districts at The Wilderness on the Touw River, Woodville, and Deepwalls were visited. Woodville and Deepwalls are on the lower slope of the Outeniqua Mts. A wonderful view is obtained from the headquarters of the Forest Officer at Deepwalls, Mr. Laughton, which stands at 1700 ft., and overlooks miles of forest-land on the slopes of these mountains with a distant view of the Zitzikama Mts.

Among the plants collected the following may be noted :—

MORÆA IRIDIOIDES L. Frequent in the undergrowth in the Woodville Forest Reserve, George ; no. 111 ; in fl. July 27.

THAMNOCHORTUS ARGENTEUS Kunth. Open country, Jonkersberg, George ; no 118 ; in fl. July 26.

SCHŒNOXIPHIUM LANCEUM Kükenth. (*S. capense* Nees). Woodville Forest Reserve, George ; no. 124 ; in young fl. July 27.

CELASTRUS PEDUNCULARIS (Sond.) Loes. Deepwalls Forest Reserve, Knysna, about 1700 ft.; no. 137; in fl. July 28.

HELICHRYSUM FŒTIDUM Cass. Woodville Forest Reserve, George; no 150; in fl. July 27.

VENIDIUM DISCOLOR Less. Woodville Forest Reserve; no. 163; in fl. July 27.

GERBERA CORDATA Less. Woodville Forest Reserve; no. 174; in fl. July 27.

SENECIO MIKANIOIDES Otto. Woodville Forest Reserve; no. 152; in fl. July 27. A climber.

S. RHOMBOIDEUS Harv. Glebe Forest, Knysna; no. 175; in fl. July 28. With fleshy leaves.

LOBELIA HIRSUTA L. Woodville Forest Reserve; no. 213; in fl. July 27. A common herb on the edge of forest-clearings.

SEBÆA BREHMERI Schinz. Woodville Forest Reserve; no. 202; in fl. July 27.

PLECTRANTHUS FRUTICOSUS L'Hérit. Woodville Forest Reserve; no. 190; in fl. July 27. A shrubby plant, 3–4 ft. high, with erect spikes and blue flowers.

DICLIS REPTANS Benth. (Scrophulariaceæ). Woodville Forest Reserve; no. 196; in fl. July 27. A small diffuse herb in wet places.

PEPEROMIA RETUSA C. DC. On the forest-floor, Woodville Forest Reserve, George; no. 187; in fl. July 27.

P. REFLEXA Dietr. Deepwalls Forest Reserve, Knysna; no. 188; in fl. July 28.

VISCUM OBSCURUM Thunb. Deepwalls Forest Reserve, Knysna; no. 182; in young fruit, July 28.

RUMEX SAGITTATUS Thunb. Woodville Forest Reserve, George; no. 189; in fl. July 27.

ANDRACHNE OVALIS Muell. Arg. (Euphorbiaceæ). By roadside, Glebe Forest, Knysna; no 180; in fl. and fr. July 28.

LACHNOSTYLIS CAPENSIS Turcz. (Euphorbiaceæ). Deepwalls Forest Reserve, Knysna; no. 183; in fl. July 28.

Returning from Deepwalls to Knysna Town a detour was made over the highlands to the top of Paarde Kop, above Plattenberg Bay, overlooking a wide stretch of deeply furrowed downland covered with scanty herbage. A small *Kleinia* was found here which the late Mr. Spencer Moore has described as a new species. Associated plants were the Composites, *Othonna carnosa* Less. (no. 166), *Helichrysum anomalum* Less. (no. 161), and the Leguminous *Rhynchosia chrysocias* Benth. (no. 217).

Senecio (§ **Kleinoidei**) **carnosulifolius** S. Moore, sp. nov.

Suffrutex humilis; *caule* verisimiliter simplici erecto crassiusculo ob foliorum delapsorum bases brevissimas persistentes intus floccosas noduloso; *foliis* paucis ad apicem caulis confertis sessilibus crassis (siccis lineari-oblongis) acute mucronatis basin versus gradatim angustatis carnosulis; *capitulis* mediocribus solitariis homogamis discoideis circa 25-flosculosis scapum tenuem folia pluries excedentem terminantibus; *involucri* anguste campanulati phyllis 12–13 linearibus acutis margine membranaceis 1–3-nervibus, additis perpaucis parvulis decoloribus calyculum constituentibus; corollis breviter exsertis flavis; *styli* ramis truncatis penicillatis; *achæniis* anguste oblongis appresse pubescentibus; *pappi* setis copiosis scabriusculis, albis.

Hab. South Africa, Knysna district: in open ground, summit of Paarde Kop, no. 173. In flower July 28, 1929.

Stem 3–4 cm. long, 5–6 cm. wide at the base, 3 cm. in the upper part. Leaves drying pale green, 1·5 to nearly 2 cm. long, 2–3 mm. wide. Scape 7–8 cm. long. Head in flower 12×12 mm. Involucral leaves pale green, 10 mm. long. Corolla-tube 6 mm. long. Genitalia shortly exserted. Achenes pale, 2·5–3 mm. long (not seen ripe). Pappus 6 mm. long.

In general appearance very like *S. bulbinæfolius* DC., but, besides the discoid capitula, all the parts are much smaller and the involucral leaves more numerous.—S. MOORE.

From George the railway climbs up to the Montagu Pass, a steep 5-mile ascent of two hours through luxuriant vegetation, and affording wide views over the coastal area. From the summit of the pass, about 2800 ft., it enters the high sweet veld, crossing the flat country to Oudtshoorn, behind which rise the Zwarteberg Mts., now partially snow-covered. Several Composites formed bright patches by the railroad—*Dimorphotheca cuneata* DC., *Osteospermum muricatum* E. Mey., *Cryptostemma calendulaceum* R. Br., and a showy *Gazania* with large orange flowers.

About 200 species were collected in Southern Rhodesia, though the time of year, August 4–13, was early for the vegetation. The railway from Johannesburg to the Victoria Falls runs north after leaving Mafeking along the edge of the Kalahari Desert, through an arid sandy country the level of which is broken by low kopjes. The sparse woody vegetation consists of stunted Acacias and other species of similar habit. A few plants were picked up at the occasional halts, but these yielded nothing of special interest. *Helichrysum argyrosphærum* DC., with pink and white flowers, formed attractive little mats in the sand. *Carissa edulis* Vahl (Apocynaceæ) was a small spiny bush just coming into flower, and *Ipomœa palmata* Forsk. was climbing over bushes. Scattered small prostrate herbs closely appressed to the dry sandy soil included several spurges—*Euphorbia hypericifolia* L., *E. prostrata* Ait., and *E. sanguinea* Hochst. & Steud. Other stunted more or less prostrate plants were *Vahlia capensis* Thunb. (Saxifragaceæ), *Lotononis Leobordea* Benth. (Legum.), and three Amarantaceæ, *Alternanthera echinata* Smith, *Amarantus græcizans* L., and *Gomphrena globosa* L., the last an introduction from South America.

Collections were made on the ascent to Cecil Rhodes's grave, " World's View," in the Matopos, bleak and dry at the time of our visit with very few plants in flower, in the more pleasant warm surroundings of the Victoria Falls, where a rich vegetation was already springing into new life, on the dry veld round Fort Victoria, and in the more interesting country round Zimbabwe. The last-named afforded a pleasant contrast with the, at the time of our visit, arid plain on which Fort Victoria stands. Passing through the low mountains, penetrated by the Pioneer Column in 1890 to found the original Fort Victoria, a broken undulating country of irregular hills with granitic outcrops and a richer vegetation is reached. About three miles from the Zimbabwe Ruins the Chibopopo River runs through a rough rocky valley, and after a series of miniature waterfalls traverses a piece of marsh-land, very green with grass, rushes, etc. An interesting day's botanizing was spent in this locality. A very different experience was afforded by a visit, with Mr. Fred Eyles as guide, to Domboshawa Rocks about 20 miles from Salisbury, a wild country of bare whale-backed granitic kopjes.

Victoria, Zimbabwe, and the country northward to Umtali and west to the Udzi Mountains are in the Sabi River basin. This river, which enters the Indian Ocean about 100 miles south of Beira, with the Lundi River and other smaller tributaries, drains the country between the basins of the much larger Limpopo and Zambesi Rivers. The greater part of the area is in the neighbourhood of 4000 ft. altitude. The watershed between the three river-areas, including the country between Bulawayo and Salisbury, is from 4000–6000 ft. The railway from Salisbury to Umtali runs almost entirely through this more elevated area. The Udzi Mountains form the eastern boundary of the Sabi Valley; a little beyond Umtali the railway passes this range to descend to the lower level before reaching the coastal plain at Beira. To the south is the Melsetter country, including a very rich botanical area, in which some interesting collections were made by Mr. C. F. M. Swynnerton (see Journ. Linn. Soc. (Bot.), xl. 1, 1911).

In the following notes I quote mainly only those species which are additions to Mr. Eyles's list, ' Records of Plants collected in Southern Rhodesia ' (Trans. Roy. Soc. South Africa, v. pt. 4, 1916), or which supply new localities. To facilitate reference I have followed the arrangement of Eyles's list—Engler's "System." In the case of species not hitherto recorded from Southern Rhodesia I have indicated the general distribution, or given a reference to the ' Flora of Tropical Africa.'

Aponogeton Eylesii, sp. nov. *Herba* aquatica, *foliis* natantibus elliptico-oblongis apice et basi obtusis, nervis parallelis utrinque 4 percursis venulis transversis plurimis connexis, exemplo singulo

11 cm. long. 3·7 cm. lat., petiolo longo submerso 3 dm. vel ultra; *scapo* parte superiore crasso demum emergente, 7·5–8 dm. long. ad 5–6 mm. diam.; *inflorescentia* distachya spicis crassis omnino densifloris ad 9 cm. long. 8–10 mm. diam., floribus flavis; *tepalis* 2 tenuibus subspathulatis, apice rotundatis basi truncatis, uninerviis 2 mm. long. vix 1 mm. lat.; *staminibus* 6 tepala paullo excedentibus, filamentis e basi latiore gradatim angustatis; *carpellis* 3 cum stylo conspicuo æquilongo demum 3·5 mm. longis; *fructu* subgloboso rostrato 5 mm. long.; seminibus 4–5 oblongis obtusis interiore nigris, testa fulvida minute reticulata translucente alis angustis longitudinalibus percursa laxiter indutis, 2·5 mm. long. 1 mm. crass.

Hab. Southern Rhodesia; in pool above Waterfall Dam near Fort Victoria; no. 404; in flower Aug. 9, 1929. Rua River, Salisbury, 4800 ft. alt., F. Eyles; no. 852; in fruit and flower Oct. 1917 (type).

The pair of bright yellow spikes carried above the surface of the water on the thick fleshy scape are a conspicuous object; of the leaves Mr. Eyles says dull green to dull red above, lighter below; the fruit is dull green.

Its habit suggests a giant form of *A. leptostachyus* E. Mey. It is characterized by the thick fleshy scape and stout spikes, the yellow flowers (tepals, anthers, and styles), subspathulate tepals, and seed envelope.

ISCHÆMUM PURPURASCENS Stapf in Fl. Trop. Afr. ix. 32. Victoria Falls, above the Devil's Cataract on rocks in stream; no. 396; Aug. 7.

ANDROPOGON GAYANUS Kunth var. SQUAMULATUS Stapf, l. c. 263. Matopos, ascent to " World's View "; no. 397 *a*; Aug. 5.

THEMEDA TRIANDRA Forsk. Matopos, ascent to " World's View "; no. 397; Aug. 5.

SETARIA PALLIDE-FUSCA (Schumach.) Stapf & Hubbard (*S. rubiginosa* Miq.). Matopos, ascent to " World's View "; no. 398; Aug. 5. Zimbabwe; no. 396; Aug. 12.

ARISTIDA LEUCOPHÆA Henrard in Med. Van's Rijks Herb. Leiden, no. 54 A, 298 (1927). Near Chibopopo River; no. 389; Aug. 11. Type from Salisbury; Eyles, 2238.

ERAGROSTIS INTERRUPTA Beauv. var. NAMAQUENSIS Schinz & Durand. Waterfall Dam, near Fort Victoria; no. 391; Aug. 9. Chibopopo River; no. 390; Aug. 11.

E. JEFFREYSII Hack. Near Bulawayo; no. 392; Aug. 5. The type-locality.

LIPOCARPHA ARGENTEA R. Br. Zimbabwe; no. 384; Aug. 12.

CYPERUS AMABILIS Vahl. Matopos, crest of " World's View "; no. 383; Aug. 5.

ERIOSPORA VILLOSULA C. B. Clarke. Domboshawa Rocks; no. 382; Aug. 13. On bare granitic soil. The slender wiry stems spring from a stout hard matted rootstock 6–10 ins. high. Previously collected by Swynnerton in the Chimanimani Mts. at 7000 feet.—Nyasaland, Tanganyika Territory.

Very near *E. Oliveri* C. B. Clarke, which has a similar distribution in East Africa, but is not recorded for Southern Rhodesia.

XYRIS MULTICAULIS N. E. Br. Victoria Falls, edge of; no. 377; in fl. Aug. 6.

ERIOCAULON LACTEUM Rendle. Chibopopo River, in marsh, below falls; no. 379 *a*; in fl. Aug. 11.—Angola, Nyasaland.

E. MATOPENSE Rendle. Growing with the preceding; no. 379. Known previously only from the type-locality in the Matopos, where it was collected by Miss Gibbs in 1905.

E. SUBULATUM N. E. Br. Victoria Falls; Livingstone Island; no. 380; Rain Forest; no. 381; in fl. Aug. 6, 7. Plentiful in the saturated ground.

FLOSCOPA RIVULARIOIDES Th. Fr. in Wiss. Ergebn. Schwed. Rhod. Kongo Exped. 1911–12, I. Botan. Untersuch. 223 (1916). Victoria Falls, Livingstone Island, in swamp near edge of the Falls; no. 378; in fl. Aug. 6. Also Livingstone Island, F. A. Rogers; no. 7409; in fruit; Victoria Falls, swampy ground by edge of rain forest, Livingstone Island, and on emerged rocks in the river; Gibbs, nos. 297, 114.

The specimens collected by Miss Gibbs were referred by the late C. B. Clarke to *Floscopa glomerata* Hassk. (Journ. Linn. Soc. (Bot.), xxxvii, 474), but I agree with Th. Fries that we have here a distinct species. It is a much smaller plant, lacking the rather coarse habit of *F. glomerata*, with shorter leaves, smaller sparse inflorescence, and smaller seeds. Clarke (Flor. Trop. Afr. viii. 86) distinguishes *F. glomerata* from *F. rivularis* by the presence of ribs radiating from the embryostega in the seeds of the latter, whereas the seeds of *F. glomerata* are smooth. In *F. rivularioides* the ribs are obscurely indicated.

I have seen typical *F. glomerata* from Southern Rhodesia, from Miami, in and beside running water, Rand, no. 130, and Matopo Hills, 4500 feet, Eyles, no. 1171; also a specimen from Broken Hill, N. Rhodesia, F. A. Rogers, no. 8033.

NOTE:—*Floscopa Elliotii* C. B. Clarke in Flor. Trop. Afr. viii. 88 (1901), Sierra Leone, Scott Elliot, no. 4340, is indistinguishable from *F. axillaris* C. B. Clarke in DC. Mon. Phan. iii. (1881), Sierra Leone, Afzelius, etc., and must be regarded as conspecific.

(To be continued.)

OBITUARY.

GEORGE FORREST
(1873–1932).

MR. GEORGE FORREST, V.M.H., who died early in January of heart failure at Tengyueh, Yunnan, W. China, was probably the most outstanding plant collector of modern times. Although his chief contributions have been to horticulture, it is fitting that this botanical journal should pay tribute to one who has vastly enriched our knowledge of the flora of S.W. China.

Born at Falkirk on March 13th, 1873, he was educated at Kilmarnock Academy. At an early age he became an outdoor naturalist and formed an extensive British herbarium. His was ever an adventurous spirit, and in his early twenties he went to Australia. After some time in the interior, he attempted to reach the coast by crossing a desert area, but as the watering-places on which he had relied had dried up he got into desperate straits and almost died of thirst before he got through. Some three years later on his return journey to Britain, he spent a few months in South Africa working on a fruit farm.

In 1903 he turned to botany and horticulture as a career, and for a short period was engaged in the herbarium at the Royal Botanic Garden, Edinburgh. About this time Mr. A. K. Bulley wanted someone to collect plants of horticultural value in China, and Forrest was recommended to him for this work by Professor Bayley Balfour. The results of his first expedition, 1904–6, justified the belief that western China would yield material of the greatest value to European horticulture. This was fully confirmed by later expeditions. On one occasion during his first journey he was lucky to escape with his life. His native collectors, with one exception, and his French Missionary hosts were cruelly slaughtered at the instigation of the lamas, who objected to the presence of foreigners in their area. Forrest led a fugitive life for ten days in a valley invested by the lamist followers, and owed his escape to a tremendous power of endurance and resource, and ultimately to the help of some friendly natives, who smuggled him to safety in a load of hay. He himself was convinced that his escape was due to the intervention of some supernatural agency. This alarming experience would probably have restrained most men from returning to such an area, but he subsequently organised seven expeditions, most of which necessitated two seasons continuously in the field, though it was many years before he was able to re-visit the scene of these episodes in search of *Rhododendron Forrestii* Balf. f. and other specialties, fragments of which he had contrived to secure and carry in his pocket-book during his flight.

His copious herbarium material approaches 30,000 gatherings, and probably exceeds that number as the result of his last expe-

dition. Each gathering comprises an extensive range of specimens, and the majority of the species are accompanied by seed-collections. It is probable that in quality and richness his herbarium material has never been surpassed. He had developed the technique of plant-drying to a fine point, and the notes with which he accompanied his specimens are a model to all collectors. This is the more remarkable in that Forrest at first had no encouragement to collect herbarium material, the value of which was not appreciated by his then employers. The assistance of his native collectors must not be forgotten. Forrest's influence on these men was remarkable. He gathered around him a devoted band of servants who were ready to accompany him on successive expeditions and whom he had trained in drying methods to his own standard of perfection. This contributed in no small measure to the success of his expeditions.

Forrest did not confine his attention to plants, but found time to make valuable collections of mammals, birds, and insects for museums in this country. His efforts are characterized by the same thoroughness throughout, and testify to his keen observation and real interest in the objects he collected. He was a skilful photographer, and his lectures, illustrated by his numerous fine pictures, provided a feast of information regarding the country itself, its people, and its plants. In the superbly rich area in which he worked Forrest was especially interested in the genera *Rhododendron*, *Primula*, *Gentiana*, *Nomocharis*, and *Meconopsis*. His unique knowledge of these genera in the field was of the greatest value to systematists, and the authoritative accounts now available of most of these genera have been possible only by his unstinted co-operation. His field-work led him to a study of the constituent elements of the flora of South-west China and their relationship with those of neighbouring regions. It is greatly regretted that he left no published account of this subject, of which he had unrivalled knowledge. Indeed, considering the material at his disposal, the amount of his published work was trifling. He was loathe to recount his observations or experiences except in an occasional lecture or in conversation.

Forrest was responsible for the introduction of many plants of great horticultural merit, and his name is commemorated in those of a number of species now in cultivation such as *Osmanthus Forrestii* Rehd., *Aster Forrestii* Stapf, *Dracocephalum Forrestii* W. W. Sm., and *Primula Forrestii* Balf. f. The influence of his travels on the development of horticulture cannot yet be assessed as many of his finest introductions, such as *Manglietia Forrestii* W. W. Sm., have yet to reach maturity. He received many honours. In 1920 the Royal Horticultural Society awarded him the Victoria Medal of Honour, and in the same year the Massachusetts Horticultural Society presented to him the Robert George White Medal of Honour for eminence in horticulture.

The 1924 volume of 'The Garden' and the 1927 number of 'Curtis's Botanical Magazine' were dedicated to him. The Royal Horticultural Society again honoured him in 1927 by awarding the Veitch Memorial Medal, and in 1930 by the presentation of the Rhododendron Cup. He was a Fellow of the Linnean Society from 1924 until 1931.

Forrest was a man of great independence and determination. This, doubtless, accounted for his impatience towards routine. He was essentially a man of outdoor pursuits, and his leisure in this country was mostly spent in fishing, in which he had become proficient in his early youth.

He is survived by his wife, only daughter of the late George William Traill, a well-known authority on Scottish marine Algæ. To her and her three sons we express the sympathy of systematic botanists, who have lost a valued collaborator.—G. Taylor.

SHORT NOTES.

Limonium paradoxum Pugsley.—In August last I went with Mr. Francis Druce to St. David's, Pembrokeshire, to see this rare plant in its native habitat. We had little difficulty in finding it, although its station is very restricted. In one spot there are probably a few hundred plants growing on the ledges and in the chinks of the bare granite cliff. As seen from above, the species may be recognised at once by the capitate appearance of its flower-spikes; and it is remarkably floriferous. It is of relatively dwarf growth, nearly all of the plants bearing scapes about 10 cm. high. With *L. paradoxum* we found one or two clumps of *L. binervosum* (G. E. Sm.) C. E. Salmon, which attracted attention by their taller scapes; and there was one exceedingly floriferous plant, with scapes nearly 30 cm. high, which appears to be a hybrid. Messrs. Sandwith and Alston, who visited the locality independently about the same time, also found a few plants of *L. binervosum* and one or two hybrids among the mass of *L. paradoxum*, and they met with a small colony of the latter, which I did not see, at another neighbouring spot along the cliffs.

The corolla of *L. paradoxum*, which could not be adequately described from the dried material available (Journ. Bot. 1931, 46), differs from that both of *L. binervosum* and of *L. transwallianum* Pugsl. In form it recalls the former, having broadly oblong, retuse, and imbricated perianth-segments, but in size it is less, its diameter being only about 4 mm. In colour it is a clear violet, with a rosy mid-vein to each segment. My recollection of the two allied species is that their corollas are concolorous, and this agrees with the original E. B. drawing of *L. binervosum*. The drawing of the flower of *L. humile* Mill. for 'English Botany' shows pink veins to the perianth-segments, exactly matching

the colouring in *L. paradoxum*. This is the only illustration of a pink-veined *Limonium* flower that I have seen, but it is likely to be an overlooked or inconstant feature in other species.—H. W. PUGSLEY.

LIMONIUM HUMILE Mill. NOT IN THE ISLE OF MAN.—In the Supplement to "Topographical Botany" published in this Journal as a Supplement to vol. xliv. (1906), we find under *Statice bahusiensis* "71. Man. Herb. Mus. Brit." There is no specimen from the Isle of Man in the Museum, but there is one (herb. J. Carroll) labelled "Salt marsh near Douglas, Sept. 1853," which is no doubt responsible for the error. Carroll's specimen is from County Cork.—A. J. WILMOTT.

EVOLUTION IN THE MONOCOTYLEDONOUS SEEDLING: A NEW INTERPRETATION OF THE MORPHOLOGY OF THE GRASS EMBRYO.—Dr. Lucy Boyd (Trans. Proc. Bot. Soc. Edinburgh, xxx. pp. 286–303, 1931) presents a condensed account of the apparent evolutionary trends in the embryo and seedling structure of Monocotyledons, the conditions found in Gramineæ being regarded as the culmination of these tendencies. The author proceeds from a discussion of previous views on the morphology of the embryo and seedling of grasses to a comparison of certain types of grass embryo, previously described by Sargent and Arber, with those of genera in Bromeliaceæ and Zingiberaceæ. The examination of the seedling anatomy of these genera provides the basis of the new interpretation, which differs fundamentally from the commonly accepted theory of the structure of the grass embryo proposed by Sargent and Arber. In the genera of Bromeliaceæ and Zingiberaceæ investigated the plumular axis is traversed, like the so-called mesocotyl of grasses, by vascular strands proceeding directly from the cotyledon, which in certain instances is entirely free from vascular tissue, save in the region of the suctorial tip. The external morphology of these ligulate seedlings affords a clue to that of the grass embryo which exhibits intra-seminally an orientation and differentiation of organs normally attained in other families after germination. Part of the cotyledon in Gramineæ is regarded as having disappeared, only the scutellum (possibly in itself a double organ) and a fragment of the sheathing base, hitherto designated the epiblast, remaining. An interesting account is given of the possible factors concerned in the reduction and loss of cotyledonary tissue and the peculiarities which had formerly to be explained with some difficulty. Bruns and Coulter had a similar conception of the mesocotyl and coleoptile as the plumular axis and the first leaf, but it was based entirely on external morphology and on a belief that the epiblast was a second cotyledon. The present view is the result of a comparative study within the Monocotyledones, and brings

the grass embryo into consonance with the general monocotyledonous type. Adequate figures are provided of the genera investigated. It is to be hoped that the comprehensive survey, of which the present paper is simply an outline, will shortly be available.—G. TAYLOR.

POLYGONUM OXYSPERMUM Mey. et Bge. IN BRITAIN.—An account of this species and its relation to *P. Raii* Bab. (and subsp. *norvegicum* Sam.) is given in the Acta Hort. Berg. vol. xi. no. 3, pp. 68–80, pls. i. & ii. Prof. Samuelsson found in the Stockholm Herbarium material of *P. oxyspermum* from Gosfort in Haddington, and last year, when visiting the Natural History Museum after the International Congress, discovered further specimens from Forfarshire (*Monifieth*, 1845, and *Carnoustie*, 1846: coll. W. Gardiner). I think a specimen from North Yorkshire (sea-wall, Redcar, *T. J. Foggitt*, Sept. 1874) in the same herbarium is identical with these Forfar specimens.

It differs from *P. Raii* in having long internodes (in large specimens from 1·5–4 cm.), the ochreæ on the larger branches being only one-fourth to one-fifth the length of the internode, the laminæ linear to narrowly lanceolate and acutate, not obtuse, and the nut olivaceous or pale brown (to 6 mm.×3 mm.). In addition, the inflorescence tends to be redder and the perianth-segments do not overlap. The colour of the nut is best seen in fully ripe nuts gathered not too late in autumn.

In the same paper the author (pp. 71–72) discusses the variability of *P. Raii* in the British Isles, and notes that he has seen specimens with rich-flowered cymes and scarcely overlapping perianth-segments which strongly approach his subsp. *norvegicum*, and are scarcely separable except by the more red-suffused perianth-segments. Those seen by him were from Arran (1850, *C. F. Meisner* in Hb. De Candolle) and Galway (Dog's Bay, *Lindman & Ostenfeld*, 1911). The former gathering is presumably the same as that now in the Natural History Museum Herbarium, viz., a duplicate from C. F. Meisner in Herb. Shuttleworth collected by Walker Arnott in Brodick Bay in 1850. Like Prof. Samuelsson, I have insufficient material to judge whether it were better placed in his subsp. *norvegicum*, but I should be glad if collectors visiting either of these localities would collect further material and let me see it. The subsp. *norvegicum* Samuelsson (*op. cit.* 72) is defined as differing from typical *P. Raii* "cymulis magis multifloris, perianthii laciniis angustioribus sese non tegentibus late albomarginatis vix roseis."—A. J. WILMOTT.

A VARIETY OF CLEMATIS VITALBA L.—In August 1931 a form of *Clematis Vitalba*, differing markedly from the ordinary plant, was found at Thorley, Isle of Wight. It is characterized

by its long, rather narrowly lanceolate leaflets, and agrees exactly with a specimen in my herbarium labelled "*Clematis Vitalba* Linn. var. *lanceolata* Timb., Garonne, Juil. 1876, Timbal-Lagrave."

A careful search through the works of Timbal-Lagrave, in which Mr. Wilmott has most generously helped me, has failed to find any reference to this variety, and it seems that neither name nor description was ever published. In order that Timbal-Lagrave's association with the plant may not be lost, it is here named var. *Timbali*.

C. Vitalba L. var. *Timbali*, var. nov.; a typo differt foliolis longis anguste lanceolatis acuminatis grosse dentato-serratis vel interdum integris. Typus in Herb. Drabble.

The variety differs from typical *Vitalba* in its long and rather narrowly lanceolate acuminate leaflets, which are generally coarsely dentate-serrate, occasionally entire. The terminal leaflet may be as much as 9 cm. in length by 2·5 cm. in breadth, the lateral ones 6 cm. × 2 cm., in each case exclusive of the stalk. The fruit matured about three weeks later than in the ordinary *Vitalba* with which the variety was growing, but it is uncertain at present how far this is generally characteristic. No intermediates between the type and the variety were found.

A specimen has been placed in the Herbarium at the British Museum.—E. Drabble.

REVIEWS.

Handbuch der Bodenlehre. Edited by Dr. E. Blanck. Bd. VI. *Die physikalische Beschaffenheit des Bodens.* 8vo, pp. vii, 423, 104 figs. Springer: Berlin, 1931. Price 46.60 R.M.
(*Handbook of Soil Science. Physical Properties of the Soil.*)

Soil physics is essentially a border-line subject receiving contributions from and providing material for branches of pure and applied science as far apart as botany and highway engineering. In the few more general treatments of the subject it is possible to recognize local features amounting almost to national characteristics, and depending partly on climatic conditions and partly on the stage of development of agriculture and forestry reached at the time of the awakening of scientific interest in the middle of last century. In this country, drainage of soils was the subject of keen controversy at the beginning of the nineteenth century, but the broad practical questions were settled empirically before the creation of Research Stations and University Departments of Agriculture. Drainage remains empirical, but the successful introduction of fertilizers gave a definitely chemical bias to research and teaching, and soil science still forms a branch of agricultural chemistry for University purposes. We have in this

country only one laboratory specifically devoted to the study of soil physics, and its Head, Dr. B. A. Keen, has recently published one of the Rothamsted Monographs on Agricultural Science with the same title as the German volume under review.

In Germany the organisation of agricultural science took a different form, and many of the agricultural sections of Universities have independent Institutes for Soil Science, Agricultural Chemistry, and Soil Melioration. Soil physics is studied and applied by forest ecologists and by "Kulturtechnikers," who are concerned with the scientific and technical problems involved in land-improvement, especially by drainage. The International Society of Soil Science reflects its continental origin by devoting one of its six Commissions or Sections to this type of work. In North America, with its vast arid areas and its relatively new agriculture, some of the most notable contributions to the subject were made by plant physiologists and ecologists such as Clements, Livingstone, and Shantz, but the Agricultural Colleges and Experiment Stations all have Soil Physics Departments. Civil and irrigation engineers and geologists have added their contributions, and the subject is rapidly being linked up with other branches of applied colloid chemistry and physics.

With such diversity of origin and interest, in addition to language difficulties, it is inevitable that the subject lacks a fundamental unity, and often appears to present a bewildering array of unassimilable information to those who come to it from other subjects. Botanists have not infrequently worked laboriously at questions on which abundant information was already available though admittedly not readily accessible. It is the purpose of this 'Handbuch' to bring together such information, and within the limitations indicated above the compilation is well done. There are six sections: "Soil Texture" (66 pages) by A. Densch; "Soil Water" (155 pages) by M. Helbig; "Soil Atmosphere" (89 pages) by F. Giesecke; "Soil Temperature" (33 pages) by J. Schubert; "Electrical Properties and Radio-activity" (22 pages) by V. F. Hess.

A comparison of Keen's monograph with the German volume may serve not only to illustrate the insularity already pointed out, but to guide the botanist seeking assistance in his own work. There is little overlapping in actual material. Thus Keen treats some thirty-seven papers from the Soil Physics Department at Rothamsted, of which only one is mentioned in the 'Handbuch,' and, on the other hand, Zunker's name appears thirty-five times in the German index, but not once in Keen's. Of eleven authors each quoted more than twenty times in the German volume only four appear in Keen's. The authors have naturally used local data whenever possible, but with the two books available it is unlikely that much of importance will be missed. Keen's book is an eminently readable introduction to broad principles

and research methods, especially on the agricultural side, and the German 'Handbuch' is a compilation of results. In it the ecologist will find abundant useful data on such questions as the evaporating power of the air, the factors influencing the composition of the soil atmosphere, and the effect of forest and other covers on the temperature and moisture content of the soil; together with much formal discussion on capillarity and the theoretical aspects of drainage which he will doubtless prefer to omit.—E. M. CROWTHER, Rothamsted Experimental Station.

Bibliotheca Botanica. Edited by Prof. Dr. L. DIELS. Heft 102 : *Die marine Vegetation der Azoren in ihren Grundzügen dargestellt.* By OTTO CHRISTIAN SCHMIDT. 4to, pp. viii, 116, 104 text-figs., 10 pls., and 6 tables. Price 54 Marks. Heft 103 : *Paläobotanische Monographie des Federseerieds.* By KARL BERTSCH. 4to, pp. viii, 86 text-figs., 3 pls., and 8 tables. Price 50 Marks. E. Schweizerbart'sche Verlagsbuchhandlung : Stuttgart, 1931.

DR. SCHMIDT'S account of the marine vegetation of the Azores forms a valuable addition to marine algology. The author spent several months of the spring and summer of 1928 in investigating the coasts of the Islands of San Miguel, Terceira, and Fayal, and has also made use of the results of previous investigators, especially of W. Trelease (1894 and 1896), whose collections were determined by the late Prof. Farlow, and of Louis Gain (1914), who accompanied the oceanographical journey of the 'Hirondelle II.' under the auspices of Prince Albert of Monaco. Gain's list contains all the species (99 in number) known up to date of publication.

Dr. Schmidt's list (pp. 5–67) includes eight genera of Cyanophyta, twelve of Chlorophyta, twenty-two of Phæophyta, and fifty of Rhodophyta. As a proportion of the genera are represented by two or more species, the enumeration represents a considerable increase in our knowledge of the marine flora of the Azores. Under each species are given references to previous enumerations, detailed localities, geographical distribution, and also critical notes. Small text-figures illustrating points of structure are also frequently included.

Then follows (pp. 68–98) an account of the Formations and Associations classed under the headings Epilitoral, Litoral, and Sublitoral. Epilitoral comprises the *Bangia fusco-purpurea*-Cyanophyte Association, to which is added the *Lichina pygmæa*-Association, characterized by the rock-covering lichen of that name, with which are associated some Cyanophyta and Diatomeæ. The Litoral Group comprises seventeen Associations subdivided into two groups, namely, those with a free exposure

to light and wave-action and those in less illuminated positions—caves and rock-hollows. In the Sublitoral Group are five Associations.

The author then discusses the algo-geographical position of the Azores with the help of a series of tables showing the distribution of the species in Western European, Mediterranean, and Atlantic areas compared with those known for the Azores. He concludes that the Azores represent algo-geographically a subprovince of the North-West-European-Mediterranean province of the Atlantic, that differs essentially from the other subprovinces in wanting many of the otherwise generally distributed Phæophyta and Rhodophyta and in having a number of tropical forms. It represents an area of transition between the South-European-Mediterranean algal vegetation and the tropical-Atlantic.

The text concludes with a bibliography and an index of the plant-names referred to in its pages. The plates are photographic reproductions, a few of habit of individual species, but mainly representing very fair attempts to reproduce the facies of the various Associations described in the text.

In the second publication Karl Bertsch describes an intensive palæobotanical investigation of the Federseemoor in the Wurttemberg Oberland. The area has yielded a rich harvest of finds from the palæolithic period onwards, and the investigation of the successive layers of which it is comprised gave promise of interesting scientific results. The area studied was originally occupied by a lake of glacial origin with a water-surface of about 27 square kilometres, but it has been gradually filling up, and at present the water-area is only about 1·5 sp. kilom. Rapid alteration has gone on during the last two hundred years, and the area now includes some high-moor, peat, and cultivated land.

The author describes botanical features of the successive layers from a large number of borings that have been taken at selected spots, sixty-four in number, the position of which is indicated on a sketch-map. The series of results is classified according to the character of the objects indicating human occupation that have been found—Mesolithic, Neolithic, Bronze Age, and so on. The botanical results of each boring are described in detail, and the prevailing tree-vegetation—pine, fir, oak, beech, birch, hazel, and alder—in the successive layers is indicated by vertical diagrams. There follows a complete list of the species represented, which include nine fungi, eighteen algæ, with diatoms, and four Characeæ, thirty-six Mosses, ten Pteridophyta, five Coniferæ, fifty-six Monocotyledons, and 115 Dicotyledons.

The author finally discusses the relative and comparative value of the results obtained from the different borings, the diagrams of which show a general agreement with individual

differences. The evidence for climatic alterations is also considered. A list of thirty publications dealing with the area in question concludes the text.

The production of these two parts maintains the high standard that we associate with the 'Bibliotheca Botanica.' The high price must, however, seriously limit their sphere of usefulness.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY.—At the General Meeting on February 4, Mr. H. W. Pugsley gave some account of his recent work on the genera *Fumaria* and *Rupicapnos*, especially in Morocco and Dalmatia. He illustrated his account with views projected on the screen, showing the nature of the country.

Miss Godward exhibited an epiphytic green freshwater Alga, *Phœothamnion*, new to Britain, which she had found on water-crowfoot in a pond in Epping Forest. Prof. F. E. Fritsch contributed some general remarks on the genus.

Mr. J. Ramsbottom gave an account of the fungus-stone, *Polyporus tuberaster*. The mycelium of the fungus permeates a solid mass of earth and small stones, and when watered gives rise to a crop of fructifications. A history was given of the phenomenon, which was known to and described by early pre-Linnean European botanists.

Prof. R. R. Gates read a paper explanatory of conceptions of phylogeny in the genus *Œnothera*. The cytology of the numerous forms was described, and emphasis was laid on the part played by hybridization in their origin.

At the General Meeting on February 18, the President, Prof. F. E. Weiss, announced a bequest of "Smithiana" from Dr. Francis Pierrepont Barnard, great grand-nephew of the leading founder of the Society, and gave an account of the various items, which included portraits of the founder and a cabinet of seals with a number of impressions.

Prof. Fritsch showed specimens of the freshwater Alga, *Protosiphon botryoides*, sent by Prof. Oliver from Egypt, where it is found growing abundantly on desert-silt which has become saturated with flood-water after one of the very rare showers.

Miss Jean Dickson exhibited a root of the Scarlet Runner bean in which the tuberous development natural to the species had been somewhat exaggerated. Dr. Tincker showed a comparable example produced by growing the plants under a shortened period of light, and suggested that the late sowing of the beans and the consequent postponement of full development of the plants until the shorter days of the autumn would account for the increase in bulk of the root. The plant is naturally a perennial, though grown in this country as an annual.

Dr. David McCall gave an account, illustrated with lantern-slides, of his intensive study of the diatoms of the Tay District.

AFRICAN NOTES.—II. (*continued*).

By A. B. RENDLE.

(Continued from p. 78.)

Sansevieria Livingstoniæ, sp. nov. *Herba* erecta glabra circa 2-pedalis, caule brevi, *foliis* longis suberectis anguste cylindricis vix 1 cm. diam., lineis duobus longitudinalibus excavatis, margine in sectione transversa undata; *spica* cylindrica densiflora 1·5 dm. longa, floribus ad quemque nodum 4–6, pedicellis 5–6 mm. long. paullo infra medium articulatis; *perianthii* tubo cylindrico 1 cm. longo, lobis 1·3 cm. long. 1·25 mm. lat.

Hab. Victoria Falls, Livingstone Island; in the wood behind the Falls; no. 374; in fl. Aug. 6.

Characterised by its long narrow cylindrical leaves, the smooth surface of which is broken by shallow longitudinal furrows, which are discontinuous, and by two very narrow depressions, which appear as continuous lines running down the leaf. The flowers are creamy-white.

I am unable to match this plant with any of the species included in Mr. N. E. Brown's monograph in the 'Kew Bulletin' (1915). It approaches *S. Pearsonii* N. E. Br., but is distinguished by the leaf-characters. It is probably the *S. cylindrica* Bojer of Eyles's list (p. 325), but, as Mr. Brown has shown, this is a distinct Madagascar species and has not hitherto been found in East Africa.

TREMA GUINEENSIS Ficalho. Zimbabwe; no. 367; in fl. Aug. 11.

FICUS BURKEI Miq. Macheke, 70 miles east of Salisbury, 5000 ft.; no. 369; in fr. Aug. 14.

F. CAPENSIS Thunb. Victoria Falls, Livingstone Island, growing in the spray on the edge of the Fall; no. 370; in fl. and very young leaf, Aug. 6.

LORANTHUS ERIANTHUS Sprague in Fl. Trop. Afr. vi. 360. Dry veld two miles from Fort Victoria; on *Rhus* sp.; no. 363; in fl. Aug. 10. The type is from N.W. Rhodesia at 4000 ft.

L. KALACHARIENSIS Schinz. Dry veld two miles from Fort Victoria; on *Acacia nigrescens* (Knubbly Tree); no. 362; in fl. Aug. 10. A very decorative species with tassels of large flowers, crimson passing into ivory-white below; stamens and style bright crimson.—Angola to Nyasaland.

POLYGONUM LAPATHIFOLIUM L. Waterfall Dam near Fort Victoria; no. 360; in fl. Aug. 9. By the pool above the Dam.

AMARANTUS GRÆCIZANS L. Sawmills, 60 miles N.W. of Bulawayo; no. 350; Aug. 8. A very reduced form in dry sand by railroad.

PSILOTRICHUM GRACILENTUM C. B. Clarke. Domboshawa Rocks; no. 355; in fl. Aug. 13.

ALTERNANTHERA ECHINATA Smith. Sawmills; no. 357; in fl. Aug. 8. Dry sand by railroad.

GOMPHRENA DECUMBENS Jacq.; Burtt Davy, Fl. Transv. 185. Bembesi; no. 354. Dry sand by railroad. An introduction from the New World. Erroneously referred on p. 75 to *G. globosa* L.

PHYTOLACCA DODECANDRA L'Hérit. Chibopopo River; climbing near waterfall; no. 358; in fl. Aug. 11.

CASSYTHA FILIFORMIS L. Victoria Falls, Livingstone Island; no. 361; in fl. Aug. 6.

GYNANDROPSIS PENTAPHYLLA L. (Capparidaceæ). Inyazura, 40 miles N.W. of Umtali, at 3995 ft.; no. 251; in fl. Aug. 14.

DICRÆA TENAX C. H. Wright (Podostemonaceæ). Victoria Falls, plentiful on rocks in the stream immediately above the Devil's Cataract; no. 415; in fr. Aug. 7. This is identical with the plant collected at the Falls by Miss Gibbs (no. 322), which I named from incomplete material (in Journ. Linn. Soc. xxxvii. 466) *Sphærothylax* sp. I am indebted to Mr. G. Taylor for the determination.

KALANCHOE GLANDULOSA Hochst. Chibopopo River, on rocks near waterfall; no. 260; in fl. Aug. 11.

K. ROTUNDIFOLIA Haw. Chibopopo River, on rocks near waterfall; no. 261; in fl. Aug. 11.

Kalanchoe zimbabwensis, sp. nov. *Herba* (?) annua erecta glandulo-pilosa, pilis simplicibus, 1½–2-pedalis, caule subrobusto simplici ad ·5 cm. diam.; *foliis* oppositis, inferioribus obovato-rotundatis subsessilibus, c. 5 cm. long., 4 cm. lat., margine obscure sinuata, apice rotundato, pari superiore oblanceolato 4 cm. long. (petiolo brevi incluso), 1·3 cm. lat., apice obtuso, basi in petiolum 7 mm. long. transgrediente; *cymis* in capitulo denso hemisphærico 6 cm. diam. aggregatis, et in capitulis 2–4 parvis paucifloris pedunculatis in parte caulis superiore, bracteis lineari-angustatis ad 7 mm. long.; *floribus* aurantiacis subsessilibus, *calyce* densiter glandulo-piloso pæne usque ad basin diviso, segmentis 4 ovato-lanceolatis subacuminatis, 5 mm. long.; *corollæ* tubo supra medium constricto sparsius glandulo-piloso, 8·5 mm. long., lobis 4 late ellipticis abrupte apiculatis, 4–5 mm. long., 3·5 mm. lat.; *antheris* supra medium tubi insertis; *gynœcio* 6 mm. long., stylis conniventibus, stigmatibus capitatis; *squamis* linearibus subobtusis 1 mm. long.

Hab. Southern Rhodesia; on rocks by Chibopopo River; no. 259; in fl. Aug. 11, 1929. Zimbabwe; Dame Alice and the Misses Godman; no. 162; in fl. Aug. 1929.

The species is well characterised by its dense heads of deep orange-coloured flowers. Two to four small few-flowered heads are borne in both the specimens on peduncles up to 4 cm. at nodes down to 10 cm. below the main head. The glandular hairs with which the stem and inflorescence, and to a less degree the leaves, are covered are simple and many-celled, with a small globular head.

Specimens collected by Eyles (no. 1678) at Umtali, "on granite hill" at 3700 ft., June 1919, "flowers flame-red" seem to represent a form of this species. It is a plant, apparently annual, about a foot high, with a smaller terminal head about 5 cm. in diameter and redder flowers, there are no lower flower-heads; the lower leaves (7×4·5 cm.) resemble those of the species, but have a short stalk, about 1 cm. long.

The affinity of this species is with the South Tropical African *K. lanceolata* Pers. (*K. glandulosa* Hochst.), in which Hamet in his monograph of the genus (Bull. Herb. Boiss. 1908, 32) includes several species which other authors regard as distinct. Eyles's plant has been named tentatively *K. Kirkii* N. E. Br., a much larger species with a very different appearance, a paniculate inflorescence, and larger flowers. *K. glandulosa* var. *rhodesica* Bak. fil. differs in its open inflorescence, longer corolla-tube, and other points.

VAHLIA CAPENSIS Thunb. (Saxifragaceæ). Bembesi, 4482 ft., 30 miles N.E. of Bulawayo; no. 269; in fl. Aug. 8. In dry sandy soil by railroad.

LISTIA HETEROPHYLLA E. Meyer (Leguminosæ). Fort Victoria, by dry drift on veld; no. 408; in fl. Aug. 10.

ÆSCHYNOMENE MIMOSIFOLIA Vatke forma. Domboshawa Rocks; no. 414; in fl. Aug. 13. On granitic rocks.

SPHENOSTYLIS ERECTA Bak. fil. Chibopopo River, on dry bank by marsh below waterfall; no. 407; new flowering shoots just breaking from old stem, Aug. 11.

RHYNCHOSIA RESINOSA Hochst. Matopos, ascent to "World's View"; no. 409; in fl. Aug. 5. Chibopopo River, near Zimbabwe; no. 410; in fl. Aug. 11.

ERIOSEMA ELLIPTICUM Welw. By Chibopopo River; no. 405; in fl. Aug. 11.

E. ENGLERI Harms. By railroad 10 miles from Veldt, S.E. of Salisbury; no. 406; in fl. Aug. 13.

PTEROCARPUS ANGOLENSIS DC. Zimbabwe; no. 411; in fr. Aug. 12.

BRACHYSTEGIA RANDII Bak. fil. Fort Victoria; no. 412; small tree on veld; in fl. Aug. 10.

OXALIS CORNICULATA L. Zimbabwe; no. 258; in fl. Aug. 11.

POLYGALA PYGMÆA Gürke. Matopos, " World's View " ; no. 373 ; in fr. Aug. 5.—Tanganyika Territory and Uganda.
Chodat regards this as a small form of the Angolan *P. Welwitschii* Chodat.

SECURIDACA LONGIPEDUNCULATA Fries. Domboshawa Rocks ; no. 252 ; in fr. Aug. 13.

PSEUDOLACHNOSTYLIS MAPROUNEÆFOLIA Pax (Euphorbiaceæ). Matopos, ascent to " World's View " ; no. 424 ; near Bulawayo ; no. 425 ; in fr. Aug. 5.

EUPHORBIA MATABELENSIS Pax. Domboshawa Rocks ; no. 364 ; leafless, in fl. Aug. 13. A small spiny shrub.

E. HYPERICIFOLIA L. Sawmills, 60 miles N.W. of Bulawayo ; no. 365 ; in fl. Aug. 8. A small prostrate plant in dry soil by railroad.

E. PROSTRATA Ait. Sawmills ; no. 420 ; in fl. Aug. 8. Growing near the previous species and similar in habit.

E. SANGUINEA Hochst. & Steud. Bembesi, 30 miles N.E. of Bulawayo ; no. 366 ; in fl. Aug. 8. Similar in habit and locality to the last two species.

BRIDELIA CATHARTICA Bertol. fil. Near Victoria Falls ; no. 419 ; in fr. Aug. 7.

RHUS LANCEA Linn. fil. Near Fort Victoria, on dry veld ; no. 266 ; in fl. Aug. 10. A small tree.

GREWIA FLAVESCENS Juss. Near Fort Victoria, on dry veld ; no. 421 ; in fr. Aug. 10. A shrubby climber with winged stem. The 2–4-lobed chestnut-brown fruits covered with stellate hairs are very attractive.

TRIUMFETTA MASTERSII Bak. fil. By railroad, 10 miles from Veldt, S.E. of Salisbury ; no. 255 ; in fl. Aug. 13.

SIDA CORDIFOLIA L. By railroad, 30 miles N.W. of Bulawayo ; no. 256 ; in fl. Aug. 5.

HIBISCUS RHODANTHUS Gürke. By railroad, 10 miles from Veldt, S.E. of Salisbury ; no. 257 ; in fl. Aug. 13.

DOMBEYA ROTUNDIFOLIA Harv. Fort Victoria ; no. 254 ; in fl. Aug. 9.

WALTHERIA AMERICANA L. Near Bulawayo ; no. 253 ; in fl. Aug. 5.

ROTALA LONGISTYLA Gibbs (Lythraceæ). Victoria Falls, Rain Forest ; no. 418 ; in fl. Aug. 7. The type locality.

AMMANIA MULTIFLORA Roxb. Waterfall Dam, near Fort Victoria ; no. 359 ; in fl. Aug. 9. In dry sand near the pool.

NESÆA FLORIBUNDA Sond. Victoria Falls, open ground, near the Rain Forest ; no. 272 ; in fl. Aug. 6.

N. RADICANS Guill. & Perr. Victoria Falls, Rain Forest ; no. 271 ; in fl. Aug. 6.

COMBRETUM APICULATUM Sond. Matopos, ascent to " World's View " ; no. 400 ; in fr. Aug. 10.

C. GUEINZII Sond. var. HOLOSERICEUM Exell (*C. holosericeum* Sond.). Near Chibopopo River ; no. 403 ; in fr. Aug. 11.

C. PORPHYROLEPIS Engl. & Diels. Near Fort Victoria, on dry veld ; no. 401 ; in fr. Aug. 10.

C. VILLOSISSIMUM Engl. Victoria Falls, near Devil's Cataract ; no. 402 ; in fr. Aug. 7.

C. ZEYHERI Sond. Near Fort Victoria on dry veld ; no. 399 ; in fr. Aug. 10. A small tree.

C. OATESII Rolfe. By railroad, Nortons, 20 miles west of Salisbury ; no. 262 ; in fl. Aug. 13.

ZYZYGIUM GUINEENSE DC. (Myrtaceæ). Domboshawa Rocks ; no. 263 ; in fl. Aug. 13.

JUSSIEUA cf. SUFFRUTICOSA L. Zimbabwe ; no. 267 ; in fl. & fr. Aug. 11.

HETEROMORPHA ARBORESCENS Cham. & Schlecht. (Umbelliferæ). Victoria Falls, near Rain Forest ; no. 423 ; Aug. 6.

PEUCEDANUM ARALIACEUM Hochst. Victoria Falls, near Rain Forest ; no. 422 ; in fr. Aug. 6.

PLUMBAGO ZEYLANICA L. Inyazura, Mashonaland, at 3995 ft. ; no. 317 ; in fl. Aug. 14.

EUCLEA MULTIFLORA Hiern (Ebenaceæ). Near Chibopopo River ; no. 275 ; in fl. Aug. 11. A bush.

Diospyros odorata Hiern ex Greves var. nov. **rhodesiana.** *Arbor* parva valde ramosa ramulis rugosis ; *foliis* coriaceis ellipticis apice et basi rotundatis vel interdum obtusis breviter petiolatis, ad 8 cm. long., 4 cm. lat. ; *floribus* inter minores crassiusculis in foliorum axillis aggregatis tomento atro-brunneo dense indutis ; *masculis* calyce campanulato c. 5 mm. long., 4–5-lobo, lobis late ovato-rotundatis, corolla hypocrateriforme, tubo lato 9 mm. long. 4 mm. lat., limbis 4–5 patentibus saturate rubris late ellipticis 5×4 mm., staminibus 13–16, filamentis vix 1 mm. long., antheris apiculatis 4–5 mm. long. ; *femininis* calycis segmentis ovato-obtusis 2 mm. long., corollæ tubo brevi 2 mm. long., lobis ovato-obtusis 5 mm. long., staminodiis geminis, ovario subsphærico.

Hab. Southern Rhodesia: Victoria Falls, open ground between the Hotel and Gorge; no. 318; in flower Aug. 6, 1929.

A small tree barely 15 ft. high, much branched and densely leaved. The young twigs and petioles bear a sparse adpressed very dark red-brown tomentum similar to that in which the leaf-buds and inflorescence are densely enveloped. Leaves polished green above, grey-green beneath, and sparsely hairy on the midrib and surface when young; petioles about 5 mm. long. Flowers covered on the outside with the characteristic velvety tomentum which remains in the open flower on that portion of the spreading corolla-lobes which is exposed in the bud.

Very near to the Angolan *D. odorata* Hiern, but differing in its broadly elliptical leaves and slightly smaller flowers. The rugose branchlets and dark brown velvety tomentum are characteristic of both. I have described the plant in full, as the description of *D. odorata* (Journ. Bot., Suppl. 1929, 78) does not accord in every respect with the specimens—three numbers of Gossweiler in Herb. Mus. Brit. It is described as *arbor magna*, but Gossweiler's notes on the specimens describe them respectively as "a smallish tree," "15 ft.," and "up to 30 ft." The leaves are not ovate, as described, but narrowly elliptical to oblong-elliptical, sometimes subacuminate. Nor can I understand the description of the flowers as bisexual—all that I have examined were male; and the anthers are not "alate," the thin membrane of the dehisced anther-cells may have conveyed this impression.

SEBÆA BARBEYANA Schinz. Victoria Falls, Rain Forest; no. 323; in fl. Aug. 7.

CANSCORA KIRKII N. E. Br. Victoria Falls, Livingstone Island, no. 321; Rain Forest, no. 322; in fl. Aug. 6, 7. The type locality.

CYNOGLOSSUM LANCEOLATUM Forsk. Chibopopo River; no. 324; in fl. Aug. 11.

IPOMŒA PALMATA Forsk. By railroad, Pasipas, near Bulawayo; no. 325; in fl. Aug. 5.

PLECTRANTHUS FLORIBUNDUS N. E. Br. (Labiatæ). Chibopopo River; no. 348; in fl. Aug. 11. A showy plant with lilac-blue flowers.

LEUCAS MILANJIANA Gürke. By railroad Odzi, 20 miles west of Umtali, 3100 ft.; no. 349; in fl. Aug. 14.

APTOSIMUM DECUMBENS Schinz (Scrophulariaceæ). 'Big Tree' Grove (*Adansonia digitata*), one mile above the Victoria Falls; no. 351; in fl. Aug. 6. A trailing shrub.

Nemesia zimbabwensis, sp. nov. *Herba* annua erecta, a basi ramosa, ramis patenti-ascendentibus vel suberectis; *caulibus ramisque* foliatis quadrangulis, juventute sparsim glanduloso-puberulis denique glabrescentibus; *foliis* membranaceis glabris ovatis acutis super basin serratis, basi rotundata vel latissime inæqualiter cuneata, nervo mediano in sicco conspicuo nervis utrinque 1 vel 2 e basi laminæ ascendentibus, 1·5–3 cm. long., ·8–1·8 cm. lat., petiolis tenuibus 4–7 mm. long; *racemis* caulem et ramos terminantibus brevibus paucifloris in fructu paullo elongato, 2–5 cm. long.; bracteis oppositis foliaceis petiolo breviore vel sessilibus, in racemo elongato alternantibus superne deminuentibus ovato-acuminatis vel ovato-lanceolatis; *floribus* parvis delicatulis albidis pedicello tenuissimo minute puberulo c. 6 mm. long.; *calycis* lobis linearibus vel lineari-oblongis subobtusis, 1–3-nerviis, sparsim glanduloso-puberulis, vix 3 mm. long.; *corollæ* glabræ labio superiore 4-lobo, 4–5 mm. long., lobis lateralibus late ellipticis rotundatis vix 2 mm. long., medianis angustioribus obtusis 2 mm. long., labio inferiore 5 mm. long. emarginato, palato bilobulato glabro, calcare e basi latiore tenui cylindrico 3 mm. long.; *capsula* subcoriacea compressa urceolata sub vertice vix constricta, leviter bicornuta latissime truncato-emarginata, marginibus loborum incrassatis, ·7–1 cm. long. c. 5 mm. lat.

Hab. Southern Rhodesia: Zimbabwe; no. 329; in flower and young fruit, Aug. 11, 1929. Also collected at the same place by Dame Alice and the Misses Godman, no. 171, Aug. 1929.

My own specimens are small herbs not exceeding 6 cm. high, the Godmans' gathering consists of a slender broken-off flowering and fruiting shoot 3 dm. long.

In leaf-characters this species very nearly resembles the South African *N. melissæfolia* Benth., but is a far less robust plant apparently annual and with flowers of only about half the size.

SUTERA FISSIFOLIA S. Moore. Fort Victoria, by nearly dry drift on veld; no. 327; in fl. Aug. 10.

BUCHNERA cf. ENSIFOLIA Engl. By railroad, Bembesi, 30 miles N.E. of Bulawayo; no. 352; in fr. Aug. 8.

ILYSANTHES PARVIFLORA Benth. Waterfall Dam near Fort Victoria, in dry sand near pool; no. 320; in fl. Aug. 9. Widely distributed in Tropical Africa.

UTRICULARIA DIPLOGLOSSA Welw. Chibopopo River, in little puddles of water in grassy marsh below the Falls; no. 332; flowers yellow; Aug. 11.—Huilla (Angola).

U. KIRKII Stapf. Victoria Falls, Livingstone Island; no. 334; in fl. Aug. 6. The type locality.

U. TRANSRUGOSA Stapf. Chibopopo River, grassy marsh below the Falls; no. 331; in fl. Aug. 11.

U. WELWITSCHII Oliver. Chibopopo River, grassy marsh below the Falls; no. 333; in fl. Aug. 11. Flower purple with yellow palate.

PHAYLOPSIS PARVIFLORA (Acanthaceæ) Willd. Victoria Falls, Livingstone Island; no. 340; in fl. Aug. 6.

P. MICROPHYLLA T. Anders. Chibopopo River; no. 338; in fl. Aug. 11.

DISPERMA VISCIDISSIMUM S. Moore. Above the Victoria Falls; no. 342; in fl. and fr. Aug. 6. The type locality.

HEMIGRAPHIS TENERA C. B. Clarke. Victoria Falls, Rain Forest; no. 341; in fl. Aug. 6.

(To be continued.)

LICHENOLOGICAL NOTES.—VI. (*concluded*).

BY W. WATSON, D.SC.

(Concluded from p. 72.)

PHYSCIA MELOPS (Duf.) Nyl. A specimen collected on bark at Walkerburn (78) was sent to me as having been so determined by Nylander. It does not correspond either to description or to other authenticated specimens, but agrees very well with *P. aipolia* var. *cercidia*. All the specimens of *P. melops* I have seen are saxicolous, and are not unlike *P. cæsia* var. *teretiuscula* except for the absence of soralia, though perhaps the laciniæ of Crombie's type-specimen are a little flatter. Chard (5), Ashton Court near Bristol (6), Aberystwyth (46), Mam Tor near Castleton (57), Arbroath (90, *leg.* W. Smith).

P. HISPIDA form SUBOBSCURA (Nyl.) A. L. Sm. Aberystwyth (46). Lynge in Mon. Norw. Phys. revives E. Nylander's unsuitable name of *marina* and elevates it to specific rank.

P. LITHOTEA (Ach.) Nyl. The locality given for this plant for v.c. 6 in my 'Lichens of Somerset' is Clevedon, and this is near the sea. The plant is usually a maritime species, but occasionally occurs inland, as on a slate roof at Orchard Portman in v.c. 5.

DIRINA REPANDA (Fr.) Nyl. A sorediate form occurs at Berry Head in S. Devon (3). This may be distinguished as form *sorediata*.

ARTHONIA ASPERELLA Leight. Clatworthy (5), Guiting Wood (33, H. H. K.), Devil's Bridge (46), near Ardlui (99).

A. ASPERSA Leight. On ash, Langford Heathfield (5).

A. DISPERSA (Schrad.) Nyl. On ash, Langford Heathfield (5).

A. EXCIPIENDA (Nyl.) Cromb. On holly, Clatworthy (5).

A. PUNCTIFORMIS var. MELANTERA (Ach.) Leight. Somerton (6), Ben Doran (98).

ALLARTHONIA PATELLULATA (Nyl.) Zahl. On bark, Torrent Walk, Dolgelly (48). This specimen was collected by Mr. Travis in 1923. It had previously been known only from Ireland.

PHÆOGRAPHIS INUSTA (Ach.) Müll. This has recently been noted for Dorset (9) on trees near Beaminster. It is not uncommon in the south-western counties of England.

OPEGRAPHA LITHYRGA Ach. This was detected with a specimen of *Thelidium mesocarpum* collected from a wall near Llanbedr (48) by D. A. Jones.

VERRUCARIA PROMINULA Nyl. On rocks near the sea, but well above tide-marks, Bangor (with var. *minor* A. L. Sm., 49, D. A. J.), St. Bees Hd. (70, leg. Travis).

V. LORRAINSMITHIÆ Knowles. Mr. Jones has found this at St. David's (45), near Harlech (48), and near Beaumaris (52).

V. STRIATULA Wahl. Near Harlech (48, D. A. J.).

V. AQUATILIS Mudd. On stones in stream to Llyn Idwal (49) and in a tributary of the Wharfe above Buckden (64).

V. MACULIFORMIS Kremp. Compass Cove near Dartmouth (3), frequent in v.c. 5 (Lich. Som.), Somerton (6), Barmouth (48). It is often found on slaty rocks, and is much more frequent than is generally understood.

V. MUTABILIS Borr. Maentwrog (D. A. J.) in v.c. 48.

V. PSEUDOMEMNONIA Zsch. Harlech (48). This is the *Verrucaria* which has been given as *V. maura* var. *memnonia* Wedd. According to Zschacke *V. memnonia* Flot. ex Krb. does not refer to this plant, and therefore he has renamed it. The true *memnonia* has a very thin and continuous crust, the numerous perithecia form hemispherical warts 0·2 mm. broad, the spores are 14–18 × 4–5 μ, and the hymenial gelatine is reddened by iodine.

V. MUCOSA Wahl. is usually on rocks below the level of high-tide, and often extends a considerable distance below, whereas the other maritime Verrucarias are usually above or near high-tide level: Mullion etc. (1); Kynance (1, D. A. J.); Lynmouth (4); Quantoxhead etc. (5); Clevedon etc. (6); Harlech (48, D. A. J.); St. Abb's Hd. (81, D. A. J.). It has been recorded from v.c. 2 by Holmes (Vict. Count. Hist. Cornwall), and I have a record without precise locality from v.c. 3, so that it occurs in

vice-counties 1–6. The few localities in which it has been found in northern counties are widely distributed, and suggest that the plant is a frequent member of the lowest maritime zone where lichens occur.

V. MICROSPORA Nyl. Blakeney Pt. (27), Aberystwyth (46), Harlech (48). It is frequent on the coasts of Somerset (5–6, Lich. of Som.) and S. Devon (3). The variety (or form) *mucosula* Wedd. occurs in v.c. 6 at Clevedon and in v.c. 48 at Harlech.

V. MICROSPOROIDES Nyl. occurs on rocks near high-tide level at Clevedon in v.c. 6.

V. MURALIS var. SUBMURALIS (Byl.) Oliv. On limestone, Taunton (5) and Boxhill (17).

V. INTEGRA (Nyl.) Carroll. Dovedale (57, H. H. K.), Pickering (62), Buckden (64).

V. CŒRULEA D. C. Chalford (33). Recorded from Chedworth in that district by Joshua (Leight. Fl. ed. 3, p. 452).

DERMATOCARPUM MINIATUM var. COMPLICATUM form DECIPIENS (Mass.) A. L. Sm. Pass of Llanberis (49), Cautley Sprout (65, *leg.* W. West).

D. AQUATICUM (Weiss.) Zahlb. On stones in streams, Trevaylor near Penzance (1), Exmoor (5), R. Artro etc. (48), Llyn Idwal etc. (49), Hawkshead (69).

NORMANDINA PULCHELLA (Borr.) Cromb. Usually on mossy trunks of trees, where it has been found in several places (Castle Neroche etc.) in v.c. 5. Near Corfe Castle (9) Mr. Jones and I noticed it on old mossy thatch of a barn.

THELIDIUM MESOTROPUM (Nyl.) A. L. Sm. Bwlch Gwyn (50, D. A. J. !).

T. PYRENOPHORUM (Ach.) Mudd. May Hill (34, H. H. K. !).

T. MICROCARPUM (Dav.) A. L. Sm. On small stone in mortar of old house (near Hebron) on Snowdon path from Llanberis.

T. CATARACTARUM (Hepp.) Lönnr. The spores in this plant of rocks in streams are very variable in regard to the number of septa. It is often associated with *Aspicilia lacustris* in the specimens collected by Mr. Jones at Maentwrog in the R. Artro and at Talsarnau in v.c. 48. Variations occur in the spores of the specimens in the British Museum (*see* Mon. Brit. Lich. ii. ed. 2, 326) and on this account Zschacke has described two new species. Mudd's 281 from near Ayton (62) with spores 1–3-septate, 25–36 × 10–14 μ is *T. subgelatinosum* Zsch., whilst Leighton's 319 with spores always 1-septate, 21–32 × 10–11 μ is *T. margaceum* Zsch. In the material from the stream-bed at Talsarnau most of the spores

were 1-septate, a 3-septate one only occasionally being met with, so that this specimen would go under Zschacke's *T. subgelatinosum*, although the perithecia are often over 0·25 mm. diameter. In the Maentwrog material the spores were too ill-developed for critical work, but it probably belongs to the same Zschackian species also. It was associated with *Staurothele umbrinum*, in which the spores were also ill-developed, seldom becoming dark brown in colour. Other points of difference noted by Zschacke are that in *T. cataractarum* the thallus is not paraplectenchymatous, the perithecia are less emergent, slightly larger (up to 0·27 mm. diameter), and have a special involucrellum. In the other two the thallus is paraplectenchymatous, the perithecia are almost sessile (often less than 0·2 mm. diam.) and have no special involucrellum. There is probably more variation in characters than Zschacke allows for and Lorrain Smith (Mon. Brit. Lich. *loc. cit.*) is probably correct when she considers that in Leighton's specimen (given as a new species, *T. margaceum*, by Zschacke) the spores are arrested in development.

T. INCAVATUM Arn. On calcareous rocks, near Yatton and Wells (6), Cheltenham (33, H. H. K.), Bwlch Gwyn (50), Buxton (57, H. H. K.). In Mon. Br. Lich. 1926, this is given as *T. auruntii* Kremp., *fide* A. Zahlb. Cat. Lich. Univ. This is not in accordance with Zschacke's monograph ('Hedwigia,' 1923) on this group. He states that *T. auruntii* Mass. (1853) is *Verrucaria incavata* Nyl. (1861), but considers that *incavata* as collected by Mudd and Leighton in this country is not the same plant. *T. auruntii* Mass. has a blackish-brown thallus, the perithecia are semi-immersed, impressed at the apex, the wall dark and entire, with a fairly strong involucrellum, and the spores are 1-septate, 23–35 × 9–15 μ, whereas *T. incavatum* Arn. (*V. incavata* Leight., 1871, *V. pyrenophora* var. *incavata* Nyl., ex Mudd, 1861) has a whitish or greyish thallus, the perithecia are immersed, the apex visible but not truncated, not walled round by the thallus, and the spores are usually 3-septate and larger (30–50 × 13–18 μ). Zschacke may not be strictly correct in using the name *incavatum*, but the *Thelidium* occurring in the stations given above is certainly not *T. auruntii* as defined by him or by Lindau. Zschacke also states that some British specimens of *T. incavatum* collected by Mudd belong to *T. bavaricum* D. T. & S., which differs in spore-characters, some longitudinal divisions occurring, though the number of divisions is insufficient to warrant the lichen being placed with *Polyblastia*. Mudd collected specimens from Bilsdale (62) and Castle Eden (66). There are often slight variations in the septation of the spores in *T. incavatum* and those mentioned by Zschacke seem to fall within the possible variations occurring within the species.

STAUROTHELE HYMENOGONIA (Nyl.) Zahl. Near Taunton (5), in one case the thallus was blackened and obscured by *Glœocapsa*, Wytham (23, D. A. J. & H. H. K.), Llanwrytd Wells (42, H. H. K. !), Llangollen (50, H. H. K. !).

S. RUPIFRAGA (Mass.) Arn. Cheddar etc. (6, with var. *pauci-spora* Wats. Lich. Som.), Coldwell Rocks (34), Clogwyn Dur-arddhu (49), Peel (71, recorded as *V. terebrata* by Wilkinson).

POLYBLASTIA INTERCEDENS (Nyl.) Lönnr. Cheddar (6, H. H. K. !), Buckden (T. Hebden).

P. HENSCHELIANA (Krb.) Lonnr. Maentwrog (48, D. A. J. !), Cwm Idwal (49), Loch Tulla (98), near Ardlui (99).

Arthopyrenia Knightii, sp. nov. *Thallus* cinereus tenuis aut obsoletus cum gonidiis flavo-rufescentibus. *Perithecia* minuta plus minusve circa 0·1 mm. nigra orbiculata plus minusve convexa congregata in gregibus quinque usque ad viginta vel plura ; ascus ovato-clavatus sæpe ad basim paullum curvus circa $50 \times 16\,\mu$, superne muro crasso hyalinoque ; paraphyses tenues ramosæ plus minusve erectæ sed interdum flexuosæ et paullum implicatæ ; *hymenium* solum cum iodo flavescens, asci et sporæ rufescento-fuscæ ; sporæ octonæ, non seriatim, hyalinæ $15 \times 4\,\mu$ vel paullum majores, uniseptatæ, loculus superior major quam loculus inferior qui acutior est. Calcicola.

This was collected at Birdlip in Gloucester (33) in 1919 by Mr. Knight. It has more definite paraphyses than either *A. saxicola* Mass. or *A. socialis* Krb. From *A. saxicola* its chief difference is in the congregate perithecia, whilst its spores are too long for *A. socialis*.

A. CINEREOPRUINOSA (Schaer.) Krb. Trevaylor (1), near Taunton and Wiveliscombe (5, with form *Hederæ* Arn.), Somerton (6), Harlech (48, D. A. J.), Bettws-y-Coed (50, H. H. K.).

VEGETATION AT BRISLINGTON RAILWAY STATION, NORTH SOMERSET.

BY H. STUART THOMPSON, A.L.S.

BRISLINGTON is the first suburban station on the picturesque single line of railway from Bristol to Radstock. The North Somerset Junction railway was opened on Sept. 3, 1873, and the property was acquired by the G.W.R. Company in 1884. The line runs north and south at Brislington, and on the Bristol side of the station it is in a cutting through the New Red Sandstone which overlies the grey Pennant Sandstone.

The following is a brief sketch of the interesting phanerogamic vegetation of the railway and its banks from the south end of Brislington Station northwards about 400 yards to the second bridge, which carries the main road from Bristol to Bath. It is based upon a survey made there on July 20 and August 25, 1931, and casual observations by the writer since 1915. I listed all the wild plants observed in July and August (1) between the metals, (2) on the grassy sides and sandstone banks, and (3) on or about the short road approach to the station from Knowle Lane (now Talbot Road) which passes over the first bridge. This lane forms part of the municipal boundary of Bristol.

In 1915 I was first attracted to the spot after noticing from a train large colonies of *Trifolium arvense*, *Œnothera odorata*, and some *Berteroa* (*Alyssum*) *incana*. These three species have increased considerably since the War. It does not appear to be known when they got introduced ; but White says of the last, in his 'Flora of Bristol,' p. 154 (1912), "A casual . . . introduced with foreign grain and not established anywhere." For *Trifolium arvense* he gives several localities on sandstone or colliery débris in the Avon Valley (Glos), and he quotes Swayne in 'Withering' for Wyck Cliffs (Glos) and J. Foster in 'Swete,' 1854, for "Brislington." Personally I have never seen *T. arvense* in Somerset or Gloucester nearer than the Somerset coast, except at Brislington Station. R. P. Murray ('Flor. Somerset,' 81, 1896) does not record this plant from Brislington, but from N.E. of Bath—viz., "By the railway between Bathampton and Bathford." Nor does he mention *Alyssum incanum* at all, and *Œnothera odorata* only from the coast of Somerset.

Mr. White believes the Avon Valley *Trifolium* is var. *strictius* Koch. The name was given by Herr Freyn. Of recent years this Hare's-foot Trefoil has increased greatly on the railway, and become the dominant plant on both sides, but especially on the west bank. This is far less bushy than the east bank, which beyond the first (station) bridge is rough with *Rubi*, *Salices*, and several other shrubs and young trees.

Of *Œnothera odorata* White (*loc. cit.*) says : "Plentiful in a cutting of the N. Somerset Railway 150 yards north of Brislington Station, 1907." No other localities are given, except a few on the sandy coast of Somerset, where, *e. g.*, between Berrow and Burnham, Mr. White and I have known it for 48 years, and I have a specimen *ex Herb.* Thomas Clark dated 1859. This elegant alien from Patagonia is so prolific a seeder than one would expect to see it elsewhere more often than is the case.

At least 120 species of phanerogams were noted by me, mostly on August 25th, in the small area dealt with. Doubtless some others, of small stature, would have been visible in June. About 25 species grew between the metals, though the permanent

way was cleaned of weeds only some six weeks earlier. Two men were starting to weed again on Aug. 25th.

Among plants on the permanent way at Brislington may be mentioned that persistent railway-weed *Linaria minor* Desf. (*L. viscida* Moench), *Epilobium parviflorum*, *E. montanum*, *E. angustifolium* (one seedling), *Diplotaxis muralis*, *Sisymbrium officinale* (very short), *Arenaria serpyllifolia*, *Sagina filicaulis* Jord., *Geranium rotundifolium*? (seedling), *Erigeron canadense*, *Sonchus oleraceus*, *Carduus* sp. (2 seedlings), *Daucus Carota*, *Heracleum Sphondylium*, *Prunella vulgaris*, *Veronica arvensis*, *Polygonum maculatum*, *P. Persicaria*, and *P. aviculare*. *Sagina filicaulis* is intermediate between *S. apetala* and *S. ciliata*; and finer specimens were growing near the base of a wall in Knowle Lane close to the first bridge over the railway. Voucher specimens from both places were kept.

The more interesting or frequent plants on the grassy railway sides and sandstone banks comprise: *Bromus erectus* (extremely common about Bristol, though usually on calcareous soil), *Festuca rubra*, *Agrostis alba*, *Holcus*, and other grasses; *Linum catharticum*, *Lotus corniculatus*, *Vicia hirsuta*, *V. sativa*, *Trifolium dubium*, *T. procumbens*, *T. pratense*, *T. arvense*, *T. striatum* (one plant in July), *Lathyrus pratensis*, *Medicago lupulina*, *Arenaria leptoclados** in great quantity locally, *A. trinervia*, *Diplotaxis tenuifolia* (one clump four feet high on west bank), *Potentilla reptans*, *Geranium dissectum*, *G. columbinum*, *Pimpinella Saxifraga* (sub-dominant), *Conium* (one small colony), *Anthriscus sylvestris*, *Æthusa Cynapium*, *Hypericum perforatum*, *Epilobium tetragonum*, very frequent, *E. parviflorum*, *E. montanum*, *E. hirsutum*, *Scabiosa arvensis* in beautiful array, *Erigeron canadense* (very little), *E. acre*, *Centaurea nigra*, *Tanacetum vulgare*, *Senecio Jacobæa* (frequent), *Tussilago Farfara*, *Matricaria inodora*, *Achillea Millefolium* (not much), *Hypochæris radicata*, *Leontodon hispidum*, *L. autumnale*, *L. hirtum*, *Sonchus oleraceus*, *Hieracium Pilosella* in great quantity on both embankments, *Convolvulus arvensis*, *Marrubium vulgare* (one clump), *Lamium album*, *Urtica dioica*, *Solanum Dulcamara*, *Rumex acetosa* and *R. acetosella*, another *Rumex*, *Juncus inflexus*, *Carex flacca*, and *C. contigua* in several enormous clumps on the west bank with many of the slender wiry culms 3–4 ft. long and beaten down by the rain and wind.

An exposure of sandstone rock on the west bank at an angle of about 45° is carpeted with *Hieracium Pilosella*, *Sedum acre*, and *Trifolium arvense*; and among these are some *Berteroa incana*, *Œnothera odorata*, *Festuca rubra*, and *Bromus erectus*.

The bushy northern half of the East bank is partly covered with two species of *Rubus*, several Willow bushes including *Salix viminalis*, *S. aurita*, and another species. In the long

* Dr. Drabble places most of the specimens under his var. *micrantha*.

grass beneath are actually some drawn up specimens of *Salix repens* 18 inches high. Close by is a large form of *Equisetum arvense* and *Hedera Helix*; and among the brushwood are a bush or two of *Cornus sanguinea*, *Prunus insititia*, *Cratægus monogyna*, and a sapling or two of Oak, Ash, Sycamore, and *Populus nigra*. The presence of one or two of these shrubs, together with a little *Fragaria elatior* (*moschata* Duchesne) beneath, rather indicates that this portion of the east bank may have once been cultivated. The further corner by the second bridge is covered with *Clematis Vitalba*.

Among the thirty species seen on the grassy borders of the short station-approach, mention may be made of *Pimpinella Saxifraga* in quantity, *Daucus*, *Ægopodium Podagraria*, *Anthriscus sylvestris*, *Malva sylvestris*, *Senecio Jacobæa*, *Leontodon hispidus*, *Crepis virens*, *Cnicus lanceolatus*, *Sonchus* sp., *Epilobium tetragonum*, *Plantago lanceolata*, *P. media*, *Lamium album*, *Bromus erectus*, *Arrhenatherum elatius*, *Agrostis canina*, etc. There is a little *Poa compressa* and *Erigeron canadense* by the path at the station gate. The former is an abundant grass on many walls in and about Bristol.

On the Ivy at the foot of the boundary wall within forty yards of the booking-office on August 25th there were half-a-dozen spikes of *Orobanche Hederæ*. It was in profusion on the ivy-topped wall of the lane just outside the station-approach, and also by the main tramway road to Bristol, close to where the white-flowered variety of *Linaria Cymbalaria* persists for a hundred yards or so. The normal form grows on the railway bridge at the station. This season (1931), as occasionally in former years, *O. Hederæ* has been particularly plentiful about Bristol.

In August 1930 I gathered on the railway side at the station a specimen or two from a large plant of *Erigeron acre* × *canadense*, and sent a sheet to the Watson B. E. Club, but saw none of this scarce hybrid in 1931.

It is remotely possible that the *Salix repens* may have come with some damp peat or even a dry "turf" or two from the peat-moors near Glastonbury.

Plants notably absent from the Brislington railway banks are *Chrysanthemum Leucanthemum*, *Artemisia vulgaris* (frequent on waste ground nearer Bristol), and any *Hieracium* other than *Pilosella*.

Mr. J. E. Little kindly helped me to determine the *Carex contigua*, which is variable and abnormal in general appearance and variable in the size of its utricles and nuts.

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

Dombeya Gamwelliæ Exell (Sterculiaceæ), sp. nov. *Arbor* parva. *Folia* longipetiolata, petiolo 5–12 cm. longo glabro, lamina membranacea suborbiculare, ad 13×16 cm., apice nonnunquam trilobata, margine crenata, basi alte cordata, supra infraque stellato-pubescenti. *Flores* ad apicem pedunculi longiusculi pseudo-umbellatim conferti. *Pedunculus* 12 cm. longus, sparsissime stellato-pubescens. *Pedicelli* graciles, 2–3 cm. longi, stellato-pubescentes. *Sepala* lanceolata, 15×3 mm., reflexa, extus stellato-tomentosa, intus glabra. *Petala* oblique obovata, 18×15 mm., glabra. *Stamina* cum staminodiis basi in cupulam 4·5 mm. longam connata, in triades inter staminodia disposita, filamentis 1–3 mm. longis. *Staminodia* ligulata, 10–12 mm. longa, quam petala paullo breviora, glabra. *Ovarium* subglobosum, 4×4 mm., dense tomentosum, 5-loculare, loculis 3–4-ovulatis, stylo 7 mm. longo.

Hab. NORTHERN RHODESIA. Tanganyika District; Abercorn, beside stream-beds, at an alt. of 5000 ft., fl. May, *Miss A. H. Gamwell*, 50 (holotype in Herb. Brit. Mus.).

A tree about the size of a sapling beech.

This species is characterized by the dense umbelliform inflorescences composed of 20–30 flowers and the nearly glabrous peduncles.—A. W. E.

Uvaria Petelotii Exell (Annonaceæ), sp. nov. *Arbor* ramulis primo appresse-pubescentibus mox glabrescentibus. *Folia* petiolata, petiolo appresse-puberulo vel glabro 4–8 mm. longo, lamina elliptica vel oblongo-elliptica vel anguste elliptica apice basique acuminata juventute rufo-sericea tandem glabra supra nitida, 5–10 cm. longa, 2·5–4 cm. lata, costis lateralibus utrinque 7–8 supra infraque prominulis. *Flores* terminales pedunculati, pedunculo 2·5–4 cm. longo sparse appresse-pubescenti. *Sepala* subcordata vel ovato-cordata 12–16 mm. longa, 12–14 mm. lata, puberula. *Petala* obovata vel elliptico-obovata primo dense sericea demum appresse-pubescentia, 25–35 mm. longa, 18–22 mm. lata. *Stamina* 2·5 mm. longa, connectivo truncato fulvo-velutino. *Carpella* 1·5 mm. longa fulvo-tomentosa.

Hab. TONKIN: tree of 7–8 m. height with white flowers, massif of Tam Dao, about 900 m. height, fl. May, *Pételot* 3964 (holotype in Herb. Brit. Mus.); massif of Tam Dao, at about 800 m., fl. April, *Pételot* 3954.

The leaves of this species are very similar to those of the Indian species *U. micrantha* (A. DC.) Hook. fil. & Thoms., but the flowers are very much larger. In no. 3954 the flowers are distinctly smaller than those of no. 3964, but the specimens are otherwise identical. The former number was collected a month earlier and the flowers are somewhat immature.—A. W. E.

Uvaria ugandensis (Bagshawe & Bak. fil.) Exell, comb. nov. (*Meiocarpidium ugandense* Bagshawe & Bak. fil. in Journ. Bot. 1908, 220). This species seems better placed in *Uvaria*, from which genus it does not seem to differ in any important respect, than in *Meiocarpidium*, a monotypic genus from the Cameroons with a very characteristic lepidote indumentum.—A. W. EXELL.

Æolanthus Gamwelliæ G. Tayl. (Labiatæ), sp. nov. *Suffrutex* ramosus, altitudinis circ. 1·5 m.; rami foliiferi et floriferi obtuse tetragoni, dense albido- vel lilacino-pubescentes, internodis ut videtur usque ad 3 cm. longis. *Folia* petiolata, petiolo usque ad 2·3 cm. longo; lamina ovato-lanceolata ad oblongo-elliptica, basi cuneata in petiolum decurrens, apice obtusa vel acuta, margine plus minusve irregulariter crenata vel undulata, usque ad 9 cm. longa et 4 cm. lata, utrinque glanduloso-punctata præsertim in costa nervisque pubescens. *Inflorescentia* profuse ramosa, multiflora, saltem 30 cm. longa; racemi paniculati, ramorum oppositorum apicem versus aggregati, secundiflori, floribus sessilibus; bracteæ oblongæ ad lineari-oblanceolatæ, apicem versus concavæ, plerumque 3–4 mm. longæ, deinde caducæ, intus glabræ, extus dense albido- vel lilacino-pubescentes apicem versus dense glanduloso-papillosæ; bracteolæ singulæ, plus minusve oblongæ, circ. 3 mm. longæ, extus dense albido- vel lilacino-pubescentes glanduloso-punctatæ. *Calyx* brevissime tubuloso-campanulatus, apice sinuatus, extus albido- vel lilacino-tomentosus, per anthesin circ. 2 mm. longus, in fructu accrescens usque ad 4·5 cm. longus ore contracto basi circumscissus. *Corollæ* tubus trombiformis, leviter declinatus, ore obliquus, 1·5–2 cm. longus, ore circ. 0·5 cm. latus, extus pubescens; labium posticum quadratum, apice 4-lobatum, 5 mm. longum et 3 mm. latum, extus dense pubescens, lobis medianis suborbicularibus, lateralibus eis similibus sed minoribus; labium anticum leviter cymbiforme, ambitu lanceolatum, apice acutum, usque ad 1·2 cm. longum et 0·3 cm. latum. *Staminum* filamenta ex corollæ tubo 1 cm. exserta. *Stylus* usque ad 3·1 cm. longus.

Hab. NORTHERN RHODESIA. Tanganyika District; Abercorn, usually growing on outcrops of rock at an altitude of about 1400 m., 12 April, 1931, *Miss A. H. Gamwell*, 23 (type in Herb. Brit. Mus.).

The collector's notes indicate that the flowers are mauve-coloured and strongly scented. The vernacular name is *nindi*.

The affinity of this handsome species is with *A. myrianthus* Baker, from which it differs in having much larger flowers and leaves more densely pubescent beneath. The bracteoles in *A. myrianthus* are much narrower and not so densely pubescent. In both species the bracts have a characteristic glandular area

near the apex, which is free from pubescence. The inflorescence of *A. Gamwelliæ* yields, on distillation, an essential oil which is at present the subject of investigation.

Æolanthus cassawa G. Tayl., sp. nov. *Herba* annua, ut videtur parce ramosa altitudinis saltem 19 cm. attingens; rami apicem versus minute hispiduli glanduloso-punctatique. *Folia* sessilia; lamina oblonga vel oblanceolata-oblonga, uninervia, basi cuneata, apice obtusa, margine integra in sicco leviter revoluta, usque ad 2·5 cm. longa et 0·7 cm. lata, utrinque dense glanduloso-punctata, supra glabrescens, subtus in costa parce hispidula. *Flores* in spicas depauperatas secundifloras dispositi; bracteæ oblongæ vel oblongo-lanceolatæ, usque ad 2 cm. longæ et 1 mm. latæ, intus glabræ, extus pubescentes glanduloso-punctatæque, margine ciliatæ. *Calyx* campanulatus per anthesin 1 mm. longus et ad orem 1 mm. latus, labiis obsoletis, extus dense pubescens, post anthesin usque ad 3 mm. longus et circ. 1·5 mm. latus, basi circumscissus. *Corolla* extus parce pubescens; tubus angustus, 3·5 mm. longus; labium posticum trilobatum circ. 1·5 mm. longum, lobis plus minusve rotundatis; labium anticum concavum, circ. 2 mm. longum. *Nuculæ* compressæ, oblongo-ellipsoideæ.

Hab. NORTHERN RHODESIA. Tanganyika District; Abercorn, growing on flat expanses of rock in vleis at an altitude of about 1200–1800 m., 12 April, 1931, *Miss A. H. Gamwell*, 29 (type in Herb. Brit. Mus.).

According to the collector's notes the plant may grow into a bushy herb of about one foot in height. The flowers are pale blue, very strongly scented. The vernacular name is given as *cassawa*.

This species appears to be most closely related to *A. elongatus* Briq., differing from that species in leaf-shape, and in having a more condensed inflorescence with much smaller flowers.

Acrotome tenuis G. Tayl. (Labiatæ), sp. nov. *Herba* annua, altitudinis usque ad 26 cm. attingens; caulis simplex, erectus, omnino hispido-pubescens, internodis usque ad 13·5 cm. longis. *Folia* sessilia; lamina linearis, basin versus attenuata, apice rotundata, margine subintegra vel apicem versus distanter irregulariterque serrata, usque ad 3 cm. longa et 0·2 cm. lata, supra hispido-pubescens, infra ad costam nervosque hispido-pubescens, margine ciliata. *Flores* breviter pedicellati, in capitulum terminale hemisphæricum usque ad 8 cm. longum et 1·5 cm. latum conferti; bracteæ involucrales subulatæ, apice spinosæ, hispido-pubescentes. *Calycis* tubus campanulato-cylindricus, 10-nervius, extus hispido-pubescens, per anthesin 6 mm. longus et 2 mm. latus, nervis dentibusque conspicue viridibus, dentibus 8 deltoideis apice spinosis. *Corollæ* tubus extus dense retrorse pubescens, ex

calyce circ. 1 cm. exsertus; labium posticum rectum, apice emarginatum, 6 mm. longum; labium anticum 7 mm. longum, 3-lobatum, lobo medio maximo quadrato-obovato margine fimbriato, lateralibus ovatis. *Stamina* ad corollæ faucem inserta et in eius tubo inclusa; filamenta barbata, postica lateraliter arcuata, antica apicem versus uncinata; antheræ posticæ 1-cellulares cohærentes, anticæ 2-cellulares cohærentes. *Stylus* hirsutus, apice truncatus. *Nuculæ* acuto-triquetræ, apice truncatæ, circ. 1 mm. longæ.

Hab. NORTHERN RHODESIA. Serenje District; Kaombi, growing at an altitude of about 1400 m., in flower and in fruit, April 1930, *R. E. Lloyd* (type in Herb. Brit. Mus.).

This is a very distinct member of the genus *Acrotome*, differing from all known species by having the flowers aggregated in solitary terminal capitula. The slender unbranched habit and linear leaves are also diagnostic.

RUBUS LATIFOLIUS BABINGTON.

BY W. C. BARTON, B.A., AND H. J. RIDDELSDELL, M.A.

BABINGTON'S species was published in 'Manual,' ed. iii. 104 (1851); and the description was emended and improved in 'Manual,' ed. v, 99 (1862).

His herbarium contains four gatherings of this species, each of two sheets:—

(1) No. 79; 28 Aug., 1845, by the river above Cramond Bridge near Edinburgh. This we have selected and labelled as lectotype.
(2) No. 137; 11 Aug., 1846, woods above Cramond Bridge.
(3) No. 138; 9 Aug., 1846, wooded bank by the road-side between Kenmore and Acharn Falls, Perthshire.
(4) No. 2253; 1 Sept., 1886, woody island near Perth, district Gowrie, coll. F. B. White.

Rogers, on seeing these sheets in March 1911, wrote:—"These beautiful specimens . . . ought clearly to be accepted as representing Babington's type. I now see them for the first time, and find the stem leaves more corylifolian in character than in the Anglesey plant, from a study of which (in the field and in the herbarium) my description in the 'Handbook of British Rubi' was chiefly drawn. We are thus left in considerable doubt as to the range of variation in this difficult species."

Rogers never saw good specimens of *R. latifolius* Bab. in the field, for though he visited Cramond Bridge twice in 1896 he was on both occasions too early for stem-pieces, as he himself stated and as his sheet of 30 June, 1896, in our herbarium shows.

W. Watson has an incomplete account of the species in Journ. Bot. 1930, 184. For Babington's four gatherings exhibit a *very stout* stem, with rather short but *long-based* prickles; leaves with *very prominent* yellow veins; flowering branch *stout*, with 3-nate leaves as much lobate as those of the stem; panicle small in three gatherings, but *large* in no. 4; branches ascending at an angle of about 45°; the *topmost sometimes nearly patent*. Young leaves, *e. g.*, on the upper part of the panicle, *very thickly felted* as in the Anglesey plant. (Italics show where Watson's description needs correction or amplification.)

As regards the N. Wales "*latifolius*" (Watson's *lætus*), Rogers's description in 'Handbook,' pp. 25–6, is incorrect chiefly in so far as it is imperfect. A large number of sheets of it are in our herbarium both from Anglesey and from Merioneth (Talsarnau and near Llanuwchllyn). Our specimens and notes show a plant low-growing, though sometimes in a young state suberect, with stem sometimes but not always green. Leaf-toothing is so deeply incised-compound as usually to form shallow lobes at some part of the leaf-border. Stipules variable in breadth even on one plant, sometimes very narrow, sometimes as broad as in most caesians except *cæsius* and *Balfourianus*. The panicle is variable in size, "truncate-cylindrical, narrow and quite racemose above" (*Rogers*) and "broadly pyramidal, with a broad top, dense, etc." (*Watson*). Both sizes of panicle occur together in Merioneth and at Ty Croes in Anglesey; at Talsarnau they occur side by side. The large reddish bracts are a remarkable feature; bracts on the Cramond Bridge plant are neither so large nor so red. The North Wales plant makes some approach to a cæsian, and some of the clear-cut contrasts drawn by Watson will not hold on a more extended examination. The two are, however, distinct, as Rogers suspected and Watson assents. True *R. latifolius* Bab. is not known to occur elsewhere than at Cramond Bridge and at the two spots in Perthshire. The North Wales plant must have its separate name, but Watson's name *lætus* is inadmissible; there is a *Rubus lætus* Progel (Acht. Ber. Bot. Ver. in Landshut, Bayern, 1882). We therefore apply to this species the suitable name *R. monensis*, as it was first discovered in Anglesey.

Rubus monensis, sp. nov. *Stem* soon nearly prostrate, very slightly hairy, when mature deeply furrowed above. Stem-prickles rather unequal, mostly short with long base. *Stipules* variable in breadth, very narrow to broadish. *Leaves* very large, quinate-digitate; rather hard to the touch beneath, though with fairly close short hair; ribs prominent; young leaves with thick soft hair beneath, usually not felted. Toothing compound, deeply incised (or even lobate). *Leaflets* all broad, ±imbricate; basal leaflets subsessile or shortly stalked. Terminal leaflet roundish-ovate or obovate, acuminate or very long acuminate; the base

emarginate to very broadly cordate; rather short-stalked. *Panicle* cylindrical, truncate, subracemose, short and close above with distant ascending branches below; often, however, large and more compound, pyramidal with broad top and very floriferous. *Bracts* conspicuous, deep-cleft, reddish. Rachis with much long hair, few or many rather short but long-based prickles and an occasional sunken gland. *Flowers* large as in *gratus*, rose-coloured. Stamens longer than styles. Calyx externally grey (occasionally olive-grey), felted and hairy, often aciculate, usually patent or subpatent in fruit. *Carpels* hairy.

R. monensis Bart. & Ridd. is not a cæsian, and though Focke and Sudre link it closely with *R. gratus* Focke, as we ourselves were at first disposed to do, we consider that Rogers found a better place for it when he put it among his *Subrhamnifolii*.

R. monensis occurs in Anglesey v.c. 52 !, Merioneth v.c. 48 !, and (teste *Watson*) Carnarvon v.c. 49. It was distributed in Set of British Rubi, no. 107, from Ty Croes, Anglesey.

A short definition follows :—

Turiones procumbentes, superne sulcati, aculeis sat brevibus e basi longa instructi. *Stipulæ* latitudine variæ. *Folia* ampla, subtus capillis brevibus vestita, dentibus compositis ±lobata; foliola lata, infima subsessilia, terminale acuminatum, fundo emarginatum vel cordatum, breviter petiolulatum. *Inflorescentia* apicem versus vix decrescens, brevis cylindrata vel maior pyramidalis, flore subsessili terminata; bracteæ multæ rubræ conspicuæ; rachis capillis multis longis, aculeis sat brevibus e basi longa munita. *Flores* spectabiles rosei; stamina stylos superantia; sepala tomentosa, hirsuta, post anthesin patentia; carpella pilosa.

Stem very low, furrowed above, with shortish long-based prickles. Stipules variable in breadth. Leaves very large, with short hair beneath; compound toothing somewhat lobate; leaflets broad, basal subsessile, terminal leaflet acuminate, emarginate or cordate, shortly stalked. Panicle short and cylindrical or large and pyramidal, truncate topped, with many conspicuous reddish bracts. Rachis with much long hair and shortish long-based prickles. Flowers very large, rose; stamens exceeding styles; sepals felted, hairy, rising in fruit; carpels hairy.

Exsiccata: (in Herb. Bart. & Ridd.), ref. nos. 2659 (typus), 2658–2661. Set of British Rubi, no. 107.

NOTE :—The West Cornwall plants hitherto named *latifolius* cannot be placed under *R. latifolius* Bab. or *R. monensis* Bart. & Ridd.; they require separate treatment. The Monmouth (or West Gloucester) plant we have not seen.

Our thanks are due to the authorities of the Cambridge University Herbarium, by whose courtesy we have been able to study the authentic material in Babington's *Rubus* collection.

CINCLIDOTUS RIPARIUS (HOST) ARNOTT AS A BRITISH PLANT.

By W. E. NICHOLSON, F.L.S.

SINCE its original publication by Host in 1797 as *Gymnostomum riparium* this moss has been the subject of a good deal of misunderstanding both here and on the Continent. It started badly, as it is difficult to understand how it could ever have been referred to the genus *Gymnostomum*, since the capsule has a very well-marked peristome. The authors of the 'Bryologia Europæa' regarded the plant which we now know as *C. Brebissoni* (Brid.) Husnot as a terrestrial form of it, and they claimed to have observed in several places a regular series of transitional forms as the plant receded from the water. This view, and the evidence which was supposed to support it, are still more difficult to understand, as the two plants are abundantly distinct. It was, however, widely held for some time, though Wilson in his 'Bryologia Britannica' (1855) points out in his description of *C. Brebissoni* as the var. *terrestris* of *C. riparius* that this was the only form then known in Britain, though, as he says, repeated search had been made for what he calls the aquatic form without success, which caused him to doubt whether the two plants might not be specifically distinct.

It was not until 1890 that Mr. A. W. Weyman found the plant in the River Teme near Ludlow. It seems to have been generally accepted at the time and it is described and figured in the late Dr. Braithwaite's 'British Moss Flora,' ii. 253, pl. lxxxiv. (1895). Mr. H. N. Dixon also included the plant in the first edition of his 'Student's Handbook of British Mosses' (1896), but added a note to the effect that he felt considerable doubt whether it were not a form of *C. fontinaloides* (Hedw.) P. B., principally on the ground that the leaf-cells in the Teme plant were frequently papillose and with somewhat incrassate walls as in *C. fontinaloides*. In the second edition of his book (1904) Mr. Dixon, while still retaining *C. riparius* as a possible native, further questioned the plant from the Teme as the true species, basing his opinion to some extent on the fact that he had gathered in the Pyrenees a plant with short obtuse leaves and a narrow nerve which was shown by the fruit to belong to *C. fontinaloides*. This plant was described by Thériot as *C. fontinaloides* var. *Dixoni* Thér. (Rev. Bry. 1905, 69). Its leaves, however, are strongly contorted when dry, and it does not bear much general resemblance to the Teme plant. In 1911, the Rev. Dr. P. G. M. Rhodes gathered a plant in the Teme at Shelsley Beauchamp, Worcestershire, which he distributed to the Moss Exchange Club in 1912 as *C. riparius*, upon which as referee I unfortunately reported as follows: "From the rather obscure papillose areolation and other features I should refer it to *C. fontinaloides* rather than to *C. riparius*." As a matter of fact, though the leaf-cells are usually rather more papillose in *C. fontinaloides* they may be slightly papillose or quite smooth in both species, but I had come to believe that the Teme plant was not *C. riparius* and I had found bad reasons for what I believed upon instinct, as has been unkindly said of the metaphysicians.

In 1928 Dr. Rhodes gathered the plant again at the same place in some quantity and sent it to Herr Bauer for inclusion in his 'Musci europ. et americ. exsicc.' as a form of *C. fontinaloides*, with a copy of my note attached.

A copy of the series containing the plant (no. 2064) came into the possession of Dr. P. Culmann of Paris, who wrote to me in Dec. 1930 to protest against my finding and enclosing specimens of the true *C. riparius* which agreed substantially with the Teme plant. I therefore overhauled the rather extensive material of *C. riparius* which I have from various parts of Europe, and compared them with the Teme plant, when I came to the conclusion that there was no doubt but that it was the true *C. riparius*.

In October last Dr. Rhodes was kind enough to take me to the locality at Shelsley Beauchamp, where the plant grows in considerable abundance and, though persistently sterile, agrees well in habit with *C. riparius* as I have seen it growing in Austria. The persistent sterility of a plant growing in such abundance is a point very much in favour of its being *C. riparius*, as all field-bryologists are aware that it is very unusual to see any large quantity of *C. fontinaloides* without some of it being in fruit.

The tufts of *C. riparius* are shorter and more compact than those of *C. fontinaloides*. The leaves are shortly mucronate with parallel sides, while those of *C. fontinaloides* taper towards each end. The leaf-cells are usually smoother, though forms of *C. fontinaloides* may be found with equally smooth cells and the nerve is narrower, measuring towards the base about 110 μ as against 170 μ in *C. fontinaloides*. The leaves in *C. riparius* are little altered when dry, while in *C. fontinaloides* they are strongly contorted. No capsules have been found on the Teme plant, and it would seem that we have only the female plant.

Certainly all the material which I have examined has proved to be female with abundant archegonia. These may be found on short lateral branches as in *C. fontinaloides*, but they are also to be found in the terminal buds of the main stems, a position in which they are never found in *C. fontinaloides*. As the stems innovate below the female flowers, the plant acquires the short compact habit, which is very different from the long flexuose growth of the typical forms of *C. fontinaloides*. The terminal position of the female flower may, I think, be regarded as a crucial character and one which removes any doubt which may have attached to the Teme plant.

I should like to add that Mr. H. N. Dixon agrees with me in the rehabilitation of the Teme plant as *C. riparius*. It has been gathered in at least three English counties, viz., in Shropshire by Mr. A. W. Weyman, in Worcestershire by Dr. Rhodes, and in Herefordshire by the Rev. C. H. Binstead.

SHORT NOTES.

COLEOSPORIUM TROPÆOLI AS A BRITISH SPECIES.—This Uredine is very rare, and has hitherto rested its claim to be British upon a single record.

Coleosporium Tropæoli (Desm. ?) Palm, in Vestergr. Microm. sel. no. 1456 (on *Trop. minus*). Sydow, Ured. Mon. iii. 632–3.

Uredo Tropæoli Desm. in Ann. Sci. Nat. vi. 243 (1836) (on *Trop. minus*). Cooke, in Journ. Bot. iv. 97; Handb. p. 528; Micr. Fung. p. 216. Plowr. Ured. p. 258. Sacc. Syll. vii. 862.

Uredospores. *Sori* hypophyllous, small, roundish, scattered in little yellow groups, showing as yellowish spots on the upper side of the leaf; *spores* sparingly developed, concatenate, roundish, ellipsoid or oblong, yellow, rather densely and minutely verruculose, 16–22×15–18μ; wall 1·5μ thick.

On leaves of *Tropæolum canariense*, Shere, near Guildford (*Capron*), Oct. 1865. St. Peter Port, Guernsey, Channel Islands (*Rhodes*), Sept. 1931. It has also been recorded from France, Belgium, Germany, and Sweden, but always in small quantity.

The specimens, containing uredospores only, in Westendarp's Herb. Crypt. no. 839, from Courtrai, Belgium, on *T. canariense*, are very similar to Palm's *Coleosporium*. But, since *Tropæolum* is a comparatively recent introduction into Europe, it may well be that these, as also the British specimens, were merely cases of the transference to that plant of a *Coleosporium* which ordinarily lives on another (indigenous) host. Klebahn (see Zeitschr. f. Pflanzenkr. xxiv. 14 (1914)) was able to infect *Tropæolum* with spores of *C. Campanulæ*, *C. Tussilaginis*, and *C. Senecionis*, although he could not do so with *C. Euphrasiæ*, *C. Melampyri*, or *C. Sonchi*. This transference to a host with which it is not quite in harmony may be the reason why the fungus on *Tropæolum* is so rare and so meagrely developed, and has seldom been found as yet to produce teleutospores. Against this must be set the fact that its uredospores are smaller than those on the indigenous species, unless that inferiority also is due to the want of perfect harmony. Moreover, *Cronartium asclepiadeum* grows on four species of *Tropæolum* and could, without due care, be mistaken in the uredo-stage for a *Coleosporium*. In fact, Palm's uredospores were found at Stockholm in the neighbourhood of a *Cronartium*.—W. B. GROVE.

SOME JERSEY RECORDS.—While staying in Jersey during August and September 1929, I was able to do some rather desultory collecting of flowering plants, and the following finds are perhaps worth recording :—

VICIA VILLOSA Roth. Thinly scattered over about half-an-acre of out-stubble between St. Aubin and St. Brelade. Kindly named for me by Mr. A. J. Wilmott. Apparently a new record for the island.

CALLITRICHE STAGNALIS Scop. On mud by the pond at Le Ouainé. Mr. Wilmott agrees to this identification. Apparently a new record for the island.

ARRHENATHERUM AVENACEUM Beauv. (*Avena elatior* L.) is recorded as frequent by Mr. Lester-Garland, no doubt as an aggregate. I examined the *Arrhenatherum* growing in various parts of the island (*e. g.*, at St. Brelade, St. Peter, and Gorey) and all that I noticed was *A. tuberosum* Gilib.

AVENA STRIGOSA Schreb. Only recorded by Mr. Lester-Garland in his ' List of Errors, Ambiguities, etc.,' where a reference is given to a list of Jersey plants compiled in 1834 by Professor La Gasca of Madrid. This grass is, however, now a frequent plant of sandy waysides and arable—at any rate, in the western parts of Jersey. I noted it at St. Brelade, St. Peter, St. Ouen, Portinfer, L'Etac, etc.

BROMUS BRITANNICUS I. A. W. A solitary belated plant by the main road from St. Aubin to St. Brelade. A new record for the island.

GLYCERIA FLUITANS R. Br. Mr. Lester-Garland records this as an aggregate, and adds " A plant from the Waterworks Valley was named by the Rev. W. Moyle Rogers *G. pedicellata* Townsend. I do not understand the segregates." In the damp valley between St. Brelade's Church and La Moye station I found plants of *Glyceria declinata* Breb. They were growing with restricted *G. fluitans*. The character of the inner pale protruding beyond the outer pale scarcely seems a dependable one, since both in this locality and by St. Ouen's pond I gathered plants, otherwise indistinguishable from *G. fluitans*, in which the inner pale was protruding. Apart from other characters, the size of the flowers and anthers appears to be a useful guide in determining these Glycerias. I have examined the various gatherings in my own herbarium, and find that in *G. fluitans* the flowers are from 5·5–7 mm. long and the anthers from 1·5–2 mm. In *G. declinata* the flowers measure 4–4·5 mm., and the anthers scarcely 1 mm. in length. The corresponding measurements for *G. plicata* are 4–5 mm. for the flowers and about 1·25 mm. for the anthers. I did not notice *G. plicata* in Jersey.

Specimens of most of the above plants are in the British Museum Herbarium.

One or two other plants, notably a white-flowered *Solanum* which is certainly not *nigrum*, still remain undetermined.—I. A. WILLIAMS.

ORCHIS HIRCINA L. IN BEDFORDSHIRE.—A specimen collected by Miss Sylvia Tearle on Dunstable Downs on 24th June, 1930, has been presented by her to the British Museum Herbarium. The root was dug up and taken to Whipsnade for planting on the downland in the Zoo grounds, but it is at present in a garden in the hope that it may be split into two or three parts before planting.—A. J. WILMOTT.

REVIEWS.

Synopsis Rosarum Spontanearum Europæ Mediæ. By ROBERT KELLER. Royal 4to, in two volumes, text pp. x, 796, and plates xl. In *Denkschriften der Schweizerischen Naturforschenden Gesellschaft*, lxv. Gebrüder Fretz, A.G.: Zurich, 1931.

IN this work Dr. Keller sets forth the description of the Roses of Central Europe in a masterly manner. He adopts very similar primary divisions of the genus to those used in Britain, with the addition of one or two to cover species not indigenous in these islands, but his subdivisions of some of them are on different lines.

The *Vestitæ* (*Villosæ*) and *Rubiginosæ* call for little comment, except that the author associates *R. omissa* Déségl. (*R. Sherardi* Dav.) with *R. tomentosa* and not with *R. pomifera* Herrm. and *R. mollis* Sm., with which its chromosomes show its affinities to be.

The *Eu-Caninæ* are divided into *R. obtusifolia* Desv. and *R. canina*, sensu lato, the latter comprising as subspecies *R. Pouzini* Tratt., *R. vulgaris* Gams (our *R. canina*), and *R. dumetorum* Thuill. It is not clear how he classifies *R. Afzeliana* Fr., but it follows immediately after subsp. *R. Pouzini*, as if it were an element of that.

R. Afzeliana is divided into four subspecies, including both glabrous and pubescent varieties, as does *R. canina*. These are *R. vosagiaca* Desp. (*R. glauca* Vill., non Pourr.), *R. subcanina* (Hayek) R. Kell., *R. coriifolia* Fr., and *R. subcollina* Hayek, the two subspecies *subcanina* and *subcollina* each containing a very large number of varieties and forms. The author defines these two subspecies in terms which indicate a wide divergence from those expressed by Christ in describing the two varieties on which they are based, and which the author purports to follow. Comments on this have been made in 'A Revision of British Roses.'

The whole genus is very greatly subdivided into groups, usually bearing no names, but distinguished by letters and numerals in various types, with a word or two on the description

of each. It is not very easy to refer from one to another of the minor groups from lack of the use of more distinctive type and spacing, since the next group of the same grade may appear some pages further on, and forward references to the page of the next alternative group are only given in the case of the major ones. This minuteness of subdivision has the effect of disassociating what seem to be very closely allied forms. Thus *R. Afzeliana* Fr. var. *denticulata* R. Kell. and its forma *subcomplicata* Hayek, as arranged in 'A List of the British Roses,' become separated by 28 forms, covering five pages in the 'Synopsis.'

It is a little difficult to pick out the names of the varieties and forms, which become confused, from the lack of suitable type, with the descriptions and synonymy and with the authorities for the names, but a very good index reduces to a minimum the difficulty of finding a given form. The placing of the details of Swiss stations at the end of each species instead of after each form is not a good arrangement.

The descriptions are adequate, though their length may sometimes be too great, in view of the fact that the longer a description the greater is the difficulty of matching it. The consequence is that though it is often easy to identify a specimen with its ultimate group, it will not be found to agree in all respects, often important ones, with the details of the description of any one form.

As an example of the minuteness of subdivision which the author adopts, the aggregate species *R. vulgaris* is divided into 21 varieties and 260 forms, which are ranged under three main groups, *Uniserratæ*, *Transitoriæ*, and *Biserratæ-Compositæ*, divided into six secondary and twelve tertiary subgroups of various grades, and a large number of minor segregations. This appears complicated, but it simplifies the location of the final group for a given specimen, though it often ends in its identification with some very unfamiliar form, differing in no essential from some much better known one which falls into a different group, differentiated by some minor character such as a greater degree of biserration, or of hispidity of styles.

A large number—the majority, in fact—of the forms are not known as British, and the author includes under his *R. vulgaris* forms with pubescent midribs, instead of ranging them under *R. dumetorum*, as is customary. On the other hand, many British varieties and forms are omitted, mainly no doubt because the Synopsis only covers that part of Europe as far as the east of France.

In some species it is not clear whether the forms which immediately follow the varieties are intended to be subordinate to the latter or to be independent of them, since a variety often appears in the middle of a group, both preceded and followed by several forms, which may overlap into the next group before another variety is named.

A separate volume of 40 excellent plates, reproduced from photographs, gives a good general idea of the leading species, though as a means to identify specimens figures are of little value in so variable a genus.

In spite of these shortcomings, the main one of which is excessive splitting, the publication of the Synopsis marks an epoch in European rhodology.—A. H. WOLLEY-DOD.

NEW BOOKS ON PLANT-CHEMISTRY.

Pflanzenmikrochemie. By Dr. O. TUNMANN. Second edition, revised and enlarged. By Dr. L. ROSENTHALER. 8vo, pp. 1047, 190 text-figs. Price 75 R.M.

Die Alkaloide. Second revised edition. Part II. 8vo, pp. xi, 357–1061. By Dr. GEORG TRIER. Price 42 R.M.

Die Glykoside. By Dr. J. J. L. VAN RIJN. Second enlarged and revised edition. By Dr. HUGO DIETERLE. 8vo, pp. viii, 620. Price 48 M.

(Gebrüder Borntraeger: Berlin, 1931.)

THESE three new editions issued by Messrs. Borntraeger represent valuable works of reference for those interested in the chemical constituents of plants.

The first edition of the 'Pflanzenmikrochemie' by the late Dr. Otto Tunmann was published in 1913. Dr. Rosenthaler contributes a number of additional sections, among which are those dealing with the micromanipulator, colouring-matters, colouring-material of Fungi and Bacteria, and the micro-chemistry of Yeasts and of Bacteria. The number of illustrations has been increased.

The text-matter includes a General portion (pp. 7–109) dealing with the technique of the subject and a Special portion (pp. 110–1022). The Special portion is divided into four sections. The first, Inorganic, deals with the occurrence and methods of investigation of the chemical elements and their inorganic compounds, arranged under the heading of the characteristic element. The second, Organic, has two subsections, Acyclic substances, including the consideration among others of aldehydes, plant-acids, amines, asparagin, leucin, etc., carbohydrates; and Iso- and heterocyclic substances among which are found ethereal oils, resins, caoutchouc, tannins, colouring-matters of the cell-sap in Phanerogams, the two extensive classes of alkaloids and glycosides, albuminous substances, and enzymes. The alkaloids are classified under the various plant-families in which they occur; the glycosides alphabetically. Section III., The Protoplast, deals with the protoplasm itself, its structure, composition, properties and reactions, plasmolysis, the nucleus, the chromatophores and their colouring-matters, the colouring-matters of the non-vascular Cryptogams, aleurone-grains, starch, and other cell-contents, elaioplasts, chemotaxis, and chemotropism. In Section IV. the cell-membrane and theories of cell-growth are discussed,

and the properties and reactions of the cellulose cell-wall and its numerous derivatives. In the production of so exhaustive a work compilation must obviously play an important part, and references to previous publications are fully cited in the form of page foot-notes. The author also acknowledges the help in various sections of Dr. Buren of Berne and Dr. Ehlers of Jena.

'*Die Alkaloide*.'—In order to facilitate reference the detailed table of contents of the whole work is included at the beginning of Part II. of Prof. Ernst Winterstein and Dr. Trier's work on the Alkaloids, the first part of which (pp. 1–356) appeared in 1927. The whole work is divided into a Special portion (pp. 35–860) and a smaller General portion (pp. 861–984). The Special part deals with the chemistry of the natural bases under three headings—the better known, the less well known, and the less well known of more general distribution. Part II. opens about the middle of the first section, with the Lupin-group—Spartein and others. There follows consideration of the Indol-group, the Chinolin-group, and the Iso-chinolin group. The second section, which fills nearly 200 pages, deals with alkaloids of more or less unknown constitution. These are arranged in the systematic order of the plant-families in which they occur, starting from the alkaloid of ergot, to which thirty pages are devoted. Little or nothing is known of the existence of alkaloids in the rest of the Cryptogams. The Gymnosperms yield Taxin from the Yew and Ephedrin from species of *Ephedra*; the latter has been treated in the first volume and a few pages on recent work are devoted to it in the Appendix. The description of the Angiospermic alkaloids includes seven families of Monocotyledons and forty-eight of Dicotyledons. The General Part (pp. 861–984) includes sections on the relation between constitution and distribution of the natural bases, the biochemistry and pharmacology of the alkaloids and methods of analysis.

The original edition of Dr. van Rijn's 'Chemische Monographie der Pflanzenglykoside' was published in 1900. Though the treatment of the subject is purely chemical, the arrangement adopted is botanical, as the glycosides are treated under the respective families of the Phanerogams (92 in number) in which they occur. It is a volume which may aptly find a place as a work of reference in a well-equipped botanical library.

The Glycosides. By E. F. ARMSTRONG, D.Sc., F.R.S., and K. F. ARMSTRONG, B.A., B.Sc. Roy. 8vo, pp. vii, 123. Longmans, Green & Co.: London, 1931. Price 12*s.* 6*d.* net.

THIS is one of the series of monographs on biochemistry edited by Dr. R. H. A. Plimmer and Sir F. G. Hopkins, and is a development of the section in the writers' former work on the Simple Carbohydrates, recording the progress

made in the glycoside field since the publication of their previous monograph. Advance in horticulture, agriculture, and in the understanding of life itself largely depends on exact knowledge in regard to the facts of the plant. The work, which naturally assumes familiarity with organic chemistry on the part of the reader, deals successively with Natural Glycosides, Glycosides of the Soluble Plant Pigments (Anthoxanthins and Anthocyanins), Glycosides with Physiological Action (Digitalis and others), other natural glycosides (mustard oil, indican, etc.), Synthetic Glycosides, and The Uronic acids. The plant-sources of the glycosides are mentioned, but the discussion is purely chemical. The last two chapters on the functions of glycosides and their specific enzymes and the utilisation of carbohydrates by plants, should, however, interest the general botanist. Their most important function would appear to be their action in keeping dormant and unchanged substances of great importance in the metabolism of the plant until the precise moment when they are required. The book concludes with a useful bibliography in which the references are classified according to the subject-matter of the text.

Botany for Matriculation. By F. Cavers, D.Sc. Revised by L. C. Fox, M.A. 8vo, pp. viii, 509, with 176 text-figs. University Tutorial Press: London, 1931. Price 6*s.* 6*d.*

Dr. Cavers's handbook has had a considerable vogue among teachers and students engaged in preparation for matriculation and similar examinations in elementary botany. While the presentation of facts in independent numbered paragraphs does not make for attractiveness nor favour literary style, the method has an appeal to the examinee confronted with a syllabus the material of which must be mastered within a given time. From this point of view the present volume must be regarded as successful. The didactic method is adopted and the reader is made wise as to the elementary facts of the structure and function of flowering plants, and should be able to tackle with confidence any straightforward question in his examination. It will require some ingenuity on the part of the examiner not to repeat questions which have already been suggested to the student at the end of the various chapters. A pleasing feature of the book is found in the chapters devoted to the families of which some knowledge is required by the syllabus. The descriptions of the common wild genera of the country, with keys by which they may be distinguished when found should encourage field-work—if more information is desired reference is given to generally used British Floras. The text-figures, though often crude, are simple and clear; they are, "as far as possible, patterns of the kind of drawing that is required in an examination answer."

BOOK-NOTES, NEWS, ETC.

Linnean Society.—At the General Meeting on March 3 the President, Prof. F. E. Weiss, F.R.S., referred to the loss the Society has sustained by the death of Dr. G. Claridge Druce.

The President also made an appeal to members to help him to raise a fund for the purchase of a portrait of Prof. Julius Sachs, one of the most distinguished of our former Foreign Members, the centenary of whose birth falls in the present year. The portrait has been painted by Prof. Sachs's daughter, a Munich artist, and it is hoped that it may be hung in the rooms of the Society.

Sir Arthur W. Hill, K.C.M.G., F.R.S., showed three lantern-slides illustrating *Oxalis natans* in South Africa. The photographs were taken by Miss M. A. Pocock at Volvox Vlei, Cape Flats, near Capetown.

Prof. J. McLean Thompson gave a summary of Dr. I. V. Newman's paper "Studies in the Australian Acacias.—I. & II.," which was followed by a lecture by Professor Thompson entitled 'The Theory of the Leguminous Strobilus.'

At the meeting on March 17 the President announced that the Council had awarded the Linnean Gold Medal for the year to Edwin Stephen Goodrich, Linacre Professor of Zoology and Comparative Anatomy at Oxford University. Professor Goodrich served as Zoological Secretary to the Society from 1915–1923.

Mr. J. T. Cunningham, on behalf of himself and Mr. D. M. Reid gave an account of the dehiscence of the sporocarp and germination of the spores in *Marsilia polycarpa* Hook. & Grev. based on material collected in Marajo Island at the mouths of the Amazon.

Prof. E. J. Salisbury showed and commented on some Dune-slack Liverworts, including fertile specimens of *Petalophyllum Ralfsii* Gottsche.

Mr. Eric Ashby gave an interesting lecture on some problems suggested by the vegetation of the Sonoran desert in the south-west United States, in which the Tucson desert-laboratory is situated. His description was illustrated by a series of excellent lantern-slides showing the characteristic bush, tree, and cactus vegetation.

British Mycological Society.—Vol. xvi. pts. 2 & 3 of the 'Transactions' of this Society has a wide interest, including among other communications an account of a fungus (*Alternaria gossypina*) causing leaf-spot and boll-rot of cotton, by J. C. F. Hopkins, of the Department of Agriculture, Southern Rhodesia, a brief account of the almost negative response of species of *Ægilops* to infection by bunt, *Tilletia Tritici*, by I. Reichert of the Agricultural Experimental Station, Tel Aviv, Palestine, an enumeration by Miss A. Lorrain Smith of a collection of lichens from Northern India made by G. L. Chopra of the Lahore University, and suggestions for the standardization of common names of plant-

diseases, by G. H. Cunningham, a New Zealand mycologist. C. R. Metcalfe details the results of an exhaustive investigation of the "Shab" disease of lavender, which has seriously affected the cultivation of the plant in this country. By a series of inoculation experiments the writer shows that the primary cause of the disease is the fungus *Phoma Lavandulæ*.

'COUNTRY-SIDE.'—The Spring number of the organ of the B. E. N. A. contains a portrait of the late Edward Step, President of the Association 1928-31 and a brief record of his life-work. J. E. Louseley gives an account of the structure and life-history of the tooth-wort, *Lathræa Squamaria*, and there are short articles on "Our Wild Flowers as Medicines" by J. F. Rayner, "The Preservation of our Wild Plants" by H. W. Powell, and on "The Story of a Grass" by the late E. Kay Robinson. J. E. Little contributes a short list of flowers visited by humble-bees.

SIXTH INTERNATIONAL BOTANICAL CONGRESS.—According to a decision by the Fifth International Botanical Congress at Cambridge in 1930, the Sixth Congress will be held in Holland in 1935. An Executive Committee has been formed, the President of which is Professor Dr. F. A. F. C. Went (Utrecht). Professor Dr. J. C. Schoute (Groningen) will act as Vice-President, Dr. W. C. de Leeuw (Bilthoven) as Treasurer, and Dr. M. J. Sirks (Wageningen) as Secretary. The Committee has decided that the Sixth Congress will meet at Amsterdam, September 9–14, 1935. Scientific Societies are kindly requested to remember these dates when planning their own meetings.

ROYAL HORTICULTURAL SOCIETY.—The 128th anniversary of the foundation of the Society was marked by an interesting ceremony. A plaque has been placed on the face of Messrs. Hatchard's premises in Piccadilly recording the fact that in John Hatchard's house, which stood on the site, the Royal Horticultural Society was founded on March 7, 1804, and on an illuminated memorial inside Messrs. Hatchard's book-shop are inscribed the names of the founders—John Wedgwood, *Chairman*, Sir Joseph Banks, Charles Greville, Richard Anthony Salisbury, William Townsend Aiton, William Forsyth, and J. Dickson. After some introductory remarks by Mr. Gerald Loder, ex-President of the Society, the memorial was unveiled by the President, the Hon. Henry McLaren.

ROYAL SOCIETY.—We note with much pleasure the name of Professor F. E. Fritsch in the list of those recommended by the Council for admission to the Fellowship of the Society.

DR. G. CLARIDGE DRUCE.—We record with regret the death of Dr. Druce, which took place at Oxford on February 29 in his 81st year. An appreciation of his work will appear in our next number.

CONTRIBUTIONS TO OUR KNOWLEDGE OF BRITISH ALGÆ*.

BY F. E. FRITSCH, D.Sc.

I. *FISCHERELLOPSIS*, A NEW GENUS OF MYXOPHYCEÆ.

I AM indebted to Mr. G. T. Harris, of Honiton, Devonshire, for this interesting alga, which he collected in 1924 from an unnamed pool near the road on Kentismoor, East Devonshire. Unfortunately, at the time when he approached me with reference to the determination of the alga he no longer possessed any material, apart from two excellently mounted slides. These he has very kindly placed at my disposal, and I take this opportunity of thanking him for his courtesy. Despite the rather scanty material the slides have furnished so many striking particulars differentiating the alga from all known forms that I have no hesitation in describing it as a new genus. Many features are, however, still obscure, and it is to be hoped that this form will soon be rediscovered.

The main threads are composed of more or less numerous trichomes, sometimes only one, two, or three, sometimes as many as a dozen (figs. 1; 2, F). These trichomes are embedded in a mass of very delicate, structureless, usually hyaline mucilage, which has an irregular edge and is often only recognizable by the foreign particles adhering to it; in some cases (probably older specimens) it possesses a yellowish or yellow-brown colour. The trichomes composing these main threads are subparallel (fig. 1), but it is mostly not easy to follow up any single one for any considerable distance, since there is a great tendency for the individual trichomes to dip in amongst the others and for a time to run beneath the level of that of their fellows. There is, however, no pronounced entwining, such as often occurs in *Microcoleus*. In a few cases the main threads were observed to branch.

Arising from these main threads are numerous longer or shorter offstanding laterals (fig. 1), sometimes in pairs, but more usually single. The laterals are invariably composed of a single trichome which always widens in a characteristic manner from the base to the club-shaped apex (figs. 1; 2, F). In the vast majority of cases the laterals are false branches (pseudo-branches), being direct apical continuations of the trichomes composing the main thread. They are very rarely branched.

The cells of the trichomes in the main threads vary considerably in shape (fig. 2, B, E, F), being flattened, isodiametric and almost quadrate, or more rarely longer than broad. The cells

* From the Department of Botany, East London College, University of London.

are not uncommonly of unequal width in different parts of the trichome, sometimes being broader towards the ends than in the middle. The cell-contents always contain abundant granules. There is usually well-marked constriction between adjacent cells, and distinct protoplasmic connections are generally recognizable (fig. 2, B, E). Each trichome possesses a firm, though delicate, sheath, which is constricted between the successive cells (fig. 2). The general mucilage enveloping the entirety of the trichomes in a thread is independent of these close-fitting sheaths.

Occasional intercalary heterocysts are found in the trichomes

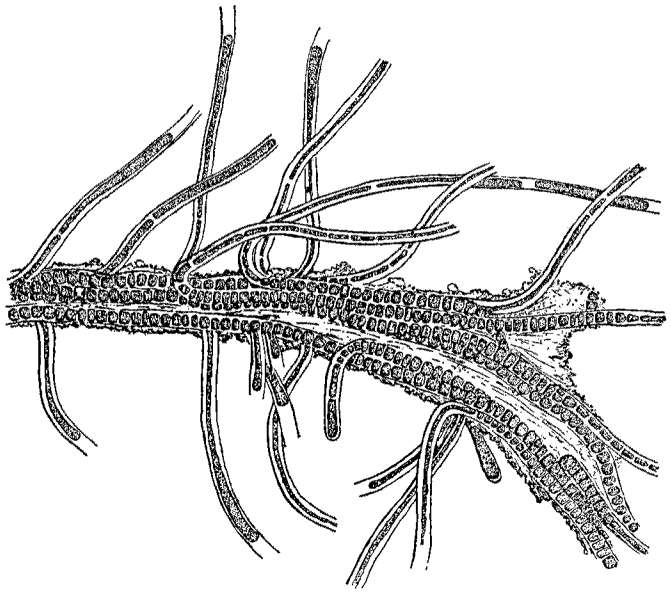


Fig. 1.—*Fischerellopsis Harrisii*, gen. et sp. nov. General habit. (× 185.) (Drawing by Miss F. Rich.)

of the main threads; they appear always to occur singly (fig. 2, B, E, F). The heterocysts are slightly wider than the vegetative cells, have a firm well-defined wall, and are usually quadrate or flattened (fig. 2, H), like the heterocysts of a *Nodularia*. Well-marked polar thickenings were only recognizable in a few cases. The heterocysts mostly show well-defined contents which as a general rule contain relatively few or no granules, although sometimes many are present.

As above mentioned, most of the numerous laterals appear as direct apical continuations of the trichomes of the main threads,

and there is usually no great difficulty in establishing the fact that the latter are produced into a lateral at *either* end (fig. 2, E). In other words, the unit of construction in this alga is a trichome of which the middle part is practically straight and, together with others, forms the main thread, while the ends are produced as laterals. The respective laterals of a main trichome may be turned to the same or to different sides. The laterals either stand off at right angles to the main thread or are inclined at

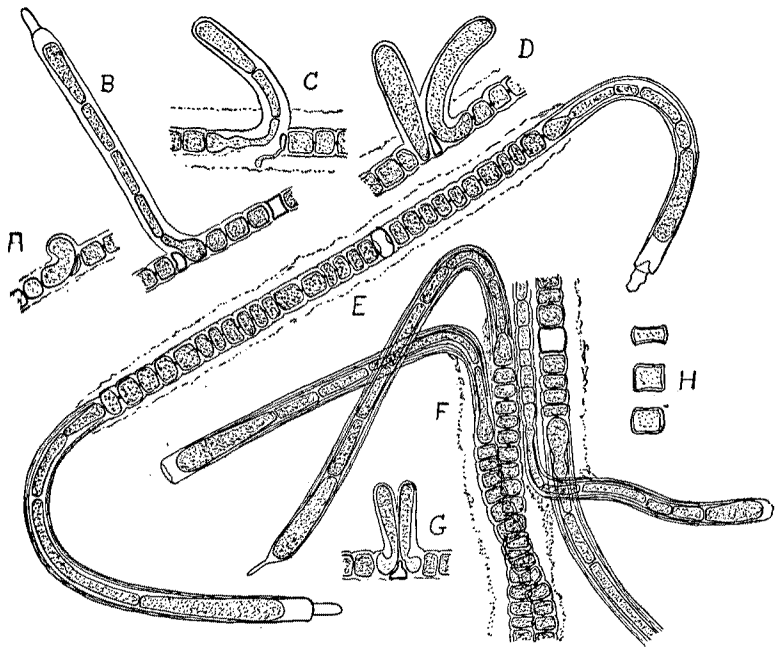


Fig. 2.—*Fischerellopsis Harrisii*. A–C. Formation of single false branches, in B adjacent to a heterocyst, in A and C with non-development of the second false branch. D and G. Formation of paired false branches, showing the intervening dead cell of the main trichome. E. A single complete trichome, showing the sheath, the club-shaped laterals, and a heterocyst with polar thickenings. F. Small part of one of the main threads, with laterals. H. Forms of heterocysts from the main trichomes. (All figures × 500.)

an angle to the latter; some are reflexed, so that they run at an acute angle to, and in the same direction as, the backward continuation of the main trichome (*cf.* fig. 2, F). The majority of the laterals do not grow to any considerable length, but occasional ones may extend a long distance from the main thread. The longer laterals are commonly convoluted.

The laterals have an altogether different structure from that of the trichomes of which they are the apical continuations. In the first place, they never contain heterocysts. They possess a firm sheath which is a direct continuation of that investing the trichome in the main thread, but here it is not constricted (fig. 2, E). It is nearly always hyaline, sometimes faintly yellowish. This sheath is thickened and often lamellate in the lower part of the branch (fig. 3, E, F), but becomes progressively thinner towards the apex. The trichome itself shows the reverse relation, gradually widening from the base towards the apex in the same measure as the sheath becomes thinner (fig. 2, E, F). At the base of the lateral there is a narrow space between trichome and sheath, but the sheath fits much more closely around the dilated terminal portion. Thus, although the trichome of the lateral at its apex may be twice as wide as at its base, the width of the lateral as a whole (*i. e.*, trichome plus sheath) remains practically constant throughout its length.

The first cell of a lateral is usually more or less lageniform (fig. 2, B, F), the basal part adjacent to the ordinary cells of the main trichome being inflated, while the rest of the elongate cell is greatly narrowed; sometimes a second smaller inflation occurs above the first (fig. 2, C). This basal cell usually only contains a few granules, and this is sometimes also true of one or two of the next cells. The basal inflated part always lies in a direct line with the rest of the main trichome, but the narrowed portion is usually more or less pronouncedly curved (fig. 2, C, D), so that the second cell of the lateral is already at an angle to the main thread. In other cases, however, the curvature which results in the erection or angular position of the lateral is accomplished by the second cell (fig. 2, F). The cells of the laterals are nearly always markedly elongate, several times longer than broad, have delicate walls, and there are no constrictions or protoplasmic connections; sometimes the cells increase in length towards the apex of the lateral (fig. 2, B, E, F). There are usually abundant granules, especially in the upper wider cells. In a few cases the apex of the lateral was occupied by a few short cells (fig. 3, E), but this was far from being the rule. It has not been possible to detect any septa in the long cells generally composing the laterals.

The sheath at the extremity of the lateral is thin and at first closed and rounded off. In the majority of cases it bears a curious hyaline cap, which is narrower than the sheath, appears solid, and is of varying length (fig. 2, B, E); it has not been possible to determine the nature or mode of origin of these caps. Many of the sheaths of the laterals are, however, perforated by a rounded aperture of varying width (fig. 2, E, F), which may still have attached to it remains of the hyaline cap (fig. 2, E, right-hand side). The closed sheath either fits closely over the

apex of the contained trichome or there is a longer or shorter space between the apex of the trichome and the end of the sheath. The trichome in the lateral is usually broken into its separate elongate cells, and in such cases the apex of the sheath is nearly always open (fig. 2, E, F). It can hardly be doubted that the long cells function as hormogonia, which escape through the ruptured apex of the sheath. Occasional laterals are found in which the apex of the sheath is drawn out like a pipette; I incline to believe that these are empty parts of the sheath from which the contents have been liberated (fig. 2, F). In rare cases (fig. 3, D) the sheath at the end of the lateral was found widely open, such sheaths showing very clearly the tapering towards the apex.

As already mentioned, these laterals are pseudo-branches which appear ordinarily to arise in pairs. Their mode of origin is illustrated in fig. 2, D and G. In most cases they appear to arise by the dying of an intercalary cell of the main trichome, the free ends of the latter then growing out laterally as branches. The dead cell is often recognizable for a time as a triangular structure between the two developing branches. In rare cases but a single lateral is produced, probably usually as a result of the failure of one branch of the pair to develop (fig. 2, A, C). The development of false branches does not generally seem to bear any relation to the heterocysts, but in fig. 2, B, is shown a case where a single pseudo-branch is arising next to a heterocyst, after the manner customary in *Tolypothrix*.

The mode of origin of the complex and highly characteristic aggregate of trichomes with its numerous irregular offstanding branches can only be conjectured, but I believe that the following suggestions will be found to come very near to the truth. The primary trichome formed from a hormogonium grows out at either end into a lateral, while the cells in the middle proceed to divide and lengthen the trichome. Sooner or later, by the dying away of an intercalary cell, a pair of false branches arises, and the original trichome is split into two, each with a lateral at either end. By the continuance of intercalary division in the middle parts of the two trichomes the two pseudo-branches of the pair get carried apart and the two trichomes grow along one another, overlapping more and more. If this course of events ensues time after time, we shall ultimately get numerous more or less parallel main trichomes with many laterals arising at irregular intervals. It is to be noticed that every main trichome always terminates in a lateral at one and nearly always at both ends, that the lengths of the diverse main trichomes (*i. e.*, apart from their laterals) is very varied, and that the number of main trichomes varies in different parts of the same thread, since as one follows the course of the latter certain trichomes bend out as laterals and disappear, whilst others make their appearance (fig. 1).

Whilst the younger short laterals are commonly found in pairs, the longer and older ones are nearly always single. All this is in harmony with the above suggestion as to the origin of the peculiar structure presented by the alga. It should be added that no case has been found in which a lateral had reverted to the structure typical of the trichomes of the main thread.

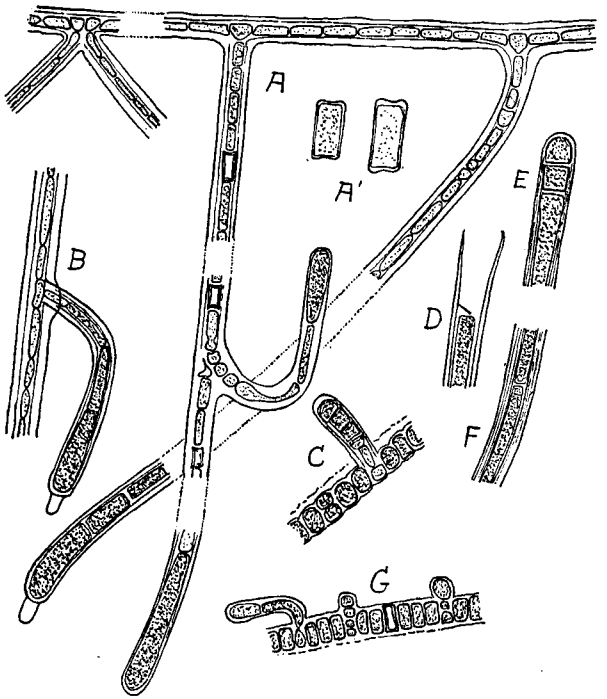


Fig. 3.—*Fischerellopsis Harrisii.* A. A thread exhibiting abundant formation of true branches of considerable length containing elongate heterocysts; the laterals are much longer than shown, the missing parts between apex and base being indicated by dotted lines. A'. Forms of heterocysts found in the true branches shown in fig. A. B. True branching of one of these laterals. C and G. The normal form of the true branches; in fig. C also longitudinal division of one of the cells. D. Apex of a false branch from which part of the contained trichome has escaped; note the tapering walls of the sheath. E. Apex of a false branch with unusually short cells. F. Part of a false branch with a clearly lamellate sheath. (A' × 1000, other figs. × 500.)

Longitudinal division of the cells of the main trichomes is a by no means uncommon phenomenon, but it rarely occurs in several consecutive cells (fig. 3, C), and there is no evidence that two adjacent filaments could arise in this way. On the other

hand, there is undoubtedly a tendency for one of the cells formed by a longitudinal division to grow out into a *true* lateral branch which stands off at right angles to the main thread (fig. 3, C) or is sometimes curved like the false branches (fig. 3, G). This method of branch-formation is, however, rare, and in most cases in the available material led to the formation of only short branches of a few cells. But on one main trichome quite a number of exceptionally well-developed true laterals were found (fig. 3, A); they usually occurred singly, but in one instance formed a diverging pair. The true laterals in this case were very long and contained heterocysts which were of an elongated shape corresponding to the elongate form of the cells composing these branches. These lengthy true branches ended in the same clavate enlargement as did the ordinary false branches, while one of them had itself developed a pseudo-branch of the normal type (fig. 3, A, the middle lateral). The bulk of the cells in these laterals were of a narrow elongate form with comparatively few granules in their contents. The sheath was hyaline and thick and closely invested the cells.

It appears clear, therefore, that when true laterals are properly developed they differentiate heterocysts, although these are never found in the false laterals. It was noticeable that the main trichome bearing these well-developed true laterals was composed of much more elongate cells than is the rule in the trichomes of the main thread—in fact, this trichome and its branches might almost have been regarded as belonging to a distinct alga were it not for the fact that it occurred within the same mucilage-sheath as other ordinary main trichomes, that the laterals exhibited the usual clavate enlargement of the terminal portion of the trichome, and that, as above mentioned, one of these laterals bore false branches of the type usual in this alga. At present it is not possible to say what rôle these elongate true branches play in the life of the alga, nor how frequently they are produced.

The alga which has just been described combines the characters of different blue-green genera and even of families. In the protoplasmic connections between the cells of the main trichomes, the occasional longitudinal division, and the development of a certain number of true branches it recalls the Stigonemataceæ, and especially *Fischerella*. It resembles certain species of this genus also in the contrast between the cells of the main trichomes and of their branches. The usual false branching with the pseudo-branches in pairs recalls *Scytonema*, while the occasional solitary pseudo-branches adjacent to a heterocyst recall *Tolypothrix*, both members of the Scytonemataceæ. The occurrence of numerous trichomes within a common bundle enveloped in diffluent mucilage is most reminiscent of the condition in certain Oscillatoriaceæ.

Frémy * has described under the name of *Fischerella moniliformis* an alga from stagnant water in tropical Africa which shows many points of similarity with the one above described and clearly belongs to the same genus. Thus, it possesses a moniliform main trichome which contains heterocysts and is produced at the ends into special segments devoid of heterocysts and with club-shaped dilated apices. The main trichome bears a number of laterals, the majority of which are true branches arising as a result of the occasional longitudinal division of a cell of the main trichome. One of these laterals repeats altogether the structure of the main trichome †, but the others are relatively short and exhibit the same clavate enlargement as is seen at the ends of the main trichome. One of the side-branches in Frémy's figure is, however, clearly false, and commences with a lageniform basal cell, just like the peudo-branches in the Devonshire alga. All the short laterals are composed of unconstricted cells and contain no heterocysts. In Frémy's alga the main trichomes are not grouped in bundles, although, judging by the features shown in his figure, it is not improbable that the alga might assume this habit after abundant growth and formation of false branches. The dimensions of the African alga are considerably greater than those of the British one.

The African alga and the one above described differ from the true species of *Fischerella* in many respects. The most outstanding feature is the production of false branches which develop into club-shaped hormogonia devoid of heterocysts; such false branches would appear to be rare in Frémy's species, but are very abundant in the British alga. The second characteristic lies in the fact that the lateral branches are essentially employed for the production of hormogonia, apparently a single one composed of a number of flat cells in the African alga, but a series of elongate unicellular ones in the British alga. The marked differences between the main trichomes and their branches are a further peculiarity distinguishing the two algæ from the known species of *Fischerella*, although it is customary in this genus for the main filaments to be torulose and consist of larger cells, while the laterals are composed of narrow elongate cells, often without constrictions. It should also be noted that false branching is not altogether unknown in the species of *Fischerella*. Thus, in *F. ambigua* (Naeg.) Gom. (*Scytonema ambiguum* Naeg.) some of the laterals show false branches ‡. Despite these facts, the differences are sufficiently marked to warrant placing the

* P. Frémy, "Les Myxophycées de l'Afrique équatoriale française," Arch. de Bot. iii. 440, fig. 348 (1930); *cf.* also Geitler, Cyanophyceæ, Rabenhorst's *Kryptogamenflora*, xiv. 493, figs. 300, 301 (1931).

† In Frémy, *l. c.* fig. 349, several such laterals are shown. His forma *veterascens* (*l. c.* 445, fig. 350) recalls the formation of elongate true laterals in the British species described above.

‡ *Cf.* Frémy, *l. c.* 447, fig. 351; Geitler, *l. c.* 490, fig. 297.

two species in a distinct genus, *Fischerellopsis*, which will probably be best referred to Stigonemataceæ, although the sometimes abundant false branching constitutes a marked link with Scytonemataceæ.

The diagnoses of the genus and its two species follow:—

FISCHERELLOPSIS, gen. nov. Stigonematacearum. Fila singula vel in fasciculis subparallelis intra vaginam mucosam diffluentem aggregatis; trichomatibus in utroque apice in ramis clavæformibus qui sæpe ex pseudoramis oriuntur productis; ramis lateralibus veris numerosis vel paucis, per divisionem longitudinalem fortuitam cellularum in media parte trichomatis ortis, aut brevibus, aut perlongis, rare ramosis; trichomatibus in media parte inter cellulas evidenter constrictis, cellulis sæpe deplanatis vel quadratis; trichomatibus in ramis lateralibus inter cellulas non constrictis, cellulis sæpe valde elongatis. Heterocystis singulis, solum in media parte trichomatis et in ramis lateralibus veris longioribus; trichomatibus in ramis lateralibus brevibus e basi ad apicem evidenter ampliatis, hormogonia vel plures ex hiato apicali vaginæ liberata producentibus. Sporis intercalaribus, subsphæricis, in una specie solum notatis.

Fischerellopsis moniliformis (Frémy) Fritsch, comb. nov. (*Fischerella moniliformis* Frémy); filis primariis singulis, pseudoramis raris; ramis lateralibus aut filis principalibus similibus aut plerumque brevibus clavæformibus, heterocystis nullis, hormogonium singulum producentibus; vaginis ramorum lateralium maturorum sæpe ocreatis; sporis singulis, sphæricis vel ellipsoideis. Fila primaria 16–24 (raro –30) μ crassa; cellulæ 12·5–15 μ crass., 6–12 μ long.; rami 12–16 μ crass., cellulis 8–12 μ crass., 4–8 μ long.; hormogonia terminalia ad 1000 μ long., 8 μ in basi, 10–11 μ in apice crass. Sporæ 18–24 μ in fil. prim., ca. 15 μ in ram. lat.

Hab. In stagnant water in Tropical Africa.

Fischerellopsis Harrisii, sp. nov. filis primariis in fasciculis subparallelis, ramis numerosis patentibus munitis, pseudoramis frequentibus; ramis lateralibus nunquam filis principalibus similibus, sed ramis lateralibus veris interdum valde elongatis et heterocystis continentibus; pseudoramis semper hormogonia unicellularia compluria producentibus, vaginis non ocreatis sed incrassatis et lamellatis, apicem versus tenuibus. Fascicula primaria 50–90 μ crass.; diam. cell. trich. prim. 8–9·5 μ, long. 5·8 (rarius 12) μ; diam. heterocyst. 10 μ, long. 10–11 μ; long. pseudoram. 120–510 μ (et supra), crass. 9–10 μ; diam. trich. ad bas. pseudoram. 3–5 μ, ad apic. pseudoram. 7·5–8·5 μ; long. cell. in pseudoram. ad bas. 22–25 μ, ad apic. 36–61 μ.

Hab. In a pool near the road on Kentismoor, East Devon.

II. *Chrysopyxis stenostoma* Lauterborn *. (Fig. 4.)

A brief reference to this characteristic epiphyte seems desirable, because it appears to be of frequent occurrence in the Epping Forest region, although, so far as I am aware, not yet recorded in print for the British Isles. The particular specimens shown in fig. 4 came from a pond near the edge of the forest at Woodford and were collected in October of 1930. So far I have only seen the species during the autumn and winter months. The alga belongs to the group Chrysomonadales (series Chromulinales) of the Chrysophyceæ and seems normally to occur on *Mougeotia* and *Zygnema*. I have never seen it in great abundance.

The unicellular individual, when viewed in its normal position on the substratum, is contained within a delicate, though rigid, ovoid envelope (13·5–14 μ wide and 18 μ long) with a moderately wide aperture on the side remote from the point of attachment (fig. 4, A–C, E). Viewed in a plane at right angles to this,

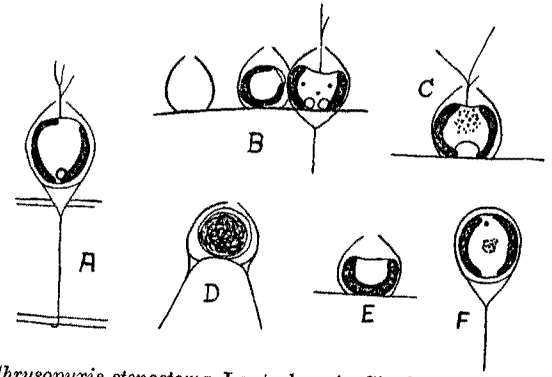


Fig. 4.—*Chrysopyxis stenostoma* Lauterb. A. Single individual seen from the side, showing the annular mucilage-thread enveloping the *Mougeotia*-cell and the apical rhizopodium. B. Group of three individuals, the right-hand one showing contractile vacuoles and rhizopodium. C and E. Single individuals; the large mass at the posterior end in fig. C is possibly leucosin. D. Detached individual, showing the saddle-like form of the envelope. F. Developing cyst (?). (All figs. × 640.)

in other words one transverse to the longitudinal axis of the supporting filament, the envelope appears wider and is seen to be saddle-shaped at its base (fig. 4, D). The two corners of the saddle are produced into a delicate mucilage-thread which completely encircles the filament of the supporting alga (fig. 4, A). This characteristic structure is best seen in individuals that have

* *Cf.* Pascher, "Süsswasserfl. Deutschlands, Österreichs und der Schweiz," ii. 29, fig. 43 (1913); also West and Fritsch, 'British Freshwater Algæ,' 317 (1927).

been detached from the substratum (fig. 4, D). The corners of the saddle that are drawn out into the ring-shaped mucilage-thread are solid.

The individual within the envelope does not usually completely fill it, a fairly wide space being left at the apex (fig. 4, C). The protoplast is naked and contains a single yellowish-brown chromatophore (fig. 4, B, C, E), which has the shape of a curved plate, often so placed that the two thick edges of the chromatophore are visible when the individual is seen in its normal position on the algal thread. Pascher (*loc. cit.*) states that there are two chromatophores, but I have been unable to convince myself that there was more than one in the material I examined. Two prominent contractile vacuoles, that contract alternately, are situated in the lower (posterior) part of the cell (fig. 4, A, B). There are possibly sometimes more than two. No eye-spot was observed. The anterior end of the protoplast is produced into a delicate, thread-like, little-branched rhizopodium which projects from the aperture of the envelope (fig. 4, A–C). The protoplasm forming this rhizopodium is often in streaming movement, and can be seen to contain Bacteria which are carried down into the protoplast of the individual.

The swarmers of this species have not yet been observed. In other species of the genus they are formed by longitudinal division of the protoplast into two, one half remaining within the parent-envelope, whilst the other puts out a cilium and swarms away. When it settles on a new substratum, it becomes attached by the cilium-bearing end, and the protoplast thereupon wanders completely round the algal filament, meanwhile secreting the mucilage-ring, a new envelope being formed only when its journey is complete and it has returned to the starting-point. In fig. 4, F, in which the protoplast is rounded off, we have possibly an incipient stage in cyst-formation.

AFRICAN NOTES.—II. (*continued*).

By A. B. Rendle.

(Continued from p. 96.)

Barleria affinis C. B. Clarke. Matopos, near Rhodes's Grave, "World's View"; no. 337, in fl. Aug. 5. Marico District, E. Transvaal.

Mr. Moore was doubtful as to regarding this as a new species, as it differs from the Transvaal specimen in having somewhat smaller and shorter-petioled leaves and in other small points, but I cannot separate the two plants specifically. The only specimen hitherto known is the type in the Kew Herbarium, which bears no corolla. The corolla in my specimen is purplish in colour, the cylindrical tube is 1·5 cm. long and the lobes ·5 cm. long.

BARLERIA SPINULOSA Klotzsch. Fort Victoria, dry sandy soil near Waterfall Dam ; no. 343 ; in fl. Aug. 9.

BLEPHARIS EDULIS Pers. Fort Victoria ; no. 345 ; in fl. Aug. 9.—Angola to East Tropical Africa.

HYPOESTES ANTENNIFERA S. Moore. Chibopopo River, near waterfall ; no. 344 ; in fl. Aug. 11. Stems 3–5 ft. high.—South Africa, East Tropical Africa.

OLDENLANDIA CORYMBOSA L. (Rubiaceæ). Victoria Falls ; Livingstone Island ; no. 273 ; Rain Forest ; no. 274 ; in fl. Aug. 6, 7.—A widely distributed tropical African species.

PENTANISIA RHODESIANA S. Moore. By railroad between Gwelo and Sobolo ; no. 278 ; in fl. Aug. 13.

HYMENODICTYON KURRIA Hochst. Domboshawa Rocks ; no. 280 ; a small tree bearing fruit only, Aug. 13.

WAHLENBERGIA ARENARIA DC. Nortons, 5000 ft., 20 miles west of Salisbury ; no. 313 ; in fl. Aug. 13.

LOBELIA ERINUS L. Victoria Falls ; Livingstone Island ; no. 315 ; Rain Forest ; no. 316 ; in fl. Aug. 6, 7. A small herb with spreading branches. It is remarkable that this conspicuous and attractive little plant should not have been more generally collected at the Victoria Falls. The only record in Eyles's list is Rogers, no. 5290 ; a specimen in Herb. Mus. Brit. shows this to have been collected in the rain-forest in 1909. Miss Gibbs made a good general collection at the Falls in September 1905, and Prof. Engler was also there. The species is widely spread in South Africa ranging northwards to the Transvaal. The plant from Victoria Falls resembles the form so well known in cultivation. Is it an introduction at the Falls ? It would, however, be difficult to account for its introduction on Livingstone Island *above* the Falls.

L. WELWITSCHII Engl. & Diels. Chibopopo River, marsh below the waterfall ; no. 314 ; in fl. Aug. 11. A small cæspitose plant with slender almost capillary shoots bearing small sessile leaves below and a few blue-purple flowers above. Identical with the type-specimens from Angola, where it seems common, as we have in Herb. Mus. Brit. several gatherings from Gossweiler in addition to the original Welwitsch specimens from Huilla. There is also a specimen from the Kymbila district, north of Lake Nyasa (A. Stolz, no. 2317).

ERLANGEA SCHINZII O. Hoffm. (Compositæ). Above Victoria Falls ; no. 281 ; in fl. Aug. 7.

VERNONIA cf. POSKEANA Vatke. Waterfall Dam, near Fort Victoria ; in dry sand near the pool ; no. 433 ; in fl. Aug. 9.

A dwarf form with very few florets to the keel and involucre only 5 mm. long.

V. AMYGDALINA Del. Near Victoria Falls ; no. 311 ; in fl. Aug. 6. Near Bushman's Cave, Macheke, Mashonaland ; no. 432 ; in fl. Aug. 14.

NIDORELLA AURICULATA DC. Fort Victoria, on dry veld ; no. 291 ; in fl. Aug. 10.

CONYZA PERSICÆFOLIA Oliv. & Hiern. Victoria Falls, Palm Grove ; no. 312 ; in fl. Aug. 7.

NOLLETIA RHODESIANA S. Moore in Journ. Bot. 1917, 104. Victoria Falls, Livingstone Island ; no. 283 ; in fl. Aug. 6. Previously collected by F. A. Rogers at the Falls (no. 13,299, type).

BLUMEA LACERA DC. Victoria Falls, Rain Forest ; no. 282 ; in fl. Aug. 7.

LAGGERA ALATA Sch. Bipont. Victoria Falls, Palm Grove ; no. 284 ; in fl. Aug. 7.

DENEKA CAPENSIS Thunb. Waterfall Dam, near Fort Victoria ; no. 287 ; in fl. Aug. 9. A dwarf specimen on the dry sandy soil.

SPHÆRANTHUS ANGUSTIFOLIA DC. (*S. Randii* S. Moore). Fort Victoria ; plentiful on sandy veld, no. 289, in fl. Aug. 10 ; dry sandy soil at Waterfall Dam, no. 290, in fl. Aug. 9.

GNAPHALIUM LUTEO-ALBUM L. Waterfall Dam, near Fort Victoria ; no. 288 ; in fl. Aug. 9.

HELICHRYSUM ARGYROSPHÆRUM DC. Nyamandlohvu, 30 m. N.W. of Bulawayo, by railroad, no. 297 ; in fl. Aug. 5. Also collected by the railroad in Bechuanaland ; no. 298 ; in fl. Aug. 4.

H. LEPTOLEPIS DC. Inyazura, 45 miles west of Umtali, at 3995 ft. ; no. 296 ; in fl. Aug. 14.

H. KRAUSSII Sch. Bip. Matopos, ascent to " World's View " ; no. 430 ; in fl. Aug. 5. Chibopopo River ; no. 431 ; in fl. Aug. 11.

Pulicaria zimbabwense S. Moore, sp. nov. *Suffrutex* parvus, ramulis bene foliosis scabro-pubescentibus ; *foliis* petiolatis ovatis breviter acuminatis basi truncatis leviterve cordatis superioribus quam inferiora multo brevioribus basi 3-nervibus margine dentatis superioribus vero denticulatis utrinque præsertim in nervis scabriusculo-puberulis ; *capitulis* hemisphæricis heterogamis radiatis circa 45-flosculosis in corymbos 2–5-cephalos foliis longiores digestis ; *involucri* phyllis 3-serialibus linearilanceolatis (paucis extimis linearibus) acuminatis dorso scabriusculis ; *receptaculo* convexo ; *ligulis* 8 discique corollis exsertis ; *achæniis* oblongis 5-costatis microscopice scabridis ; *pappi*

setis circa 10 scabridis squamis oblongis ima basi connatis apice incisis ambabus albis.

Hab. Southern Rhodesia: Zimbabwe, no. 292. In flower Aug. 11, 1929. Branches rather slender, terete, with some glandular hairs among the others, but all short and stiff. Leaves up to 18×11 mm., but usually much smaller, *e. g.*, 5–12×3–5 mm.; petioles filiform, scabrous-pubescent, of the larger leaves 10–15 mm. long, of the smaller down to 2–3 mm: Corymbs up to 3× 3·5 cm., but often smaller; proper peduncles usually 1–1·5 cm. long, with one or few small linear bracts. Flowering heads 6×8 mm. Involucral leaves 3–5 mm. long. Ligules ovate, 3-toothed, 3 mm. long. Corolla-tube of disk florets 3·5 mm. l. Achenes pale, rather more than 1 mm. long. Pappus setæ 3 mm., scales ⅓ mm. long.

Differs from *P. petiolaris* Jaub. & Spach chiefly in the smaller leaves and heads, the lengthily acuminate involucral leaves rough on the back, the convex receptacle, and scabrous achenes. [S. M.]

SCHKUHRIA ISOPAPPA Benth. ? Nyamandlohvu, 4500 ft., 30 miles N.W. of Bulawayo; no. 429; in fl. Aug. 5. Introduced, a native of Colombia. *S. bonariensis* L. of Eyles's list. Has a pappus of broad scales without aristæ, and so cannot be either *S. abrotanoides* Roth. nor *bonariensis* Hook. & Arn., names mistakenly given to specimens naturalised in Africa. [S. M.]

EMILIA PROTRACTA S. Moore. Victoria Falls, edge of Rain Forest; no. 285; in fl. Aug. 7.

SENECIO DELTOIDEUS Less. Zimbabwe; no. 294; in fl. Aug. 11. A climber.

S. LASIORHIZUS DC. Fort Victoria, on dry veld; no 308; in fl. Aug. 10. A dwarf form barely 3 inches high, with compressed corymb.

CRASSOCEPHALUM PICRIDIFOLIUM S. Moore (*Senecio picridifolius* DC.). Chibopopo River; no. 300; in fl. Aug. 11.

URSINEA ANETHIFOLIA N. E. Br. Fort Victoria; no. 295; in fl. Aug. 10. A South African species (Cape Province) collected also in Deepwalls Forest Reserve, Knysna (no. 165).

DICOMA ANOMALA Sond. var. MICROCEPHALA Harv. Waterfall Dam, near Fort Victoria; no. 434; in fl. Aug. 9. In very dry sand.

D. KIRKII Harv. var. ANGUSTIFOLIA S. Moore. Near Chibopopo River; no. 299; in fl. Aug. 11.

On the voyage from Beira to Mombasa a short stay was made at Zanzibar, and a few plants were collected at Chwaka, a shallow

sandy bay on the Indian Ocean. These included *Cyperus maritimus* Poir. (no. 702) with long stout stolons penetrating the sand, the widespread grass *Cenchrus catharticus* Del. (no. 703), *Cleome strigosa* Bojer (no. 705), *Tribulus terrestris* L. (no. 706), *Triumfetta Bartramia* L. (no. 714), the Composites, *Wedelia biflora* DC. (no. 715), *Ageratum conyzoides* L. (no. 716), and *Vernonia cinerea* (no. 717), *Stachytarpheta indica* Vahl (no. 708), *Blepharis boerhaavifolia* Retz. (no. 718), *Ipomœa obscura* Ker, and *Boerhaavia adscendens* Willd. In the thicket behind the beach *Clerodendron capitatum* var. *cephalanthum* Baker (no. 710) was conspicuous, with its heads of flowers supported by crimson bracts, and *Plectranthus flaccidus* Gürke (no. 711) was a small herb with a slender spike of bright blue flowers.

Several excursions were made from Nairobi, one to Kiambu and Limuru, the latter a beautifully situated upland district, at 7340 ft. elevation, near the ridge of the Great Rift Valley, and to Nyeri, a hill-station (6200 ft.) between the Aberdare Range and Mt. Kenya. From Nyeri, about 30 miles from Mt. Kenya, two trips were made under the guidance of Mr. Gardner, Conservator of Forests, to the lower slopes of the mountain, namely to the Camphor Forest on the south side and the Cedar Forest near Nanyuki, where the Equator cuts the mountain, on the north-west side. On the second excursion a halt was made in the *Brachylæna* forest. *Brachylæna Hutchinsii* is a tall deciduous timber-tree belonging to the Compositæ. It reaches 90–100 ft. in height with a diameter of 30 inches, and is "of first class economic importance." Its range is through Kenya Colony from the coast to 6500 ft., and it is confined to the East of the Rift Valley.

The following brief account of the Mt. Kenya forests was prepared by Mr. Gardner for our use on these two excursions:—

The forest forms a complete ring round the mountain except for a gap of about eight miles on the north, where the grass plains merge into rough rather stony moorland covered with low shrubs and scattered trees of *Faurea saligna* and *Protea abyssinica*. Except in this timberless gap there is a broad zone of pure bamboo (*Arundinaria alpina*) between the upper limit of the forest and the lower edge of the Alpine moorlands.

The forest belt comprises two main types—the Cedar (*Juniperus procera*) forest on the north and west, where rainfall is 35–40 inches, and the Camphor (*Ocotea usambarensis*) forest on the south and east, where the rainfall is probably from 50–60 inches. Between these two types there is a "transition" forest containing neither species, the main trees being *Albizzia fastigiata, Cassipourea Elliotii, Apodytes dimidiata, Olea Hochstetteri, Casearia gladiiformis, Celtis Kraussiana, Ekebergia Ruepelliana, Clausena melioides.*

There are two small areas of entirely different types of forest, namely (*a*) in the south-west below the Cedar and near its junction with the "transition" forest is a small area of *Brachylæna* forest similar to the forests round Nairobi. The main species are *Brachylæna Hutchinsii*, *Olea chrysophylla*, *Croton megalocarpa*, *Teclea* sp., *Calodendron capense*, *Strychnos* and *Acokanthera* spp. (*b*) A strip at Meru forming the lower edge of the forest on the north-east. This lies below the Cedar forest near its junction with the eastern end of the Camphor belt. The climate here is warm and moist. The main species are *Vitex keniensis*, *Cordia Holstii*, *Premna maxima*, *Linociera Welwitschii*, *Celtis ugandensis*, *Oncoba Routledgei*, *Turræa Holstii*. The first three are among the finest timbers in Kenya, but only the upper edge of this forest has been saved, the rest having been destroyed by shifting cultivation.

THE CAMPHOR FOREST is a temperate rain forest with an abundance of ferns. The altitude on the lower boundary is 6500 ft. The bamboos begin at about 8000 ft., but *Podocarpus*, *Nuxia congesta*, *Schefflera* and one or two other species continue scattered among the bamboo up to 9000 ft., where the bamboo is practically pure. The main tree species are *Ocotea usambarensis* (Lauraceæ), *Podocarpus milanjiana* (Taxaceæ), *Apodytes dimidiata* and *Strombosia Scheffleri* (Olacaceæ), *Albizzia fastigiata* (Mimoseæ), *Casearia gladiiformis* (Samydaceæ), *Cola* spp. (Sterculiaceæ), *Cassipourea Elliotii* (Rhizophoraceæ), *Syzygium guineense* (Myrtaceæ), *Cornus Volkensii* (Cornaceæ), *Macaranga kilimanjarica* and *Neoboutonia macrocalyx* (Euphorbiaceæ), *Schefflera Volkensii* (Araliaceæ), *Allophyllus abyssinicus* (Sapindaceæ), *Xymalos monospora* (Monimiaceæ),*Conopharyngia Holstii* (Apocynaceæ).

The Camphor (*Ocotea*), the most valuable timber, is peculiar in that it is practically only found in broken country, that is on narrow ridges or on the edges of steep slopes, very rarely on broad ridges or on flat land. It regenerates almost entirely from suckers and coppice shoots. It flowers and fruits freely, but the seeds appear generally to be destroyed by insects or fungi before they can ripen.

In these forests there are large areas of almost treeless bush, mainly a dense growth of *Triumfetta* and *Rubus* spp.

CEDAR FORESTS.—The lower portions of these forests are of a fairly dry type and consist either of pure Cedar or of Cedar and Brown Olive (*Olea chrysophylla*). The Cedar is usually very unsound, the finest looking boles often being riddled with cavities made by the Cedar fungus, *Fomes juniperinus*. There is often a dense undergrowth of Wych-hazel (*Trichocladus malosanus*).

Above the dry zone is a moist type consisting of a mixture of

Cedar (*Juniperus procera*), *Podocarpus* (*P. gracilior* and *P. Milanjiana*), *Olea Hochstetteri*, *Pygium africanum*. *Podocarpus gracilior* is confined to a fairly narrow belt, whereas *P. milanjiana* continues into the colder, wetter forests, and even into the bamboo. The Cedar in this zone is fairly free from fungus, but has rather a lot of ingrowing bark, which causes much waste in sawing.

(To be continued.)

NOTES ON TROPICAL AFRICAN UMBELLIFERÆ.

BY C. NORMAN, F.L.S.

Pimpinella Robynsii, sp. nov. *Herba* robusta erecta ±18 dm. alta, caulis teres glaber, summo tantum leviter ramosus. *Folia* (caulina) homomorphia, 3-jugata pinnata; lamina ±12 cm. longa petiolum æquante, foliolis imis petiolulatis ceteris sessilibus, ambitu lanceolatis 3·5–5×2–3 cm., supra glabris et lævibus, infra nervis scabridulis conspicuis ascendentibus acute elevatis, apice acutis, basi rotundatis vel subtruncatis, margine leviter serratis. *Umbellæ* ±10-radiatæ, radiis valde inæquilongis tenuibus glabris. *Flores* hermaphroditi generis; ovarium glabrum.

Hab. Belgian Congo; valley of the Akangaru, 1700 metres. *Robyns* 2406 (type), Herb. Brux.

Allied to *P. Buchananii* Wolff, but apparently distinct, being much larger, with prominent nerves on the underside of the leaves, and less branched. The basal leaves are missing. It is probable that they only differ from those described in being larger.

P. Buchananii Wolff var. **triradiata,** var. nov. A typo differt caule tenuiore radiis tantum 2 vel 3 tenuissimis, divaricatis.

Hab. Belgian Congo; Mukulu, ±1100 metres, *Robyns* 2114 (type), Herb. Brux. Katanga; Quarré, 1048 in part, Herb. Brux. & Herb. Mus. Brit.

Possibly a distinct species, often very slender, but it appears to grade into typical *P. Buchananii*.

Spuriodaucus asper, sp. nov. *Herba* ut videtur procumbens, caulis simplex, apice præsertim pilis rigidis albidis sparse vestitus, glabratus. *Folia* basalia breviter petiolata, lamina 4-jugata, jugis 4–5 cm. inter se remotis, ambitu late lanceolata, ±22 cm. longa et medio ±14 cm. lata, quam petiolus triplo longiora, bipinnatisecta supra glabra infra nervis elevatis et rhachide pilis rigidis obtecta; pinnæ oblongæ, segmentis ultimis decurrentibus irregulariter ovatis incisis, margine longe dentatis. Folia caulina ad bracteas vaginantes reducta. *Umbellæ* ±20-radiatæ,

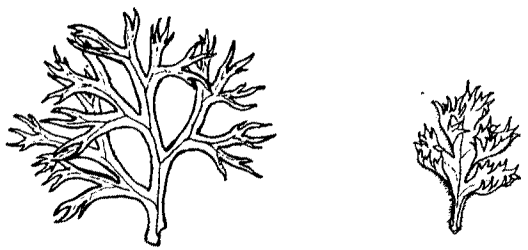
radiis scabridulis graduatim inæquilongis (interioribus brevissimis, mediis longioribus, externalibus longissimis) validis usque 3 cm. longis ; *pedicellis* numerosis, centralibus sessilibus vel subsessilibus, exterioribus usque ·5 cm. longis. *Involucri* phylla linearilanceolata acuta 1–1·5 cm. longa, conspicua ; *involucellorum* angustissime linearia acuta flores superantia. *Flores* dioici vel polygami. *Petala* fl. masc. minuta ovata lobulo inflexo. *Calycis* dentes lineares acuti, arcuati, conspicui. Fructus et flores feminei invisi.

Hab. Belgian Congo ; Mt. Kundelungu ; *Kassner* 2758 (type) in Herb. Mus. Brit.

At once distinguished from the other two species, both of which are completely glabrous, by the stiff hairs on stem and leaves. The three species may be further differentiated as follows :—

Sp. Quarrei Norman (the type-species of the genus *), while resembling *Sp. asper* in habit—both are procumbent on trailing plants with whitish flowers,—has very different leaves. *Sp. atropurpureus* Norman is a rigidly upright plant with dark purple flowers, subequal rays, and leaves generally a good deal larger but yet very similar to those of *Sp. Quarrei*.

The differences in the detail of the leaves are shown in the following sketches kindly made by Mr. G. Tandy, to whom my thanks are due :—



A. Portion of pinna of *Sp. Quarrei*. In *Sp. atropurpureus* the peculiar cervicorn branching is identical, but the ultimate segments are about half the width. B. Upper pinna of *Sp. asper*.

Peucedanum Eylesii, sp. nov. *Herba* alta glaberrima caulis ramosus in sicco caniculatus. *Folia* basalia variabilia petiolo laminæ subæquante ; lamina ambitu lanceolata ±4-jugata bipinnata, pinnis imis longiuscule petiolulatis ; foliolis anguste lanceolatis 3·5–6×·6 cm., acutis, sessilibus margine remote serratis (serratulis mucronatis) sæpius bi- vel trilobatis. *Umbellæ* mediocres 6–10-radiatæ, radiis inæquilongis, 2–5 cm. longis ; involucri et involucellorum phylla parva linearia acuta. *Flores*

* See Contrib. Flor. Katanga, Suppl. iii. 119 (1930).

polygami, pedicellis fructiferis usque 1 cm. longis, masculis multo brevioribus. *Petala* ex coll. flava. Fructus pro genere, immaturus.

Hab. S. Rhodesia ; Macheke, 5000 ft., *Eyles* 2006 (type), in Herb. Kew. *Hock* s. n. from Elisabethville, Katanga, in Herb Brux., must, I think, be the same species. It is an imperfect specimen, with the base of the stem and three basal leaves attached. Two of these agree very well with the type ; on the third the leaflets, though of exactly the same shape and toothing, are a good deal larger.

Œnanthe in Tropical Africa.

The genus *Œnanthe* was first identified as occurring in Tropical Africa by the late Hermann Wolff in describing the species *Œ. Mildbraedii* in Engler, Jahrb. xlviii. 271 (1912). By a somewhat strange coincidence he described the other two species, which it is the object of these notes to show also occur there, in the same paper, but assigned them to two other genera. This was no doubt owing to the fact that he had either seen no fruit at all or only fruit in a more or less undeveloped state. Mature fruit is now known, and the true generic position of these two plants becomes evident. The genus is represented by several species in North Africa, but the tropical species are not nearly related to any of them, but rather to the Asiatic *Œ. stolonifera* and *Œ. benghalensis*, and belong to the same section (subgenus) of the genus, viz., *Dasyloma* (DC.) Benth. & Hook. f.

The only South African species has no obvious affinity with any other, and indeed Wolff recently made it the type of a monotypic genus *Thunbergiella*.

A short account of the Tropical African species follows :

Leaflets with serrate margins.	
Terminal leaflets up to 2 cm. long, obovate, obtuse, or acute; involucels inconspicuous, not overtopping the flowers	1. *Œ. Mildbraedii.*
Terminal leaflet up to 5 cm. long, narrow, lanceolate, acute; involucels conspicuous, much overtopping the flowers	2. *Œ. Uhligii.*
Leaflets with fimbrillate margins; involucels conspicuous, much overtopping the flowers	3. *Œ. procumbens.*

1. Œ. Mildbraedii Wolff, *loc. cit.*

A weak fistular procumbent plant, to be distinguished by its short relatively broad leaflets, small umbels (up to about eight rather short rays) and the bracts of the involucel inconspicuous though well developed.

Hab. Belgian Congo ; N.E. of Lake Kivu, in swamp S.E. of Mount Karisimbi, *Mildbraed* 1659 (type) in Herb. Berol. ; Mukule *Bequaert* 6308 ; Kaitafu, *Bequaert* 6030 in Herb. Brux. Uganda ; Fort Portal, *Bagshawe* 977 (in part) in Herb. Mus. Brit. Ripe fruit

is not known, but that of *Bequaert* 6308 is sufficiently developed to make it almost certain that it does not differ from that of the next species.

Wolff in the original description describes the plant as "*subglabra.*" I find all the specimens completely glabrous.

2. **Œ. Uhligii** (Wolff) Norman, comb. nov. *Peucedanum Uhligii* Wolff, *loc. cit.* 281.

Apparently a larger plant than the preceeding, but with the same weak fistular habit, and closely allied to it. To be recognized by the longer and narrower leaflets, by the larger umbel (*i. e.*, with longer, more numerous, and more unequal rays), and by the long conspicuous tracts of the involucel.

Hab. Belgian Congo ; Kaitafu, *Bequaert* 5968 in Herb. Brux. East Africa ; by the banks of Ngare Olmotonj, near the source, *Uhlig* 459 (type) in Herb. Berol. Uganda ; Magije, Kyadondo, in papyrus swamp, *Dümmer* 1291 in Herb. Mus. Brit. and Kew ; in papyrus swamp near Gegede, *Dümmer* 3113 in Herb. Mus. Brit. and Kew ; Nunziro Forest, path to Kagera River, *Maitland* 922 in Herb. Kew ; Mawokota, 3900 ft., *Brown* 156 in Herb. Kew. Kenya ; El Geyo escarpment, *R. L. Harger* s.n. in Herb. Mus. Brit. ; Nandi, *Scott Elliot* 6940 in Herb. Mus. Brit.

The ripe fruit of this species (*Dümmer* 3113 in Herb. Mus. Brit.) can be best described by comparing it with that of the widely spread and well-known *Œ. stolonifera* (Roxb.) DC., from which it is practically indistinguishable, both outwardly and in the cross-section, the "corky" tissue ("pleenchyma" of Briquet) so characteristic of the genus being equally conspicuous in both species.

3. **Œ. procumbens** (Wolff) Norman, comb. nov. *Volkensiella procumbens* Wolff, *loc. cit.* 265. *Œnanthe ruwenzoriensis* Norman in Plant. Bequaertianæ, iv. fasc. ii. 303 (1927).

A more slender plant than the other two species, easily distinguished by the long teeth on the margin of the leaflets, giving them a fringed appearance.

Hab. Belgian Congo ; valley of the Butagu, *Bequaert* 3750 in Herb. Brux. and Herb. Mus. Brit. ; Kivu, Mount Mikeno, *Humbert* 8024 in Herb. Mus. Congo, Tervueren ; Uganda ; Ruwenzori, *Scott Elliot* 7791 (type of *Œ. ruwenzoriensis*) in Herb. Mus. Brit. Mt. Elgon, *Dümmer* 3779 in Herb. Kew. Kenya ; Kisumu–Nairobi, *Dümmer* 1673 in Herb. Mus. Brit. and Kew. Tanganyika Terr. ; Marangu, *Volkens* 1489 (type) in Herb. Berol.

The ripe fruit of this species (*Scott Elliot* 7791) only differs from that of *Œ. Uhligii* in the fact that the cross-section shows the vittæ to be more deeply set into the back of the seed than is the case in that species ; the pleenchyma is equally conspicuous. Outwardly they are inseparable.

The figures of the fruit in the 'Pflanzenreich,' iv. 228 (1927), p. 183, f. 15, G and J, are misleading, and were evidently drawn from immature carpels, as indeed all are on the type-specimen.

I tender my thanks to Dr. Diels of the Berlin Herbarium for loan of the three type-specimens concerned, and to Dr. Robyns of the Brussels Herbarium for the loan of Bequaert's specimens.

OBITUARIES.

George Claridge Druce
(1850–1932).

By the death of Dr. G. C. Druce on the 29th February last British taxonomic botany loses its most conspicuous devotee. Druce was almost the last survivor of the generation of field-botanists who laboured to develop the knowledge of the British Flora as bequeathed to them by Syme, Babington, and Watson, and in output of work he has surpassed all of his contemporaries. He was born in Northamptonshire, close to the Buckinghamshire boundary at Stony Stratford, on 23rd May, 1850, where, as he relates in the Introduction to the Flora of Bucks, he was brought up in straightened circumstances owing to the death of his father. On leaving school he was apprenticed to a chemist in Northampton, and here his remarkable energy was soon made manifest by his simultaneous diligence in business and devotion to field botany. By 1879 he had saved sufficient money to purchase a chemist's establishment in High Street, Oxford, to which he removed from Northampton and where he lived until his removal to Yardley Lodge in 1904. His success in business and attainment of civic honours in Oxford, of which he was mayor in 1900, have been recorded in other appreciations, so that the present notice can be restricted to his botanical activities.

As a child Druce was attracted by the wild flowers of his country home, and at the age of 23 he started to form a herbarium, doing most of his field-work in the early morning before business hours. With the aid of this herbarium he compiled a "Flora of Northamptonshire," which was published in the 'Journal of the Northampton Natural History Society' before his departure for Oxford. His first visits to Ireland, the Channel Islands, and the Lake District date from this period, and his earliest contribution to the *Journal of Botany* appeared in 1877 (p. 307), on Guernsey and Northamptonshire plants. In 1879 he joined the Linnean Society. At Oxford Druce worked assiduously at the county flora, and in 1886 his first important book was published, the 'Flora of Oxfordshire.' This work was favourably reviewed in this Journal, and established his botanical reputation. It was modelled on Trimen and Dyer's 'Flora of Middlesex,' with numerous notes of interest interspersed in the text, and the

accompanying botanologia gives a good account of the botanical history of the county. In 1889 the University of Oxford conferred upon him the honorary degree of M.A. During the succeeding years Druce was largely occupied in investigating the flora of Berkshire, and at the same time he contributed numerous papers to this and other Journals, usually connected with the distribution of British plants. In 1896, in the *Annals of Scottish Natural History*, he severely criticized the nomenclature of the ninth edition of the 'London Catalogue of British Plants,' suggesting various changes in the interest of priority. This brought him into conflict with other British botanists, and he was rebuked by the then editor of this Journal for his "contribution to the confusion of nomenclature." In the same year he described his first new species, *Bromus interruptus*, in the 'Journal of the Linnean Society.' The 'Flora of Berkshire' appeared in 1897, published by the Clarendon Press, and is its author's most considerable work. It is dedicated to Queen Victoria and occupies over 800 pages. Its plan is similar to that of the 'Flora of Oxfordshire,' and a full bibliography is included, with copious interesting notes. Ten years later an account of the Dillenian Herbaria, written in conjunction with Prof. Vines, was published; in 1908 a new 'Plant List,' designed to supplant the London Catalogue; in 1909 a revised edition of Hayward's 'Botanist's Pocket-Book'; and in 1914 (with Prof. Vines) an account of the Morisonian Herbaria.

Meanwhile, in 1904 the late Charles Bailey, who had been Secretary and Treasurer of the Botanical Exchange Club of the British Isles for many years, resigned, and Druce became his successor. The annual Report of the Club had hitherto been the work of the distributor for the year, but the new secretary immediately proceeded to insert an additional "Secretary's Report" on salient current events in British botany. This was enlarged and issued as a separate volume in 1912, and has since become the main feature of the Report. In 1910 Druce added the words "and Society" after "Club" in the title of the Report, and in 1914 this was altered to "Botanical Society and Exchange Club of the British Isles." These changes were not effected without some opposition, and drew from this Journal (lii. 158) the caustic editorial comment that the report "becomes yearly less and less connected with the Club, and more and more a medium for the expression of the views of Mr. Druce, the Secretary, upon various botanical matters, and above all for the publication of the 'comb. nov.,' of which he is so expert a manufacturer." The last clause was probably prompted by the inclusion in the Report for 1913 of a list of 136 new combinations for non-British plants not connected with the Exchange Club, but it did not discourage the author from continuing these creations, for in 1917 he issued as a Second Supplement to the Yearly Report

a list of over 500 new combinations for African and Australian plants. Under Druce's guidance the Exchange Club, as such, remained stationary, but the total number of subscribing members, many of whom would not claim to be botanists, was vastly augmented, and I believe now exceeds 500. The number of titled personages is a conspicuous feature of the members' list. As might be expected, the Secretary's Annual Report became a semi-popular rather than a strictly scientific periodical. While its essential features, plant-notes, county records etc., were written by himself, other papers concerning British plants from the pens of various members of the club were also admitted, and these were sometimes very interesting. And, free from editorial criticism, Druce was able to describe new groups and create new names at will, and this he did with no sparing hand. His descriptions were singularly unequal and never orthodox, and he usually avoided the citation of types. In nomenclature he adhered only partially to the Vienna Rules. He seems to have consistently favoured the "earliest name," and *nomina conservanda* were anathema to him. Among his many papers in these reports perhaps the most important are the Floras of Shetland (1921) and of West Ross (1928). These, however, are not comparable with his two early county Floras. In addition to his Annual Reports Druce brought out in 1926 his 'Flora of Buckinghamshire,' which had long been under preparation; a second edition of the 'Flora of Oxfordshire' in 1927; of the 'Plant List' in 1928; and a new 'Flora of Northamptonshire' in 1930—a remarkable performance for a man approaching eighty. In 1927 he was elected F.R.S. His last work, 'The Comital Flora of the British Isles,' was issued just after his death.

Druce's botanical career shows him to have been pre-eminently a topographical botanist, and it is by his County Floras that he will be remembered. In the preface to his last work he says: "A new record was not to be sneered at but was a real joy." And this throughout was his guiding principle. No botanist over explored these islands so extensively or made so many county records. And, possessing as he did such a mass of detailed information, it may be regretted that he never attempted any analysis of our Flora or its probable history. He never studied intensively or became an authority on any particular group of plants, and always relied upon experts to name specimens of difficult genera. It is probably due to this cause that his real additions to our Flora are so few in comparison with his long and varied explorations; and the soundness of his taxonomic judgment may often be questioned. Although he travelled extensively abroad, especially in his last years, he appears never to have worked seriously at continental plants or to have utilized them in investigating forms found in Britain. The plants that will be chiefly associated with his name are *Sagina*

scotica, *Spergularia atheniensis*, *Gentiana septentrionalis*, *Orobanche Ritro* var. *hypochœroides*, *O. reticulata* var. *procera*, *Rumex arifolius*, *Orchis prætermissa*, *O. Fuchsii*, *Potamogeton Drucei*, *Carex Pairœi*, *Kœleria valesiana*, *Poa irrigata*, and *Bromus interruptus*. Druce was always impatient of criticism, and often did not do justice to the independent work of other botanists in what he came to regard as his own domain; but he showed great kindness and encouragement to many, and especially to younger men, and by his agreeable and interesting personality won the friendship and affection of a very large circle of lovers of nature, as was evinced on the celebration of his eightieth birthday.—H. W. Pugsley.

Eliza Standerwick Gregory
(1840–1932).

Born December 6, 1840, at Thrapston, Northamptonshire, Eliza S. Barnes, when two years old, moved with her parents to Trowbridge, Wilts. In 1863 she married Mr. Arthur Gregory of that town; and in 1885 the family removed to Weston-super-Mare, where, in 1887, Mrs. Gregory founded a school for boys, with the help of her daughter and elder son. Her younger son, the late Reginald P. Gregory, afterwards Lecturer in Botany at Cambridge University, was one of the boys at the school in the beginning. Field botany and natural history were a feature of the education.

Mr. and Mrs. Gregory went to reside at Chesterton, Cambridge, in 1904. Mrs. Gregory had previously become interested in Violets, and in North Somerset had been struck with their variety and mutations. This particular interest was developed at Cambridge, where a plot in the Botanical Gardens was allotted to her, in which she was able to grow and study the life-history of specimens received from England and the Continent.

Having specialized in the *Nominium* section of the genus *Viola*, she eventually compiled her well-illustrated monograph on 'British Violets,' which was published in 1912, and for which the late G. C. Druce wrote an Introduction. The work was reviewed at some length in this Journal, 1913, pp. 23–25, by the late E. S. Marshall.

In her Preface, p. xiv, we read: "Much, perhaps most of my inspiration and enthusiasm for botanical study was derived from two friends, Mr. James Walter White and the late Mr. David Fry." And Mr. White, in his 'Flora of Bristol,' 1912, p. 170, in a footnote (under *Viola*), acknowledges the help he obtained from notes and specimens from "my friend Mrs. Gregory . . . whose knowledge of the *Nominium* section is unexcelled by any British Botanist."

Between 1904 and 1923 Mrs. Gregory had the following articles and notes in this Journal:—"*Viola calcarea* as a Species" (1904); "Seed Production in Violets," and "Pollen of Hybrid Violets" (1907); and "A new Variety of *Viola odorata*" (1923)—this was var. *immaculata* from S. Devon, sent by Miss C. L. Peck.

Mrs. Gregory was a helpful member of both the Exchange Clubs—the Watson Exchange Club for 28 years. She presented her herbarium, including the British Violets, to the British Museum (Nat. Hist.) when she left Cambridge in 1919.

Mrs. Gregory died, aged 91, at Weston-super-Mare, March 22, 1932, and was buried in the town cemetery on March 26.—H. S. Thompson.

REVIEWS.

A Handbook of the British Seaweeds. By Lily Newton, Ph.D., F.L.S. 8vo, pp. 478, figs. 270. The Trustees of the British Museum: London, 1931. Price 15*s*.

Botanists are singularly fortunate in the admirable treatises on the British Cryptogamic flora which are at their disposal. But Algae, though not the least attractive, have largely remained unprovided for, and the seaweeds have been the more neglected. Harvey's great work, 'Phycologia Britannica' (1846–1851), is still the standard work of many algologists and university departments, though naturally it is supplemented by Rabenhorst's 'Kryptogamen-Flora,' Batters's 'Catalogue,' or local lists and floras of the countries concerned.

The task of providing a handbook of British Seaweeds, to be issued by the Trustees of the Natural History Museum, fell to Dr. L. Batten, now Professor L. Newton, the author of the well-known revision of the British Polysiphoniæ. The volume has been produced under circumstances of exceptional difficulty. At first Dr. Newton worked at the Natural History Museum, where the full resources of the Department of Botany were at her disposal, but subsequently she had to work elsewhere and the volume was completed whilst carrying out the duties of the Professorship of Botany at University College, Aberystwyth.

The Handbook opens with a short Introduction dealing with the distribution, ecology, and uses of algae, which, since it contains so many items of interest, awakens the desire that this section might have been extended. An outline of the classification follows, giving the chief morphological and taxonomic characters of the four main divisions. The plan followed in the body of the work, dealing with the flora itself, is simple and ideal for the ordinary student. Each of the main divisions (Myxophyceæ, Chlorophyceæ, Phæophyceæ, and Rhodophyceæ) is prefixed by an artificial key to genera. The orders and families

in the divisions are distinguished by short descriptions without keys. Keys are provided to the species, which are briefly described, with notes added as to habit and distribution. The more important synonyms are cited, but no references are given. The work is profusely illustrated, every genus being portrayed, often by means of four or five figures. Most of the latter are the work of the late Mr. Percy Highley, the well-known artist at the British Museum, though some are by the author herself. Many of the figures are excellent, and this feature of the volume is not excelled by any other algal flora in existence.

A large portion of the keys appears to be original, and their elaboration must have entailed considerable labour. Opportunity for testing them in the field will come. The classification and nomenclature adopted is, in the main, that of Batters, but in certain Rhodophyceæ the author has followed the grouping of Rosenvinge and Kylin. The complete absence of references and the scanty synonymy make the work less serviceable for the advanced worker; but for the elementary student no better plan for a flora could be devised, and the admirable get-up of the Natural History Museum handbooks sets off this method to advantage. By reducing the bulk it has been possible to issue the volume at the low figure of 15*s*.

With regard to the botany itself, the author is no doubt fully aware that the taxonomy of certain groups is at present much confused. Indeed, as the Keeper of the Department of Botany states in the Preface, the Handbook is to be regarded as a forerunner of monographic studies. The greater part of the systematic work is, however, sound, and will stand the test of time, and all workers will be grateful to Prof. Newton for taking them thus far. Years of research (not so much in the herbarium, but in the field and in the laboratory, where alone life-histories can be studied) are required to elucidate, for instance, many species of *Cladophora* amongst the Greens, *Ectocarpus* amongst the Browns, *Callithamnium* and *Ceramium* amongst the Reds. Happily the cultural, cytological, and ecological work by various algologists in this country, as well as in Denmark and Sweden, is slowly bringing order out of the confusion, though the cosmopolitan and plastic genus *Enteromorpha* so far sets all systematists at defiance. Many other species of various genera in all groups, moreover, are well known to critical workers to be unsatisfactory. The author has boldly tackled all these problems, and set down what to her is the best solution for the present, and the method of treatment adopted has simplified the task.

There is one point which may be raised as a matter of principle rather than taxonomy, namely, the introduction of important changes without explanation. The most striking example is that of the remarkable *Codium* known from the Atlantic seaboard

of the British Isles for upwards of a hundred years, but not described till 1912. By intensive study in the field and in the herbarium it was shown to be a variety of *C. mucronatum*. The plant has since attracted considerable attention, and has been referred to by several writers in Europe, and its identity accepted. Professor Newton, without a word of explanation, omits all reference to *C. mucronatum*, and transfers the variety to another species. A somewhat similar attitude towards critical work is found in several other cases. Every author is entitled to his own opinion, but it is desirable, especially in a work with a world-wide circulation, such as a British Museum handbook, to insert at least a footnote of explanation when results of really critical work are set aside.

There are a number of small points which might be commented on did space permit, but one unfortunate defect must be noticed. Although, as stated in the Preface, an attempt is made "to give an account of the whole of the British species," the work practically includes only those which are enumerated in Batters's 'Catalogue' of 1902. A few recent additions are included, particularly varieties, but most of those added to the British flora by various workers during the last twenty-nine years are omitted. These include a few very well known forms, though naturally the majority are rare, or, owing to their not having been searched for, are hitherto known only from a few localities. In all nine genera and over thirty species as well as several varieties are involved. This unfortunate inadvertence was, it is understood, due to a misunderstanding. The records as to these species, which are often accompanied by useful critical notes, are scattered in a variety of works and periodicals, and are not easy of access to the student.

The proof-reading has been well done, and considerable attention has evidently been paid to nomenclature, though even here a few errors occur. The inclusion of the full derivation of all generic and specific names is a useful feature. There can be no question that the author has rendered great service to algologists and that the Handbook will act as a great stimulus to the study of the group. It will also be widely used on the Continent, where such a treatise is not less needed than in England.

The British Museum Monographs and Handbooks are a source of national pride and have, moreover, an international reputation. One may venture to hope, therefore, that when a new edition of the present work is required the Museum authorities may invite comments from the exceedingly small band of specialists in various branches of phycology in this country, so that the Handbook may be as free from errors as it is possible to make it.—A. D. Cotton.

Ergot and Ergotism. A Monograph based on the Dohme Lectures delivered in Johns Hopkins University, Baltimore. By GEORGE BARGER, F.R.S. 8vo, pp. x, 299; text-figs. 41. Gurney and Jackson: London, 1931. Price 15*s*.

THIS valuable monograph contains much information about ergot (*Claviceps purpurea*) of interest to mycologists. It is a matter for congratulation that the author has carried out an intention formed twenty years ago to write a full account of the subject rather than publish merely the Dohme Lectures.

The volume begins with a historical account of ergot. Following the New English Dictionary, the word is said to have been used in an English text for the first time in 1683. The distribution of the fungus in Europe, its common names, and its relation to the cultivation of rye are given. The first mention of ergot, apart from its toxic effects, is said to be in Adam Lonicer's 'Kreuterbuch,' 1562: "long black hard narrow corn pegs, internally white, often protruding like long nails from between the grains in the ear." The English herbals omit it, its earliest record being in Ray's 'Catalogus Plantarum Angliae' (ed. 1677). The first illustration is in C. Bauhin's 'Theatrum Botanicum' (ed. 1658), where diseased rye is called *Secale luxurians*.

Ergot was used by European midwives in various countries in the eighteenth century. It was introduced into official medicine in the United States of America early in the nineteenth century, and an account of its use was published in 1808.

A full account of the types of ergot-poisoning clears up many points which have puzzled others as well as mycologists. Two types are known, the convulsive and the gangrenous types. An analysis of the vast literature shows that these have a well-marked distribution, the first east of the Rhine, the second west of it. There seems no reason to doubt that they are symptoms of the same disease, the convulsive type occuring where there is a deficiency of vitamin A. Convulsive ergotism is "St. Anthony's fire," "St. Martial's fire," and so on, of mediævalists.

After considering supposed references in the ancients, the author gives a very full and readable account of ergotism in the middle ages. Most mycologists have some knowledge of this chiefly through odd references, though Galama's full historical account (1834) is probably better known than Professor Barger suggests. There appears to have been only one occurrence of typical gangrenous ergotism in England, where it affected the family of an agricultural labourer near Bury St. Edmunds in 1762. A mild but extensive epidemic of ergotism occurred in Lancashire from 1922 to 1929, the Manchester cases being among Jewish immigrants from Central Europe who lived on rye bread.

In the chapter headed "Botanical" there is first a short historical summary and then a full description of the different stages of the fungus, with two excellent plates. There are signs that the author is not on quite such familiar ground here as in the rest of the monograph. Thus, for example, it is a little startling to read "It is complex as regards the development of the ascogenous hyphæ, and this complexity brings *Claviceps* close to the *Ascomycetes* proper," for *Claviceps* is a typical Ascomycete. Included in this chapter is a discussion of the species of *Claviceps*: this adds to the completeness of the book, but is not critical, and it probably would have been better to have sought collaboration in this chapter. The commonest British species is *Claviceps microcephala*, and in my experience it is more frequent on *Molinia* than on *Phragmites*, for it is rare to meet a clump of the grass which is not infected; the sclerotium "germinates" on the ground late in February. A list of ergot-hosts is also given, and will surprise most readers by its length; a few additions could have been made by consulting Seymour's 'Host Index of the Fungi of North America.'

The remaining chapters are "Chemical," "Pharmacological and Clinical," and "Pharmaceutical and Forensic." So far as I am able to judge, these chapters will prove of the greatest value to those for whom they are specially written. They include an account of Professor Barger's own noteworthy contributions. A special word of praise is due to the comprehensive Bibliography and Index of Authors, which occupies thirty-five pages.

Perhaps it would not be out of place to say that in the Department of Botany, British Museum, there are some excellent drawings of the development of ergot by the famous botanical artist Francis Bauer in his series 'Diseases in Corn.' I have not been able to find any specimen of ergot in Sloane's Herbarium.

The monograph is one which will prove useful to mycologists because of the large number of widely scattered references which have been summarized. It is well produced, and the few blemishes which I have ventured to indicate are of little consequence and can easily be remedied if it meets with the success it richly deserves.—J. RAMSBOTTOM.

Soil Conditions and Plant Growth. By Sir E. JOHN RUSSELL, F.R.S. Sixth Edition. 8vo, pp. viii, 636; frontisp., 60 figs., including 6 plates. Longmans, Green and Co: London, 1932. Price 21*s*.

THE first edition of this book (1913) was a miniature affair of some 160 pages, but big enough to contain an adequate survey of the subject. The present edition is nearly four times its size, a sufficient indication of the growth of knowledge of the soil,

which subject now has its distinctive journals and organizations. The publication of a sixth edition is warrant enough of the quality of and the need for the work.

After an admirable historical introduction the author considers in the course of five chapters those chemical, physical, and biological conditions of the soil which play the most important part in the growth of the plant. Much of this subject-matter requires some, if not much, specialized knowledge of the reader, but some parts will appeal to others besides the agriculturalist; chapter vi., for example, on the microflora and fauna of the soil, is of extraordinary interest, and will reveal to many a new world. The remaining chapters consider the resultant of the various factors on the growth of the plant, and these are particularly of value to the œcologist as well as the agriculturalist. The last chapter, a short one, is concerned with the methods of characterizing soils. Then follow an appendix on the methods of soil analysis and a selected bibliography, which, with the many footnote references throughout the letterpress, will be of the greatest value to the student. Finally, there is an adequate author and subject-index.

In these five hundred odd pages the author has given a wealth of information—so much indeed that in parts the book is a work of reference rather than a text-book. In consequence of the hot pace often set, some of that finer literary quality characteristic of Sir John's shorter writings is missed; but here and there we meet some characteristic incisive remark, shrewd criticism, or apt quotation.

The author is to be congratulated on his work, which is indispensable to all who are interested, from whatever point of view, in the growth of the plant.—T. G. Hill.

Field Museum of Natural History, Chicago, U.S.A., Botanical Series. Edited by B. E. Dahlgren, Acting Curator, Department of Botany.

The Associate Curator, P. C. Standley, continues his studies of Tropical American Rubiaceæ. 'The Rubiaceæ of Bolivia' and 'The Rubiaceæ of Venezuela' comprise parts 3 and 4 of vol. vii. Bolivia lies at the south-western extremity of the principal area of dispersal of the American Rubiaceæ, and much of it is of so great an elevation that only a few temperate genera are represented. It is only on the eastern slopes of the Bolivian Andes that species of the tropical genera are found. Sixty-three genera in all are represented. The Venezuela list enumerates 81 genera and 351 species, a number which must be far short of the total existing in the country, only a relatively small portion of which has been botanically explored. In both parts the Key to the Tribes and Genera has been adopted (with

acknowledgment) from that published by Wernham for the tropical American genera in this Journal (1916, 326). 'Studies of American Plants.—V.' (vol. viii. pt. 5) is mainly devoted to tropical American Rubiaceæ, and gives the result of an examination of more than 4000 sheets lent by various European Herbaria. J. F. Macbride continues his notes on Peruvian Spermatophytes (vol. xi. pts. 1, 2).

Lehrbuch des Obstbaus auf Physiologischer Grundlage. By Dr. Fritz Kobel. 8vo, pp. viii, 274, 63 text-figs. J. Springer: Berlin, 1931. Price R.M. 16.

Dr. Kobel, who is botanist to the Swiss Research Institute for fruit-, vine-, and garden-culture at Wädenswil, dedicates this volume to his teacher Professor Dr. Ed. Fischer of Berne "zum siebzigsten geburtstage." The object of the work is to demonstrate on the basis of plant physiological investigations the grounds for successful practical fruit-culture. The book will not replace practical handbooks, but seeks to show why and under what conditions the practical measures advocated should be carried out. The five chapters deal respectively with the general physiology of the fruit-tree, its flowering and fruiting, the relations between vegetative growth and production of flower and fruit, and the breeding of new varieties. Study of the development of the flower is followed by a discussion of the various theories of flower-formation and of the effects of manuring, of increase or retardation of assimilation, of ringing and other measures, on flower production. The chapter on fruit-formation occupies one-half of the text, and includes the study of fertilization, pollen-sterility, self-sterility, and inter-sterility in the various species, and the subsequent development of the fruit. References to previous work are freely given. The illustrations, many of which are borrowed with acknowledgment from other sources, are clear and helpful. A full and classified bibliography is appended. Dr. Kobel's book should afford profitable reading for those interested in scientific fructiculture.

Handbuch der biologischen Arbeitsmethoden. Edited by Prof. Dr. Emil Abderhalden. Lief. 353: *Ernährung und Stoffwechsel der Pflanzen.* 8vo, pp. 193–371. Price R.M. 10. Lief. 356: *Methoden der Vererbungsforschung.* Pp. 941–1112. Price R.M. 11. Urban and Schwarzenberg: Vienna, 1931.

These two parts of Prof. Abderhalden's monumental work represent respectively Abteilung XI., 'Chemische, physikalische und physikalisch-chemische Notizen zur Untersuchung des Bodens und der Pflanze,' Teil 4, Heft 2, and Abteilung IX.,

'Methoden zur Erforschung der Leistungen des tierischen Organismus,' Teil 3, Heft 6. The first comprises three papers by J. Kisser on the preparation of plant-ash pictures and silica skeletons from anthracogramms, the preparation of thin sections of recent plant material, and maceration methods applied to recent plant material; two by Karl A. Jurasky on methods of section-cutting in palæobotany, and maceration methods in palæobotany; and one by Heinrich Walter on the cryoscopic determination of osmotic values in plants. The terms Anthracogramm and Kohlenbild, which are synonymous, were coined to describe microscopic preparations of carbonized organic material produced by heating in various ways. The method is of use, for instance, when it is desired to compare the structure of normal plant tissues with that of charcoal. It has been claimed that the further application of this method to thin sections of certain fossil plants reveals details in the structure which cannot otherwise be detected. Similar advantages result from the examination of plant-ashes, and various methods for preparing these for microscopic examination are described in detail. Kisser's second paper deals briefly with the preparation of sections of ordinary plant material and methods of infiltrating and embedding fragile objects, including charcoal. The same author's account of the maceration method includes methods specially adapted to living tissues, algæ, and fungi, the tissues of the higher plants with and without preservation of the cell-contents, with separate sections on parenchyma, latex tubes, sieve-tubes, and excretory cells, lignified tissue, bast fibres, cork, and methods of isolating individual tissues, *e. g.*, epidermal layers and cuticles. Jurasky's two papers give a general account of the technique of preparing fossil sections and the application of the maceration method to palæobotany in the microscopic examination of fossil woods and other lignified tissue, charcoal, pollen masses, and spores and fossil leaf cuticles.

Lieferung 356, though forming part of a zoological series, contains an article by Walter Zimmermann of Tübingen entitled "Arbeitsweise der botanischen Phylogenetik und anderer Gruppierungswissenschaften," which fills two-thirds of the number (pp. 941–1053, with 14 text-figures). The author discusses the methods of investigation in formulating the various systems of classification—the artificial, which selects one or more characters as criteria, the typological or idealistic, which is based on abstract conception, and the phylogenetic. The greater part of his communication deals with the last-named. The various lines of investigation are considered and their comparative value is discussed, as well as the results which have been obtained and their methods of presentation. The essay concludes with a list of the relevant literature, to which full reference is made in the text.—B. J. Rendle.

Important Western Browse Plants. By William A. Dayton. 8vo, pp. 213, 45 text-figs. United States Department of Agriculture, Miscellaneous Publications, no. 101. 1931. Price 45 cents.

The term browse is used here to indicate "shrubby, woody vine, or small tree vegetation, whether palatable or not," forming one of the four main groups into which, for forestry purposes, range vegetation is popularly divided, the others being grasses, grass-like plants, and weeds (*i.e.*, nongrasslike herbs). The number of such species in the United States "runs easily into the thousands." During the past twenty-two years approximately 1000 species of shrubs, undershrubs, and woody vines, embracing 225 genera and 68 families, have been collected on national forest ranges by forest officers, and large areas of the West are still unexplored botanically. The present publication gives a brief survey of the more important western browse plants and their rôle in range management for the use of forest officers and stockmen. Short botanical descriptions are given of the genera or species, but emphasis is placed wholly on economic and ecological data. The genera are arranged alphabetically within the families which follow the order of Engler's System. The species are indicated by native names, botanical names being also quoted. The illustrations supply a helpful guide to recognition of the species and to distinguishing between different species of one genus. An index serves also as a checklist of the genera, species, subspecies, and varieties discussed in the text.

Practical Microscopy. By L. C. Martin and B. K. Johnson. 8vo, pp. 116, with 88 figures and a frontispiece. Blackie and Son: London, 1931. Price 3*s.* 6*d.* net.

Botanists commonly affect a contempt for the niceties of microscopy, but if any can be persuaded to read this small book they will find it a great help to the technique of modern microscopy. There is a need for something of the sort, since most of the introductory teaching on microscopy which botanical students receive is most inadequate, and its effects are shown later in research days. Should this be doubted the opinion of any competent microscopist on the details of much of the microscopy in recently published botanical research will bring disillusion.

The book suffers from the fact that both the authors are physicists. A laudable effort has been made to present simply some rather elusive ideas, but so light is the touch on some of the summarized knowledge that unless the reader has a fair knowledge of physics much of its point will be lost.

Some remarks on the preparation of biological specimens and on mounting and staining are so scrappy as to be useless,

and are better ignored; the authors might have avoided describing a special technique which is obviously foreign to them and adequately treated elsewhere. The few casual remarks on work in the ultra-violet are well informed; but surely this is still outside the range of ordinary practical microscopy.

A slightly pontifical air is at times a little comic, as when we are assured that the magnifying power of an optical instrument is:

$$\frac{\text{"size of retinal image of object seen with instrument}}{\text{size of retinal image of object seen with unaided eye."}}$$

Two portions of the book are especially valuable. One is a table of instructions of "routine method for correct setting-up of the microscope for general use," which if followed (even unintelligently) would produce good results; and the other is a chapter on "The interpretation of the image in the microscope." The latter emphasizes the fact that a point in the image does not always correspond to a point source in the object, and that optical sections give a completely false picture of an object.

In spite of the few unfavourable criticisms the book is commendable, as its use will help an investigator to determine the "real" structure of microscopic objects.—E. H. Ellis.

CORRESPONDENCE.

Mr. Wilmott's criticism in this Journal (*supra*, p. 49) of Dr. Gregor's paper on "Experimental Delimitation of Species" ('New Phytologist,' xxx. 204, 1931) has provoked the following correspondence. Dr. Gregor writes:—

"After a perusal of the paper Mr. Wilmott considers that '*Phleum alpinum* remains an entity morphologically, distributionally, and historically distinct from *P. pratense* and from the hexaploid species which the author also identifies (? rightly) as *P. pratense*.' This point of view would be justified if one ignored the fact, demonstrated in my paper, that *P. alpinum* is intimately related genetically to the group known to systematists as *P. pratense* L. Mr. Wilmott remarks that 'all good taxonomists are anxious to use genetical, cytological, and ecological knowledge,' but he does not appear disposed to consider the information contained in my paper, since it is at variance with his own opinions upon the classification of this group. The combination of these two Linnean species, however, is quite permissible from the ordinary taxonomic standpoint, since it had been already effected by Ascherson and Graebner (1899), a fact which detracts considerably from the force of Mr. Wilmott's statement that 'Only when geneticists and cytologists are also competent taxonomists shall we obtain useful results and good progress.' Although, after experimentation, I have grouped these two species in a single cœnospecies, *P. pratense-alpinum*, I expressly emphasized the existence of four distinct subgroups (ecospecies) within this common species, *i. e.*, a diploid and a hexaploid group within *P. pratense* L. and a diploid and a tetraploid group within *P. alpinum* L.

"The taxonomist who, according to Mr. Wilmott, 'from his knowledge of genetics could often predict many genetical factors within a group from the study of wild populations alone' is obviously in a most enviable position. Nevertheless, I believe that, whenever practicable, the experimental study of a group from as many aspects as possible is the most reliable means of obtaining precise information regarding its component parts; this is proved by the fact that the observational method alone had failed to make the important distinction between the two groups of *P. pratense* L."—J. W. Gregor, Scottish Plant Breeding Station, Corstorphine, Edinburgh.

Mr. Wilmott adds the following reply:—"I am quite content to let Dr. Gregor's letter speak for itself. He appears to think that he can attack taxonomists without getting a reply and I have been thanked for doing a necessary deed, and even told that I was too restrained. My comments on his objections are:—(1) relationship does not destroy individuality, *e. g.*, I remain an entity in spite of my intimate genetical relationship with close relatives; (2) I am prepared to use information in Dr. Gregor's paper, but am not forced to use it in his way; (3) the reference to Ascherson and Graebner and the rest of the letter in my opinion emphasize my statement rather than detract from it.—A. J. Wilmott.

BOOK-NOTES, NEWS, etc.

Linnean Society of London.—At the General Meeting on April 14 the President, Professor F. E. Weiss, F.R.S., gave an account, illustrated by lantern-slides, of "Some unusual female catkins of *Corylus*"; Mr. H. N. Dixon, exhibited and commented on some Mosses as Tumble Weeds, and Mr. A. D. Cotton gave an account of "The Tree Senecios of the high African Mountains."

Orchids of Sikkim Himalaya.—In the 'Orchid Review' for April B. N. Ghose gives a few notes on some species discovered since the publication of King and Pantling's monograph. The absence from the latter of the conspicuous free-flowering *Cœlogyne barbata* provokes the suggestion that its seed may have recently been brought by the wind from the Assam Hills.

'The Hong Kong Naturalist,' vol. ii, no. 4 (November 1931), contains a second communication by W. A. Setchell on Hong Kong Seaweeds entitled "Sargassaceæ of Hong Kong and Vicinity." A discussion on the systematics of the group is followed by an attempt to arrange the subgenera in a provisional working key. The five subgenera are based on J. G. Agardh's ideas of the evolution of the frond and of the vesicles, together with the shape and arrangement of the receptacles. A list is given of the thirty-two species indicated as occurring in Hong Kong, with a tentative artificial key.

'THE JOURNAL OF THE WASHINGTON ACADEMY OF SCIENCES,' xxii. no. 6 (March 1932), contains a revision of the Peruvian species of the genus *Sanchezia* (Acanthaceæ) by E. C. Leonard of the U.S. National Museum. Of the twenty-one species recognized nine are described for the first time. The genus was founded by Ruiz and Pavon in their 'Flora Peruviana et Chilensis' (1798), and original specimens of their two species are preserved in the British Museum Herbarium. Unfortunately Mr. Leonard has not had the opportunity of examining them. No. 2 (January 1932) contains a revision of the twenty-two species of *Cestrum* (Solanaceæ) known from Venezuela up to 1930 by H. Pittier. Eight of the species are new. An elaborate key to the species is given, and the novelties and more critical species are described at length. In no. 3 (February) E. P. Killip describes five new species of *Bomarea* (Amaryllidaceæ) and C. V. Morton a new *Hymenophyllum*, from Peru.

'BULLETIN DE LA SOCIÉTÉ ROYALE DE BOTANIQUE DE BELGIQUE.'—The recent issue of the Bulletin (vol. lxiv. fasc. 1) contains a bibliographical and historical article entitled 'Phototypie et Phototypes' by Albert Tiberghien, on "nature-printing," the production of permanent plant-impressions from the actual specimens, an art which has been practised since the XVIth century, perhaps even earlier. The Greek word *ectypa* has been used to designate such impressions. The writer notes the various references to or examples of this process from the time of Pedemontanus onwards, and cites an anonymous 'Herbarius vivus seu Hortus hyemalis' preserved in the manuscript collection of the Bibliothèque Royale de Belgique, dated 1673, in the preface to which the author gives full directions for preparing the impressions by use of printer's ink. Modern phototypie, developed and perfected in the XIXth century, depends on the production of electrotypes, a process invented in 1849 by A. A. Auer, director of the National Press of Vienna. The plant or other natural object is subjected to pressure between sheets of polished steel and lead, and the imprint thus obtained in the lead is reproduced on copper by electrotypy; impressions may then be taken from the copper-plate. This process was brought to London in 1831 by Henry Bradbury, who issued the well-known 'Ferns of Great Britain and Ireland' by Thomas Moore, edited by John Lindley, a grand folio with 51 plates printed in colour, in 1857.

In the same number Lucien Hauman gives a phytogeographic sketch of the subtropical forests of the Argentine and of their relations with the other botanical provinces of extra-tropical South America. The article is illustrated by maps and a series of photographic reproductions of the vegetation. M. Choisy contributes a discussion on the classification of the lichen family Gyrophoraceæ based on a study of the evolution of the four types of apothecium.

AFRICAN NOTES.—II. (*concluded*).

By A. B. RENDLE.

(Continued from p. 137.)

THE plants collected in Kenya Colony, about 150 in number, include the following. The collections on the mountain were made in the lower part of the forest at an altitude of about 6500 ft.

LISSOCHILUS ELLIOTII Rendle in Journ. Bot. 1895, 169. Mt. Kenya; growing in a moist depression in the Camphor Forest; no. 519; in fl. Aug. 27. A very handsome terrestrial orchid, with a tall scape bearing a raceme of handsome flowers, which must, I think, be regarded as conspecific with the type collected by Scott Elliot at Wimi, 7000 ft. alt., on Mt. Ruwenzori, no. 7924, June 1894. The Kenya plant is larger than the type-specimen, which was "about 5 ft. high," the flowering spike of the former being 7 ft. high. The flowers are also a little larger, the dorsal sepal 2·5×1·5 cm.; the lateral sepals 2·8×1·2 cm., and the petals 3×2·9 cm., as compared with 2·5×1·1 cm., 2·2×1 cm., and 2·5 cm. respectively in the type.

As the type-specimen bears no leaves I add the description of a leaf from the Kenya plant—a narrowly lanceolate blade 6 dm. long by 10·5 cm. greatest width, passing below into a long narrow stalk 2·5 dm. or more long. The few leaves were somewhat rigid in texture, of a deep green colour, with the blade erecto-patent on the stiff almost erect stalk.

DISPERIS NEMOROSA Rendle in Journ. Bot. 1895, 297. Limuru; in copse, 7340 ft.; no. 518; flowers white, in fl. Aug. 24. A diminutive little ground orchid, identical with the type from Wimi, Ruwenzori, 7–8000 ft., in deep forest, Scott Elliot, no. 7944, June 1894.

TACCA LEONTOPETALOIDES O. Kuntze. Mombasa; no. 632; in fl. Aug. 31.

COMMELINA IMBERBIS Hassk. Mt. Kenya, Camphor Forest; no. 637; in fl. Aug. 27.

ISACHNE ALBENS Trin. Mt. Kenya, a common grass in the Camphor Forest; no. 633; in fl. Aug. 27.

MARISCUS TOMAIOPHYLLUS C. B. Clarke. Mt. Kenya, Camphor Forest; no. 627; Aug. 27.

KYLLINGA CYLINDRICA var. MAJOR C. B. Clarke. Mt. Kenya, Camphor Forest; no. 629; Aug. 27.

CAREX CHLOROSACCUS C. B. Clarke. Mt. Kenya, Camphor Forest, in damp place; no. 631; Aug. 27. Also on Mt. Kilimanjaro and Clarence Peak, Fernando Po.

Chlorophytum limurense, sp. nov. *Herba* glabra rhizomate brevi, tuberculis ovati-fusiformibus breviter pilosis, radicibus tenuiter fusiformibus; *foliis* radicalibus 5–6 membranaceis anguste lineari-lanceolatis ad apicem acuminatum angustatis, basi tenui elongata plicata in vaginam desinente, ad 3 dm. long. et 8–12 mm. lat., venis parallelis ad 10; *scapo* nudo, simplici, folia excedente, cum inflorescentia c. 4 dm. long.; *inflorescentia* simplici sparse racemosa; *bracteis* ovatis apice breviter aristulatis 6–7 mm. long., ad 3·25 mm. lat.; *floribus* parvis geminis, pedicellis paullo supra medium articulatis, 5 mm. long.; *petalis* albis nervis viridibus 3 lineatis, et 6–7 mm. long.; *fructu* valde emarginato, segmentis 4– vix 5 mm. long., ad 4 mm. lat.; seminibus planis, nigris.

Hab. Kenya Colony: Limuru, in copse, 7340 ft. alt.; no. 636. In flower and fruit, Aug. 24, 1929.

A small herb with a tuft of five to six thin long narrow leaves springing from the root-stock by the base of the slender scape. The shrivelled tubercles are 1 cm. or less in length; the upper part of the roots is similarly hairy. The parallel nerves at the broadest part of the leaf are 1–1·5 mm. apart. The three outer petals are subovate, concave, with a well-marked green keel passing into the hooded apex; the inner, more delicate, are elliptic-oblong and blunt; the yellow broadly linear anthers are 1·5 mm. long.

Very near *C. Bequaertii* De Wild. from the Kabare Steppe on the borders of Lake Albert Edward, judging from the description (Plant. Bequaertianæ, i. 14 (1921)), which differs in having glabrous tubercles and roots, narrower linear leaves, longer narrower bracts, and lanceolate petals. It is also near *C. bukobense* Engl. (Lake Victoria), but is distinguished by the narrower longer leaves, much shorter less acuminate bracts, and smaller fruits. It resembles *C. ramiferum* Rendle (collected by W. E. Taylor "between Zanzibar and Uyui") in habit of leaf, but *C. ramiferum* has a large laxly branched floriferous panicle.

Clematis simensis Fresen. Mt. Kenya, Cedar Forest; no. 523; in fl. Aug. 28.

Thalictrum rhynchocarpum Dill. & Rich. Mt. Kenya, Cedar Forest; no. 524; in fl. Aug. 28.

Ranunculus pubescens Thunb. Mt. Kenya, by rocky stream in Cedar Forest; no. 521; in fl. Aug. 28.

Capparis Rothii Oliver. Small river-valley, *Brachylæna* Forest, about 6000 ft.; no. 526; in fl. Aug. 28.

Maerua triphylla Rich. Small river-valley, *Brachylæna* Forest; no. 525; in fl. Aug. 28.

Caylusea abyssinica Fisch. & Mey. (Resedaceæ). By Rogati River, on road to Camphor Forest, about 6000 ft.; no. 527; in fl. and fr. Aug. 27.

Polygala Emlersii Gürke. Mt. Kenya, edge of Cedar Forest; no. 528; in fl. Aug. 28.

Drymaria cordata Willd. (Caryophyllaceæ). Mt. Kenya, edge of Camphor Forest; no. 547; in fl. Aug. 27.

Hibiscus Ludwigii Eckl. & Zeyh. Roadside, Karatina *, 6000 ft.; no. 643; in fl. Aug. 27.

Pavonia Schimperiana Hochst. var. tomentosa Ulbr. Roadside, Karatina; no. 638; in fl. Aug. 27.

Triumfetta tomentosa Boj. Mt. Kenya, Camphor Forest; no. 530; in fl. Aug. 27.

Geranium simense Hochst. Mt. Kenya, Camphor Forest; no. 532; in fl. Aug. 27; Cedar Forest; no. 533; in fl. Aug. 28.

Impatiens Hochstetteri Warb. Mt. Kenya, Camphor Forest; no. 535; in fl. Aug. 27.

I. cf. cruciata Th. Fr. Mt. Kenya, Camphor Forest; no. 534; in bud Aug. 27.

I. Fischeri Warb. Mt. Kenya, Cedar Forest, edge of stream; no. 537; in fl. Aug. 28.

I. elegantissima Gilg. Mt. Kenya, Cedar Forest, edge of stream; no. 538; in fl. Aug. 28. A very handsome plant, about 5 feet high, with large crimson flowers.

I. filicetorum Th. Fr. Limuru, 7340 ft., in copse; no. 536; in fl. Aug. 24.

Toddalia aculeata Pers. Mt. Kenya, Cedar Forest; no. 545; in fl. & young fr. Aug. 28.

Elæodendron æthiopicum Oliver. Mt. Kenya, Cedar Forest; no. 541; in fl. Aug. 28.

Rhamnus prinoides L'Hérit. Mt. Kenya, Cedar Forest; nos. 539, 542; in fl. Aug. 28.

Cissus allophyloides Gilg & Brandt (e descript. in Engl. Bot. Jahrb. xlvi. 539 (1912)). Mt. Kenya, Camphor Forest; no. 543; in fl. Aug. 27. The type was collected in West Usambara at 1500 m. alt.

Allophylus cf. repanda Bak. fil. Mt. Kenya, Cedar Forest; nos. 544, 597; just coming into flower, Aug. 28. A specimen collected by Dümmer, no. 2007, at Kisumu, near Nandi, Feb. 1915, has smaller leaves but seems conspecific.

* Karatina, a native settlement about 12 miles south by east of Mt. Kenya, in open country.

CROTALARIA AGATIFLORA Schweinf. Mt. Kenya, in clearing in Cedar Forest; no. 642; in fl. Aug 28.

SESBANIA ÆGYPTIACA Poir. By Rogati river on road to Camphor Forest; no. 639; in fl. Aug. 27.

ASTRAGALUS BATTISCOMBEI Bak. fil. Mt. Kenya; a tall herb at edge of Camphor Forest; no. 640; in fl. Aug. 27.

DESMODIUM SCALPE DC. Mt. Kenya, Cedar Forest; no. 641; in fl. Aug. 28.

PAROCHETUS MAJOR Ham. Mt. Kenya, Cedar Forest; nos. 531, 540; in fl. Aug. 28. A small herb.

ALCHEMILLA GRACILIPES Engl. Mt. Kenya; on bank in clearing in Cedar Forest; no 546; in fl. Aug. 28.

TRICHOCLADUS MALOSANUS Baker (Hamamelidaceæ). Mt. Kenya, edge of Camphor Forest; no. 548; in young fl. Aug. 27.

COMBRETUM GUEINZII Sond. subsp. SPLENDENS Exell (*C. splendens* Engler). Karatina; no. 625; in fr. Aug. 27.

BEGONIA MEYERI-JOHANNIS Engl. Mt. Kenya, Camphor Forest; no. 549; in fl. Aug. 27. A climbing herb with pink and white flowers.

SANICULA EUROPÆA L. Mt. Kenya, near stream in Cedar Forest; no. 626; in fl. Aug. 28.

CAUCALIS GRACILIS Hook. f. var. UMBROSA Engl. In copse, Limuru, 7340 ft.; no. 623; in fl. & fr. Aug. 24.

ALANGIUM CHINENSE (Lour.) Rehder. On way to Camphor Forest; no. 529; in fl. Aug. 27.

PENTAS PURPUREA Oliv. Limuru, 7340 ft.; no. 553; in fl. Aug. 24.

P. CARNEA Benth. forma. Mt. Kenya, Camphor Forest; no. 560, in fl.; no. 561, in fr.; Aug. 27.

UROPHYLLUM HOLSTII K. Schum. Mt. Kenya, Camphor Forest; no. 556; in fl. Aug. 27—Tanganyika Territory.

CANTHIUM SCHIMPERIANUM A. Rich. Mt. Kenya, Cedar Forest, 6300 ft.; in fl. Aug. 28.

BORRERIA PRINCEÆ K. Schum. Mt. Kenya, Camphor Forest; no. 559; in fl. Aug. 28.—Nyasa highlands.

ERLANGEA FUSCA S. Moore (Compositæ) in Journ. Bot. 1908, 159. Plentiful along road from Karatina to Camphor Forest; no. 563; in fl. Aug. 27.

CRASSOCEPHALUM VITELLINUM S. Moore. Limuru, 7340 ft.; no. 565; in fl. Aug. 24.

LACTUCA PARADOXA Sch. Bip. Limuru, 7340 ft; no. 564; in fl. Aug. 24.

LOBELIA HOLSTII Engl. Mt. Kenya, Cedar Forest; no. 568; in fl. Aug. 28.

L. KUMMERIÆ Engl. Mt. Kenya, Camphor Forest; no. 581; in fl. Aug. 27.

ACOKANTHERA SCHIMPERI Schweinf. Mt. Kenya, Cedar Forest; no. 598; Rogati River valley, between Nyeri and Nanyuki; no. 599; in fl. Aug. 28; Kilima Kiu, Kapiti plains; no. 600; in fr. Aug. 30.

A. LONGIFLORA Stapf. Native name Goima. Kilima Kiu; no. 601; in fr. Aug 30.

ASCLEPIAS RHACODES (Schum.) N. E. Br. Mt. Kenya, western side, grassy glade, near Narro, River Elu, 7500 ft.; no. 622; coll. H. M. Steven; in fl. Aug 27.

PERIPLOCA LINEARIFOLIA Dill. & Rich. Mt. Kenya, Nanyuki; no. 624; in fl. Aug. 28.

CYNOGLOSSUM AMPLIFOLIUM Hochst. Mt. Kenya, clearing in Camphor Forest; nos. 574, 577; in fl. Aug. 27.

EHRETIA INAMŒNA Standley. By Rogati River, on way to Camphor Forest; no 578; in fl. Aug. 27.

Heliotropium Scotteæ, sp. nov. *Herba* caulibus quadrangulis scabridulo-pilosis; *foliis* oppositis ovatis acutis, basi in petiolum subito desinentibus, margine minute denticulato, plus minusve appresso-pilosis præcipue in facie inferiore, 10–11 cm. long., petiolis brevibus ad 1 cm. long., *inflorescentia* terminali ebracteata, cymis geminis densis ascendentibus demum revolutis c. 10 cm. longis; *calyce* pæne ad basin diviso, segmentis e basi lata lineari-subulata 6 mm. long., nervo mediano crasso dorso prominente, margine et dorso fulvido-strigosis; *corollæ* tubo 5 mm. longo cylindrico villosulo basi et cervice paullo constricto, lobis e basi angustiore subreniformibus 1·5 mm. long. et lat.; *staminibus* 2 mm. supra basin tubi insertis, filamentis brevibus, antheris vix 2 mm. long.; stylo terminali 2·5 mm. long., medio annulo stigmatoso cincto, apice subconico minute quadrifido coronato; nuculis immaturis lævibus in paribus cohærentibus.

Hab. Mt. Kenya district: Rogati River, near Karatina, 6000 ft. alt.; no. 575; in fl. Aug. 27, 1929. Also collected at the same locality by Prof. J. H. Priestley and Miss L. Scott, to the latter of whom the species is dedicated. A specimen in Herb. Mus. Brit. "from the Katherini River (1800 m.) and the Kasorangai

River (1950 m.) to W. Kenia Forest Station (2250 m.), Mt. Kenia," collected by Dr. E. A. Mearns, no. 1254, Smithsonian African Expedition, Sept. 1909, and labelled "*Heliotropium indicum* L.," is conspecific.

This species is allied to the widespread *H. indicum* L., but may be distinguished at sight in the herbarium by the leaf-characters—a softer texture, with nerves somewhat prominent on the upper face, and leaf-base passing more abruptly into a short petiole, and the striking forked terminal ebracteate inflorescence; the longer linear-subulate calyx-segments are also distinctive. The hairs on the leaves are of two kinds, sparse stiff white hairs with a small bulbous base, and more numerous shorter tawny less stiff hairs.

Orobanche minor L. Limuru, 7340 ft.; no. 584; in fl. Aug. 24; Karatina, 6000 ft.; no. 585; in fl. Aug. 27.

Thunbergia alata Boj. var. vixalata Burkill. Approach to Camphor Forest, about 6000 ft.; no. 590; in fl. Aug. 27. A common creeping herb.

Hypoestes aristata R. Br. Mt. Kenya, Cedar Forest, Nanyuki; no. 591; in fl. Aug. 28.

Justicia (§ **Calophanoides**) **keniensis,** sp. nov. *Herba* debilis decumbens, *caulibus* tenuibus sparsissime albido-tomentosis, 4–5 dm. long. vel longioribus, c. 2 mm. diam.; *foliis* ellipticoovatis vel ovatis interdum ellipticis, apice subobtuso vel rotundato, 1·5–3 cm. long., ·9–1·8 cm. lat., petiolis tenuibus 2–8 mm. long.; *floribus* pallide purpureis, 1–2 (vel pluribus) in axillis subsessilibus, bracteolis minutis, c. 1 mm. long.; *calycis* segmentis 5 subæqualibus lineari-lanceolatis acuminatis sparse pilosis, 4·5–5 mm. long.; *corolla* 8 mm. long., tubo 3 mm., labio superiore subquadrato, 3·5 mm. long., labio inferiore 5 mm. long. lobis rotundatis, palato purpureo-notato conspicuo; *staminum* filamentis c. 1 mm. long., antheræ loculo superiore mutico, ·75 mm. long., inferiore calcare curvato sese æquante; *stylo* basi piloso, 5 mm. long.; *capsula* glabra acuta 6 mm. long.; *seminibus* atris obsolete scrobiculatis c. 5 mm. diam.

Hab. Mt. Kenya: Cedar Forest, Nanyuki, about 7000 ft.; no. 589. In flower and fruit Aug. 28, 1929.

A weak herb straggling on the forest-floor, with a few small pale-purplish flowers in the upper part of the slender shoots.

Has the habit of *J. toroensis* S. Moore (Journ. Bot. 1910, 255) from Uganda, but the flowers are smaller with a proportionately shorter corolla-tube, and the leaves are not acuminate as in that species. In floral details it resembles another Uganda species, *J. unyorensis* S. Moore (Journ. Bot. 1911, 308), which is a robust herb 4 ft. high, with acuminate leaves.

Achyrospermum radicans Gürke. Mt. Kenya, Rogati River, Camphor Forest; no. 592; in fl. Aug. 27. A tall suffrutescent plant with purplish flowers.

Plectranthus sylvestris Gürke. Limuru, 7340 ft.; no. 594; in fl. Aug. 24. Mt. Kenya, Camphor Forest; no. 595; in fl. Aug. 27. A tall slender herb with blue and white flowers.

Tinnea Fischeri Gürke. Kiambu, 6000 ft.; no. 582; in fl. Aug. 24.

Achyranthes argentea Lam. Karatina, 6000 ft.; no.603; in fl. Aug. 27.

Cyathula polycephala Baker. Limuru, 7340 ft.; no. 602; in fl. Aug. 24.

Basella alba L. Mt. Kenya, Camphor Forest; no. 621; in fl. Aug. 27.

Polygonum acuminatum H. B. K. Mt. Kenya, Camphor Forest, in river-bed, Rogati River; no. 604; in fl. Aug. 27.

P. nepalense Meissn. Mt. Kenya, Camphor Forest; no. 646; in fl. Aug. 27.

Piper capense Linn. f. Mt. Kenya, Camphor Forest; no 606; in fl. Aug. 27.

Peperomia cf. Stuhlmannii C. DC. Mt. Kenya, Cedar Forest; no. 605; in fl. Aug. 28.

I have not seen a typical specimen of this species. My plant is identical with R. E. & Th. Fries, no. 491, from Aberdare Mts., which is named *P. Stuhlmannii* C. DC. ?

Englerodaphne leiosiphon Gilg. Kiambu, Mr. Bentley's Estate; no. 550; in fl. Aug. 24.

Loranthus Friesiorum Krause in Notizbl. Bot. Gart. Berlin, viii. 494 (1923). Mt. Kenya, Cedar Forest; no. 609; in fl. Aug. 28.—Mt. Kenya and Aberdare Mts.

L. rigidilobus Krause, *l. c.* 498. Open country, Karatina, 6000 ft.; no. 610; in fl. Aug. 27. On *Cassipourea Elliottii* Alston. The type was collected by R. E. & Th. Fries (no. 1711) at Meru, N.E. of Mt. Kenya, on the lower edge of the rain forest on *Croton*, Feb. 1922.

L. woodfordioides Schweinf. Mt. Kenya, edge of Cedar Forest, near Nanyuki; no. 608; in fl. Aug. 28.

Euphorbia Schimperiana Scheele, var. velutina N. E. Br. Mt. Kenya, Cedar Forest; no. 611; Aug. 28.

PHYLLANTHUS FISCHERI Pax. Mt. Kenya, Cedar Forest; no. 612; in fl. and fr. Aug. 28.

CLUYTIA MOLLIS Pax. Mt. Kenya, Cedar Forest; no. 614; in fl. Aug. 28.

Tragia keniensis, sp nov. *Herba* volubilis caulibus gracilibus, specimine 2 mm. diam., pilis haud stimulosis; *foliis* late ovatis apice acutis, basi anguste cordatis, margine serrulatis, ad 5 cm. long. 4·2 cm. lat., facie superiore præcipue in nervis appresse pilosis subtus densius pilosis, petiolis brevibus ad 1 cm. long.; *racemis* puberulis caules et ramos breves terminantibus, c. 5 cm. long., pedunculo gracili flexuoso basi florem femininum unicum (?), parte superiore flores masculos gerente; *fl.* ♀ bractea orbiculari, apice rotundata, 5 mm. long., bracteolis obovatis obtusis 5 mm. long., pedicello in fructu 3·5 mm. long., *sepalis* 6 biseriatis fructu lineari-oblongis induratis pinnatis, lobulis c. 5 ascendo-patentibus 1 mm. long., apice membranaceo recurvato, appresse pilosis, 6–7 mm. long.; *capsula* appresse pilosa, coccis 5 mm. long.; seminibus globosis brunneo-marmoratis, 3 mm. diam.; *fl.* ♂ bracteis unifloris ovatis acutis ad 5 mm. long., bracteolis 2 lineari-oblongis, staminibus 3 subsessilibus, antheris introrsis.

Hab. Mt. Kenya, Camphor Forest, no. 613; in fr. with a few male flowers, Aug. 28.

This species falls into the *Tagira-Cordifoliæ* group of Pax's arrangement in the 'Pflanzenreich,' and is characterized by the broadly ovate leaves with narrowly cordate base, absence of stinging hairs and bristles on the whole plant, and the slightly enlarged indurated shortly hairy shortly pinnate fruiting sepals, grey in colour, with a short lobulate membranous green tip.

FICUS THONNINGII Bl. Karatina, 6000 ft.; no. 617; Aug. 27. A large tree.

DORSTENIA SCHLECHTERI Engl. Chania Falls, Thika, 4940 ft.; no. 618; in fl. Aug. 26.

PILEA VERONICIFOLIA Engl. Chania Falls, Chika, 4940 ft.; no. 619; in fl. Aug. 26. A small form of the species was collected in the Cedar Forest on Mt. Kenya; no. 620; in fl. Aug. 28.

On the return journey to Mombasa I spent a day on Captain Joyce's farm at Kilima Kiu on the Kapiti plains, about 55 mile east of Nairobi, at 5500 ft. altitude. The farm lies on the slope of the hills and affords a fine view over the plains to the distant mountains. The country was very dry, as only 4 inches of rain had fallen that year. Mrs. Joyce was making a praiseworthy effort to grow native plants in her garden, a change from the common practice among settlers in Kenya of beautifying their gardens with the produce of packets of seeds from home. A morning's botanizing on the dry hillside behind the bungalow yielded nothing of special botanical interest. Characteristic features of the dry country were several species of Apocynaceæ—the spiny shrub *Carissa edulis* Vahl (nos. 551, 554), *Acokanthera longifolia* Stapf (no. 562), and *A. Schimperi* Schweinf. (600), both the latter in berry.

Descending from the tableland to the coast at Mombasa the train runs through beautiful hilly country with luxuriant tropical vegetation. A brief halt at about 500 ft. gave opportunity for collecting a few plants:—*Stylosanthes erecta* P. Beauv. (Leguminosæ) (no. 587), *Lobelia fervens* Thunb. (no. 571), three Compositæ—*Aspilia Holstii* O. Hoffm. (no. 566), *Tridax procumbens* L. (no. 562), and *Vernonia Poskeana* Vatke (no. 567),—*Asystasia parvula* C. B. Clarke (Acanthaceæ) (no. 588), and *Rhamphicarpa veronicifolia* Vatke, a showy herb with large deep blue flowers, which was also collected in the mangrove swamp behind the harbour at Kilindini.

Correction.—For *Sansevieria Livingstoniæ* on p. 89 read *Sansevieria livingstoniæ.*

AN ENUMERATION OF THE SPECIES OF *POLYGALA* IN THE BELGIAN CONGO.

BY A. W. EXELL, M.A., F.L.S.

THE following enumeration of the Belgian Congo species of *Polygala*, with an attempt at a key, is published in the hope that it may prove temporarily useful. I am well aware that a number of the more difficult problems are left unsolved, but they will probably remain so until the Tropical African flora has received the same detailed study as that of Europe or North America.

Of the new species here described *P. Wittei*, *P. Homblei*, and *P. Dewevrei* are, so far as I am aware, quite distinct, but *P. katangensis*, *P. kasikensis*, and *P. loanzensis* are of more doubtful status, and may be reduced when further material is available.

I am very grateful to Dr. De Wildeman and Dr. Robyns of the Brussels Botanic Garden, and to Dr. Staner of the Congo Museum, Tervueren, near Brussels, for opportunities to study the materials in their charge.

Sepals caducous ..... 1. *P. Cabræ.*
Sepals persistent.
*Sepals all free.
†Wings suborbicular, broadly elliptic, ovate, or obovate, the other three sepals equal or subequal.
‡Wings exceeding 2·5 mm. in length.

§Seeds densely pubescent or pilose, usually sericeous.
Wings more than 9 mm. long in mature flowers (usually exceeding 10 mm.).
Pedicels pilose.
Leaves linear to linear-lanceolate, usually glabrous or sparsely pubescent beneath; flowers white or pale violet (sometimes fading to yellowish when dried).
Lower of the three bracts at the base of the pedicel with long acumen, and much longer than the other two ..... 2. *P. macrostigma.*
Lower of the three bracts subsimilar to the other two and without a long acumen ..... 3. *P. kasikensis.*
Leaves elliptic to elliptic-lanceolate, usually distinctly apiculate, and usually distinctly pubescent beneath; flowers generally purple (often fading when dried) ..... 4. *P. ruwenzori-[ensis.*
Pedicels glabrous ..... 5. *P. Wittei.*
Wings less than 9 mm. in length (rarely exceeding 8 mm.).
Branching cymose, becoming monopodial; flowers in dense heads .... 13. *P. arenaria.*
Branching usually racemose, if tending to be cymose, then flowers not in dense heads.
Wings greenish; reticulation of leaves rather conspicuous; plant apparently a dwarf perennial ..... 11. *P. katangensis.*
Wings usually white or coloured, but sometimes greenish or with a green striation, but if so plant not a dwarf perennial; reticulation not very distinct.
Inflorescence lateral (never terminal) or flowers solitary.
Leaves oblong or oblong-elliptic, less than 1 cm. broad.
Wings with a distinct greenish striation ..... 12. *P. erioptera.*
Wings not as above.
Rhachis and stem thickly patent-pubescent ..... 21. *P. Fischeri.*
Rhachis and stem mostly with crisped hairs, though also with some patent hairs ..... 20. *P. Quartiniana.*
Leaves suborbicular to obovate, up to 2 cm. broad ..... 17. *P. Vatkeana.*
Inflorescences terminal or terminal and lateral.
Wings usually glabrous.
Flowers very congested, in racemes up to about 5 cm. long ..... 16. *P. albida.*

Flowers in laxer, more elongated racemes, up to 10–15 cm. long ..... 14. *P. persicarii-[folia.*
Wings pubescent or pilose, or at least with a few hairs towards the base.
Pedicels 3–5 mm. long.
Flowers red (sometimes fading when dried), in long terminal branched racemes with occasional lateral racemes; leaves dark green, drying blackish ..... 6. *P. Bakeriana.*
Flowers blue (usually fading to pale yellow when dried), in long terminal occasionally branched racemes.
Leaves linear to elliptic, up to 6–10 mm. broad. 7. *P. usafuensis.*
Leaves filiform; inflorescence less dense ..... 8. *P. sparsiflora.*
Flowers white or greenish, in terminal racemes and often also in short lateral racemes distributed down the stem.
Wings up to 7 mm. long; flowers congested ... 16. *P. albida.*
Wings up to 5 mm. long; flowers laxer ..... 15. *P. Stanleyana.*
Pedicels up to 2 mm. long.
Stem and leaves patent-pilose 9. *P. Claessensii.*
Stem and leaves appressed-pilose ..... 10. *P. ukirensis.*
§§Seeds glabrous or sparsely pubescent when mature.
Seeds quite glabrous ..... 18. *P. melilotoides.*
Seeds sparsely pubescent ..... 19. *P. pygmæa.*
‡‡Wings less than 2 mm. long.
Seeds with glochidiate hairs..... 22. *P. africana.*
Seeds with appressed hairs ..... 23. *P. capillaris.*
††Wings narrowly elliptic, one of the remaining three sepals much longer than the other two and nearly equalling the wings.
Plant upright with fairly rigid leaves ..... 24. *P. myriantha.*
Plant of weak prostrate growth, with thin leaves ..... 25. *P. kisantu-[ensis.*
**Two inferior sepals connate for at least two-thirds of their length.
Crest present on the carina.
Leaves fasciculate ..... 26. *P. acicularis.*
Leaves not fasciculate.
Fertile stamens 8; wings exceeding 8 mm. in length..... 27. *P. Homblei.*
Fertile stamens 6; wings not exceeding 7·5 mm. in length.
Leaves elliptic to oblong-elliptic, up to 6 mm. broad ..... 28. *P. Poggei.*

Leaves narrowly linear, less than 2 mm. broad ..... 39. *P. Dewevrei.*
Crest absent.
Leaves elliptic to narrowly-elliptic, about four times as long as broad ..... 30. *P. loanzensis.*
Leaves linear to linear-elliptic, five to twelve times as long as broad.
Wings 4 mm. long or longer ..... 31. *P. xanthina.*
Wings up to 3·5 mm. long ..... 32. *P. Petitiana.*

1. P. CABRÆ Chodat in Bull. Herb. Boiss. vi. 838 (1898). *Cabra* 112 (Herb. Brit. Mus.; Herb. Brussels).

Distribution. Belgian and Portuguese Congo.

2. P. MACROSTIGMA Chodat in Engl. Bot. Jahrb. xlviii. 319 (1912). *P. splendens* Exell in Journ. Bot. lxiv., Suppl. Polypet. 22 (1926). *Flamigny* 350 (Herb. Brussels), 414 (Herb. Brussels); *Gillet* 1134 (Herb. Brussels), 1648 (Herb. Brussels); *Hecq* s.n. (Herb. Brussels); *Kassner* 2570 (Herb. Brit. Mus.), 2771 (Herb. Brit. Mus.), 2771 *a* (Herb. Kew); *Quarré* 326 (Herb. Brussels), 2524 (Herb. Brit. Mus.; Herb. Mus. Congo); *Vanderyst* 21749, 21755, 21881, 22086 (all in Herb. Brussels); *De Witte* 168 (Herb. Brit. Mus.; Herb. Mus. Congo), 371 (Herb. Mus. Congo).

This species is very closely related to *P. butyracea* Heck., *P. Gomesiana* Welw., *P. kasikensis* Exell, *P. ruwenzoriensis* Chodat, *P. Elliotii* Chodat, and *P. virgata* Thunb. (*P. speciosa* Sims), the whole forming a species-complex which it is difficult to disentangle. The problem needs intensive study in the field. In my opinion true *P. Gomesiana* has not yet been collected in the Belgian Congo, the Angolan specimens having much longer inflorescences and more globular seeds. In *P. virgata* Thunb. (*P. speciosa* Sims, a species the correct name of which is in doubt), a South African species extending as far as Rhodesia, the bracts are much more deciduous, and the plant seems to differ in habit.

Distribution. Angola, Belgian Congo, Tanganyika Territory, and Uganda.

3. **Polygala kasikensis** Exell, sp. nov. *Herba* erecta, caulibus teretibus fere glabris; *foliis* brevissime petiolatis linearibus supra puberulis subtus fere glabris; *floribus* magnis verisimiliter roseis vel purpureis pedicellatis, pedicello patenti-piloso, in racemos elongatos multifloros terminales congestis; *bracteis* scariosis ovato-lanceolatis inter se subsimilibus; *alis* oblique obovatis margine minutissime ciliolatis ceteroque glabris; *sepalis* liberis late ellipticis margine minute ciliolatis nonnunquam sparse pilosis; *petalis superioribus* anguste oblongis medio angulo recto sursum genuflexis, basin versus ad marginem superiorem pubescentibus; *carina* ad marginem superiorem pubescenti ceteroque glabra; *staminibus* 8; *stigmate* glabro; *capsula* oblongo-obovata, margine pilosa; *seminibus* subcylindricis sericeis, carunculo subæqualiter trifido glabro, appendicibus minutis.

Hab. BELGIAN CONGO: Kasiki, Katanga, *G. F. de Witte* 412 (holotype in Herb. Mus. Congo; Herb. Brit. Mus.); Kasiki, *G. F. de Witte* 403 *bis* (Herb. Brit. Mus.; Herb. Mus. Congo); Marungu, *De Giorgi* s.n. (Herb. Brussels).

"Liane de galerie forestière."

Leaves up to 10×·6 cm.; *inflorescences* up to 25 cm. long; *pedicels* up to 10 mm. long; *bracts* 6–7×2·5–3·5 mm.; *wings* up to 15×13 mm.; *upper petals* 12×3·5 mm., bent in the middle; *carina* 12×7 mm.; *capsule* 8×6 mm.

This species is very close to *P. macrostigma* Chodat, but differs in having the three bracts at the base of the pedicel subsimilar, and in having rather larger, more congested flowers. In appearance there also seems to be some difference, owing to the fact that the carina is very large and in the dried specimens is not completely concealed by the wings. The native name is said to be "Molembwe."

4. P. RUWENZORIENSIS Chodat in Journ. Bot. xxxiv. 199 (1896). *Bequaert* 6930 (Herb. Brussels); *Kassner* 2926, 2971 (Herb. Brit. Mus.; Herb. Kew); *Scaetta* 515 (Herb. Brussels); *Verdick* 544 (Herb. Brussels); *De Witte* 373, 462 (Herb. Brit. Mus.; Herb. Mus. Congo).

P. Elliotii Chodat is probably merely a form of this species.

Distribution. Belgian Congo, Tanganyika Territory, and Uganda.

(To be continued.)

ADDITIONS TO THE FLORA OF ST. KILDA.

BY C. P. PETCH.

THE island of St. Kilda, lying off the West Coast of Scotland, 50 miles beyond the Outer Hebrides, has recently attracted considerable attention on account of the evacuation of its inhabitants. In the summer of 1931 a scientific party from Oxford and Cambridge Universities visited the island, with the object of observing the conditions after the removal of the population and their flocks, to provide a starting-point for observations on the development of the flora and fauna in a state of nature.

The flora of this isolated island was fully listed in a paper by Turrill (Bot. Exchange Club Report, viii. 428) from a collection made by Gladstone in 1927 and earlier records, but in the course of an ecological survey several additions were made to this list. All except twenty-two of the 148 previously recorded species were found; of these twenty-two, which were carefully sought for, some are most probably errors, and a few, which are weeds of arable land, have presumably become extinct on the abandonment of cultivation.

All records in the following list refer to the main island, Hirta.

LIST OF ADDITIONS.

VICIA HIRSUTA Gray. A few plants outside the Factor's House; evidently an introduction, but probably not since 1927, as it might easily be overlooked.

CALLITRICHE STAGNALIS Scop. Common in pools on the west side of Hirta. Recorded with a query by Turrill.

VACCINIUM VITIS-IDÆA L. Rare on the top of Conacher, 1300 ft.

ERICA TETRALIX L. One patch on the plateau An Lag Boh'n Tuath, 300 ft.

EUPHRASIA BOREALIS Towns. Rare. Village (120 ft.) and Mullach Bi (900 ft.).

E. BREVIFOLIA Burnat & Gremli. Rare. Close to cultivated area.

E. OCCIDENTALIS Wettst. Rare. East side of Glen Mhor, within reach of sea-spray.

E. FOULAENSIS Towns. The most common form. Generally distributed.

E. MICRANTHA Rchb. (*E. gracilis* Fr.). South face of Conacher, 1000 ft.

MALAXIS PALUDOSA Sw. Two plants near Am Blaid, 500 ft.

SCIRPUS PAUCIFLORUS Lightf. In a bog below Mullach Mor, 300 ft.

CAREX ŒDERI Retz. On the spray-washed peninsulas of Ruaival and Gob na h'Aride; characteristic of this situation.

C. FULVA Host. South face of Conacher, common.

LYCOPODIUM SELAGO L. One plant on top of Mullach Mor, one on Oiseval, and several on Conacher, all over 900 ft.

Many species were much more abundant than Turrill's records lead one to believe. *Gentiana campestris* and *Selaginella selaginoides* were common everywhere; *Ligusticum scoticum* was very frequent on Dun, where Gladstone records "one patch"; *Vicia sepium*, *Drosera rotundifolia*, *Epilobium palustre*, and *Lonicera Periclymenum*, each stated to be confined to one locality, were found in several more in each case. An interesting

discovery, recorded by Barrington in 1886, but not by later observers, was *Schœnus nigricans*, of which there were two clumps on Oiseval.

The following plants are presumed to have become extinct on the abandonment of cultivation:—*Spergula arvensis*, *Trifolium pratense*, *Artemisia vulgaris*, *Bellis perennis*, *Senecio vulgaris*, *Myosotis arvensis*, *Polygonum Persicaria* ?, *Hordeum vulgare*.

Trifolium and *Artemisia* were not found by Gladstone in 1927. The remainder, excepting *Bellis*, are annual weeds which might be expected to disappear rapidly. A similar fate will probably overtake a number of other aliens at present maintaining themselves among the houses, e. g., *Galeopsis Tetrahit*, *Chrysanthemum segetum*, thus removing about twenty species from the flora. *Stellaria media* and *Poa annua*, on the other hand, appear to have a place in the natural vegetation of the island in view of their constant association with puffin-burrows. It will be interesting to note how long perennials such as nettles and thistles persist.

It may not be out of place to mention here that peat samples, whose examination was suggested in Turrill's paper, were collected on the island, and show, as far as has been at present ascertained, pollen of *Pinus*, *Betula*, and *Alnus*.

My thanks are due to Mr. H. W. Pugsley for determining *Euphrasia* specimens, and to Messrs. J. S. L. Gilmour, T. G. Tutin, and E. W. Jones for other assistance.

NOTE ON THE BRYOPHYTES. BY P. W. RICHARDS.

The collection of bryophytes made by Mr. Petch includes the following, which are additional to those recorded from St. Kilda by W. Evans ("Some Moss Records from St. Kilda," Trans. Bot. Soc. Edinburgh, xxviii. 67 (1921)) and by C. Gordon Hewitt ("A Contribution to the Flora of St. Kilda," Ann. Scott. Nat. Hist. 1907, 239):—

**Sphagnum tenellum* Lindb. (det. W. R. Sherrin).
**Polytrichum formosum* Hedw.
Blindia acuta B. & S.
Campylopus atrovirens De Not.
C. brevipilus B. & S.
**Dicranum scoparium* Hedw., var. *orthophyllum* Brid.
**Fissidens Curnowii* Mitt.
Funaria Templetoni Sm.
Philonotis fontana Brid.
Fontinalis antipyretica L.
**Eurhynchium rusciforme* Milde.
Hypnum sarmentosum Wahl.
Conocephalum conicum (L.) Dum.
Alicularia scalaris (Schrad.) Corda.
Scapania undulata (L.) Dum.

Those marked * are not recorded for v.c. 110 (Outer Hebrides) in the 'Census Catalogue of British Mosses,' edition 2 (1926).

ABSTRACTS OF PAPERS OF INTEREST TO STUDENTS OF THE BRITISH FLORA.

DEVONSHIRE ASSOCIATION.—The Report and Transactions of the Association for 1931 contain the 23rd Botany Report for the county, edited by the Recorder, Mr. G. T. Harris. In this Report is an extensive number of plant records for each of the botanical districts, chiefly Phanerogams and Fungi. The Report gives a list of 52 additions to the County Flora. Of the 29 Phanerogams included in this list, however, nearly all are varieties only or alien species. Among the records a few appear unlikely and in need of confirmation, e. g., *Brassica oleracea* (Saunton), *Lotus angustissimus*, *Cladium Mariscus*, *Potentilla verna* (Belstone), *Pulmonaria longifolia* (Okehampton), *Euphrasia occidentalis* (Princetown), *E. curta* × *nemorosa* (Babbacombe), *Œnanthe aquatica* (Drewsteignton), *Galeopsis dubia* (Loddiswell), and *Polygonum maritimum* (Paignton). The Hartland *Jasione* is no doubt var. *latifolia* Pugsl., which is frequent on the North Devon coast; the var. *major* M. & K. is a rare and doubtful plant in Britain. The *Orchis latifolia* of this district is probably what has been known in recent years as *O. prætermissa* Druce.

The volume includes, further, a report by Lt.-Col. Watts on the preliminary arrangements for the production of a County Flora, and an interesting account of the sea-weeds of North Devon by G. F. Tregelles, with an extensive list of species and their stations.—H. W. PUGSLEY.

EUPHRASIA.—G. E. du Rietz (Svensk. Bot. Tidsk. xxv. 500–42 (1931)) in an important paper (in English) describes and figures two new species of *Euphrasia* from the Philippines, and discusses their phytogeographical significance. The author points out that these new species, together with *E. borneensis* Stapf and other recently discovered species in Formosa, form a tropical group that are really remains of an old bridge once forming a more continuous connection between the boreal group of the palæarctic regions and the austral group of Australia and New Zealand. The taxonomic and phytogeographical position of the remarkable Juan Fernandez species, *E. formosissima* Skottsb., which is totally different from the South American species (*Trifidæ*), is also dealt with.—H. W. PUGSLEY.

ZANNICHELLIA GIBBEROSA Rchb.—With reference to the abstract referring to this species in the January issue (p. 21), there is a slight omission which renders the classification suggested by L'Abbé Fournier impossible. In his original paper (Bull. Soc. Bot. Fr. lxxviii. 295, 1931) "B." is given as "Female flowers pedicellate (carpels borne on a common peduncle)," and includes *Z. dentata* Willd. and *Z. pedicellata* Fries. In the Novit. Mant. i. 18, 1832, Fries agrees that the fruits of the latter are "distincte pedicellatis," but further states that the umbel is "directly sessile" and

"agreeing more nearly with *Z. gibberosa* than with *Z. pedunculata*." The carpels of *Z. pedicellata* Fries therefore possess no common peduncle, and for that reason cannot be included under "B." I pointed this out to L'Abbé Fournier, and he replied regretting that he had overlooked the reference in Mant. i. 18. In this connection it may further be observed that Ascherson and Graebner ('Pflanzenreich,' iv. 11, p. 156, 1907) include *Z. gibberosa* Rchb. under their var. *pedunculata*, which also is erroneous for the reason given above.—W. H. PEARSALL.

OUTLINES TO A GENETIC MONOGRAPH OF THE GENUS GALEOPSIS, by Arne Müntzing, Lund, 1930.—The purpose of the present investigation is, firstly, to elucidate by means of genetic and cytological methods special problems concerning the genus *Galeopsis* (polymorphism, species limitation, interrelationship, etc.), secondly, to contribute to the solution of more general problems.

The author arranges the species of *Galeopsis* in three different non-intercrossing natural groups, the cœnospecies *Ladanum*, *pubescens-speciosa*, and *Tetrahit-bifida*. Each cœnospecies comprises different ecospecies which hybridize in nature. The result is polymorphism. The species delimitation, however, is upheld by selective elimination. For the selective correlation of the species characters in *Tetrahit-bifida* internal balance conditions seem to be important.

The species are self-fertile and more or less autogamous. The degree of self-fertilization is on an average inversely proportional to the flower-size. The occurrence of crosses between *G. Tetrahit* and *G. bifida* in nature was proved by the finding of spontaneous hybrids and observations on their progeny.

The species characters of *Tetrahit* and *bifida* and the pollen-fertility are influenced by different and independent genes. The species constancy is upheld by selective elimination among the diplonts. Deficient selective elimination probably accounts for the cases of intraspecific sterility.

Species crosses in subgenus *Ladanum* gave five different kinds of hybrids. In some cases the hybrid seeds are of bad quality, but may be induced to germinate by artificial means. The cytological and experimental results strongly indicate that *G. Tetrahit* and *G. bifida* have been produced by means of species hybridization and chromosome summation. The parent species must have been *G. speciosa* and *pubescens* or biotypes closely allied to these species.

The author gives two coloured plates in which are figured: pure lines of *G. Tetrahit*; flowers from the triploid f_2 plant of the cross *pubescens* × *speciosa*; pure lines of *G. bifida*; the cross *Tetrahit* × *bifida*; some *pubescens* biotypes; the cross *pubescens* × *speciosa*; flowers and bud from a *pubescens* chimaera; flowers

from large-flowered f_3 family of the cross *Tetrahit* × *bifida*; flowers from an f_2 cross *pubescens* × *speciosa*; the cross *ochroleuca* × *angustifolia*; the cross *Ladanum* × *pyrenaica*; and the cross *Ladanum* × *ochroleuca*.

This paper, which is a thesis for the Ph.D. degree in the University of Lund, and preparatory to a monograph of the genus, should be carefully studied by students interested in the genus *Galeopsis* and its hybrids.—E. G. B.

ISOËTES LACUSTRIS (Erganzungen zur Entwicklungsgeschichte von *Isoëtes lacustris* L.).—Johann Liebig (*Flora*, cxxv. 321–58, with 18 text-figs. and 3 pls.) gives a detailed description of the morphology, anatomy, and development of *Isoëtes lacustris* L. The first botanist to deal with this subject was Tausch, in 1819, "Ueber *Isoëtes lacustris*, eine in Böhmen aufgefundene Pflanze," *Flora*, i. 501–7, but since that date numerous botanists have investigated this plant, and the author gives a useful bibliography of the principal workers. The organs are dealt with seriatim (the root, axis, leaf, microspores, and macrospores), and the anatomy and development are described and illustrated by numerous figures.—E. G. B.

REVIEWS.

Curtis's Botanical Magazine Dedications 1827–1927. *Portraits and Biographical Notes.* Compiled by ERNEST NELMES and WILLIAM CUTHBERTSON, V.M.H. Roy. 8vo, pp. xxi, 400. Published for the Royal Horticultural Society by B. Quaritch: London, 1931. Price 30*s*.

BOTANISTS and horticulturists owe a debt of gratitude to Mr. William Cuthbertson, who has been responsible for the preparation of this collection of portraits and biographical notes of the eminent men and women to whom the volumes of the *Botanical Magazine* have been dedicated for the years 1827–1927. The compilation has involved considerable research, and Mr. E. Nelmes, of the Staff of the Kew Herbarium, who has prepared the biographies, acknowledges the assistance of many helpers.

The fine collection of portraits at the Royal Botanic Gardens has contributed many of the illustrations. Among other sources are numerous private individuals, including Mr. Thomas Hay, with whom the idea of the publication in part originated.

As a collection of portraits the general standard of the reproductions is not a high one. Some are very good—as, for instance, those of M. J. Berkeley, J. H. Balfour, Maxwell Masters, C. S. Sargent, Decimus Burton, David Prain, and L. H. Bailey—others are indifferent, or even poor. The inclusion of the actual date of the portrait would have been a useful addition. The restriction of the biographies as a rule to 400–500 words has, as Mr. Nelmes remarks, necessitated the omission of "readable" items, but the facts recorded form a valuable contribution to botanical bibliography. The volume begins appropriately with a biography of the founder of the *Botanical Magazine*, William Curtis, who died in 1799; the first number of the Magazine was issued on February 1, 1787: the custom of dedicating the volumes was begun in 1827. The variety of the subjects treated in the pages that follow is of interest; it includes many eminent professional botanists and horticulturists, but also numerous amateurs in very different tanks of life; a large proportion of those honoured in the earlier volumes were men or women of title.

As the Council of the Royal Horticultural Society have decided to include a portrait of the "dedicatee" in future volumes—the first appeared in the volume for 1928—continuity has been secured.

Monographie der Gattung Lathræa. By Prof. Dr. EMIL HEINRICHER. 8vo, pp. 152, 45 text-figs., 5 pls. Fischer: Jena, 1931. Price R.M. 12.

No one is more competent to write a monograph of *Lathræa* than Prof. Heinricher, who ever since his first investigation of this genus, published in 1895, has been occupied in further researches on this interesting plant and on the structure and behaviour of its semiparasitic allies in the group of Rhinantheæ. He now brings together, so far as *Lathræa* is concerned, the results of thirty-five years of his own work together with that of other observers, with criticism, sometimes trenchant, of some of their opinions. We have thus in this monograph all that is known at the present time of the various species of *Lathræa*.

Heinricher is naturally insistent that the proper systematic position of *Lathræa* should receive more general recognition. Though Solms-Laubach as early as 1865 suggested that the genus should be placed in the Rhinanthaceæ, and though this view was defended and emphasized by Heinricher in 1895, the majority of systematic works published since that time have adhered to the older practice of including *Lathræa* in the Orobanchaceæ. It is dealt with as a member of that family by Beck-Mannagetta in Engler's 'Pflanzenfamilien' (1st ed.), and even in the more recently published account of the Orobanchaceæ in the 'Pflanzenreich' (1930). Among the newer English books on systematic botany Hutchinson, in his 'Families of Flowering Plants,' adheres to the older classification; but Rendle, in his 'Classification of Flowering Plants,' adopts the modern and more correct systematic position.

In his Monograph Heinricher repeats with greater emphasis, due to further investigations, the arguments in favour of including *Lathræa* in the Rhinantheæ. The more important of these are:

(1) the structure and development of the seeds; (2) the differentiation of the embryo into radicle and cotyledons as compared with the rudimentary globular embryo of *Orobanche*; (3) the well-developed root-system; (4) the possession of sessile water-secreting glands characteristic of most Rhinantheæ; (5) the occurrence in *Lathræa* and the Rhinantheæ of protein crystals in the nuclei.

One of the chief morphological differences between the Orobanchaceæ and the Scrophulariaceæ has been considered to be the parietal placentation of the former and the axile placentation of the latter; Heinricher has been able to show, however, that in the early stages in the development of the ovary of *Lathræa clandestina* an axile placentation can be observed, and that the base of the ovary of *Lathræa Squamaria* is bilocular. Both these observations are figured by him in the publication under review.

The monograph, dealing as it does with the genus *Lathræa*, concerns itself with the five known species. *Lathræa purpurea* from the Eastern Himalaya, described by Cummins in 1895, is evidently nearly related to *Lathræa clandestina*, but possesses ten to fifteen ovules in place of the four found in the latter species. Of the Mediterranean form, *Lathræa rhodopea* Dingl., and of the Japanese species *Lathræa Miqueliana* Franch. & Savat., Heinricher was able to obtain material for detailed examination, and gives full descriptions of their various organs. Dealing with all five species he discusses the function of the intricate chambers of the subterranean scales and the secretion of water by the sessile shield-shaped glands. The function of the stalked glands he considers still problematical.

The germination of the seeds is dealt with in some detail and reference is made to his experiments in connection with the attachment of the seedlings to the host-plants. Heinricher differs from Chemin, and insists upon the fact that his experiments show that haustoria are only formed when the seedling comes in contact with living roots of a host-plant, and argues that some chemical stimulus is required for the production of haustoria.

Heinricher's monograph contains a mine of information on this interesting genus, and readers will be grateful to him for having brought together in one publication observations he has so perseveringly collected during a long period of years, and of which some account is found in many papers scattered in various journals.

We have noted only a few inaccuracies. The reference to Chemin's first paper in the bibliography should read tome ii. 1920, instead of tome i. 1919, of the Annales des Sci. nat.; and Gilburt's paper in the Journal of the Roy. Micro. Soc. vol. iii. 1880, is on page 737 not 767.—F. E. Weiss.

Handbuch der Pflanzenanalyse. Edited by G. Klein. Bd. I. *Allgemeine Methoden der Pflanzenanalyse.* Roy. 8vo, pp. xii, 627, text-figs. 323. Bd. II. *Spezielle Analyse*, Theil 1. Pp. xi, 973, text-figs. 164. Springer: Vienna, 1931, 1932. Price R.M. 66 and R.M. 96.

The greater part of this volume (pp. 1–515) is non-biological and deals with general, chemical, and physical methods, preparation of pure reagents, description of chemical or physical processes and of the requisite apparatus, methods of determination of ultimate elements or radicals, and of computation of results. The eighteen sections into which the subject-matter of this portion is divided are the work of twelve different authors—Professors Hirsch, Klein, Kögel, Lieb, Matula, Michaelis, and Weygand, and Drs. Feigl, Keyssner, Kleinmann, and Linser. The second part (pp. 516–598), by Dr. R. Brieger of Berlin, deals with the application of the methods to plant-material. In the first section the collection, preparation, and various methods of treatment of the prepared material are described, and in the second the details of preliminary and ultimate plant-analysis. At the end of each section throughout the volume a list of relevant literature is supplied, and the volume concludes with an index of nearly thirty pages.

The work of the special portion (vol. ii. pt. 1) has been distributed among twenty-three specialists, and the ponderous volume is replete with information on the numerous chemical compounds occurring naturally in plants and their means of recognition and determination. The text is divided into two sections, dealing respectively with inorganic and organic substances, the latter naturally the larger and occupying nearly three-fourths of the whole. Ash- and gas-analysis comprise a large proportion of the subject-matter of the first section. Organic compounds are classified under thirteen headings, including Alcohols, Aldehydes and Ketones, Phenols and Chinones, Organic Acids, Fats and Wax, Sugars and Polysaccharides. The chemistry of the numerous compounds considered is fully treated, and apparatus and methods of determination and estimation are described in detail, but the information is by no means exclusively chemical. The source in the plant of the substance in question is indicated, and sections on histological demonstration and the part played in plant-physiology or biology are included. Extensive lists are also given of the systematic distribution and occurrence of the various classes of compounds in families, genera, or species, with an indication of the part of the plant in which the substance is found. In the case of organic acids, for instance, this list occupies fifty closely printed pages.

A commendable use is made of page-headings, the left-hand indicating the author or authors and the title of the section, the right-hand the special compound or other subject under immediate consideration. References to literature are given throughout the text, and a comprehensive index of nearly ninety pages includes the names of the families, genera, and species of plants referred to in the volume. The book is a valuable work of reference, but the high price must seriously limit its circulation among scientific workers.

Forest Trees and Timber of the British Empire. Edited by L. CHALK and J. BURTT DAVY. I. *Some East African Coniferæ and Leguminosæ.* By L. CHALK, J. BURTT DAVY, and H. E. DESCH. 8vo, pp. 68, 10 pls. 2 text-figs. Clarendon Press: Oxford, 1932. Price 5*s.*

THIS is the first of a series to be issued by the Imperial Forestry Institute, which combines systematic descriptions of important timber-trees with detailed descriptions of their wood structure. The limiting factor in the preparation of complete and accurate wood descriptions is authentic material, and it has been thought well to issue these descriptions as they become available rather than postpone publication until such time as all the more important timbers of a single botanical family or geographical group can be dealt with together. Systematic botany can benefit by a close association with anatomy, an association which is particularly appropriate in the case of timber-trees, and it is to be hoped that the proposal to enlist co-operation in different parts of the Empire, and so to continue this series with similar descriptions of potentially valuable species, will be successful. The species dealt with in the present issue are as follows:—*Juniperus procera* Hochst., *Widdringtonia Whytei* Rendle and *W. juniperoides* Endl., *Podocarpus gracilior* Pilger and *P. milanjianus* Rendle, *Afzelia quanzensis* Welw., *A. africana* Smith, and *A. bipindensis* Harms, *Baikiæa plurijuga* Harms, *Copaifera mopane* Kirk and *C. coleosperma* Benth., *Piptadenia Buchananii* Baker and *P. africana* Hook. f., *Pterocarpus angolensis* DC. and *P. Stevensonii* Burtt Davy. It will be seen that the list includes some species that are well known and others which are at present of minor importance, and the descriptions are consequently not all of the same order of completeness. Besides the botanical and wood descriptions they include notes on distribution, climatic conditions, vegetation type, regeneration and afforestation, diseases and pests, importance and uses, and keys to the species of each genus. The illustrations, which are excellent, comprise drawings of the morphological features, habit-photographs and photomicrographs of wood sections.—B. J. RENDLE.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on April 28, the President, Prof. F. E. Weiss, F.R.S., in the Chair, Miss E. R. Saunders read a paper on "The Cause of Petaloid Colouring in 'Apetalous' Flowers." The author distinguished two forms of apetaly, the one characteristic of monochlamydeous families and the other occurring in those families where the flower is normally dichlamydeous. Miss Saunders found a "cause" in the nature of the vascular supply to the individual members of the whorl. In true monochlamydeous flowers the green sepal received a single median vascular bundle from the pedicel, whereas in the other series, where the "sepal" is petaloid in character, an alternating bundle from the central strand passed out and branched, one branch going to each of two adjacent members of the whorl. This correlation of vascular supply and petaloid character is very interesting, but the botanists present seemed to find a difficulty in appreciating the connection between the two.

Dr. E. B. Worthington gave an interesting account, illustrated by lantern-slides, of the ecology of the African Lake Systems which are involved in the regions of the two great rift-valleys.

At the Meeting on May 12 the following three botanists were elected to the Foreign Membership:—Professor Klas Robert Elias Fries, Director of the Bergianska Trädgården, Stockholm, Professor Eduard Fischer, Director of the Botanisches Institut, Berne, and Professor Ludwig Jost, Director of the Botanisches Institut, Heidelberg. Mr. J. W. Bodger showed a specimen of *Scrophularia vernalis* from a locality in Northamptonshire, where it was known thirty years ago. Capt. F. Kingdon Ward gave an account of his recent botanical exploration on the Burma–Tibet frontier, illustrated by a number of excellent photographic lantern-slides.

At THE Anniversary Meeting on May 24 the Treasurer and the Assistant Secretary presented reports for the past session. The serious increase in the cost of foreign periodicals had allowed very little expenditure on new books. The President commended the practice, adopted by some of the Fellows, of presenting a copy of their publications to the Society's library, and also referred to a generous donation by the Treasurer to the library fund. During the past session 44 Fellows had been removed by death or other causes and 39 had been elected. Prof. F. E. Weiss, Mr. Francis Druce, Mr. J. Ramsbottom, and Lt.-Col. J. Stephenson were re-elected as President, Treasurer, and Secretaries respectively.

Mr. S. E. Chandler and Prof. W. Neilson Jones replace Mr. I. H. Burkill and Prof. R. R. Gates on the Council.

The President's address took the form of an exhaustive review of the structure and taxonomic position of the fossil genus *Stigmaria.*

Dr. John Briquet.

We gladly give publicity to the following appeal :—

" On the 26th of October, 1931, Dr. John Briquet, Director of the Botanic Garden and ' Conservatoire botanique ' in Geneva, died at the age of 61, after a brief illness. In his death botanists have lost a true friend, a lovable, highly accomplished man, and a recognized authority ; one whose scientific conscientiousness is reflected in all his published works.

" All who have attended meetings of the International Botanical Congresses—in 1900, 1905, 1910, and 1926—will realize the great loss botany has suffered by his death. At those meetings he was an outstanding figure in all discussions on Nomenclature, and the rôle he played as recorder, by his tactful, sagacious, and conciliatory nature, together with his great knowledge of languages and absolute command of the matter in hand, left an indelible impression on the minds of all. Thus he contributed greatly to the unifying of botanical nomenclature, and his services at the memorable Congress held at Cambridge in 1930 will long be gratefully remembered.

" The undersigned, personal friends and colleagues of Briquet, representing the botanical circles of his native land, desire to commemorate his great services to our science by the erection of a bronze bust to be placed in the ' Conservatoire botanique ' in Geneva, along with those of Vaucher, De Candolle, Boissier, Ascherson, Engler, and others who have done so much to enrich the herbarium of the Conservatoire, to which Briquet has contributed in so large a degree. We feel sure it is the desire of all botanists to bear this testimony to the very great services he rendered to that botanical institute, as well as to his invaluable and ever willing help to all who used the herbarium. Together with de Candolle, Delessert, Boissier, and Chodat he made Geneva a Mecca to all botanists.

" We shall be glad if you will show your appreciation of the life-work of Briquet by contributing to the above memorial. Subscriptions should be sent to M. le Prof. E. Wilczek, Palais de Rumine, Musée botanique, Lausanne.

" Dr. H. Christ, Riehen near Basle ; Dr. B. P. G. Hochreutiner, director of the botanic Conservatory, Geneva ; M. Oechslin, president of the Swiss botanic Society, Altdorf ; Prof. Dr. E. Rübel, central president of the Helvetic Society of Natural sciences, Zurich ; Prof. Dr. H. Schinz, emeritus professor at Zurich University ; Prof. Dr. C. Schröter, emeritus professor at the Federal School of High technical studies, Zurich ; Prof. Dr. E. Wilczek, Conservator of the botanic Museum, Lausanne."

STERCULIACEÆ.

Scaphopetalum Blackii Mast. P. Congo: a cauliflorous undershrub, height 1 m. or more, corolla pale yellow, corona dusky purple, on the banks of the River Belize, Official Residence, Belize, Mayumbe, fl. Nov., 7555.—Nigeria to Congo.

TILIACEÆ.

Grewia Gossweileri (Burret) Exell, comb. nov. (*Microcos Gossweileri* Burret in Notizbl. Bot. Gart. Berl. ix. 762 (1926)). In enumerating the species of this genus I followed Burret in splitting up *Grewia*, but I have since come to the conclusion that this is not advisable. All the other species collected by Gossweiler are already provided with names in the genus *Grewia*, although some of them were enumerated under *Microcos* and some under *Vincentia*. The latter name is in any case antedated by *Vincentia* Gaudich. (Cyperaceæ).

G. herbacea Welw. ex Hiern. Angola : at 1000 m. alt., near the Rivers Cambongo (Gunza) and Quéve (Cuvo), Seles (Ucu), Cuanza Sul, fl. Oct., 9319.—Angola, Rhodesia, and Nyasaland.

G. villosa Willd. Angola: at 1000 m. alt., near the Rivers Cambongo and Quéve, Seles, Cuanza Sul, 9318.—Widespread in Tropical Africa.

G. carpinifolia Juss. Angola : common in hot dry situations at Granja de S. Luiz, Cazengo, 4363, 4630, 4663, 4860, 5451 ; near the Railway Station, Quetta, Golungo Alto, 4849.—Western Tropical Africa and Uganda.

G. flavescens Juss. Angola : at 300 m. alt., Shella Mts., Mossamedes, 9445.—Widespread in Tropical Africa.

Corchorus triloculars L. Angola : at 1000 m. alt., near the Rivers Cambongo (Gunza) and Quéve (Cuvo), 9361.—Widespread.

Triumfetta glechomoides Welw. Angola: Kirima, Planalto de Malange, 9486.—Angola.

T. heptaphylla Exell. Angola : in open shrub-grown pasturage, near Fte. P. Amelia, Cubango, fl. Dec., 3652. Most of the leaves on this specimen are 5-foliolate.—Angola.

MALPIGHIACEÆ.

Triaspis macropteron Welw. ex Oliv. Angola: a woody climber up to 20 ft. high, petals whitish red outside, white inside, fruits purplish green, flowers most fragrant, here and there at Granja de S. Luiz, Cazengo, fl. and fr. May, 5719 ; Granja de S. Luiz, N'Dallatondo, Cazengo, fl. and fr. April, 5968.—Angola and Congo, extending to Tanganyika Territory according to Niedenzu.

C. ANTHYLLOPSIS Welw. ANGOLA: Bihe, Bie, s. n.—Angola, Abyssinia, Congo, and Nyasaland.

Crotalaria kelaensis Bak. fil., sp. nov. Species ad *C. floridam* Welw. et *C. Antunesii* Bak. fil. accedens; *radice* tuberosa perenne; *caule* erecto in specimine nostro copiose ramosa; *stipulis* nullis; *foliis* trifoliolatis petiolatis iis *C. Lotononidis* Welw. subsimilibus, foliolis lineari-oblongis vel lineari-ellipticis superne glabris subtus pubescentibus, petiolis gracilibus superne canaliculatis; *floribus* inter mediocres generis in racemos laxos et terminales dispositis; *bracteis* parvis persistentibus quam pedicellis brevioribus; *calyce* extus pubescente dentibus subacuminatis; *vexillo* ovale vel suborbiculare; *carina* dorso angulo fere recto curvata inde in rostrum rectum attenuata; *alis* oblongis basi unguiculatis; *leguminibus* brevibus extus pubescentibus.

Hab. ANGOLA: near the River Lui, Kela, Planalto de Malange, fl. and fr. Feb., 9527.

Stems 3–4 dm. high; *leaflets* 2–4 cm. long, 3–6 mm. broad; *petioles* 1·2–2·3 cm. long; *flowers* 12–13 mm. long; *calyx* 5–6 mm.; *standard* ±12 mm. long, ±8 mm. broad; *carina* ±12 mm. long; *pod* ±8 mm. long.

This species is allied to *C. florida* Welw. and *C. Lotononis* Welw., both from Angola. It differs from the former by the narrow, linear- or linear-elliptical leaflets and from *C. Lotononis* in the shape of the carina.

ARGYROLOBIUM ÆQUINOCTIALE Welw. ANGOLA: Planalto de Malange, Kela, in open woods near the River Lui, 9586.—Angola.

INDIGOFERA PROCERA Schum. & Thonn. ANGOLA: Baixa da Cassange, Dunda, near the River Lui, Cuango, alt. 800 m., 6914.—Widely spread in Trop. Africa.

I. MIMOSOIDES Baker. ANGOLA: Planalto de Malange, Kirima, near River Kombe, Luanda.—Angola.

I. MARITIMA Baker. ANGOLA: Mossamedes, Schella Mountains, 9444.—Angola.

I. ANTUNESIANA Harms. ANGOLA: many-headed perennial with brilliant scarlet flowers, Distr. of Cuanza Sul, Seles, near River Cambongo, 9300.—Angola and Southern Rhodesia.

I. BAUMIANA Harms. ANGOLA: undershrub with carmine-red corolla, in woods of *Berlinia* and *Brachystegia*, Planalto de Malange, Kela near the River Lui, 9516; in open woods near the River Luando-Lui, 9576; Bihe, Bie, 9455.—Angola and Belgian Congo.

TEPHROSIA DECORA Welw. ANGOLA: in the shade of ravines of hygrophyte galleries, Planalto de Malange, Kirima, near the River Jombo, 9620.—Angola.

AN ENUMERATION OF THE SPECIES OF *POLYGALA* IN THE BELGIAN CONGO.

BY A. W. EXELL, M.A., F.L.S.

(Concluded from p. 169.)

5. **Polygala Wittei** Exell, sp. nov. *Suffrutex* erectus, ramulis teretibus glabris; *foliis* breviter petiolatis ellipticis vel oblongo-ellipticis, apice apiculatis, omnino glabris; *floribus* pedicellatis, pedicello gracile glabro, in racemos multifloros elongatos terminales dispositis; *bracteis* ovato-lanceolatis glabris inter se subsimilibus mox deciduis; *alis* late ovatis glabris; *sepalis* liberis glabris; *petalis superioribus* spathulatis basin versus angustatis fere glabris; *carina* sparse pubescenti cristata, crista multifida; *staminibus* 8; *capsula* obovata glabra; *seminibus* vix maturis sericeo-pubescentibus.

Hab. BELGIAN CONGO: "arbuste," Kitentwe-Kasiki, *G. F. de Witte* 365 (holotype in Herb. Mus. Congo; Herb. Brit. Mus.).

Leaves 1·5–2·5 × ·5–·9 cm.; *petioles* 1 mm. long; *inflorescences* up to 10–13 cm. long; *pedicels* up to 7 mm. long; *bracts* 2 mm. long; *wings* up to 9 × 6·5 mm.; *sepals* 3 mm. long; *upper petals* 4 × 3 mm.; *carina* 4 × 2·5 mm.; *crest* 3 mm. long; *capsule* 5·5 × 4·5 mm.

This species has long conspicuous inflorescences similar to those of *P. Gomesiana* Welw. and *P. macrostigma* Chodat. The stems, however, are distinctly woody and, according to the collector, the plant is a shrub. The inflorescences, moreover, are practically glabrous, while in *P. Gomesiana* and the other species closely related to it they are always hairy.

6. P. BAKERIANA Chodat in Journ. Bot. xxxiv. 199 (1896). *Elskens* 31 (Herb. Brussels), 176 (Herb. Brit. Mus.; Herb. Brussels); *Scott Elliot* 8252 (Herb. Brit. Mus.).

Distribution. Belgian Congo (Urundi).

7. P. USAFUENSIS Gürke in Engl. Bot. Jahrb. xxx. 337 (1901). *P. Verdickii* Gürke in De Wild. Etud. Fl. Kat. 205 (1903); *P. riparia* Chodat in Engl. Bot. Jahrb. xlviii. 317 (1912); *P. Engleriana* Busc. & Muschl. in Engl. Bot. Jahrb. xlix. 476 (1913), of which the type is apparently lost, but of which there is a drawing in the Brussels Herbarium, is very probably this species.

Kassner 2771 *a*, 2836, 2862 *a* (Herb. Brit. Mus.; Herb. Kew); *Quarré* 325, 1625 (Herb. Brussels); *Ringoet* 467 (Herb. Brussels); *Verdick* 556 (Herb. Brussels).

Too many species of this affinity seem to have been described and the group needs intensive study.

Distribution. Northern Rhodesia, Belgian Congo, and Tanganyika Territory.

8. P. SPARSIFLORA Oliv. Fl. Trop. Afr. i. 127 (1868). *P. Brittenïana* var. *phyllostigma* Chodat in Engl. Bot. Jahrb. xlviii. 319 (1912); *P. heliostigma* Chodat in Bull. Soc. Bot. Genève, sér. 2, v. 190 (1913). *Bavicchi* 450 (Herb. Brussels); *Bequaert* 155 (Herb. Brussels); *Butaye* s.n. (Herb. Brussels); *Gillet* 3104 (Herb. Brussels); *Kassner* 2662 (Herb. Brit. Mus.); *Lebrun* 77 (Herb. Brussels); *Quarré* 238 (Herb. Brussels); *Vanderyst* 3165, 5679, 14339, 17149, 17428 (Herb. Brussels), 16144 (Herb. Mus. Congo); *de Witte* 135 (Herb. Brit. Mus.; Herb. Mus. Congo).

Many of the specimens quoted were referred to *P. Guerkei* Chodat by Chodat himself, and there is no doubt that the two species are extremely close. Typical *P. Guerkei* from Angola, however, seems to be a much more glabrous plant. It is possible that *P. heliostigma* may turn out to be distinct, but I believe that too much importance has been given to differences in the structure of the stigma. Dr. De Wildeman seems to be of the same opinion (see Plant. Bequaert. iv. 12 (1926)).

Distribution. French Guinea, Sierra Leone, Belgian Congo, and Tanganyika Territory.

9. P. CLAESSENSII Chodat in Bull. Soc. Bot. Genève, sér. 2, v. 190 (1913). *Claessens* 590 (Herb. Brussels); *Vanderyst* 14892 (Herb. Brit. Mus.; Herb. Mus. Congo).

Distribution. Belgian Congo.

10. P. UKIRENSIS Gürke in Engl. Bot. Jahrb. xiv. 310 (1891). *Quarré* 591 (Herb. Brussels). Native name "kabukwoi." The collector states that the plant is used in making rope. It is placed for some hours in water and allowed to dry in the sun. After removal of the cortex it is then woven.

The inflorescences are a little shorter than in the type of *P. ukirensis*, but otherwise the plants seem to be identical. The flowers seem to be distinctly smaller than in *P. sparsiflora*, with which Chodat has identified this species.

Distribution. Belgian Congo and Tanganyika Territory.

11. **Polygala katangensis** Exell, sp. nov. *Herba* nana perennis, caulibus erectis dense patenti-pilosis; *foliis* ellipticis vel oblongo-ellipticis, apice acutis, basi rotundatis, utrinque pilosulis; *floribus* in racemos breves extra-axillares dispositis; *pedicellis* patenti-pilosis quam flores brevioribus; *alis* oblique obovatis unguiculatis pilosis; *sepalis* ovatis acutis pilosis; *petalis superioribus* oblique obovato-oblongis unguiculatis, ungue apicem versus parum contracto; *carina* cristata, crista multifida; *staminibus* 8; *ovario* glabro; *capsula* late obovata alata pilosula, quam alæ latiore; *seminibus* longe sericeo-pilosis; *arillo* in appendices duas breves prolongato.

Hab. BELGIAN CONGO: Elisabethville, Katanga, at an alt. of about 4000 ft., fl. June, *F. A. Rogers* 26216 (holotype in Herb. Brit. Mus.; Herb. Kew).

Plant 6–8 cm. in height; *leaves* up to 3×1 cm.; *petioles* 1 mm. long; *pedicels* 2–3·5 mm. long; *sepals* 3·5×2 mm.; *wings* 7×4 mm.; *upper petals* 4×3 mm.; *capsule* 5×4 mm.

This species is very closely related to *P. myrtillopsis* Welw., collected by Welwitsch in the Huilla District of Angola, near Lopollo, and apparently never since rediscovered. The Katanga specimens differ in having broader wings and upper petals, and slightly larger, more hairy and more acute leaves. The species are so close that intermediate specimens may eventually be found which link them up, but in view of the differences noted it seems better to describe the Katanga plant as new rather than greatly to increase the distribution of the Angolan species on an uncertain identification.

12. P. ERIOPTERA DC. Prodr. i. 326 (1824). *Bequaert* 548, 5387, 7862 (Herb. Brussels).

Distribution. Throughout Tropical Africa, Arabia, Persia, and India.

13. P. ARENARIA Willd. Sp. Pl. iii. 880 (1803). *Bequaert* 4834, 7778, 7863 (Herb. Brussels); *Claessens* 1206 (Herb. Brussels); *Flamigni* 90, 312 (Herb. Brussels; Herb. Kew); *Gillet* 540, 3189, 4706 (Herb. Brussels); *Hens* 231 (Herb. Brussels; Herb. Kew); *Vanderyst* 3535, 3939 (Herb. Brit. Mus.; Herb. Brussels), 1072, 2937 (Herb. Brussels); *Vermoesen* 1611 (Herb. Brussels); *Wellens* s.n. (Herb. Brussels).

Distribution. Widespread in Tropical Africa.

14. P. PERSICARIIFOLIA DC. Prodr. i. 326 (1824). *Bequaert* 3506, 5959 (Herb. Brussels); *Claessens* 481, 1375, 1703 (Herb. Brussels); *Homblé* 1138 Herb. Brit. Mus.; Herb. Brussels); *Quarré* 227, 1182, 1657 (Herb. Brussels); *Ringoet* 419, 430, 540 (Herb. Brussels); *Rogers* 10928 (Herb. Brit. Mus.); *Scaetta* 825, 860 (Herb. Brussels); *Seret* 171 (Herb. Brussels).

Distribution. Nyasaland, Rhodesia, Belgian Congo, Tanganyika Territory, Uganda, Abyssinia, India, Malay, and China.

15. P. STANLEYANA Chodat in Mém. Soc. Phys. Genève, xxxi. 2, 340 (1893). *Bequaert* 7744 (Herb. Brussels); *Christen Smith* s.n. (Herb. Brit. Mus.); *Feller* B 6 (Herb. Brussels); *Kassner* 2497 (Herb. Brit. Mus.; Herb. Kew), 2505, 2640 (Herb. Brit. Mus.); *Linder* 2002 (Herb. Kew); *Scaetta* 355, 678 (Herb. Brussels); *Vermoesen* 1572 (Herb. Brussels).

When dealing with the Angola Polygalas I considered this to be synonymous with *P. Livingstoniana* Chodat and *P. albida* Schinz. These three species, together with *P. arenaria* Willd. and *P. persicariifolia* DC., present a very difficult problem which

I cannot claim completely to have solved. *P. arenaria* seems to be distinguishable by its cymose branching and must be of more or less prostrate growth. *P. persicariifolia* seems to be the largest of the species concerned and has flowers with more nearly orbicular wings, which are usually glabrous and with rather distinct veins. *P. Stanleyana* and *P. albida* are extremely close. The former tends to have rather laxer inflorescences than *P. albida*, somewhat smaller flowers, wings pubescent at least towards the base and somewhat greenish, and a more northerly distribution. *P. albida* has very congested inflorescences and almost glabrous wings with the veins usually very indistinct.

Distribution. Angola, Belgian Congo, Cameroons, and Uganda.

16. P. ALBIDA Schinz in Verh. Bot. Ver. Brand. xxix. 53 (1888). *P. Livingstoniana* Chodat in Mém. Soc. Phys. Genève, xxxi. 2, 339 (1893). *P. modesta* Gürke in Engl. Bot. Jahrb. ix., Beibl. 47, 35 (1895). *Quarré* 204 (Herb. Brussels).

Distribution. Belgian Congo, Tanganyika Territory, Rhodesia, Angola, S.W. Africa, and Transvaal.

17. **P. Vatkeana** Exell, nom. nov. *P. Schimperi* Vatke ex Engl. in Abhandl. Preuss. Akad. Wiss. 1891, 281 (1892), nomen et ex Chodat in Mém. Soc. Phys. Genève, xxxi. 2, 349 (1893), non Hassk., nec Presl. *Bequaert* 3492, 3972 (Herb. Brussels).

Distribution. Abyssinia, Uganda, Tanganyika Territory, and Belgian Congo.

18. P. MELILOTOIDES Chodat in Engl. Bot. Jahrb. xlviii. 320 (1912). *P. melilotoides* var. *major* Bak. fil. in Journ. Bot. lvi. 5 (1918). *Kassner* 2938 (Herb. Brit. Mus.), 2992 (Herb. Brit. Mus.; Herb. Kew); *Quarré* 1731 (Herb. Brussels); *Rogers* 10887 (Herb. Brit. Mus.; Herb. Kew).

Distribution. Belgian Congo and Northern Rhodesia.

19. P. PYGMÆA Gürke in Pflanzenw. Ost.-Afr., C. 234 (1895). *Claessens* 411 (Herb. Brussels); *Gillet* 2076, 3006 (Herb. Brussels); *Vanderyst* 3301, 14650 (Herb. Brussels).

Distribution. Tanganyika Territory, Belgian Congo, and Rhodesia.

This species, *P. melilotoides* Chodat, and *P. Welwitschii* Chodat from Angola are all closely allied.

20. P. QUARTINIANA A. Rich. in Ann. Sci. Nat. sér. 2, xiv. 263 (1840). *Descamps* s.n. (Herb. Brussels).

Probably the large number of species which have been described in the affinity of *P. Quartiniana* provide the most difficult of the problems concerning the Tropical African species of the genus. I do not think that *P. Quartiniana* and *P. ukambica* Chodat can be kept apart, and I am very doubtful whether *P. filifera* Chodat, *P. Ehlersii* Gürke, and *P. Fischeri* Gürke are

all distinct species. *P. Fischeri* is more hairy than any of the others, and I have kept it apart for the present, although it may turn out to be no more than a form.

Distribution. From Abyssinia to Transvaal and in eastern Belgian Congo.

21. P. FISCHERI Gürke in Engl. Bot. Jahrb. xiv. 310 (1891). *Claessens* s.n. (Herb. Brussels).

Distribution. Uganda, Kenya, Tanganyika Territory, and Belgian Congo.

22. P. AFRICANA Chodat in Mém. Soc. Phys. Genève, xxxi. 2, 168 (1893). *Rogers* 10798 (Herb. Brit. Mus.).

Distribution. Belgian Congo (Katanga), Rhodesia, Angola, and Transvaal.

23. P. CAPILLARIS E. Mey. in Drège, Zwei Pfl. Docum. 212 (1843), nomen et ex Harv. in Harv. & Sond. Fl. Cap. i. 93 (1859). *Vanderyst* 1483, 1962 (Herb. Brussels), 4536 (Herb. Brit. Mus.; Herb. Brussels).

Distribution. Belgian Congo, Portuguese East Africa, and South Africa.

24. P. MYRIANTHA Chodat in Engl. Bot. Jahrb. xlviii. 321 (1912). *Vanderyst* 13261, 17560 (Herb. Brussels).

Distribution. Cameroons, Belgian Congo, Uganda, and Tanganyika Territory.

25. P. KISANTUENSIS Chodat in Bull. Soc. Bot. Genève, sér. 2, v. 189 (1913). *Gillet* 1014 (Herb. Brussels; fragment in Herb. Brit. Mus.).

Var. *tenuifolia* Chodat in De Wild. in Bull. Jard. Bot. Brux. iv. 143 (1914), nomen. *Bequaert* 7742 (Herb. Brussels; fragment in Herb. Brit. Mus.).

Differs from the type in having longer, narrower, more oblong leaves. This species is very near to *P. myriantha* Chodat, but appears to be a plant of much weaker growth. Both species are difficult to distinguish from some forms of the Asiatic species *P. oligophylla* DC.

Distribution. Belgian Congo.

26. P. ACICULARIS Oliv. Fl. Trop Afr. i. 132 (1868). *Allard* 37 174, 362, 408 (Herb. Brussels); *Bavicchi* 145, 379 (Herb. Brussels); *Bequaert* 648, 7202, 7582 (Herb. Brussels); *Blommaert* 74 (Herb. Brussels); *Broun* s.n. (Herb. Brussels); *Cabra* 29, 31 (Herb. Brussels); *Casteels* 22 (Herb. Brussels); *Claessens* 804, s.n. (Herb. Brussels); *Ghesquière* 36 (Herb. Brussels); *Gillet* 3523, s.n. (Herb. Brussels); *Goossens* 1552, 2391, 2439, 4989 (Herb. Brussels); *Hens* 246 (Herb. Kew); *Jespersen* s.n. (Herb. Brussels); *Laurent* s.n. (Herb. Brussels); *Lebrun* 2185 (Herb. Brit. Mus.; Herb. Mus. Congo); *Nys* s.n. (Herb. Brussels); *Robyns* 1281 (Herb. Brussels); *Schlechter* 12494 (Herb. Brussels); *Seret* 305

(Herb. Brussels); *Van der Gucht* 423 (Herb. Brussels); *Vanderyst* 1192, 1976, 3537, 4347, 14553 (Herb. Brussels), 3749 (Herb. Brit. Mus.; Herb. Brussels); *Vermoesen* 538 (Herb. Brussels); *Wellens* 32, 231 (Herb. Brussels).

Distribution. Nigeria, Cameroons, Bahr el Gazal, Uganda, Congo, and Angola.

27. **Polygala Homblei** Exell, sp. nov. *Herba* perennis, cæspitosa, caulibus erectis pilosulis; *foliis* brevissime petiolatis lineari-oblongis vel anguste spathulatis, apice apiculatis basi angustatis, sparse puberulis; *floribus* pedicellatis, pedicello minute puberulo, in racemos terminales dispositis; *alis* ovatis fere glabris; *sepalis* suborbicularibus margine ciliolatis, duobus inferioribus fere ad apicem connatis; *petalis superioribus* obovato-spathulatis glabris; *carina* glabra cristata; *staminibus* 8; *capsula* immatura.

Hab. Belgian Congo: Manika Plateau, near Katentania, fl. Nov. 1912, *Homblé* 817 (holotype in Herb. Brussels; fragment in Herb. Brit. Mus.).

"Termitière; fleur striée de rose."

Leaves 10–30×3–5 mm.; *inflorescences* about 4 cm. long; *pedicels* up to 9 mm. long; *wings* 10–11 × 8–9 mm.; *sepals* 4·5×3·5–4 mm.; *upper petals* 9–10×7 mm.; *carina* 11×5 mm.; *crest* 2–3 mm. long.

This species belongs to the group of species, designated *Tetrasepalæ* by Chodat, which have the two inferior sepals joined. It is perhaps nearest to *P. robusta* Gürke and *P. Baumii* Gürke, from Angola, both of which have more crowded inflorescences and much shorter pedicels.

28. P. Poggei Gürke in Engl. Bot. Jahrb. xiv. 309 (1891). *Hock* s.n. (Herb. Brussels).

This specimen, collected at Manika, differs from the type in having distinctly longer pedicels, but seems otherwise to be identical. Its status can only be determined when more material has been collected.

Distribution. Angola and Belgian Congo.

29. **Polygala Dewevrei** Exell, sp. nov. *Herba* ? ramosa, caulibus erectis glabris vel fere glabris; *foliis* brevissime petiolatis anguste linearibus, margine incurvatis, fere acicularibus, apice apiculatis, glabris vel fere glabris; *floribus* breviter pedicellatis in racemos subcapitatos axillares congestis; *alis* oblique ellipticis, apice acutis apiculatis, margine minutissime ciliolatis; *sepalis* ovatis apice apiculatis, duobus inferioribus fere ad apicem connatis; *petalis* superioribus late oblongis glabris; *carina* basin versus ad marginem superiorem minute ciliolata ceteroque glabra, cristata; *staminibus*, antheris 6 fertilibus, filamentis 2 sterilibus; *ovario* obovato glabro; *capsula* vix matura obovoidea glabra.

Hab. Belgian Congo: without precise locality, *Dewèvre* 1071 (holotype in Herb. Brussels; fragment in Herb. Brit. Mus.).

Leaves up to 15×1 mm.; *inflorescences* 1·5 cm. long; *pedicels* 2 mm. long; *wings* 5×2 mm.; *sepals* 2×1·3 mm.; *upper petals* 1·8×1 mm.; *carina* 4·5×2 mm.; *capsule* (immature) 2·5×2 mm.

This species belongs to *Tetrasepalæ* Chodat, and resembles in habit and in structure of the flowers *P. arenicola* Gürke and *P. nematophylla* Exell. It can be distinguished from both of these by the very short axillary racemes. This species and a few others of the same affinity show a reduction of the number of fertile stamens to six. This is perhaps correlated with self-pollination, for in such species one or more of the anthers is usually found, on dissection, to be closely adhering to the stigma.

30. **Polygala loanzensis** Exell, sp. nov. *Herba* annua ?, caule erecto glabro; *foliis* breviter petiolatis ellipticis apice mucronatis glabris; *floribus* pedicellatis in racemos axillares (et terminales ?) dispositis; alis oblique ellipticis vel oblique obovatis breviter unguiculatis glabris; *sepalis* ovatis glabris, duobus inferioribus fere ad apicem connatis, superiore quam inferioribus distincte majore; *petalis superioribus* obovato-cuneatis glabris; *carina* glabra ecristata; *capsula* glabra; *seminibus* breviter cylindricis sericeo-pilosis.

Hab. Belgian Congo: Loanza, Lake Mwero, *Kassner* 2814 *a* (holotype in Herb. Brit. Mus.); Kapiri Valley, Katanga, *Homblé* 1123 (Herb. Brussels).

Leaves 2·5–5·5×·5–1·8 cm.; *inflorescences* up to 6 cm. long; *pedicels* 2 mm. long; *wings* 4·5×2·5 mm.; *free sepal* 2·2×1·8 mm.; *upper petals* 3·5×2·5 mm.; *carina* 5×3 mm.; *capsule* 4×3·5 mm.

This species also belongs to *Tetrasepalæ* Chodat, and is very near to *P. xanthina* Chodat. It is, however, a much smaller plant with smaller flowers and relatively broader shorter leaves.

31. P. xanthina Chodat in Engl. Bot. Jahrb. xlviii. 325 (1912). *Bequaert* 2830, 4921 (Herb. Brussels); *Kassner* 2622, 2661 (Herb. Brit. Mus.; Herb. Kew); *Quarré* 191 (Herb. Brussels); *Rogers* 10868 (Herb. Brit. Mus.; Herb. Kew); *de Witte* 99 (Herb. Mus. Congo), 126 (Herb. Brit. Mus.; Herb. Mus. Congo).

Distribution. Belgian Congo and Tanganyika Territory.

32. P. Petitiana A. Rich. Tent. Fl. Abyss. i. 37 (1847). *P. Volkensii* Gürke in Pflanzenw. Ost.-Afr., C. 234 (1895). *Bequaert* 2730, 4088 (Herb. Brussels); *Kassner* 2616 (Herb. Brit. Mus.); *Quarré* 113, 469 (Herb. Brussels); *Vanderyst* 3557 (Herb. Brit. Mus.).

Distribution. Abyssinia, Uganda, Congo, Tanganyika Territory, Rhodesia, and Angola.

RUBUS LEUCANTHEMUS ? P. J. MUELL. (AUCTT. BRIT.).

BY W. C. BARTON AND H. J. RIDDELSDELL.

WE have in our herbarium a large number of sheets of the forms which have been placed under this name since it was introduced to the British *Rubus* list, and it is now some years since we came to the conclusions embodied in the present article. These conclusions have been checked by study of the living plant in various localities.

During the last four years Mr. W. Watson has written notes in the 'London Naturalist,' and the Rep. B. E. C. bearing on these forms. In Journ. Bot. 1930, pp. 24 *sq.*, he states definitely that certain gatherings of "*R. leucanthemus* P. J. M. ?" are in his opinion "*R. hirsutissimus* Sudre & Ley." We have seen all the four sheets he cites in the South London Botanical Institute and the British Museum. We have also in our herbarium two early (1886 and 1893) gatherings from Welsh Newton by Ley himself of *R. fuscus* Wh. & N., forma *hirsutissima, parce glandulosa* Focke, which Sudre ('Rubi Europæ,' p. 51) names *R. hirsutissimus* Sudre & Ley. To any scientific botanist experienced in this genus it would be quite impossible to confuse the Welsh Newton plant with any of the four sheets cited by Mr. Watson, or indeed with any of the forms included by Rogers in his "*leucanthemus* ?" packet.

Mr. Watson further states that three specimens collected and named by Rogers from the Bournemouth neighbourhood are in his opinion typical *R. leucandrus* Focke. It is difficult to imagine that Rogers could have confused two brambles which we know he discussed with Focke when the latter stayed with him at Bournemouth. We have, as a matter of fact, seen two of the sheets cited, one in S. Lond. Bot. Inst. and one in Herb. Mus. Brit., and we have in our herbarium a sheet of the third (Parkstone, coll. Rogers, July 11 and Sept. 13, 1900). None of these can be confused with *R. leucandrus* Focke, a specimen of which (coll. Focke, 1873) we possess.

The next paragraph of Mr. Watson's paper contains a statement that the Fittleworth plant we deal with below is *R. vestitus* Wh. & N., f. *umbrosa*. A shade-form it is, as was stated on the label when it was distributed through B. E. C.; but in almost every critical or diagnostic feature it belongs to the plant we are dealing with and not to *vestitus*, the shade-form of which is familiar to British batologists.

In the present paper we deal with three of the forms which have at one time or another been placed under the name that heads this article. Two of these constitute well-defined and satisfactory species; the third is best treated as a variety. Other forms we hope to deal with in a later article.

Rubus surrejanus, sp. nov. *Stem* low-arching, dullish green or in exposure *reddish* claret coloured (as is also the base of the prickles), *blunt-angled* and deeply striate. *Stem-prickles numerous*, unequal, *rather short*, more or less scattered, *fine but with a stout base, patent*; occasionally a few scattered pricklets; *hairs abundant*, single and clustered; *few other arms*; some gland-tipped acicles and stalked glands, irregular in quantity and in placing. Stipules narrow, hairy, and glandular-ciliate. Petioles and petiolules armed with weak prickles. *Leaves quinate*, mostly *pedate*; hairy above, softly hairy below. Toothing irregular, simple, and compound. Leaflets wavy-edged. *Terminal leaflet subrotund* with moderate acuminate or cuspidate-acuminate point, frequently narrowed below to a broad *subcordate* or emarginate base; 2½ to 3 times as long as its stalk. *Panicle long*, in large part ultra-axillary; upper part *broad*, cylindrical, *truncate-topped*; *branches distant*; lower axillary, ascending, many-flowered, upper rigid, rather long, patent or patent-erect; panicle often with several simple leaves above, the upper leaves felted beneath. *Bracts* simple and trifid, *numerous* and conspicuous, extending to individual flowers. *Rachis flexuose*, striate, clothed *with regular long straight patent hairs*, single and clustered, and thinly felted above; *prickles* rather *many*, *slender*, unequal, subpatent or declining (and occasionally falcate); *some* subsessile and *short-stalked glands* unevenly distributed, and an occasional gland-tipped acicle. *Flowers* moderately large, *white*. Petals shortly clawed and broadly elliptical. Stamens white, the outer exceeding the green styles. *Sepals* generally elliptic with distinct point, with close *greyish-olive felt*, somewhat acicular; loosely reflexed to *subpatent*. Carpels glabrous or nearly so.

R. surrejanus Bart. & Ridd. is a well-marked species and easily recognisable in its typical form, especially by its characteristic stem-prickles, the shape of the terminal leaflet, and its open panicle. The rachis and pedicels are reddish, at least in exposure; and the hair clothing of the rachis, rather spaced and regularly pectinate, is one of the most striking features of the species. The panicle branches, especially the lower ones, are usually branched rather low down, *i. e.*, near the rachis.

From *R. leucostachys* Sm. it is distinguished by its peculiar prickles, the character of the hair, the shape of the terminal leaflet, and the peculiar branching of the panicle branches, as well as by white flowers. At Oxshott, Surrey, and other places, a number of the plants by the roadside are considerably altered in appearance by the dust from the tarred roads. And at Oxshott, where the species grows in company with *R. fuscus* Wh. & N., var. *nutans* Rogers, we have seen many bushes which show a parentage of both in varying and puzzling forms. Some of these hybrids have found their way into Rogers's, Britton's, and other herbaria.

At present the species is certainly known from W. Sussex v.c. 13, S. Leonard's Forest ! ; Surrey v.c. 17, Putney Heath !, Walton Heath !, Merrow Down !, Wimbledon Common ! (where it apparently hybridises with *rhamnifolius*), Witley (*E. S. Marshall*), near Dorking (*C. E. Salmon*) ; and from Oxon v.c. 23, Goring Heath ! We intentionally omit much material which has in past years been grouped under the name "*leucanthemus*."

A short definition follows :—

Turiones rubescentes, obsolete angulati, aculeis sat brevibus ex basi lata patentibus, armatura alia rara, capillis multis instructi. Folia quinata pedata. Foliolum terminale subrotundum ad basin subcordatum. Inflorescentia lata, ramis distantibus elongata, apice truncato, bracteis multis conspicua. Rachis flexuosa, aculeis multis tenuibus armata, capillis longis rectis æquo intervallo patentibus glandulisque paucis vestita. Flores albi ; sepala cano-viridia tomentosa subpatentia.

Exsiccata (in Herb. Bart. & Ridd.) : ref. nos. 2650 typus (holotype), 699, 700, 2577–8, 2581, 2588–9.

R. surrejanus Bart. & Ridd., var. **wealdensis,** var. nov.

Differt a typo :—turionis aculeis sæpe plus minusve reclinatis ; inflorescentiæ parte ultra-axillari longiore ; petalis aliquantum majoribus ; staminibus stylos æquantibus vel paullo superantibus ; sepalis subfuscis, interdum albo-marginatis.

Differs from type by stem-prickles frequently more or less declining ; panicle with ultra-axillary part longer ; petals rather larger than in type ; stamens equalling styles or very little longer ; sepals darker, sometimes white-margined.

Somewhat nearer to *leucostachys* than is *surrejanus*. The petals were pale lilac in the 1926 Fittleworth gatherings ; see Rep. B. E. C. 1928, p. 904.

Distribution. Known certainly only from W. Sussex v.c. 13 !

Exsiccata (in Herb. Bart. & Ridd.); ref. nos. 1595, 1610, 1611 typus (holotype), 1612.

Rubus purbeckensis, sp. nov. Almost or quite *eglandular*. *Stem* very low-arching, dull in colour ; *angular*, striate, somewhat furrowed, *with abundant hairs* single and clustered, but straight. *Stem-prickles* numerous, *unequal*, scattered, *straight*, *slender*, *very short-based*, *declining*. Stipules very narrow. Petioles with numerous weak prickles, mostly hooked. *Leaves quinate*, normally *pedate* ; hairy above, softly and densely hairy beneath. Toothing very compound, incised, often with shallow lobes ; points of teeth variously directed. *Terminal leaflet broadly ovate* or subrotund *with long* gradually *acuminate point* and broadish *subcordate or emarginate* base ; the point occasionally shorter and more cuspidate ; 2½ to 3½ times the length of its stalk. *Panicle moderately long*, usually narrowly cylindrical ; *lower branches* axillary, strongly *ascending* ; *upper branches* short,

more nearly *patent-erect* ; topmost exceeding the primordial flower ; panicle often *leafy* almost to the top, the upper leaves felted beneath. Bracts simple and trifid. *Rachis* slightly flexuose, *with* rather many fine declining *prickles similar to those of the stem* ; abundantly hairy, *with long straight patent* single and clustered *hairs* ; *felted* ; eglandular or nearly so. *Flowers* rather large, *white*. Petals obovate to broad-elliptic, not contiguous. Stamens exceeding green styles. *Sepals broadish with long point*, olive-green, felted, with plentiful longish hairs, somewhat acicular ; loosely *reflexed* in fruit. Young carpels with hairy tips.

R. purbeckensis Bart. & Ridd. differs from *surrejanus* by its slender very short-based declining stem-prickles, the normal shape of its terminal leaflet, its narrower and closer panicle with branches ±ascending, and pedicels not producing flowers so low down.

Up to the present it is known only from Dorset v.c. 9 ! and S. Hants v.c. 11.

A short definition follows :—

Frutex subeglandulosus. Turiones angulati, aculeis inæqualibus rectis tenuibus e basi brevissima reclinatis, capillis multis instructi. Folia quinata, pedata. Foliolum terminale latum, longe acuminatum ad basin subcordatum vel emarginatum. Inflorescentia sat longa, ramis inferioribus ascendentibus, superioribus patenti-erectis composita, foliosa. Rachis aculeis reclinatis turionis aculeis similibus armata, tomentosa et capillis longis rectis patentibus vestita. Flores albi ; sepala sat lata, acuminata, post anthesin reflexa.

Exsiccata (in Herb. Bart. & Ridd.) ; ref. nos. 2651 typus (holotype) (coll. Rogers, Parkstone, July 11, 1900), 2338, 2339, 2346, 3138 (coll. H. Fisher, Hengistbury, 1906).

The *Rubus* list of ' London Catalogue,' ed. xi., will read :—

525 (2). *surrejanus* Bart. & Ridd.
×*rhamnifolius.*
×*nuticeps* (*nutans*).
b. *wealdensis* Bart. & Ridd.
525 (3). *purbeckensis* Bart. & Ridd.

The name *leucanthemus* disappears from the British list.

THE GENUS *UROPHYLLUM* IN MALAYA.

By H. N. Ridley, C.M.G., F.R.S.

The genus *Urophyllum* Wall., *Axanthes* Bl., was based on certain Rubiaceous shrubs or small trees of the Malay Peninsula, with stamens isomerous with the petals, namely, 4 or 5, rarely 6 of each. *Aulacodiscus* Hooker was founded on a Malay Peninsula small tree, in which there was a double row of stamens,

one alternate with and one opposite the petals. It differed, too, in having a panicled inflorescence instead of the simple cymes of the original *Urophyllum*. In the large series of these plants more lately received from Borneo and other islands, we find several species with the inflorescence of typical *Urophyllum*, but with the double row of stamens, while one species at least has the panicled inflorescence of *Aulacodiscus* (*U. paniculatus* Ridl.), without any trace of the second series of stamens of the type of that genus. This being so, the two genera appear to me to be inseparable on these grounds, as indeed they did to Wight, who described *Aulacodiscus* under the name *Axanthes enneandra*.

The species are often very difficult to separate, as they seem to run into each other. Usually unisexual, it is probable that a certain amount of hybridization takes place, and differences in the indumentum and branching of the cymes seem to occur in plants which otherwise seem to be identical species. The genus occurs widely spread over tropical Africa and Southern India and Ceylon where it is very scantily represented, and abundantly in the Malay Peninsula, and the Archipelago to New Guinea and the Philippines. It is absent from North India and Siam, and the Australian and Polynesian area. In fact, as the species are found almost always in dense wet forests, they are absent from dry countries.

I find the best way of sorting the species of the Malay region to be as follows :—

§A. Pleiocarpidia (*Aulacodiscus*).
Stamens in two whorls, 8 or 9.
Flowers sessile or in small cymes.—*U. Creaghii* Ridl., *U. longipetalum* Ridl.
Flowers in panicles.—*U. enneandrum* (Wight), *Aulacodiscus premnoides* Hook. fil.

§B. Grandifloræ.
Stamens 6 or 7, flowers 10 mm. long or longer.—*U. suberosum* Merrill, *U. bullatum* Ridl., *U. macranthum* Ridl., *U. Pellacalyx* Ridl., *U. Lowei* Ridl.

§C. Axanthes.
Stamens 4 or 5, rarely 6. Corolla-lobes acute, longer or as long as the tube.
Cymes sessile or sub-sessile.—*U. glabrum* Wall. (*U. arboreum* Miq.), *U. Griffithianum* Hook. f., *U. sessiliflorum* Ridl., *U. leucophœum* Ridl., *U. rigidum* Ridl., *U. elongatum* Miq., *U. umbellulatum* Miq., *U. Woodii* Merrill, *U. sumatranum* Ridl., *U. hirsutum* Hook. fil., *U. lasiocarpum* Ridl., *U. ferrugineum* King, *U. nigricans* Wernh., *U. Shelfordi* Ridl., *U. pilosum* Ridl., *U. castaneum* Ridl., *U. lineatum* Stapf.
Cymes peduncled corymbose.—*U. corymbosa* Korth., *U. trifurcum* Pears., *U. grandifolium* Ridl., *U. Yatesii* Ridl., *U. sericeum* Ridl.
Cymes peduncled, branches short, panicled.—*U. longifolium* Hook. fil., *U. borneense* Miq., *U. cephalotes* Ridl., *U. villosum* Wall., *U. capituligerum* Ridl., *U. subanurum* Stapf, *U. paniculatum* Ridl., *U. bracteolatum* Ridl.

§D. Tubifloræ.
Corolla-tube longer than the linear or oblong lobes.
Cymes sessile.—*U. longidens* Stapf, *U. neriifolium* Ridl., *U. streptopodium* Wall., *U. vulcanicum* Ridl., *U. Motleyi* Ridl., *U. macrophyllum* Korth., *U. cyphandrum* Stapf, *U. salicifolium* Stapf, *U. melanocarpum* Ridley, *U. congestiflorum* Ridl.

Dubiæ et indeterminatæ.

U. polyneurum Miq. Leaves only described.
U. strigosum Miq. Java.
U. moluccanum Miq. Buru.
U. (*Axanthes*) *timoriensis* DC. Timor.
U. porphyraceum Baill. Java. *Nomen nudum*, probably not an *Urophyllum*.

Urophyllum (§ **Pleiocarpidia**) **longipetalum** Ridl., sp. nov. Species ab *U. enneandro* (Wight) cui affinis foliis oblongis, cymis subsessilibus densis, lobis corollae elongatis acuminatis, floribus majoribus in fasciculis brevibus plurimis congestis differt.

Frutex glaber. *Folia* coriacea oblonga subacuta basibus attenuatis, costa subtus elevata crassa, nervis subtus elevatis 10-paribus, nervulis transversis anastomosantibus 14–14·5 cm. longa, 5·5 cm. lata, petiolis 7 mm. longis. *Stipulæ* delapsæ. *Cymæ* subsessiles multifloræ 1 cm. longæ 1·5 cm. latæ. *Pedicelli* crassi 3 mm. longi. *Calyx* patelliformis margine sinuato puberulus 3 mm. latus. *Corolla* tubo brevissimo pilis flavis in ore copiosis, lobis 6 lanceolatis acutis coriaceis 3 mm. longis. *Stamina* 8 ex ore tubi corollæ, filamentis gracilibus brevioribus, antheris parvis oblongis. *Pistillodia* in flore masculo minuta. *Discus* albus subsericeus, obtuse conicus, foveolis lineatis ab apice radiatis.

Hab. Sarawak, near Kuching (*Haviland*, 1662). The only specimen is male.

Urophyllum enneandrum, comb. nov. *Axanthes enneandra* Wight, *Aulacodiscus premnoides* Hook. fil., *A. Maingayi* King, *Pleurocarpidia premnoides* Schum.

It is quite impossible to separate this genus from *Urophyllum*. The oldest name for the plant is Wight's. As *Urophyllum*, however, antedates *Axanthes* Bl., I have to make a new combination. It is confined to Tenasserim, Malay Peninsula, and Sumatra. The plant distributed by Merrill from Sandakan under this name is a distinct species, but the specimens I have seen are all in fruit, without flowers.

Urophyllum Creaghii Ridl., sp. nov. Species ab *U. longipetalo* Ridl. cui affinis foliis longissimis longe acuminatis pilosis, floribus paucis in cymis sessilibus hirtis differt.

Frutex ? valida ramis pilosis. *Folia* subcoriacea lanceolata longe acuminata basibus attenuatis, superne glabra, costa depressa excepta, subtus pilosa, costa elevata, nervis 18-paribus, secundariis pluribus, nervulis transversis et reticulationibus laxis, omnibus albo-pilosis, 33 cm. longa, 6–7 cm. lata, petiolis 3 cm. longis crassis, rugosis, pilosis. *Stipulæ* delapsæ. *Flores* pauci in axillis congesti sessiles. *Bracteæ* suborbiculatæ pilosæ. *Calyx*

brevis campanulatus margine sinuato 6 mm. lato, 3 cm. longus pilosus. *Corolla* pilosa 5 mm. longa, tubo 2 mm. longa, lobis 4 pilosis ovatis obtusis 3 mm. longa. *Stamina* 8, filamentis brevissimis, antheris oblongis breviter apiculatis. *Pistillodium* in masculo brevissimun, stigmate lobulato. *Discus* cerebriformis albus.

Hab. British North Borneo (*Creagh*).

This is remarkable for its long, narrow, hairy leaves, with long points and hairy flowers.

Urophyllum Havilandii Ridl., sp. nov. Species ab *U. Creaghii* Ridl. cui affinis foliis lanceolatis subcoriaceis glabris minoribus, floribus ferme glabris, calyce cupulato differt.

Frutex parva glabra. *Folia* subcoriacea lanceolata acuminata obtusa basibus attenuatis, sicca grisea, nervis utrinque elevatis gracilibus in nervo intra-marginali inarcuantibus 12-paribus, nervulis elevatis laxe reticulatis, 18–19 cm. longa, 4·5–5·4 cm. lata, petiolis crassiusculis rugosis 1 cm. longis. *Stipulæ* lineares obtusæ pustulatæ 1 cm. longæ. *Flores* sessiles 3 in glomerulo sessili. *Bracteæ* orbiculares rotundatæ marginibus hirtis, 2 mm. longæ. *Calyx* cupulatus margine integro, hirto. *Corolla* 7 mm. longa extus tenuiter sericeo-puberula, tubo breviore intus piloso lobis 5, latiusculis ovatis. *Stamina* 8, filamentis brevissimis antheris lanceolato-linearibus apiculatis. *Stylodium* in masculo minutum. *Discus* elevatus.

Hab. British North Borneo, Gaya Island, "representative of *U. glabrum*, but larger, and common peduncle shorter." Small shrub (*Haviland*, 1435).

This is undoubtedly allied to *U. Creaghii* Ridl., of which the flowers are almost identical, except for being nearly glabrous, but the calyx is a deep cup, and the leaves are of a totally different shape and glabrous.

Urophyllum (§ **Grandifloræ**) **Pellacalyx** Ridl., sp. nov. Species ab *Urophyllo macrantho* Ridl. cui affinis foliis coriaceis, calyce tubo glaberrimo, pedunculis brevibus glabris, bracteis angustis lanceolatis acuminatis glabris differt.

Frutex parvus glaber. *Folia* tenuiter coriacea oblongo-elliptica cuspidata (cuspide 1–1·5 cm. longo), basi subacuto, nervis 7 paribus subtus elevatis inarcuantibus, secundariis et nervulis subtus prominulis, 14–15 cm. longa, 4–6 cm. lata, petiolis 5 mm. longis. *Stipulæ* cornutæ, crassiusculæ, 7 mm. longæ. *Cymæ* 2–3-floræ pedunculis 2–3 mm. longis, pedicellis 3 mm. longis. *Calyx* campanulatus margine integro 5 mm. longus. *Corolla* tubo brevi 5 mm. longo, lobis oblongo-lanceolatis 6 mm. longis, viridis, pilis albis linearibus copiosis in ore 5 mm. longis. *Stamina* 4, brevissima in pilis celata, antheris oblongis, basibus bidentatis apiculatis. *Flores feminei* non visi.

Hab. Sarawak, 4 miles from Kuching. Corolla green, with long white hairs, placentas on the sides of the five septa (*Haviland*, 2965, type ; 701).

Urophyllum bullatum Ridl., sp. nov. Species ab *Urophyllo macrantho* Ridl. cui affinis foliis bullatis subtus hirtis, caule hirto, calycis tubo hirto lobis linearibus hirtis differt.

Frutex hirta. *Folia* elliptico-lanceolata acuminata (acumine 2 cm. longo) basi obtusa superne bullata (sicca plumbea), costa superne depressa hirta, subtus costa elevata cum nervis elevatis 12 paribus hirtis, 16–19 cm. longa, 5·5–6 cm. lata, petiolis hirtis 5 mm. longis. *Stipulæ* elongatæ lanceolatæ acuminatæ hirtæ 2 cm. longæ. *Flores* majusculi 3–5 in glomerulis, bracteis pluribus triangularibus hirtis 2 mm. longis, pedicellis gracilibus hirtis 1–1·4 cm. longis. *Calyx* tubo subgloboso 7 mm. longo hirto, lobis linearibus hirtis 4 mm. longis. *Corolla* tubo brevi, lobis lanceolatis acutis hirtis. *Discus* calycem implens planus haud elevatus, costis elevatis radiatis in vertice. *Bacca* hirta 5-locularis, seminibus pluribus foveolatis.

Hab. Sarawak, Matang (*Ridley*), type. Selabat, 300 feet alt., and Sepudang (*Haviland*, 662), Santubong (*Bartlett, Haviland*, 1535).

I have only seen an incomplete corolla of this plant.

Urophyllum Lowei Ridl., sp. nov. Species ab *Urophyllo macrantho* Ridl. cui affinis foliis multo majoribus subtus hirtis, stipulis magnis elongatis floribus rufo-hirtis differt.

Frutex, ramis glabris. *Folia* subcoriacea elliptica vel oblonga longe cuspidata (cuspide angusto 3 cm. longo), basi acuta, superne glabra costa depressa excepta, subtus costa, nervis 20-paribus, nervulisque prominulis subparallelis hirtis 20–30 cm. longis, 7·5–9 cm. latis, petiolis hirtis 1 cm. longis. *Stipulæ* lanceolatæ coriaceæ glabræ vel hirtulæ 3–4 cm. longæ, 8 mm. latæ ad bases. *Cymæ* hirtæ ad 7-floræ in pedunculo 8 mm. longo, pedicellis 1 cm. longis gracilibus hirtis. *Calyx* globoso-urceolatus hirtus 5 mm. longus, lobis brevibus triangularibus acutis 2 mm. longis. *Corolla* tubo calycem non superante, cylindrico brevi ore pilis albis linearibus copiosis, lobis lineari-oblongis hirtis 5 mm. longis, 2 mm. latis. *Stamina* 6, quam pilis breviora, antheris oblongo-linearibus apiculatis. *Discus* parvus pulviniformis. *Bacca* urceolata 5 mm. lata, seminibus minutis papillosis.

Hab. Borneo (*Lowe, Lobb*) ; Sarawak, Kuching (*Beccari*, 14, 842), Sarawak River near Kuching (*Haviland*, 1837, type ; 703), Rejang River (*Haviland*, 711).

UROPHYLLUM GLABRUM Jack & Wall. *U. repandulum* Miq., *U. micranthum* Miq. (probably), *Axanthes arborea* Bl. The type of this is a common lowland Malay Peninsula plant, about 12 feet tall, but it appears to be polymorphic, the Javanese plant (*U. arboreum* Korth.) being somewhat distinct in its narrow leaves.

It occurs in Siam, Patalung (*Kerr*, 19,232); all over the Malay Peninsula, Anambas Isles, Gunong Datoh (*Henderson*, 2404); Borneo, Sarawak, Kuching, "Shrub, berry yellow; Corolla green" (*Haviland*, 935, 2962) (*Beccari*, 5, 804); British North Borneo, Sandakan (*Elmer*, 20,142), East Coast (*Creagh*), S.E. Borneo, Hayup (*Winkler*, 2303, 2320); Sumatra, Padang, Sungei Buluh (*Beccari*, 964) and Ayer Mancior (*Beccari*, 503); Java, Preanger (*Koorders*, 12,042, 25,568, 3578) (*Junghuhn*, 325), Bantam (*Forbes*, 597); Salak (*Kurz*, 495); Banca (*Horsfield*); Philippines, Luzon and Negros.

Var. *Blumeana* Hook. fil., simply differs in the hairiness of the midrib of the leaves on the back and the shoots. Malay Peninsula and Borneo, Sarawak (*Beccari*, 4, 3133, 426), Kuching, "Corolla green, parcel of hairs on either side of the stamens golden" (*Haviland*, 2980), Matang (*Ridley*), Santubong (*Haviland*, 1532).

The Javanese form has consistently narrower leaves, and in this the Philippine form resembles it. The peduncles of the cymes in the type are very short, but in the Borneo forms they are much longer, as are the pedicels.

U. arboreum var. *sessile* S. Moore from Palembang, Sumatra (*Forbes*) (in Journ. Bot. 1925, Supp. 49) is *U. umbellulatum* Miq.

Urophyllum rigidum Ridley, sp. nov. Species ab *U. leucophlæo* Ridl. cui affinis foliis minoribus crassioribus, calyce campanulato, petalis ovatis brevioribus differt.

Frutex glaber, ramis juvenibus angulatis. *Folia* coriacea rigida glabra oblonga acuminata obtusa, basi breviter cuneato, costa superne depressa subtus elevata, nervis superne depressis subtus elevatis, 8-paribus intra margine inarcuantibus, nervulis paucis inconspicuis, 9–10 cm. longa, 2·5–3 cm. lata, petiolis 1·5 cm. longis. *Stipulæ* lineari-lanceolatæ obscure puberulæ angustæ 1 cm. longæ. *Cymæ* puberulæ, pedunculis 5 mm. longis. *Flores* umbellati 3–4, pedicellis 5 mm. longis. *Bracteæ* lanceolatæ acuminatæ puberulæ 2 mm. longæ. *Calyx* campanulatus glaber 3 mm. longus margine integro. *Corolla* 3 mm. longa, tubo brevi lobis 4, ovatis coriaceis, 2 mm. longis. *Stamina* 4. *Discus* planus in medio elevatus, rugosus. *Bacca* subglobosa 5 mm. longa.

Hab. Malay Peninsula, Fraser Hill, upon the Selangor border, 4000–4370 feet alt. (*Burkill & Holttum*, 8668).

This is allied to *Urophyllum leucophlæum* Ridl., also a mountain plant, but the leaves are stiffer and more rigid, and the flowers smaller.

Urophyllum leucophlæum Ridl., nom. nov. This plant from Mount Ophir in Johore and Gunong Tahan in Pahang was originally named by me *U. coriaceum* (Journ. Roy. As. Soc. Str. Br. lxi, 18), but this specific name has been used by Miquel for a bad specimen of *Randia densiflora* Benth., and though long sunk the specific name cannot be repeated, so I have changed it to *U. leucophlæum*.

Urophyllum sumatranum Ridley, sp. nov. Species ab *Urophyllo leucophlæo* Ridl. cui affinis foliis majoribus nervis pluribus petiolis longioribus, cymis glabris, petalis obtusis oblongis differt.

Fruiex vel arbor, ramis crassiusculis nodis incrassatis glaber. *Folia* coriacea elliptica obtusa, basi breviter attenuato obtuso, nervis 10-paribus cum costa superne depressa subtus elevata, nervulis undulatis subtus elevatis, 15 cm. longa 6·5–7 cm. lata, petiolis 2 cm. longis. *Stipulæ* lanceolato-lineares e basi latiore, obtusæ coriaceæ 1 cm. longæ. *Flores* pauci glabri glomerulati, pedicellis 3 mm. longis. *Bracteæ* ovatæ rotundatæ breves marginibus hirtis. *Calyx* urceolatus margine integro 5 mm. longus. *Corolla* coriacea, tubo calyce breviore, intus parce piloso, lobis 4 oblongis 1 cm. longis obtusis. *Stamina* 4, antheris linearibus longis angustis appendiculatis. *Stylus* crassus 7 mm. longus superne crasse oblongo-clavatus. *Discus* planus orbicularis integer.

Hab. Sumatra, Mount Singalan (*Beccari*, 348).

Urophyllum Shelfordii Ridl., sp. nov. Species ab *U. nigricante* Wernh. cui affinis, foliis coriaceis nervis paucioribus, floribus multo majoribus, corollæ tubo brevissimo lobis ovatis obtusis differt.

Frutex glaber, ramis exsiccatis atris. *Folia* coriacea glabra oblonga vel lanceolata cuspidato-acuminata (cuspide 2 mm. longo acuto) basibus obtusis, nervis 9-paribus ascendentibus curvis subtus elevatis superne cum costa depressis, nervulis paucis undulatis ramosis, 15–17 cm. longa, 5–6 cm. lata, petiolis canaliculatis 9 mm. longis. *Stipulæ* lineares teretes 7 mm. longæ. *Cymæ* glabræ 5-floræ, in pedunculis brevissimis vix 2 mm. longis, pedicellis 5–6 mm. longis. *Bracteolæ* minutæ ovatæ acutæ. *Calyx* campanulatus brevis margine integro 3 mm. longus, 4 mm. latus. *Corolla* viridis, tubo breviore dense barbató, pilis crassiusculis, lobis 4 ovatis obtusis 5 mm. longis. *Stamina* 4, filamentis brevissimis, antheris lanceolatis acuminatis appendiculatis. *Stylus* cylindricus 2 mm. longus. *Discus* haud elevatus rugosus. *Bacca* immatura subglobosa.

Hab. Sarawak (*Beccari*, 1434, type; *Shelford*, 11627); Kuching, "Shrub, corolla green, throat with long white hairs" (*Haviland*, 2965).

Native name, Jangit Ng Sluai.

This somewhat resembles *U. nigricans* Wernh., but the leaves dry green or brown, not black, the flowers are very much larger, with a rather wide calyx and ovate blunt corolla-lobes, the hairs in the tube are large as in those of the *Grandifloræ* section and in the dry plant bright yellow.

(To be continued.)

BIBLIOGRAPHICAL NOTES.

XCVIII. Kissen : a Mythical Traveller in Arabia.

By J. E. Dandy and A. W. Exell.

A well-known example of an unintentional orthographic error among generic names is that of *Kissenia* R. Br. ex Endl. (Loasaceæ), which was originally spelt *Fissenia* by Endlicher (Gen. Pl., Suppl. ii. 76 (1842)), who was the first to publish the name. The matter has been dealt with from this point of view by Sprague (in Kew Bulletin, 1928, 355), but another error connected with the name exists, which is of a rather amusing nature and has hitherto been overlooked.

This generic name, which presumably was communicated to Endlicher by Robert Brown, either orally or in writing, was written "Kissenia" by the latter on a small ticket also bearing the locality "Keschin Bay Arabia" and now attached to the original specimen of *K. spathulata* in the British Museum Herbarium. On the back of the sheet is written "Arabia: Kissen."

The first author to suggest a derivation for the name was Wittstein (Etymol.-bot. Handwörterb. 366 (1852)), who, under the erroneous spelling *Fissenia*, gave its origin as "Nach Fissen," which must have been mere guess-work.

The first author both to correct the spelling from *Fissenia* to *Kissenia* and to offer an explanation of the derivation of the latter form was Thomas Anderson (in Journ. Proc. Linn. Soc., Suppl. v, Bot. 42 (1860)), who, speaking of the specimen of *K. spathulata* already mentioned, stated "... it does not, however, bear the name *Fissenia*, but *Kissenia*, in honour of its discoverer, M. Kissen, a traveller in Arabia." This very definite statement was sufficiently convincing to satisfy all subsequent authors, and started the legend of this traveller and collector whom we now show to be a myth.

Harvey was the first to continue the story when (in Harv. & Sond. Fl. Cap. ii. 503 (1862)) he observed under *Kissenia*: "A very remarkable plant, the only *Loasacea* yet known on the African continent. It was originally discovered in Arabia by a traveller named *Kissen*, to whose memory Dr. R. Brown inscribed the genus in MSS. in the British Museum. ... For the correct spelling now given I am indebted to my friend Dr. T. Anderson. ..." Harvey's statement was quoted by Urban (in Nova Acta Nat. Cur. lxxvi. 118 (1900)) in his monograph of the Loasaceæ, while Blatter in his 'Flora of Aden' (in Rec. Bot. Surv. Ind. vii. 205 (1915)) repeated Anderson's original explanation.

Dandy (in Kew Bulletin, 1926, 174), dealing with the genus *Kissenia*, remarked that Robert Brown "... based his genus upon an Arabian specimen, and named it in honour of the collector, Kissen, a traveller in Arabia," which statement was practically copied by Sprague (*l. c.*) in his note on the spelling of the name.

The similarity between the name "Kissen" on the back of the sheet of *K. spathulata* and the locality "Keschin Bay" on the ticket is, in itself, enough to arouse suspicion, although Anderson may be excused for considering the former to be the name of the collector, since collectors' names are so written on many of the old sheets in the British Museum Herbarium. Reference to Robert Brown's manuscripts, however, makes it quite clear that "Kissen" is a variant of the spelling of the locality where the specimen was collected. Under *Kissenia spathulata* (Loasaceæ) is included an anonymous document which explains the origin of the collection amongst which the original specimen was received. This reads as follows :—

> "Plants from Kissen in Arabia Felix. The Soil of the Country for many Miles round a white Sand without any appearance of Vegetation except in the Shade of Rocks, in which places these were gathered. They were mostly dwarf plants, and scarce. Brought to England by a person who was on board an East-Indiaman that went out with Commode. Johnson, at the time he was attacked in the Bay of St. Jago. The Indiaman having lost her passage to Bombay was obliged to Winter in Kissen Bay. There are a few Rice Fields at Kissen, at each of which a Man, with a Camel, was employed continually in Watering it."

Beneath this Sir Joseph Banks has written: "Kissen is on the S coast of Arabia within the Island." A note on other spellings of the locality (Keshin, Keschin, Kisem) has also been appended in Brown's handwriting, apparently taken from an accompanying letter which runs as follows :—

> "Swanscombe near Dartford 22 Aug. 1825. My dear Sir, Your informant was right as to Kessen's being on the Coast of Arabia Felix, but as that division of the Peninsula contained Hadramaut as well as Yemen, it is not entirely comprehended within Arrowsmith's Map of Africa—In his Map of Asia you will probably find Keshin (for so it seems the name should be spelt) in 15°. 20′ N & 50°. 45′ E. on a small bay, of which Niebuhr (Description of Arabia II. ii. Province of Hadramaut. p. 287. Germ. Ed.) has given a description & a plan (Tab. xvii) communicated to him by some English Captain. It is not mentioned by Idrisi, who is very meagre in his account of this Coast. .... Your much obliged & faithful G. C. Renouard
>
> "P.S. The Mountains at the back of Keshin are the native country of myrrh & frankincense, the part of Arabia the most deserving of examination & the least visited by Europeans, of any part of the Peninsula. Niebuhr thinks it is the Sachalites of the Ancients. This point is discussed, I suppose, by Dr. Vincent in the Periplus of Arrian."

This makes it clear that the generic name *Kissenia* is derived from Kissen, the name, not of a person, but of a locality (now usually spelt "Kishin") on the southern coast of Arabia.

NOTES ON *EUPHRASIA*.

By H. W. Pugsley, B.A., F.L.S.

Euphrasia stricta Host.

Host's name for this plant unfortunately becomes invalid owing to the new rule under which all homonyms are to be rejected. It is antedated by *E. stricta* Humboldt & Bonpland in Humb., Bonpl., & Kunth's Nov. Gen. et Spec. ii. 333 (1817), a South American plant since removed to the genus *Bartsia*.

The earliest specific synonyms cited by Wettstein and by Chabert for Host's plant are *E. rigidula* and *E. condensata*, both published in Jordan's Pugillus, pp. 134 & 135 (1852). The former of these plants does not appear from Jordan's description to be conspecific with *E. stricta* Host, but the latter seems to be essentially the same plant, and the name *E. condensata* Jordan should, therefore, be adopted. This was changed without explanation to "*E. ericetorum* Jord. in litt." in Reuter's Comptes-rendus de la Soc. Hallér. 120 (1854–56).

Euphrasia pulchella Kerner.

A gathering of an Eyebright indistinguishable from Kerner's type-specimens of *E. pulchella* (Fl. Exsicc. Austro-Hungarica, no. 152), and agreeing with his description, has lately been received in Herb. Mus. Brit. from the Thian Shan Mountains of Central Asia (F. Ludlow, Fl. Tian Shan, no. 752, Upper-Koksu, 8500′ alt., 9 Aug., 1930 !). The gathering consists of adequate and well-dried specimens.

There is no record in Wettstein's ' Monograph ' of this or any other member of the *minima* group occurring in Central Asia, and no other material from this region in Herb. Mus. Brit. or Herb. Kew.

Euphrasia asturica, sp. nov.

Among the plants collected by Messrs. Wilmott and Lacaita in Spain in 1927 is a species widely different from any hitherto distributed from that country by Sennen and other botanists, and seemingly distinct.

Planta habitu plus minusve autumnali. Caulis erectus, *gracilis*, 10–20 cm. altus, fuscescens, pilis deflexis crispulis albidis vestitus, *internodis omnibus* (nisi infimis) *longiusculis folia sæpius superantibus* ; e foliorum pare 8° –11° florens ; *ramis adscendentibus flexuosis* ramosus, interdum iterum ramosus. *Folia satis parva* (ad 10 mm. longa), numerosa, tenuia, inferne valde nervata, ut in *E. Rostkovianâ* læte viridia, erecto-patentia; caulina inferiora oblongo-cuneata, utrinque 1–2 dentibus obtusis obtusa ; superiora rhomboideo-ovata vel oblonga, basin versus breviter cuneata, 2–4 dentibus subacutis obtusa vel subacuta ; floralia ovata, inferne brevissime cuneata, 3–4 (raro 5) dentibus argutis acutis ad

breviter aristatis acuta vel cuspidata ; *omnia subglabra,* in margine et paginæ inferioris nervis *minute et parce glandulosa et setosa.* Calyx glabriusculus vel parce glanduloso-setosus, dentibus longis subulatis præditus, fructifer haud accretus. *Corolla majuscula,* dorso 8–9 mm. longa, tubo verisimiliter post anthesin parum elongato, *alba* vel pallide lilacino-tincta, striis violaceis picta et in labio inferiore luteo-maculata ; labio superiore lobis emarginatis reflexis prædito ; *labio inferiore multo longiore porrecto,* lobis valde emarginatis trilobato. *Capsula parva,* circa 5 mm. longa, *oblonga, subtruncata,* ciliata, vulgo quam calycis dentes multo brevior.

Hab. Gorge of R. Cares above Cadrales, Oviedo. Wilmott & Lacaita, Iter. Hisp. 1927, July 11. Type in Herb. Mus. Brit.

The species recalls *E. Rostkoviana* Hayne in its flexuous habit and bright green foliage, but it is readily distinguished by its more slender growth, nearly glabrous leaves (without long glandular hairs), smaller corollas with less exserted tube, and narrower oblong capsules. *E. Kerneri* Wettst. differs by its totally eglandular leaves, larger corolla with elongate tube, and broader emarginate fruits. On account of its slender flexuous habit and sparingly toothed foliage the new plant also bears some resemblance to *E. confusa* Pugsl. of the Series *Nemorosæ*, but its flowers are larger and its capsules quite different. On the whole, it appears to be best placed in the Series *Nemorosæ.*

Professor Hans Schinz has recently sent me the material in Herb. Zurich named *E. alpina* Lamk., collected in various localities in Canton Ticino, and including a very handsome late-flowering form which occurs particularly on the hills about Lake Lugano.

As defined by Wettstein (Mon. p. 210) *E. alpina* is a polymorphic plant, ranging from 4–22 cm. in height, and usually branched, with very large flowers varying in colour from blue or purple to white, and best distinguished by the long-aristate teeth of its floral leaves. It is a mountain plant, and stations are given for the Pyrenees, S.E. France, Switzerland, and Italy, with one in the Tyrol. The specimens in Herb. Mus. Brit. under this name show much diversity of form, but the Swiss Alpine examples may be seen to be dwarfer and less branched, with paler flowers, than those from the Pyrenees and elsewhere. Gremli, in his Swiss Flora, describes the stem of *E. alpina* as generally only 3–5 cm. long, but frequently branchy, with the flowers more or less violet ; and the specimens that I have collected in several alpine localities are all dwarf plants, not exceeding 10 cm., simple or but slightly branched, of æstival-like habit, and flowering from about the fifth pair of leaves.

E. alpina was originally described by Lamarck (Encycl. Méthod. ii. 400 (1790)) with this diagnosis :—E. caule humillimo, foliis ovatis argute dentatis supremis majoribus sublaciniatis, labii inferioris lobis emarginatis." Lamarck further says that it is the smallest plant of the genus [smaller than *E. minima* Jacq., which

he also distinguishes] with flowers much larger than in the common Eyebright. He gives its height as one to one and a half inches, and states that the stem is simple or with one or two short branches; and that the large flowers are of a bluish-purple colour. His description is founded on dried specimens collected by Liottard in the mountains of Dauphiny.

It is clear from this account that the original *E. alpina* is a dwarf plant as understood by Gremli, and such as grows in numerous localities in the Southern Alps. Lamarck's type had purple flowers, but their colour is evidently subject to some variation. I have not seen a type-specimen, but I have collected the very dwarf form that grows by the Mer de Glace, at Chamonix, in Savoy, where it is as tiny as Lamarck's type.

Wettstein, who (*l. c.* p. 213) states that he has not seen *E. alpina* in life, extends his definition of the species to include forms of more or less late-summer habit, and has sometimes applied the name to exsiccata widely different from Lamarck's plant. The figure which he cites from Reichenbach, however (Icon. Fl. Germ. &c. xx. tab. MDCCXXXIII. fig. 2, as *E. montana*), represents the typical form. So far as has been seen, none of the Pyrenean plants is typical, and some of them have lately been sent out by Sennen as new species under names of doubtful validity.

The late-flowering plant received from Prof. Schinz was noticed by Chevenard, who mentions it in Cat. Pl. Vasc. Tessin, 428 (1910), as *E. salisburgensis* v. *Senneni*; and H. Christ proposed (*in litt.*) to distinguish it as *E. alpina* v. *castanetorum* (Schinz & Thellung, Ber. Schweiz. Bot. Gesell. xxvi./xxix. 246–7 (1920)). There is also a specimen in Herb. Mus. Brit., "Fiori & Béguinot, Fl. Ital. Exsicc. no. 2735, Pedemontanum, Prov. Torino, S. Germano Chisone, in castanearum silvis, 1910," which was sent out as *E. stricta* Host; and a much earlier one at Kew, collected at Fobello, in the Val Mastelone, by John Ball in Sept. 1863, and labelled "*E. officinalis*, v. *salisburgensis*, f. *grandiflora*." The plant has thus been referred to *E. stricta*, *E. alpina*, and *E. salisburgensis*, from each of which it essentially differs. It is clearly of late-summer habit, with the foliage of the Subsection *Angustifoliæ*, and while its flowers are very showy, its capsules, although not glabrous, resemble those of *E. salisburgensis* as well as those of *E. stricta*. Dried specimens sometimes recall the large-flowered Pyrenean form of *E. alpina*. It grows, chiefly about the chestnut woods of the lower hills, over a wide area south of the Alps, flowering very late in the year, and appears from its ensemble of special features to deserve specific rank as a member of the *Angustifoliæ*. It is named in honour of Professor Schinz:—

Euphrasia Schinzii, sp. nov. *E. salisburgensis* v. *Senneni* Chevenard, Cat. Pl. Vasc. Tessin, 428 (1910), non *E. salisburgensis Senneni* Chabert; *E. alpina* v. *castanetorum* Christ (nomen): *E. officinalis* v. *salisburgensis* f. *grandiflora* Ball (nomen).

Exsicc. Schinz, Tesserete, 14 Sept. 1916, as *E. salisburgensis* (type in Hb. Zurich and Hb. Pugsley)! Werndli, Carona, 1915, in Hb. Zurich, as *E. alpina*! Christ, Lopagno, 1916, in Hb. Zurich, as *E. alpina*! Schinz, Bioggio, 1917, in Hb. Zurich, as *E. alpina* v. *castanetorum*!

Planta habitu autumnali. Caulis erectus, sæpius *gracilescens*, 8–22 (vulgo 10–15) cm. altus, rubescens vel fuscescens, pilis parvis deflexis crispulis albidis vestitus, *internodis omnibus brevibus* (sæpissime quam foliis brevioribus); e foliorum pare 10°–20° florens; *ramis adscendentibus* sæpius *numerosis* ramosus, nonnunquam iterum ramosus. *Folia angusta*, longitudine latitudinem 2–5-plo superante, *haud magna* (usque ad 10 mm. longa), *numerosa*, verisimiliter viridia plus minusve rubro-tincta, suberecta, infima facile caduca; caulina inferiora lineari-oblonga, utrinque 1–2 dentibus obtusis obtusa, superiora lineari-lanceolata ad ovato-lanceolata, basi cuneata, 2–3 (raro 4) dentibus angustis patulis undulatis aristatis acuta ad aristata; floralia lanceolata vel rhomboidea, basi cuneata, 3–4 (rarissime 5) dentibus angustis patulis undulatis longissime aristatis acuta vel aristata; omnia *glabra* vel rarissime in margine parce et minute setosa. Calyx glaber, dentibus longis subulatis præditus, fructifer vix accretus. *Corolla maxima*, dorso anthesis initio circa 10 mm. tandem ad 15 mm. longa, tubo calycis dentes plane superante, *pallide purpurea* obscure striata, ut videtur sine maculâ luteâ; labio superiore elongato lobis emarginatis reflexis prædito; labio inferiore paulo longiore porrecto, lobis latis valde emarginatis trilobato. *Capsula parva*, 5–5·5 mm. longa, *anguste oblonga*, subtruncata, *setis breviusculis mollibus ciliata* et superne subpilosa, quam calycis dentes brevior. Semina minima, vix 1 mm. longa (an semper ?).

Hab. Frequent in the Canton Ticino–Veglio (*Schinz*)! Ponte Cremenaga (*Schinz*)! Carona, San Salvatore (*Werndli*)! Tesserete (*Schinz*)! Lopagno (*Christ*)! Ponte Brolla (*Chevenard*)! Bioggio (*Schinz*)! Cima di Medaglia (*Arnold*)! Val Sertena (*Jaggli*)! Camoghé (*Jaggli*)! Isone (*Jäggli*)! Alp Rivolta (*Jäggli*)! Also in Piedmont–S. Germano Chisone (*Fiori & Béguinot*)! Fobello, Val Mastelone (*J. Ball*)! Flowers August to October.

From the form of its foliage *E. Schinzii* is best regarded as a member of the Subsection *Angustifoliæ*. Of the other species of this group, *E. salisburgensis* Funck is readily distinguishable by its small flowers and subglabrous (not ciliate) fruits; *E. salisburgensis Senneni* Chabert by its broader, more shortly toothed leaves, and the yellow spot on the lower lip of its corolla; *E. Portæ* Wettst. is sufficiently distinct by the much shorter teeth of its leaves and its smaller flowers; *E. illyrica* Wettst. and *E. dinarica* Beck are widely different owing to their small flowers; *E. stiriaca* Wettst. is separable by its narrower, more shortly

toothed foliage, and its smaller whitish flowers ; *E. italica* Wettst. is characterised by narrower, less toothed leaves and whitish flowers ; *E. tricuspidata* L. and *E. cuspidata* Host cannot be confused with *E. Schinzii* owing to their narrow linear leaves.

Of the Subsection *Ciliatæ*, *E. alpina* Lamk. alone resembles the new species, but it may be separated by its lower æstival habit, broader, more shortly toothed foliage, smaller flowers, and broader capsules. *E. condensata* Jord. (*E. stricta* Host) is a taller plant, with relatively broad, ovate, shortly awned leaves and very much smaller flowers.

SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES.

THE thirty-seventh Annual Congress of the South-Eastern Union of Scientific Societies was held in London from June 1–4, under the Presidency of Dr. R. E. Mortimer Wheeler, of the London Museum.

The Botanical section met in the Linnean Society's rooms, kindly lent for the occasion, on Thursday, June 2. The Annual Report, read by the honorary Secretary, Mr. F. O. Whitaker, showed satisfactory progress in the increase of members, and also in the work on the Flora of Sussex carried on under the guidance of Lt.-Col. A. H. Wolley-Dod.

The President, Mr. J. Ramsbottom, O.B.E., delivered his address on "Fungi as Scavengers" to an appreciative audience. Beginning with an account of dry-rot and other "diseases" of worked timber he passed to an account of the sanitation of forests, the destruction of tree stumps and fallen logs, the decay of leaves, and the changes taking place in the soil ; and then considered other types of vegetation. A picture was drawn of what would be the result if fungi suddenly became inactive. It is not too much to say that man could not continue to exist—the very properties of fungi which cause such damage to timber used by man for his various purposes are man's salvation. Continuing, the effect of fungi on civilisation was contrasted with their place in nature, and it was pointed out how many of their activities were now being harnessed for man's use.

On Thursday afternoon the members visited the Department of Botany of the Natural History Museum under the guidance of Mr. Ramsbottom and his staff. The examination of the old herbals and specimens formed an instructive sequel to the interesting lecture on "London Plants" given by Mr. A. J. Wilmott earlier in the day. At the end of the visit the members were entertained to tea.

On Friday afternoon Mr. F. O. Whitaker led an excursion to Lessness Woods, and described the geological formations to show the relations between plant-life and soil. These formations included the shell-beds in the Blackheath series, from which

many fossil species new to science have been obtained, as detailed in St. John Marriott's book, and in the "Vertebrate Faunas of the English Eocene," by E. J. White of the British Museum. A very distinctive flora of calciphilous species is found growing above the shell-beds, which led to their discovery. The Spindle, Buckthorn, Dogwood, Ash, and Privet are characteristic plants.

On Saturday Prof. E. J. Salisbury conducted a botanical ramble to Burnham Beeches, and gave an interesting description of the ecology of the district. Special plants noticed during the ramble were *Viola palustris*, *Scutellaria minor*, *Stellaria uliginosa*, *Myosotis palustris*, and various grasses and sedges. Among the Bryophytes the very small hepatic, *Microlejeunea ulicina*, with its minute thread-like stems creeping over the bark of trees, was noted. Among the lichens seen were ground species of *Cladonia*, and the tree lichen *Parmelia physodes*, all in good condition after the rainy season. Micro-fungi collected during the rambles are now being determined.

Prof. F. E. Fritsch, F.R.S., was elected President of the Section for the Congress in 1933, which will, it is hoped, be held at Norwich. At the General Meeting of the Congress Prof. E. J. Salisbury was elected President in succession to Dr. Mortimer Wheeler.—W. R. SHERRIN.

SOUTH-WESTERN NATURALISTS' UNION.

THE Tenth Annual Conference of the South-Western Naturalists' Union was held at Plymouth from May 20–23, by kind invitation of the Plymouth Institution and Plymouth and District Field Club, under the Presidency of Dr. A. B. Rendle, F.R.S. The attendance of members and associates of affiliated Societies was larger than in previous years, and encouraged the Council to recommend at the business meeting some suggestions to strengthen the present position of the Union, as it was felt that after ten years' existence it had hardly achieved the purpose of its founders. The scheme was adopted that the activities of the Union should be concentrated on the Annual Conference, and that, instead of publishing "Proceedings," a short Report drawn up by the Secretary should be circulated amongst all members of affiliated Societies, and thereby ensure greater co-operation and support. Mr. C. W. Bracken, B.A., of Plymouth, was elected President of the 1933 Conference to be held at Exeter.

The visitors were welcomed at the "Athenæum" by the Presidents of the two Plymouth Societies at an evening Reception on Friday, May 30, and enjoyed a fine display of exhibits arranged by the Field Club members. Living specimens of the uncommon *Allium triquetrum*, *Geranium phæum*, *Aconitum Napellus*, and *Aquilegia vulgaris* were amongst a collection of local wild flowers,

as well as plants forming " scum " on water. Cultures of bacteria for inoculating Lucerne and the Soya bean were demonstrated, and the Marine Biological Laboratory furnished an excellent exhibit of local marine life.

In his address as the retiring President, delivered on Saturday morning, May 21, Dr. Rendle dealt with the adaptation of certain plants to the conditions in which they lived. The life-history of the Sundews (*Drosera*) was described in some detail as illustrating adaptation to a habitat wanting in nitrogenous food-material, and culminating in the remarkable development of a group of species confined to Australia, in which the plant has a slender elongated stem, which scrambles over surrounding vegetation by means of attaching organs developed from specialised leaf-tentacles. The formation of leaf-pitchers—one of the commonest malformations found in plants—was then considered. The very different degrees of departure from the normal form were described. These follow certain laws, and may be of interest in the study of plant-morphology, but are apparently " purposeless." This led on to the discussion of various types of " useful " pitchers adapted for the special function of obtaining nitrogenous food-material from the bodies of insects. The common teasel was instanced as a warning that the presence of water-holding cups, in which putrefying bodies of insects may be found does not necessarily imply an insectivorous habit. Finally, the present-day occurrence of the various genera on the Earth's surface was referred to as affording an interesting problem in geographical distribution. The address was illustrated by a series of lantern-slides.

An afternoon excursion to the limestone quarries at Hove and Pomphlett was of special interest to the geologists, but the botanists were well catered for on the second excursion, conducted by Mr. R. Hansford Worth, F.G.S., by motor coach to the Valley of the river Yealm in Cornwood, beyond which they walked for some miles through the woods at Hawns and Dendles, and over the open moorland back to Cornwood. The trees were looking their best in their pale green foliage, and spring flowers were still abundant. Amongst the finds of the day was the rare lichen *Stenocybe bryophila* Watson, a new county record, found at Plymouth growing on *Plagiochila punctata*.

An instructive and interesting morning was spent at the Laboratory of the Marine Biological Association at the invitation of the Director, Dr. E. J. Allen, F.R.S., who with his Staff demonstrated the various activities of the Institution.—IDA M. ROPER.

The thanks of the members for a well-arranged and successful meeting are due to the Honorary Secretary, Miss I. M. Roper, who was re-elected for the next session, and to the local Secretaries, Miss C. P. Church and Mr. R. M. White, M.A.—A. B. RENDLE.

SHORT NOTES.

CARDAMINE PRATENSIS Linn. WITH ABNORMAL FLOWERS.—In 1928 I found one plant on Bookham Common, Surrey, with a flowering spike having double flowers in two or three tiers. The flower-stalk came up through the flower centre and continued upwards to bear another flower, and in some cases this was repeated a second time, so that there were three attempts at flowers on one stalk at intervals of three-eighths or half an inch. Several of the flowers were well-developed double ones, but others never got much beyond the bud stage, while some dropped their sepals and petals as soon as the flowers opened.

I searched the ground all round for another similar plant, but in vain. I have also looked there at various times since, but all the plants seen have been normal.

The plant was transplanted to my garden, but the change from heavy damp clay to dry chalky loam did not suit it, and it did not flourish. In 1929 it did not flower. In 1930 and 1931 it bore normal single flowers in the customary manner. These flowers in 1930 set fertile seed, and this year there are nine seedlings close to the parent. The parent has borne normal flowers on a small head. Three of the seedlings have up to the present (15 May) flowered, and two of them have the same kind of abnormal flowers as their parent had four years ago. There are so far only two, not three, tiers of flowers, and the plants are smaller than was the one on Bookham Common when I first found it. The flowers are well-developed double ones in some instances, one flower examined being five-eighths of an inch in diameter.

In 1928 the plant was examined microscopically for Mites and Eel-worms to see if the abnormality was caused by interference, but no such things were found.

The interesting point seems to be that, while the parent is no longer producing the abnormal flowers, the power has been transmitted to the offspring through the seeds. The smaller six seedlings have not as yet sent up any flowering spikes.—HAROLD J. BURKILL.

[*Cardamine pratensis* is very prone to malformations, references to which will be found in Penzig 'Pflanzenteratologie,' ii. 93, where doubling of the flower, often accompanied by proliferation, as described by Mr. Burkill, is referred to as the most frequent of the floral anomalies. It was figured by Clusius and Caspar Bauhin, and has been repeatedly noted since.—ED., *Journ. Bot.*]

CREPIS OPORINOIDES Boissier IN BRITAIN.—In October 1931 a large *Crepis* which differed in several striking respects from *C. biennis* was found at Freshwater, Isle of Wight. In 1929

Dr. G. C. Druce sent me a specimen labelled (in his own hand) "*Crepis nicæensis* Balb., N. Yorks, June 1929, ex R. J. Flintoff." Druce was evidently dissatisfied with this name and desired my opinion. The specimen was very imperfect, but a few ripe fruits were present, and from one of these a good plant was raised, which flowered in 1931 and agreed in essentials with the Freshwater plant. I have identified these plants as *C. oporinoides* Boiss., and a full account will appear in a paper on the genus *Crepis* in Britain, shortly to be published in this Journal.—E. DRABBLE.

REVIEWS.

Comital Flora of the British Isles. By GEORGE CLARIDGE DRUCE, F.R.S. Roy. 8vo, pp. xxxii, 407, with Map. Buncle & Co.: Arbroath, 1932. Price 20*s*.

THIS volume is designed to bring together the records of Watson's 'Topographical Botany' and its two Supplements, with those of Dr. Lloyd Praeger's Irish topographical works and the plants of the Channel Islands. The two editions of 'Topographical Botany' dealt solely with county records, and quoted authorities for every item, giving particulars of the sources from which they were taken in order to facilitate investigation of their correctness. The present work cites no authorities, and each record rests on the author's *ipse dixit*. Dr. Druce states that his endeavour is to deal with species of "ordinary British type-value," and he omits the critical genera *Rubus* and *Hieracium*, both of which were included in Watson's work, and also *Euphrasia*. But at the same time he includes as species the numerous segregates of *Viola tricolor*, *Alchemilla vulgaris*, *Rhinanthus Crista-Galli*, and *Thymus Serpyllum*. The omission of *Rubus* and *Hieracium* can scarcely be justified, for they have been intensively studied by generations of Continental and British botanists. Druce remarks that "it would be far better for a monographer who describes a critical genus, himself to put their distribution into his list." This is precisely what Moyle Rogers has done in his 'Handbook of British Rubi,' and the same may be said of the recent revision of British Euphrasias, so that in both cases full information was at hand ready for incorporation. In *Hieracium* the vice-county totals for each species were given in the recent edition of Druce's 'Plant List,' and the component details were presumably in his possession and could have been utilised.

The new work furnishes additional information which was not attempted by Watson, such as nature of habitats, altitudes, etc. These notes are of interest. The general distribution

of each species, which it is often difficult to ascertain, is also shown, but the information given is at times evidently unreliable, and occasionally grossly inaccurate. The range of *Fumaria Borœi* and of *F. Bastardii*, which could easily have been taken from '*Fumaria* in Britain,' is incorrect, and *F. micrantha* is awarded an extraordinary distribution, certainly culled from no botanical work. *Symphytum tuberosum*, recently shown to be restricted to France and Spain, is credited to "Europe," and there are other similar instances. Another feature of the book is the insertion of first records, usually taken from W. A. Clarke's 'First Records of British Flowering Plants.' Many of these are doubtful, and some are erroneous, *e. g.*, Gerard's *Fumaria tenuifolia*, which is identified with *F. parviflora* instead of *F. micrantha*. In the case of recent additions to the flora the first records are variously shown; sometimes they are entirely omitted.

The majority of the vice-county records throughout the book are no doubt correct, but many avoidable mistakes may be noticed. *Thalictrum marinum* (*T. dunense*) is recorded (p. 2), for v.c.'s 1 and 3, but a reference to the authority for the record shows that the plant intended had already been reported as *T. minus* for the same vice-counties; and thus the record is duplicated. *Viola rupestris* is given for 24 vice-counties, which seems incredible, and the solitary station for var. *arenaria* is shown as "N. Eng. 3. Durham. York. Teesdale"! *Fumaria muralis* is noted on p. xxii as withdrawn from the Irish Flora, but on p. 16 it is credited with 14 Irish vice-counties. Eighteen vice-counties are given for *Lathyrus tuberosus*, with no intimation of its ever being a casual; and the number for *Urtica pilulifera* is 25, excluding extinctions. The great majority of aliens are wisely excluded, but the selection of *Lychnis Preslii* in preference to *Anemone apennina*, *Dianthus Caryophyllus*, *D. plumarius*, and *Medicago sativa* is somewhat surprising.

The nomenclature, as might be expected, does not follow the International Rules. Among genera, *Centaurium* appears for *Erythræa*, *Savastana* for *Hierochloe*, and so on. Tautonyms like *Meum Meum* are numerous, and trivials ending in -oides are spelt with a capital. There are several instances of unusual taxonomy. Few botanists will agree with the arrangement shown under *Statice* and *Limonium*, or the rise of *Plantago Sabrinæ* to the rank of a full species. A mysterious new plant, *Pyrus hungarica*, is mentioned in the Introduction (p. xxvii), but seems to have been omitted from the body of the work. *Ulmus campestris* auct. is re-named *U. anglica* Druce.

A number of errors throughout the text are probably accidental. *Polycarpon* (p. 61) is not a perennial; nor is *Centaurea Calcitrapa* (p. 175), *Atriplex littoralis* (p. 250), or *Juncus bufonius* (p. 303); and *Gentiana verna* is not an annual (p. 202). It is

strange to read that *Parnassia* is "rare off limestone" (p. 118), that *Lathræa* grows on Elder (p. 227), and that the Bee Orchis prefers clayey soils (p. 286).

The general plan of the Comital Flora is a good one, but not easy of fulfilment, and it may be questioned whether a simple continuation of Watson's original work, accurately and completely brought up to date, would not have been preferable. The book, as published, bears the marks of hasty compilation. The printing and get-up of the volume are excellent, and typographical errors very few.—H. W. PUGSLEY.

Floræ Siamensis Enumeratio: a List of the Plants known from Siam, with Records of their Occurrence. By W. G. CRAIB, M.A., F.L.S., F.R.S.E. Vol. II. pt. 1. *Caprifoliaceæ and Rubiaceæ* (in part). 8vo, pp. 1–145, with title-page. The Siam Society, Bangkok; Luzac & Co., London. 1932. Price 12*s.* 10*d.*

WE note with pleasure the acceleration in the issue of the parts of Professor Craib's 'Flora of Siam,' the last part of which was noticed in this Journal in June 1931 (p. 175). The present part is occupied almost entirely with the treatment of the Rubiaceæ, Caprifoliaceæ being represented by one species of *Sambucus*, ten of *Viburnum*, including four endemic species, and six of *Lonicera*, two endemic. As in previous parts descriptions of a large proportion of the numerous novelties have already appeared in the 'Kew Bulletin,' to which references are given, but a number of new species are also described, especially in the genera *Ophiorrhiza*, more than half of the species of which are new, *Urophyllum*, *Tarenna*, *Randia*, and *Canthium*. In *Ophiorrhiza* the existence of dimorphism complicates the discrimination of species from dried material, and Professor Craib remarks that the validity of the presumed new species can be tested only by information gathered from growing specimens. Many of the new species are credited to [Miss] Geddes.

Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz. Bd. x. Abt. 3. *Dinoflagellata* by J. SCHILLER. Lief. 1. Pp. 1–256, 251 text-figs. Akadem. Verlagsges., Leipzig, 1931. Price 26.80 M.

THE established reputation of the author as an expert on the Dinoflagellata ensures that the volume dealing with this class, the first part of which is under review, will afford a valuable oversight of the present position of our knowledge of these forms. The part under discussion deals only with that group of Dinoflagellata which were separated by Pascher in 1914 as Desmokontæ from the main group, the Dinophyceæ. The treatment is entirely systematic, a general consideration of the class being apparently deferred to a later issue.

The Desmokontæ are, on the whole, less specialised than the Dinophyceæ, although in their more advanced members they exhibit fundamental features of the Peridinean organisation. They are classified by Schiller into four Series: the primitive Desmomonadales, the palmelloid Desmocapsales, the Thecatales without cilial furrows, and the Dinophysiales, in which such are differentiated, a classification closely following that adopted by Lindemann in his revision of the group in the new edition of Engler and Prantl's 'Natürliche Pflanzenfamilien.' Except for the Desmomonadales, which are naked or provided with a simple membrane, all Desmokontæ possess an envelope composed of two halves which are joined along the antero-posterior axis. The apically attached cilia of the Desmomonadales show a marked tendency to shift to a ventral position in the Prorocentraceæ, the only family of the Thecatales, whilst among the numerous Dinophysiales this is the rule, and the envelope shows definite longitudinal and transverse furrows within which the cilia lie. The description of the manifold Dinophysiales occupies the greater part of the present issue, the treatment being based on the monograph of Kofoid and Skogsberg, published in 1928.

The type and the numerous illustrations are of the excellent character with which other volumes of the 'Kryptogamenflora' have made us familiar.—F. E. FRITSCH.

Wild Flower Preservation: a Collector's Guide. By MAY COLEY. With 29 Illustrations by HILDA M. COLEY. Second Edition revised. 8vo, pp. 192. Philip Alan: London, 1932. Price 3*s.* 6*d.*

THE purpose of this little book, the first edition of which appeared in 1913, is to help the amateur botanist in the study and preservation for future use of the wild plants of our countryside. Full directions are given for collecting, pressing, and mounting in as natural a manner as possible. The simple equipment necessary for the study of the living plant is indicated, and a method of study described, and also the way to use a Flora for purpose of identification. The importance of keeping a nature note-book is emphasised, though we do not commend the author's suggestion of using it as a diary with details of picnics or similar social engagements. Though the style is popular and somewhat discursive, the instructions are very clear, and the book should prove a useful guide to the nature lover who wishes to be able to recognise our wild flowers and to keep a record

of his finds. Miss Hilda Coley's drawings, which have been reproduced photographically, are a helpful companion to the text; sixteen of the plates serve as illustrations to the glossary of descriptive terms. Owing to her sister's death the artist has also been responsible for the revision of the text.

BOOK-NOTES, NEWS, ETC.

'COUNTRY-SIDE.'—The frontispiece of the Summer number of the Official Organ of the B. E. N. A. is a good portrait of the new President of the Association, Sir J. Arthur Thomson, LL.D. J. F. Rayner contributes notes on some of our increasing wild flowers, *Epilobium angustifolium*, for which clearings through felling or fires have given additional sites, *Lobelia urens* and *Illecebrum verticillatum* recorded for more easterly stations in the Southern Counties, the vigorous *Spartina Townsendii*, *Crepis taraxacifolia* and others. Ray Palmer gives a list of flowers visited by the seven common species of Humble Bee, and J. E. Little some notes on a few small Spring flowers—*Draba verna*, *Sisymbrium Thalianum*, and *Lamium hybridum*.

'THE ORCHID REVIEW' for June and July contains the first instalments of an account of Sir Hugh Low's (1824–1905) experiences in Sarawak, by R. E. Arnold. The writer's main objective is Orchids, but his introduction, compiled largely from Sir Hugh's personal diary written in 1845 on his way out to Sarawak, with an account of some weeks' botanising in Singapore, is of general interest. Some new pitcher-plants (*Nepenthes*) were discovered at Singapore. Low sent home many botanical treasures during his period of Colonial Service in the East. Among his exploits was the ascent of Mt. Kina Balu in 1851.

'HONG KONG NATURALIST.'—Volume iii. no. 1 (March 1932) contains the first of a series of articles on the Flowering Shrubs and Trees of Hong Kong, by the Editor, Dr. G. A. C. Herklots. Descriptions are given of seven species, illustrated by line-drawings and photographic reproductions, and also of the relevant genus and family.

BOTANICAL SOCIETY OF JAPAN.—The fiftieth anniversary of this Society has recently been celebrated at a special General Meeting. The editor of the *Journal of Botany* begs to express his thanks for his election on this occasion as an honorary member of the Society.

SIR WILLIAM WRIGHT SMITH.—Our hearty congratulations are tendered to Prof. William Wright Smith, Regius Keeper, Royal Botanic Garden, Edinburgh, and King's Botanist in Scotland, on his knighthood.

MARINE ALGÆ OF KOREA AND CHINA, WITH NOTES ON THE DISTRIBUTION OF CHINESE MARINE ALGÆ.

BY VIOLET M. GRUBB, D.Sc.

Two collections of marine algæ are listed below: (I.) from Korea, and (II.) from Pei-tai-ho, N. China. The first collection was made by Miss Galbraith, B.A., in August 1926 and sent to the writer, while the second was made personally in China at the same time.

(I.) The algæ from Korea (Chosen) were collected at Sea Kongo (Kongo San), lat. 38° 40′ N., long. 128° 22′ E., situated in Chosen Bay on the east coast of the peninsular of Korea. Sea Kongo is the name given to a large group of rocks on the shore and extending out into the sea, forming a bay. The rocks are granitic.

PHÆOPHYCEÆ.

Sargassum tortile Ag. Dec. no. 2. Sp. 15; Yendo, Fucaceæ of Japan, 85, pl. xiii. figs. 1–8.
Distr. Japan, Korea, China.

RHODOPHYCEÆ.

Gelidium Amansii Lam. in Kuetz. Tab. Phyc. xviii. t. 44; Okamura, Icon. Jap. Alg. iii. 25, tab. 106 (1913).
In rock-pools.—*Distr.* China, Japan, Korea.

Chondrus crispus (L.) Lyngb. Hydrophyt. Dan. 15, t. 5, A–B.
In pools.—*Distr.* Atlantic, Japan.

Laurencia obtusa (Huds.) Lam. Essai, 130; Yamada, Notes on Jap. Laurencias, Univ. Cal. Pub. xvi. 222, pls. 16, 17 (1931).
In rock-pools. An autumn form; pinnæ short and compressed.—*Distr.* China, Japan, Atlantic, Mediterranean.

Grateloupia filicina (Wulf.) Ag. Sp. i. 223.
In rock-pools.—*Distr.* Cosmopolitan.
Var. *conferta* Kuetz. Sp. Alg. 730; Tab. Phy. xviii. 23 *a*.
Collected for food.—*Distr.* Java.

Our knowledge of the marine algæ of Korea leaves much to be desired, but various short lists of species have been published from time to time, including one by Cotton (3). These have been summed up in a paper by Okamura (9), where he gives a chart of the distribution of the 102 known species on the Korean coast. Only one can here be added to that list, *Chondrus crispus* (L.) Lyngb., while the variety of *Grateloupia filicina* (Wulf.) Ag. has not previously been recorded.

(II.) The algæ from Pei-tai-ho, N. China (lat. 39° 45′ N., long. 119° 28′ E.) were collected along the shore either attached or as drift material. There were no facilities for dredging. The coast is alluvial, with a few jutting out reefs of rocks. The strata in this district appear to be of quaternary or tertiary origin, and the rocks are a hard coarsely-grained granite. They do not offer any very satisfactory foothold for algæ, and the flora, even in rock-pools, is confined almost wholly to species of *Corallina*, *Hypnea*, and *Gelidium*. The tidal range in the Gulf of Pei-chi-li, where this beach is situated, is never greater than 6½ feet, and even at lowest tide few new species are exposed. The beach is generally lined with drift material, and after a heavy storm this is very rich.

List of Marine Algæ from Pei-tai-ho, N. China.

Localities where these species have been previously recorded noted thus :—P.=Pei-tai-ho ; C.=Cheefoo ; W.=Wei-hai-wei ; H.=Hongkong.

Chlorophyceæ.

Bryopsis plumosa (Huds.) Ag. Sp. 448.

In rock-pools. Howe (P., C.), Debeaux (Yen-tai).—*Distr.* Cosmopolitan.

Enteromorpha compressa (L.) Grev. Alg. Brit. 180.

Howe (P.), Cotton (W.), Debeaux (Yen-tai).—*Distr.* Cosmopolitan.

Ulva lactuca L. Sp. Pl. 1163.

Howe (P.), Reinbold (Tsing-tau), Gepp (Swatow).—*Distr.* Cosmopolitan.

Codium fragile (Suring) Hariot, Algues du Cap Horn, 32 (1889) ; Schmidt, Beitr. zur Kenntnis der Gattung *Codium*, Stackh. 47, figs. 29–32 (1913).

Drift material. Reinbold (under *C. mucronatum* J. Ag., Tsingtau).—*Distr.* Cosmopolitan.

Phæophyceæ.

Dictyota dichotoma (Huds.) Lam. in Desv. Journ. de Bot. ii. 42 (1809).

Gepp (W.).—*Distr.* Cosmopolitan.

Dilophus Wilsoni Ag. Anal. Algol. Cont. i. 90.

Portion of a frond.—*Distr.* Port Phillip, Victoria.

Agarum Turneri Post. & Rup. Illustr. 12, tab. xxii ; Harvey, Ner. Bor. Amer. i. 95, tab. v.

In this specimen the midrib of the frond is strongly curved, arching over until it comes in contact with the substratum. At the tip it has put out rhizoidal attachments, forming a fresh hapteron. The lamina is not developed on the inner side of the arched midrib. Thrown up on the shore after a storm.—*Distr.* Indian Oc., Japan, Korea, Kamchatka, Nova Scotia.

Sargassum Thunbergii Kuntze, Engl. Bot. Jahrb. i. 215 (1880) ; Yendo, Fucaceæ of Japan, 114, pl. xv. fig. 5.

An autumn form. The "leaves" have all been worn off the elongated lateral branches, and these are left bare and coated with epiphytes. At the base are the primary shoots with densely imbricated "leaves" in small tightly clustered bunches. These give rise to the new shoots of the coming year.

Under *Cystophyllum Thunbergii* (Mert.) J. C. Ag., recorded by Howe (P., C.), Cotton (C., W.), Gepp (W.), Debeaux (Yen-tai), Reinbold (Tsingtau).—*Distr.* China and Japan.

Rhodophyceæ.

Nemalion elminthoides Batt. Cat. Brit. Marine Alg. 59 (1902).

These specimens are very close to *N. vermiculare* Sur., and according to Suring (Ill. Alg. Jap. i. 91) can only be distinguished by the fact that in the latter species the central axis is smaller in diameter than the peripheral filaments, while in *elminthoides* the diameter of the central axis is the greatest. These specimens on this diagnosis are *N. elminthoides*.—*Distr.* Atlantic, Mediterranean, California.

Gelidium Amansii Lam. in Kuetz. Tab. Phyc. xviii. t. 44 ; Okam. Icon. Jap. Alg. iii. 25, tab. cvi. (1913).

Carposporic and tetrasporic plants in rock-pools. Gathered for the purpose of making jelly for food.—*Distr.* Japan, Korea, Formosa, California, Ind. Oc.

G. pusillum (Stackh.) Le Joli, Hist. Alg. Mar. Cherb. 139. *G. repens* Okam. Bot. Mag. Tok. xviii. 86 (1904).

In rock-pools.—*Distr.* Japan.

Gracilaria confervoides (L.) Grev. Alg. Brit. 123 ; Okam. Icon. Jap. Alg. iv. 1, tab. cli. (1916).

Carposporic plants in rock-pools. Howe (P., C.), Collins (P.), Cotton (W., H.), Gepp. (W.).—*Distr.* China, Japan, Cosmopolitan.

Champia parvula J. Ag. Epicr. 303 ; Okam. Icon. Jap. Alg. ii. 89, tab. lxxvi. (1910).

In rock-pools. Howe (W.), Gepp (W.).—*Distr.* China, Japan, Australia, Atlantic.

Laurencia venusta Yamada, Notes on Laurencia, Univ. Cal. Pub. (Botany) xvi. 203, pl. vi. (1931).

Drift material.—*Distr.* Japan.

L. obtusa var. *divaricata* J. Ag. Spec. Alg. ii. 754 ; Yamada, *l. c.* 223, pls. xvi., xvii.

An autumn form, much denuded of pinnæ.—*Distr.* Red Sea, California, Australia, Japan.

? *L. Okamurae* Yamada, *l. c.* 206, pl. vii. figs. J, K.

Yamada (Amoy).—*Distr.* China, Japan.

Chondria succulenta (J. Ag.) Falk. Rhodomelaceen, 205, t. 22, figs. 22–23 (1901). *C. sedifolia* Harv.

Densely clothed with pinnæ. Highly gelatinous. Cast up after storm.—*Distr.* Australia.

Polysiphonia japonica Harv. in Perry, Narrat. Expedit. of Amer. Squadr. to China Sea & Japan, 1852–4, ii. 331; Gepp, Chinese Marine Alg., Journ. of Bot. xlii. 161 (1904).

Attached in rock-pools.—*Distr.* China, Japan.

Symphyocladia marchantioides (Huds.) Falkb. Rhodomelaceen, 277 (1901); Okam. Icon. Jap. Alg. ii. 152, pl. xciii. (1909).

At low water.—*Distr.* Japan, New Zealand, Formosa, Australia.

Rhytiphlœa tinctoria var. *rigidula* Kuetz. Phyc. gen. 448 (1843).

Small specimen growing at low water.—*Distr.* Atlantic, Red Sea.

Dasya villosa Harv. in Lond. Journ. Bot. iii. 433; Yendo, Notes on Algæ new to Japan, v. 262 (1916).

The distinctions between *D. villosa* and *D. elegans* are not at all clear. According to Harvey *D. villosa* is a "much coarser growing plant, much less impatient of fresh water and wants the beautiful rosy colour of that (*D. elegans*) species." Yendo separates the two species on the basis of the cystocarp structure, but acknowledges that this is not very satisfactory. These specimens from China agree in cystocarpic structure with Harvey's specimens from Australia, but are much smaller and more delicate plants than his.—*Distr.* Australia, Tasmania, Japan.

Psilothallia siliqulosa (Harv.) Schmitz, Klein. Beitr. Florid. vi. 7 (1896). *Ptilota siliqulosa* Harv. Trans. Irish Acad. v. xxii. 559.

Found attached at low water and in drift material. An autumn form with many of the pinnæ worn down and only blunt projections remaining to show their former position.—*Distr.* Australia.

Spyridia filamentosa (Wulf.) Harv. in Hook. Brit. Flora, ii. 336; Okam., Icon. Jap. Alg. iii. 8, tab. cii. figs. 5–11 (1913); iv. 7, tab. clii. figs. 1–3 (1916).

A form almost entirely denuded of filamentous pinnæ.—*Distr.* Cosmopolitan.

Ceramium rubrum (Huds.) Ag. Syn. 60.

Epiphytic. Some of the tips of the pinnæ are curled round to give hooked attachment-organs. Howe (P., C.), Reinbold (Kiauchow).—*Distr.* Warmer parts of the Pacific and Japan Sea.

Gloiopeltis tenax (Turn.) J. Ag. Alg. Med. 68; Suring Illus. esp. *Gloiopeltis*, 29, t. 1, fig. 2, t. xiv.–xvii., t. xx. figs. 6–10, t. xxi.

A narrow sparsely branched form, attached at low water. This species is gathered by the Chinese for food, and owing to its highly gelatinous nature it is also boiled and used as a form of glue. Cotton (China).—*Distr.* Japan, Korea, China.

Grateloupia filicina (Wulf.) Ag. Sp. i. 223.

In rock-pools. Howe (P., C.), Collins (P.), Cotton (P.), Gepp (Swatow), Debeaux (Bay of Ki-tsen-soo).—*Distr.* Cosmopolitan.

Hyalosiphonia cæspitosa Okam., Icon. Jap. Alg. ii, 50–55, pls. lxiv., lxv. (1909).

Washed up after a storm.—*Distr.* Japan.

Nemastoma Nakamuræ Yendo, Bot. Mag. Tokyo, xxiv. 11 (1920); Okam. Icon. Jap. Algæ, vi. 14, pl. cclix. (1929). *N. Cowdryi* Howe, Chinese Mar. Alg. (Bull. Torr. Bot. Club, lvii. 143, pl. i. fig. 5 (1924)).

This species was rare at Pei-tai-ho and was only collected once in a rock-pool. It is highly gelatinous. Howe (C.).—*Distr.* Japan, China. "Peculiar to the Japan Sea and not known on the Pacific side," Okamura.

Corallina officinalis L. Fauna Suec. n. 2234.

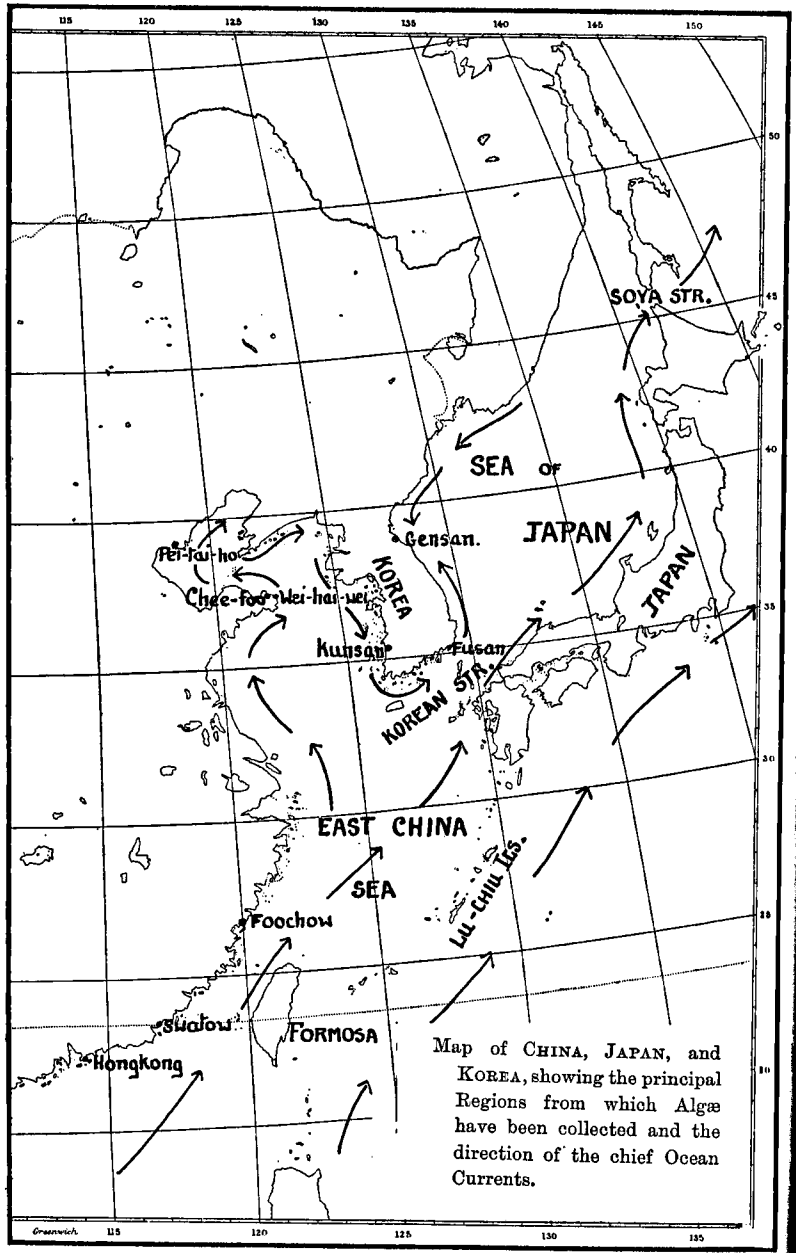
Upper tide-pools. Howe (C.), Collins (P.), Reinbold (Kiauchou).—*Distr.* China, Japan, Arctic Seas, and as far south as Mediterranean.

The number of marine algæ known from China is very small. In all, eight lists of species have been published up to the present, comprising a few collections that have been made at different times in some five localities along the coast (Collins (1), Cotton (2), Cowdray (4), Debeaux (5), Gepp (6), Howe (7), Martens (8), and Reinbold (11)). A short review of this literature, together with a chart showing the localities from which each species was obtained, has been published by Tilden (13). Previous to the present paper the most recent list of identifications was that of Howe (7), and the author, after reviewing and critically examining previous lists, puts the number of reliably determined species known to date at 92. In addition, there are some determinations made by two early writers, Martens (8) and Debeaux (5), which have never been verified and are regarded as "doubtful species." Twelve new species are recorded from N. China in this paper, namely, *Agarum Turneri* Post. & Rup., *Dilophus Wilsoni* Ag., *Nemalion lubricum* Duby, *Gelidium pusillum* (Stackh.) Le Joli, *Dasya villosa* Harv., *Laurencia venusta* Yam., *Chondria succulenta* (J. Ag.) Falk., *Symphycladia marchantiodes* (Huds.) Falk., *Rhytiphlœa tinctoria* (Clem.) J. Ag., *Psilothallia siliqulosa* Harv., *Hyalosiphonia cæspitosa* Okam., *Spyridia filamentosa* (Wulf.) Harv. This brings the total number of named species of marine algæ listed from China to 104, arranged in the following groups :—

Chlorophyceæ, 12 species or 11·5 per cent. of the total.
Phæophyceæ, 38 species or 36·5 per cent. of the total.
Rhodophyceæ, 54 species or 51·9 per cent. of the total.

Total 104

Of these, three species are known only as "sold in the markets" of various places in China—*Euchema papulosa* Cotton & Yendo, *E. spinosum* J. G. Ag., and *Sargassum serratifolium* Ag.,—and therefore it is possible that they may have been imported from



Map of CHINA, JAPAN, and KOREA, showing the principal Regions from which Algæ have been collected and the direction of the chief Ocean Currents.

Japan, where all three species are known to occur. Three others are recorded from Formosa and not from China, though included in Chinese lists—*Dilsea japonica* Okam., *Corallina pilulifera* Postels & Rup., and *Sargassum cristæfolium* Ag. Cotton includes these three species on the ground that Formosa, "though belonging to Japan, must geographically be included with China." The Japanese algologists, however, are increasingly active in their study of the Formosan flora and in their comparisons of the algæ of this island with the neighbouring chain of Lu-chiu Islands, thus linking Formosa with Japan proper. In addition, the southern coasts of China and the east and west coasts of Formosa are washed by different marine currents, and it is therefore probable that when more is known about the algal floras of these two regions they will show considerable differences. For this reason it has been thought clearer to omit the Formosan species from the following lists and to confine them strictly to named species of algæ known definitely from the coasts of China, 98 in all.

The coast-line of China with its indentations is reckoned at approximately 5000 miles in length, and in view of this it must be regarded as having an unusually sparse algal flora. It is possible that there remain large numbers of species as yet undiscovered, as, owing to the lack of communications and the disturbed condition of the country, collection has only taken place at some five localities which are either ports or holiday resorts. The coast, particularly in S. China, is made up of igneous and metamorphic rocks, which do not, however, seem to offer a favourable foothold to algæ, while in the neighbourhood of the mouths of the many rivers the shore is often only shifting sand and mud. Enormous amounts of sediment are brought down annually to the coast by the three main rivers of China as well as by the smaller ones; it is estimated that the Yangtze-kiang alone deposits annually sufficient sediment to create a new island in the Pacific each year, 1 mile square and 15 fathoms deep, while the floor of the Gulf of Pei-chi-li, on the shores of which Pei-tai-ho is situated, is silt from the Hwang Ho. In this way the coast-line in certain parts is gaining rapidly on the ocean and overwhelming many a rocky island on which an algal flora might find a foothold.

(To be continued.)

THE GENUS *UROPHYLLUM* IN MALAYA.

BY H. N. RIDLEY, C.M.G., F.R.S.

(Concluded from p. 197.)

Urophyllum pilosum Ridley, sp. nov. Species ab *U. borneensi* Miq. cui affinis foliis minoribus basibus rotundatis, petiolis brevibus, floribus minoribus differt.

Frutex? hirtus. *Folia* chartacea oblonga, acuminata basibus latis rotundatis, superne sparse setosa, costa ferrugineo-pilosa, subtus costa nervisque 11-paribus intra margines inarcuantibus

ferrugineo-pilosa, secundariis conspicuis, nervulis paucis anastomosantibus, 6–13 cm. longa, 3–3·5 cm. lata, petiolis hirtis, 3 mm. longis. *Stipulæ* elongato-triangulares acuminatæ hirtæ 1·4 cm. longæ, 5 mm. latæ ad bases. *Cymæ* pilosæ pedunculis 5 mm. longis. *Bracteæ* ovatæ acutæ ramis 4 umbellatis 1 cm. longis. *Flores* pedicellati, pedicellis 3 mm. longis. *Calyx* obconicus 3 mm. longus hirtus, lobis 4 vel 5 lineari-lanceolatis acutis hirtis, tubo æquilongis. *Corolla* extus glabra, 4 mm. longa, tubo cylindrico sepalis longiore, in ore dense albo-piloso, lobis oblongis 4 vel 5. *Stamina* 4 vel 5 e tubo extrusa, antheris brevibus ellipticis, in flore femineo minutis abortivis. *Stylus* elongatus glaber, stigmatibus 4 recurvis linearibus obtusis. *Discus* ater papulosa. *Bacca* glabra subglobosa 4 mm. longa.

Hab. Borneo, Sarawak, Rejang, Kapit (*Haviland*, 2962, type ; 2985), Entoyut (*Hose*, 432, 451), Mount Skiwa (*Hose*, 431).

Urophyllum castaneum Ridl., sp. nov. Species ab *U. ferrugineo* King & Gamble cui affinis differt foliis majoribus, floribus sessilibus, lobis calycis acutis; corolla glabra, lobis tubo multo brevioribus.

Frutex, ramulis dense appresse ferrugineo-hirtis. *Folia* membranacea superne glabra subtus hirta, oblongo-lanceolata acuminata basi attenuata, 12·5–17 cm. longa, 3–4 cm. lata, nervis 20-paribus hirtis, subtus elevatis, nervulis inconspicuis, costa superne canaliculata subtus elevata dense hirta, petiolis dense hirtis 1 cm. longis. *Stipulæ* breves ovatæ hirtæ. *Flores* parvi sessiles in glomerulis axillaribus sessilibus 3 mm. longis. *Bracteæ* lineares hirtæ 2 mm. longæ. *Calyx* patelliformis dense hirtus lobis 4 ovatis acutis. *Corolla* glabra 2 mm. longa, tubo cylindrico, lobis brevioribus 4 ovatis. *Stamina* 4, antheris ellipticis. *Discus* undulatus.

Hab. Sarawak (*Beccari*, 1562 ; 1424, type), Matang, 1400 feet (*Haviland*, 691).

Allied to *U. ferrugineum* King & Gamble, but the leaves are much larger, and the flowers sessile, the corolla-lobes only a third of the length of the tube.

Urophyllum Yatesii Ridl., sp. nov. Species ab *U. corymboso* Korth. cui affinis floribus parvis in cymis brevibus hirtis in fructu accrescentibus differt.

Frutex vel arbor glabra, ramis crassiusculis. *Folia* coriacea, lanceolata acuminata basi breviter attenuato glabrescentia, costa cum nervis subtus elevatis parce pilosis (adulta glabra) 13-paribus, nervulis inconspicuis paucis, 9·5–13 cm. longa 4·5–4·7 cm. lata, petiolis 1–1·5 cm. longis. *Stipulæ* oblongo-lanceolatæ parce pilosæ coriaceæ 1·2 cm. longæ. *Cymæ* florentes hirtæ, pedunculis 5 mm. longis, ramis 5 mm. longis. *Bracteæ* lanceolatæ hirtæ 4 mm. longæ. *Flores* parvi puberuli. *Calyx* campanulatus margine integro, 1 mm. longus. *Corolla* puberula 3 mm. longa tubo brevi intus piloso, lobis 4 triangulari-ovatis. *Stamina* 4 minuta, antheris ellipticis obtusis. *Stylus* brevissimus. *Discus* parvus elevatus. *Cymæ* fructiferæ elongatæ 4–5 cm. longæ pedunculis 1·5 cm. longis, ramis 4 patentibus 1·5 cm. longis, cymulis in ramo 2–3-floris. *Baccæ* subglobosæ glabræ 5 mm. longæ limbo calycis coronatæ. *Semina* elliptica foveolata.

Hab. Sumatra, East Coast (*H. S. Yates*, 1325, type) ; Mount Singalan (*Beccari*, 112).

The foliage and habit is that of *U. sumatrana* Ridl., but the flowers are very small, in short peduncled hairy cymes which in fruit are long accrescent with spreading branches.

Urophyllum sericeum Ridl., sp. nov. Species ab *U. umbellulato* Miq. cui affinis cymis sericeis pedunculatis differt.

Frutex ramis superne hirtis. *Folia* coriacea lanceolata acuminata vel elliptico-lanceolata cuspidata superne glabra, subtus nervis 10–14-paribus gracilibus appresse hirtis, costa superne depressa subtus elevata appresse hirta, 15–16 cm. longa, 3·5–5 cm. lata, petiolis canaliculatis hirtis 1 cm. longis. *Stipulæ* lineares hirtæ 1·5 cm. longæ 1 mm. latæ in medio. *Cymæ* pedunculatæ, pedunculis 1·5 cm. longis sericeis, ramis 3–4 umbellatis sericeis floribus 3–6. *Bracteolæ* lanceolatæ sericeæ 2 mm. longæ. *Calyx* campanulatus hirtus, lobis 5 ovatis acutis 2 mm. longus. *Corolla* glabra, tubo brevissimo intus piloso, lobis ovatis acutis 4. *Stamina* 4, antheris lanceolatis. *Stylus* cylindricus corollæ brevior, stigmatibus 4 teretibus erectis. *Discus* conicus lævis. *Bacca* globosa lævis 5 mm. longa.

Hab. Java, Mount Gede (*Ridley*, type) ; Sumatra, Siberut Island, 10 feet high (*Boden-Kloss*, 14,523), Borneo, S.E. Hayup (*Winkler*, 2320).

This species is near *U. umbellulatum* Miq., but the flowers are in a rather long peduncled silky cyme. To some extent it resembles some forms of *U. glabrum* Wall., but it is distinctly hairy on the stem and backs of leaves. Winkler's specimen has larger leaves and seems nearly glabrous.

Urophyllum bracteolatum Ridl., sp. nov. Species ab *U. villoso* Wall. cui affinis foliis minoribus angustioribus, cymis puberulis nec hirsutis, corolla brevi differt.

Frutex rufo-pubescens. *Folia* subcoriacea lanceolata acuminata basi rotundata superne lævia glabra subtus nervis elevatis 13-paribus cum costa hirtis, nervulis parallelis remotis elevatis, 16–19 cm. longa, 4–5 cm. lata, petiolis crassis hirtis 10 cm. longis. *Stipulæ* non visæ. *Cymæ* paniculatæ, hirtæ 2 cm. longæ, pedunculis 1 cm. longis, cymulis 5 mm.–1 cm. longis densifloris. *Bracteæ* et bracteolæ lanceolato-lineares obtusæ hirtæ 4 mm. longæ. *Pedicelli* 2 mm. longi. *Calyx* hirtus, tubo brevi, lobis 4 ovatis acutis. *Corolla* pallida pubescens, 3 mm. longa, tubo

brevi, intus pilis copiosis in ore, lobis 4 oblongis obtusis. *Stamina* 4, filamentis brevissimis antheris oblongis obtusis. *Pistillodium* minutum. *Discus* conicus truncatus albus, foveolis 10 e stigmate radiantibus.

Hab. Borneo, Sarawak, Mount Singhi; shrub, corolla pale (*Haviland*, 2016, type); Kuching (*Hewitt*).

Apparently male specimens only, as the stigma and ovary seem quite rudimentary.

Urophyllum cephalotes Ridl., sp. nov. Species ab *U. capituligero* Ridl. cui affinis capitulis singulis in pedunculis gracilibus foliisque minoribus differt.

Frutex hirsuta. *Folia* subcoriacea lanceolata longe acuminata, basi subacuta superne glabra, subtus costa elevata cum nervis 8–10-paribus elevatis hirtis, nervulis anastomosantibus, 10–15 cm. longa 4–4·7 cm. lata, petiolis crassiusculis hirtis 7 mm. longis. *Stipulæ* lanceolatæ acuminatæ, acumine longo angustissimo pubescentes, 1 cm. longæ, basi 3 mm. latæ. *Capitula* singula in pedunculo pubescente 1 cm. longo, densiflora subglobosa 1 cm. lata. *Flores* plures sessiles vel subsessiles. *Bracteæ* oblongæ hirtæ 4 mm. longæ. *Calyx* campanulatus pubescens, lobis 5 brevibus. *Corolla* flava 4 mm. longa, tubo brevi, intus dense barbato, lobis 5 brevibus oblongis obtusis. *Stamina* 5 in pilis oris immersa, antheris parvis ellipticis. *Stylus* calyce longior, stigmatibus 5 linearibus. *Discus* conicus truncatus albus foveolatus.

Hab. Borneo, Kuching (*Beccari*, 1456, 1030), Matang. Shrub 5 feet tall, corolla yellow (*Haviland*, 1043, type; 1046); Bau (*Haviland*, 2031).

The male flowers are rather smaller and more condensed and numerous than the females. This is remarkable for having the flowers in solitary compact heads.

Urophyllum capituligerum Ridl., sp. nov. Species ab *U. villoso* Hook. fil. cui affinis omnino glabro, paniculis elongatis, pedunculis elongatis, cymis congestis differt.

Frutex glaber. *Folia* oblonga acuta basi breviter angustata obtusa, costa superne depressa subtus elevata, nervis subtus elevatis 13 paribus, nervulis parallelis vix anastomosantibus, 21 cm. longa 6·5–7·5 cm. lata, petiolis crassiusculis 1·4 cm. longis. *Stipulæ* non visæ. *Cymæ* infra folia ortæ puberulæ, pedunculis 4 cm. longis, ramis oppositis, 2 basibus pedunculis 2 cm. longis, floribus in apices congestis, bracteis linearibus 4 mm. longis, umbellis terminalibus 4, pedunculis ·5–1 cm. longis, bracteis ovatis 4 mm. longis. *Flores* plures congesti subsessiles. *Calyx* cupulatus puberulus, lobis 5 vix distinctis, 1 mm. longus. *Corolla* brevis, tubo intus dense hirto, 2 mm. longus, lobis brevibus oblongis obtusis. *Stamina* 4 vel 5 antheris ellipticis, loculis

distinctis filamentis brevissimis, in pilis tubi celata. *Stigma* sessile globosum minutula. *Discus* conicus obtusus albus radiatim foveolatus.

Hab. Borneo, Saribas, Paku (*Haviland & Hose*, 3415, type); Saribas, Jitu (*Haviland & Hose*, 3417); British North Borneo (*Creagh*).

Urophyllum paniculatum Ridl., sp. nov. Species ab *U. enneandro* Ridl. differt staminibus 5; ab *U. capituligero* Ridl. cui affinis lobis corollæ longioribus differt.

Arbor? ramis crassis, juvenibus rufo-velutinis. *Folia* coriacea oblonga vel elliptica acuminata, basi rotundata, superne costa depressa excepta glabra, subtus costa elevata, nervis 14–16-paribus in marginibus inarcuantibus, cum secundariis et nervulis anastomosantibus omnibus elevatis hirtis, 15–20 cm. longa 6–6·5 cm. lata, petiolis validis basibus incrassatis 5 mm.–2 cm. longis. *Stipulæ* lanceolato-lineares obtusæ glabrescentes 1 cm. longæ. *Cymæ* paniculatæ infra folia 3–4 cm. longæ, 3–4 cm. latæ rufo-velutinæ. *Pedunculi* 1 cm. longi. *Bracteæ* et bracteolæ ovatæ obtusæ rufo-velutinæ, 1–2 mm. longæ. *Flores* plurimi umbellati, pedicellis 3 mm. longis. *Calyx* campanulatus hirtus 2 mm. longus, lobis 5 dentiformibus. *Corolla* viridis tubo breviore, ore parce hirto, lobis 5 ovatis glabris. *Stamina* 5 minima ex ore corollæ tubi inter lobos, filamentis brevibus, *antheris* oblongis. *Stylus* validulus, stigmatibus 5 crassis rotundatis. *Discus* elevatus pulviniformis albus. *Bacca* subglobosa, dentibus calycis coronata, 1·3 cm. crassa, septa 4 dichotoma. *Semina* copiosa foveolata brunnea.

Hab. Borneo, Sarawak, Kuching, "ovary many-ovuled 5-celled, corolla pale green" (*Haviland*, 2154, 2964; 2986, type); British North Borneo, Tawao, Elphinstone Province (*Elmer*, 21471, 21332).

The habit is that of the *Aulacodiscus* group, but the stamens are only 5. The fruit in section shows four partitions radiating from the centre and then bifurcating.

UROPHYLLUM BORNEENSE Miq. Ann. Bot. Lugd. Bat. iv. 238.

Miquel's species was decribed from a fruiting specimen of De Vries from Borneo, but very incompletely. What I take to be the plant intended by him is a common species in Borneo, and I give a complete description from a good series.

Frutex gracilis vel *arbor* parva, ramis rubiginoso-hirtis. *Folia* lanceolata longe acuminata, basibus paullo angustatis obtusis, coriacea, superne costa canaliculata excepta glabra, lævia subtus costa nervisque 12- ad 13-paribus elevatis rubiginoso-hirtis in marginibus inarcuantibus, nervulis transversis anastomosantibus, 7·5–22 cm. longa, 1·5–6 cm. lata, petiolis 5 mm.–1 cm. longis, hirtis. *Stipulæ* lanceolatæ-lineares 2 cm. longæ dense hirtæ. *Cymæ* simplices 2 cm. longæ ad pauci-ramosæ 4 cm.

longæ dense atro-rubiginosæ hirtæ. *Pedicelli* 2–5 mm. longi. *Bracteæ* lineares hirtæ. *Calyx* campanulatus basi truncato, lobis 4 vel 5 lanceolatis acutis, dense hirtus 2 mm. longus. *Corolla* alba glabra, tubo brevissimo in ore hirto, lobis 4 coriaceis ovatis, acutis, vix lobis calycis superantibus. *Stamina* 4, filamentis brevibus antheris lanceolatis appendiculatis. *Stigma* minutum. *Discus* margine undulato glaber. *Bacca* flava hirto, 4 mm. crassa subglobosa.

Hab. Borneo, Sarawak (*Lobb*; *Beccari*, 1840, 627, 608, 1638; *Lowe*); Kuching (*Haviland*, 826; "Slender shrub, berry yellow," 934, 1787); Sepudang, 1000 feet alt. (*Haviland*, "Corolla white," 739); Matang, "Small tree" (*Hullett*, 2781); Reservoir woods (*Ridley*).

Urophyllum congestiflorum Ridl., sp. nov. Species ab *Urophyllo streptopodio* Wall. cui affinis foliis majoribus, floribus umbellatis pluribus stigmatibus 5 differt.

Frutex validus, ramis pilis appressis flavidulis tectis. *Folia* subcoriacea elliptica subabrupte acuminata, basi breviter attenuata, superne lævia glabra subtus flavescentia pubescentia, costa nervisque 9-paribus elevatis, appresse hirta, nervulis transversis parallelis copiosis anastomosantibus, 10–15 cm. longa, 4–7 cm. lata, petiolis hirtis 1 cm. longis. *Stipulæ* lanceolatæ obtusæ 1·5 cm. longæ, caducæ. *Cymæ* 2–3 in axillis, pedunculis 4 mm. longis hirtis. *Flores* umbellatæ, 3–4 in umbella, bracteis pluribus ovatis hirtis, pedicellis hirtis 3 mm. longis. *Calyx* campanulatus pubescens dentibus 4 brevibus, 2 mm. longus. *Corolla* glabra tubulosa, 4 mm. longa, ore hirto lobis oblongis obtusis. *Stamina* 5 breviora, filamentis teretibus, antheris oblongis obtusis parvis. *Stylus* crassus, corollæ brevior, stigmatibus 5, obtusis carnosis recurvis. *Bacca* ovoideo-globosa, 7 mm. longa, 5 mm. crassa.

Hab. Sarawak (*Beccari*, 618, 160, 3174, 3631); Kuching (*Haviland & Hose*, 3416, type).

Urophyllum vulcanicum Ridl., sp. nov. Species ab *U. streptopodio* Wall., cui affinis, sed omnino glabra, pedicellis exceptis, calyce vix lobato, stipulis angustissimis differt.

Frutex ramis gracilibus glabris. *Folia* chartacea glabra oblongo-lanceolata cuspidata (cuspide 1·8 cm. longo) basi attenuato acuto, nervis utrinque elevatis, 10-paribus, nervulis parallelis undulatis, 15 cm. longa, 5·2 cm. lata, petiolis gracilibus 1·2 cm. longis. *Stipulæ* e basi ovatæ superne lineares, glabræ 1·2 cm. longæ. *Cymæ* multifloræ puberulæ subsessiles pedicellis gracilibus 5 mm. longis. *Calyx* patelliformis margine obscure dentato glaber 2 mm. latus. *Corolla* cylindrica tubulosa 4 mm. longa, tubo in ore piloso, lobis 5 vel 6 ovatis acutis. *Stamina* 5, filamentis brevibus incurvis, antheris sub ellipticis nutantibus, loculis disjunctis. *Stylus* nullus. *Discus* planus. *Flores* feminei non visi.

Hab. Sumatra, Berastigi. Volcanic woods of Mount Sibayak (*Ridley*).

This has the habit of *U. glabrum* Jack, but the flowers are long-tubed.

Urophyllum Motleyi Ridl., sp. nov. Species ab *U. vulcanico* Ridl. cui affinis floribus minoribus, tubo corollæ longiore, lobis brevioribus differt.

Frutex glabra ramis subgracilibus, pallidis. *Folia* membranacea oblongo-lanceolata longe acuminata basi angustata, 11–13 cm. longa, 3–4 cm. lata, nervis gracilibus 10-paribus subtus elevatis appresse hirtis, nervulis transversis elevatis hirtis, petiolis 1 cm. longis hirtis. *Stipulæ* lineares crassiusculæ, basibus dilatatis, 7 mm. longæ. *Flores* glomerati in axillis, pedicellis gracilibus 2–3 mm. longis, puberulis. *Calyx* patelliformis vix 1 mm. longus, lobis 4 triangularibus obscuris. *Corolla* tubo cylindrico 3 mm. longo, lobis 4 ovatis obtusis brevibus ·05 mm. longis. *Stamina* 4 e tubo exserta, filamentis linearibus, antheris ellipticis.

Hab. South Borneo, Banjarmassin (*Motley*, 1109).

Closely allied to *U. vulcanicum* Ridl. of Sumatra, but flowers smaller, with corolla-tube longer and lobes shorter.

UROPHYLLUM SALICIFOLIUM Stapf. The type of this from Mount Kinabalu is a portion of a female plant in fruit, the male flowers not being known. There is, however, a good specimen of what is clearly the same species in Kew Herbarium collected by J. C. Moulton on Gunong Temabok in Upper Baram at 6000 feet alt. (no. 6789). I add a description of the male flowers:—

Cymæ sessiles glomeruliformes multifloræ hirtæ 5 mm. longæ. *Flores* subsessiles straminei. *Calyx* tubo brevi campanulato, lobis ovatis acutis pilosis, 1 mm. longus. *Corolla* tubo cylindrico glabro, ore dense albo-piloso, lobis 5 ovatis acutis multo brevioribus. *Stamina* 5, antheris oblongis obtusis. *Discus* globosus ater. *Stylodio* brevi subconico.

Urophyllum neriifolium Ridl., sp. nov. Species ab *U. streptopodio* Wall. cui affinis foliis anguste lanceolatis acuminatis, floribus majoribus differt.

Frutex ramis gracilibus pubescentibus, versus apices angulatis. *Folia* coriacea superne glabra, subtus costa solummodo pubescentia lanceolata angusta longissime cuspidata basibus cuneatis, marginibus incrassatis, in sicca viridia, nervis paullo elevatis 12-paribus, 12–21 cm. longa, 1·3–3 cm. lata, petiolo 3 cm. longo appresse hirto. *Stipulæ* lanceolatæ longe acuminatæ parce hirtæ 5 mm.–2 cm. longæ. *Cymæ* sessiles pubescentes 4–5-floræ. *Bracteæ* ovato-rotundatæ marginibus hirtis 1 mm. longæ. *Pedicelli* appresse hirti in flore 5 mm. in fructu 7 mm. longi graciles. *Calyx* tubo urceolato, 2 mm. longo, lobis 4 triangularibus brevibus,

pubescens. *Corolla* glabra, tubo cylindrico 4 mm. longo, lobis lanceolatis acutis æquilongis, pilis in ore tubi copiosis. *Stamina* in femineo 5 parva. *Stylus* crassus, stigmatibus oblongis obtusis carnosis. *Discus* orbicularis elevatus lævis. *Bacca* globosa 4 mm. crassa.

Hab. Sarawak (*Beccari*, 1454, 2071), Matang (*Haviland*, 669, type; *Ridley*, 12298).

The leaves in my specimen from the same locality as Haviland's are broader than in either his or Beccari's specimens.

Urophyllum melanocarpum Ridl., sp. nov. Species *U. neriifolio* Ridl. cui affinis foliis angustioribus floribus in axillis paucis singulis vel binis differt.

Arbor parva, ramis gracilibus appresse hirtis. *Folia* coriacea glabra, costa subtus appresse hirta excepta, anguste lanceolata longe cuspidato-acuminata, mucronulata, basibus acutis, nervis 8-paribus valde inconspicuis, nervulis plurimis parallelis inconspicuis, 7–7·2 cm. longa, 7–9 mm. lata, petiolis gracilibus appresse hirtis 5 mm. longis. *Stipulæ* anguste lineares acuminatæ hirtæ 4 mm. longæ. *Cymæ* 1–2-floræ, hirtæ, pedicellis 3–4 mm. longis. *Bracteæ* lanceolatæ acutæ hirtæ. *Calyx* obovoideus glaber 2 mm. longus, lobis brevibus triangularibus acutis. *Corolla* et stamina non visa. *Discus* planus haud elevatus. *Bacca* globosa glabra nigra 5 mm. crassa, sepalis 1 mm. longis coronata. *Semina* plurima foveolata atro-rubra.

Hab. Sarawak, Mount Bongo near Tegora. Small tree, berry black (*Haviland*, 2004).

The corollas are unfortunately all fallen in this specimen, but I take it to be nearest to *U. neriifolium* Ridl., the solitary one or pair of flowers in the axils is very unusual.

THE TROPICAL AFRICAN *HYDROCHARIS*.

By J. E. Dandy, M.A., F.L.S.

In a recent paper entitled "'Dongo,' nouvelle plante à sel de l'Oubangui" (in Bull. Soc. Bot. France, lxxviii. 181–2 (1931)) F. Pellegrin has described a new species of *Hydrocharis* L. (Hydrocharitaceæ) from the French territory of Ubangi-Shari-Chad, in central Tropical Africa. The publication of this species, *H. salifera* Pellegr., is of great interest, since it constitutes the first record of the Old World genus *Hydrocharis* from the African continent south of the Tropic of Cancer. North of the Tropic the genus is apparently represented in Algeria by the well-known European species *H. Morsus-ranæ* L., which was included in Battandier and Trabut's 'Flore de l'Algérie' (Monocot. 4 (1895)) and in Thonner's 'Die Blütenpflanzen Afrikas' (84 (1908)).

Hydrocharis is now known to occur in Europe, Temperate and Tropical Asia, North Temperate and Tropical Africa, and Temperate Australia; in America its place is taken by the closely allied genera *Limnobium* Rich. and *Hydromystria* G. F. W. Mey.

The new species described by Pellegrin was based on a single specimen (*Tisserant*, 400) preserved in the herbarium of the Muséum d'Histoire Naturelle, Paris. By the courtesy of the authorities of that institution and also of the Jardin Botanique de l'Etat, Brussels, the writer has been able to examine this specimen and compare it with the original material of *Ottelia Chevalieri* De Wild., a species which he had for some time suspected to belong to *Hydrocharis*. *O. Chevalieri* was described by É. De Wildeman (Pl. Bequaert. i. 453 (1922)) from a series of specimens collected by A. Chevalier, J. Bequaert, and others in Shari and the Belgian Congo, and in his observations following the description the author remarked:—"Les récoltes de M. le Dr Bequaert étant seules accompagnées de quelques fleurs, nous nous sommes permis de soumettre le doute que nous avions, quant à la détermination de M. Aug. Chevalier* à la direction de Kew, qui nous affirma dans notre supposition que la plante devait être une Hydrocharidacée, voisine des *Ottelia*.

"Nous possédions bien en herbier une aquarelle de M. V. Durant, mais le dessin de la fleur était insuffisant pour définir ses caractères.

"Nous la croyons voisine de l'*O. alismoides* Pers., mais s'en différenciant aisément par la texture du limbe : papyracé-coriace, non translucide à l'état sec.

"Nous n'avons pu étudier en détail les fleurs que nous désirons conserver ; il serait plus qu'intéressant d'obtenir de plus nombreux documents afin de savoir si l'absence d'ailes à la spathe est un caractère constant, et si il n'y aurait pas de caractères différentiels plus accusés, car à première vue nous avions été tenté de par : la nature des feuilles, la présence du rhizome, de séparer cette forme, génériquement, des *Ottelia* actuellement connus."

The actual comparison of Pellegrin's and De Wildeman's plants showed at once that they represent a single species, which is certainly to be referred to *Hydrocharis*. Since the name *O. Chevalieri* antedates *H. salifera*, it is necessary to propose the following new combination :—

Hydrocharis Chevalieri (De Wild.) Dandy, comb. nov.

Ottelia Chevalieri De Wild., Pl. Bequaert. i. 453 (1922).

Hydrocharis salifera Pellegr. in Bull. Soc. Bot. France, lxxviii. 182 (1931).

* Chevalier's gathering (n. 7658), which is taken as the type of *O. Chevalieri*, was originally determined as *Monochoria africana* (Solms) N. E. Br. (Pontederiaceæ).

From the material seen by the writer the geographical range of the species appears to extend from the Cameroons to Ubangi-Shari-Chad and the Belgian Congo. The specimens examined are as follows :—

Cameroons. Bitye, Yaunde, 1917, *Bates*, 960 (Herb. Brit. Mus.). Bitye (Yaunde), Ebolowa, 1925, *Bates*, 1953 (Herb. Brit. Mus.).

Ubangi-Shari-Chad. Chari Oriental (Pays de Snoussi), Ndellé, 25–27 Feb. 1903, *Chevalier*, 7658 * (type of *H.* (*O.*) *Chevalieri* in Herb. Bruss. ; Herb. Kew). Oubangui, ruisseau près Riv. Kpalato Bambari, May 1921, *Tisserant*, 400 (type of *H. salifera* in Herb. Par.) (" Herbe aquatique ; les fleurs et les feuilles émergent ; eaux presque stagnantes ").

Belgian Congo. Walikale-Lubutu, 24 Jan. 1915, *Beguaert*, 6726 (Herb. Bruss.) (" Mare boueuse ; fl. blanches "). Dundusana, Sept. 1913, *Mortehan*, 475 (Herb. Bruss.) (" Plante herbacée des rivières "). Kole, 31 Oct. 1906, *Flamigni*, 164/A (Herb. Bruss.). Kasongo Batetela, 20 Oct. 1906, *Sapin* (Herb. Bruss.) (" Sert à faire sel "). Environs d'Eala, 10 Jan. 1906, *Laurent* (Herb. Bruss.) (" Endroits humides "). Vallée de la Djuma, July 1902, *Gillet*, 2735 (Herb. Bruss.), *Gentil* (Herb. Bruss.). Kasai, 1904, *Durant*, with water-colour drawing (Herb. Bruss.) (" Plante à sel ; marais salant "). Région de Bili, environs Nambia, 30 Dec. 1925, *Robyns*, 1296 (Herb. Bruss.) (" Galerie forestière marécageuse ; plante aquatique à rhizome, à fl. blanches insérées directement sur le rhizome ").

H. Chevalieri does not appear to differ essentially from *H. Morsus-ranæ* in the structure of the inflorescences, flowers, and fruit. The Tropical African species is, however, easily distinguished by the shape of the leaf-lamina, which is emersed from the water and tapers rapidly to an obtuse, acute, or subacuminate tip, instead of being broadly rounded at the apex as in *H. Morsus-ranæ*. On this account *H. Chevalieri* has a facies reminiscent more of *Limnobium spongia* (Bosc) Rich. ex Steud., from south-eastern North America, than of *H. Morsus-ranæ*.

As implied by Pellegrin's specific epithet *salifera*, *H. Chevalieri* is a salt-yielding species, being one of the aquatic plants from which the natives of central Tropical Africa obtain comestible salt by incineration. In Ubangi, according to Pellegrin (*l. c.*), the natives roughly clear a portion of a pond or very slowly flowing stream, and transplant the *dongo* (as the species is termed by the Lindas) in the mud beneath the stagnant or almost stagnant water ; the plant there multiplies and flourishes without further attention, and when sufficiently abundant is harvested for its salt.

* This number was erroneously cited by De Wildeman, *l. c.* 454, as 7653.

THE CHERRY IN CEYLON.

By T. Petch, B.A., B.Sc.

De Candolle, in ' Géographie Botanique ' (1855), 392, recorded that when transferred to Ceylon the cherry does not lose its leaves. Pfeffer (' Pflanzenphysiologie,' ii. 107) referred to the cherry in Ceylon as an evergreen, citing De Candolle. Askenasy, " Ueber die jahrliche Periode der Knospen," Bot. Zeitung, 841, 1877, stated that the cherry was evergreen in Ceylon and did not produce fruit. Corrections of these alleged facts have been published in Ceylon on several occasions, but they are still frequently cited by writers on periodicity, bud-formation, etc.

Cherry-trees are a conspicuous feature of the vegetation of Nuwara Eliya, Ceylon, many of them attaining large dimensions. Several old trees stand in a prominent position in the grounds of the Grand Hotel, and three of these measured 13 ft., 14 ft. 6 ins., and 16 ft., respectively, in girth at a height of 3 feet from the ground, in October 1923. The date of introduction of this tree is not known. As Nuwara Eliya began to be opened up as a sanatorium in 1828, and Champion recorded cherry-trees there in 1843, the introduction must have taken place between those two dates.

The misconceptions recorded by De Candolle and others originated with Champion and Gardner, neither of whom was resident at Nuwara Eliya. Champion, in 1843, stated that the cherry-trees at Nuwara Eliya did not produce fruit ; and Gardner, in an account of the vegetation of Ceylon published in Journ. Hort. Soc. London, iv. 31–40 (1849), wrote :—

" In place of losing their leaves for nearly six months of the year, the peach and the cherry are here evergreens, and hence are kept in such a continued state of excitement as to prevent their bearing. The peach does indeed give a poor crop of fruit of very inferior quality, but although the cherry blooms annually its fruit never comes to perfection."

In 1898, the foregoing statements were brought to the notice of Mr. W. Nock, who had held the post of Curator of the Hakgala Botanic Garden, 6 miles from Nuwara Eliya, since 1882. Mr. Nock wrote as follows in the ' Tropical Agriculturist,' xviii. 187 :—

" The cherry has not become an evergreen ; it loses its leaves at the end of every year, and for a short time is bare. It flowers abundantly in the locality of Nuwara Eliya (6200 ft. elevation ; 57°·7 F., av. temp.). It sets but little fruit, and that generally falls off before the stoning stage. Occasionally I have seen fruit colouring, but have never seen one ripe. It is never reproduced by seeds, but plentifully by cuttings and suckers."

In 1921, the late Mr. E. H. Wilson, of the Arnold Arboretum, visited Ceylon, and in the course of a visit to the Hakgala Garden was shown these cherry-trees at Nuwara Eliya. He immediately queried their identity, and on specimens being sent to him later, at the Arnold Arboretum, he identified them as *Prunus Puddum* Roxb., a native of Nepaul and the Himalayan region. It is probable that the tree was introduced into Ceylon from India by military officers. Nuwara Eliya was, and still is, used as a military sanatorium, and the military officers are known to have introduced plants into Ceylon from Botanic Gardens in India in the early part of the last century.

Thus, the cherry in Ceylon is not the European cherry, and it is not evergreen.

It would be of interest to know whether the European cherry exists anywhere in the tropics. As regards Java, Heyne, in 'Die nuttige planten van Nederlandsche-Indie,' ed. 2, 695 (1897), stated :—

"In the 'Tijdschrift voor Land- en Tuinbouw en Boschcultuur,' 418, 1885–6, in addition to apricots, cherries (*Prunus Cerasus* Linn.) were recorded, without mention of locality. . . . Confirmation of this report, as far as regards the cherry, would not be superfluous, since that is the only record known to me."

During my residence in Nuwara Eliya in 1927–28, I was able to make some observations on the flowering of *Prunus Puddum* there. These observations, however, are incomplete, partly because it was not until the second year that one, probably the chief, cause of the irregularities in time of flowering was apparent, and also because the subject required longer and more detailed investigations than were possible.

The "normal" flowering period is March, towards the close of the dry season, and after the coldest month, February, when ground frosts may occur for several nights in succession. Trees which are flowering normally are then covered with pink blossom. But there are numerous departures from the rule, and trees have been observed in flower, or partly in flower, in July, August, September, October, and December.

One cause of this divergence was observed in 1928. A large tree which stood in an isolated position on one of the lawns of the Nuwara Eliya Park was in full flower in March. That year, the winds of the S.W. Monsoon were exceptionally strong, and continued into August, and all the leaves were stripped off the windward side of the tree. Towards the end of September, the branches on that side, over about one-third of the tree, came into flower, the remainder of the tree being in full leaf. These September flowers had smaller petals than usual, and the display of blossom fell far short of that in March.

A group of trees of medium size was observed in full flower on July 12, 1927. On the opposite side of the road were two trees

of the same size, side by side and equally exposed, one of which was in flower and the other in leaf. In March 1928, the trees of the first group were again in flower, but of the other two, the first was in leaf and the second in flower. In July 1928, all these trees were in full leaf, with the exception of one which had been lopped to permit the passage of an electric light wire and bore a few flowers. Thus, the July flowering observed in 1927 was not repeated in 1928.

Numerous observations were made on six very old trees in front of the Grand Hotel, but no clear result was obtained. In no case did any one of these trees bloom as a whole. Some of the branches were in flower and others in leaf at the same time. Their best flowering month in both 1927 and 1928 was July, but even then the effect was poor, compared with that of large, but younger, trees elsewhere in March. There was some evidence of individuality of different branches, *e. g.*, on one tree the branches nearest the base flowered in March 1928, while the upper part of the tree flowered in July, and on another tree, suckers flowered in March, while the remainder of the tree was in nearly full flower in July. Some of these trees are partly sheltered from the wind by the hotel buildings, and others by a belt of *Cupressus*. Thus their blossoming is affected in different degrees by exposure to wind, and that, with the differences in periodicity between individual branches, makes their flowering most irregular. As an example, the following records of one tree are given; December 1926, in part flower; July 1927, still in leaf; September–October, 1927, in part flower; December 31, 1927, a few flowers; March 22, 1928, suckers in flower; July 1928, good part flower, suckers in leaf; September 1928, a few flowers.

In 1928, the tree just mentioned bore a number of fruits. The mesocarp of these fruits was very thin, and the fruits continued green until mature. The seeds appeared sound, but their viability was not tested. Previous statements concerning the fruit have perhaps been influenced by the belief that the trees were the European cherry, and the consequent expectation that they would bear similar fruit. However, it is correct that, in general, they bear very few fruits.

THE TYPE-SPECIES OF *ALLANTOMA*.

By T. A. Sprague, D.Sc., F.L.S.

At the Fifth International Botanical Congress, held at Cambridge in 1930, the type-method of nomenclature was explicitly accepted*, and the preparation of "Regulations for determining

* Art. 16 *bis*, Briq. Rec. Syn. 9 (1930); and in Rep. Proc. Fifth Internat. Bot. Congr. 564, 565 (1931).

types " * was referred to the Executive Committee of Nomenclature †. The history of nomenclature shows clearly that the desirability or otherwise of particular rules cannot be ascertained without testing them in a large number of individual cases. It is therefore proposed by the writer to publish, from time to time, the results of investigations into the types of generic and specific names, undertaken at the request of correspondents. The conclusions reached are put forward tentatively for the consideration of botanists in general and of the Executive Committee in particular, in the hope that the examples given may be of assistance when the " Regulations for determining types " are drawn up.

The following investigation into the type of the generic name *Allantoma* has been made by request of Mr. P. J. Eyma of the Utrecht Herbarium, who is revising the Lecythidaceæ of Surinam.

The genus *Allantoma*, as described by Miers in 1874 (Trans. Linn. Soc. xxx. 170, 291), originally included twelve species, flowers (but not fruits) being known in *A. multiflora* (Sm.) Miers, *A. subramosa* Miers, and *A. fagifolia* (Berg) Miers, and fruits (but not flowers) in the remaining nine species. The most important generic characters according to Miers (*l. c.* 291) were yielded, on the one hand, by the "*androphorum*" and, on the other hand, by the seeds.

It was discovered by Ducke (Arch. Jard. Bot. Rio de Janeiro, iv. 154, 1925) that the flowers of *A. lineata* (Berg) Miers differ greatly from those of *A. multiflora* and *A. subramosa*; and Mr. Eyma now informs me that two distinct genera were included by Miers in *Allantoma*, one corresponding to the flowering material seen by Miers (*A. multiflora*, *A. subramosa*, and *A. fagifolia*), and the other represented by the fruiting material.

The question now arises for which of these two genera the name *Allantoma* should be retained. It seems clear that it should be attached permanently to one of the nine fruiting species, since Miers derived the name from ἀλλᾶς, sausage, and ὅμοιος, like, in allusion to the sausage-shaped fruits. The adoption of this course has the further advantage of retaining the name *Allantoma* for the part of the genus containing the greater number of species. Both these considerations are in accordance with the spirit of Art. 45 of the old International Rules, which dealt with the division of a genus.

The choice of a type-species may be narrowed down to *A. torulosa* Miers, *A. cylindrica* Miers, *A. scutellata* Miers, and *A. Burchelliana* Miers, since these four were the only species of which seeds were known to Miers. For practical reasons,

* Art. B. 45, Briq. *l. c.* 56, 598.
† Art. 58 *bis*, Briq. *l. c.* 90, 614.

A. cylindrica and *A. scutellata* may be set aside, since little more than the fruit is known in each of these species. The final choice accordingly lies between *A. torulosa* and *A. Burchelliana*, and *A. torulosa* is here suggested as lectotype, because the operculum of the fruit is known in it, but not in *A. Burchelliana*.

Ducke has reduced *Goeldinia riparia* Huber and *G. ovatifolia* Huber to *A. lineata* (Berg) Miers. Hence the synonymy of *Allantoma* is as follows :—

ALLANTOMA *Miers* in Trans. Linn. Soc. xxx. 170, 291 (1874), emend. Eyma.
Goeldinia Huber in Bol. Mus. Paraense, iii. 438 (1902).
Lectotype-species : *A. torulosa* Miers.

Six considerations emerge as the result of the above investigation. Where an author in publishing a new generic name does not clearly indicate which species is the type, the incidence of the generic name may be determined :—

(1) By examination of the original generic description and accompanying remarks, and especially of the characters given as diagnostic by the original author.

(2) By the derivation of the generic name, which may indicate a particular species or group of species. This applies more especially to names derived from taxonomic characters.

(3) *Ceteris paribus*, by applying the name to the largest segregate group.

(4) By excluding all species not seen by the author of the generic name unless there is evidence that the generic description was primarily based on one of them.

(5) By choosing as lectotype a species known to the original author of the generic name by better material than other species.

(6) Subject to the preceding considerations, by choosing as lectotype the species best known at the time of choice.

The relative precedence which should be assigned to these six considerations may perhaps be a matter of opinion, but nos. 1 and 2 seem to be of primary importance. Nos. 3 and 6 are based on convenience. No. 4 excludes *Allantoma lineata* (Berg) Miers, which was known to Miers from description and figure, but is now apparently the best-known species of the genus, and in other circumstances might, therefore, have been selected under no. 6.

Investigations of other examples will doubtless lead to the emergence of additional criteria for determining the incidence of generic names. The present discussion has been purposely limited to considerations arising directly from the example of *Allantoma*.

NEW VICE-COUNTY RECORDS FOR SPHAGNA, MOSTLY NORTH COUNTRY.

By A. Thompson.

Sphagnum fimbriatum Wils. var. *tenue* Grav.; drying-up ditch, moor near Baslow; v.c. 57.

Var. *laxifolium* Warnst.; wet ground, Ecclesall Wood, Sheffield; v.c. 63.

S. Warnstorfii Russ.; wet ground, fells near Coniston, v.c. 69; and wet ground, near Stonethwaite, v.c. 70; also marshy ground, Longshaw, v.c. 57.

S. americanum Warnst.; fairly dry limestone pasture near Bordley; v.c. 64.

S. amblyphyllum Russ. var. *macrophyllum* Warnst.; marshy ground, Longshaw; v.c. 57.

S. pulchrum Warnst.; submerged all but heads, in small pool, Ben More, v.c. 88; and marshy ground, Stanage, v.c. 57.

S. recurvum Pal. de Beauv. var. *parvulum* Warnst.; wet ground, among rushes, Longshaw; v.c. 57.

S. fallax v. Klinggr. var. *laxifolium* Warnst.; wet bank in a wood, Rivelin Valley, Sheffield, v.c. 63; also wet ground, Longshaw, v.c. 57.

Var. *Roellii* Schlieph.; ditch, Stanage; v.c. 57.

Var. *robustum* Warnst.; damp bank in a wood, Rivelin Valley, Sheffield; v.c. 63.

S. cuspidatum Ehrh. var. *submersum* Schimp.; ditch Longshaw; v.c. 57.

Var. *plumosum* Schimp.; floating in small pool, Lustleigh Cleave, v.c. 3; and with only heads out of water, small pool, Cronkley Fell, v.c. 65; submerged all but heads, fells near Coniston, v.c. 69; submerged in pool Craig na Chaillich, v.c. 88; also, almost submerged in a pool Stake Pass, v.c. 70.

Var. *plumulosum* Schimp.; wet ground, Cracoe Fell; v.c. 64.

S. obesum Warnst. var. *insolitum* Card.; ditch in wood, Longshaw; v.c. 57.

S. subsecundum Nees var. *intermedium* Warnst.; marshy ground, fells near Coniston; v.c. 69.

S. inundatum Warnst. var. *robustum* Warnst.; edge of a pool, Longshaw; v.c. 57.

S. aquatile Warnst.; submerged, fells near Coniston; v.c. 69.

Var. *sanguinale* Warnst.; ditch near Killin, v.c. 88; and, all but heads submerged, Loughrigg, v.c. 69; also in a marsh, Longshaw, v.c. 57.

Var. *remotum* Warnst.; with heads only on surface of a pool, Ben More; v.c. 88.

Var. *pauperatum*; wet ground, Stake Pass, v.c. 70; and wet ground, Loughrigg, v.c. 69.

S. crassicladum Warnst. var. *magnifolium* Warnst.; submerged in pool, Hathersage Moor, v.c. 57.

Var. *diversifolium* Warnst.; ditch, Stanage, v.c. 57.

S. hakkodense Warnst.; wet ground, Loughrigg; v.c. 69.

S. papillosum Lindb. var. *normale* Warnst., a stunted form, rather dry limestone pasture, Bordley; v.c. 64.

Mr. W. R. Sherrin has very kindly corrected my determinations. Vice-county numbers:—3, S. Devon; 57, Derbyshire; 63, S.W. Yorks; 64, Mid-West Yorks; 65, N.W. Yorks; 69, Lake Counties; 70, Cumberland; 88, Mid-Perth.

ARCTOSTAPHYLOS IN N.E. YORKSHIRE: A DOUBTFUL RECORD.

By R. J. Flintoff, F.C.S., F.L.S.

John Gilbert Baker, in his 'Flora of North Yorkshire,' ed. 2, 335 (1906), gives the following record: "*Arbutus Uva-ursi* Linn. Abundant amongst long ling on the hills between Levisham and Cawthorne Camps; Robert Braithwaite." *Arbutus Uva-ursi* Linn. is *Arctostaphylos Uva-ursi* Spr. I would not like to state definitely that Dr. Braithwaite, the author of 'The British Moss Flora,' made a wrong identification, but I am of opinion it is an extremely doubtful record, and I am firmly convinced this plant does not grow in the locality at the present time.

Arctostaphylos may be and is confused with *Vaccinium Vitis-idea* Linn.—in fact, I have had this *Vaccinium* brought to me as *Arctostaphylos*. I have made diligent search on several occasions on the moors between Levisham and Cawthorne Camps without finding any trace of *Arctostaphylos*, whereas *Vaccinium Vitis-idea* is common. It is quite clear to me that Dr. Braithwaite's record is either a bad one or the plant has disappeared. Surely Dr. Braithwaite's specimen must be in a herbarium somewhere, so that if this could be found the matter would be

definitely settled. I have consulted representatives of local natural history societies, and cannot learn of such a record for this plant—indeed, one recorder did not hesitate to express the opinion that a mistake had been made, and the record should be struck out of the 'Flora.' Baker distinctly gives Braithwaite as his authority, and makes no comment himself, so presumably he had not seen the plant.

Henry Baines's 'Flora of Yorkshire,' 1840, comments in reference to *Vaccinium Vitis-idea* :—" Dry places on heaths, in open woods, and on the tops of hills in the West and North Ridings, very plentiful." But there is no mention of *Arctostaphylos* near Cawthorne either in this or the 'Supplement,' edited by J. G. Baker in 1854.

I shall be very pleased to hear from anyone who is in a position to give definite information relative to this record.

I submitted these notes to my friend H. J. Wilkinson, the well-known York botanist, who made the following comments :—" I return your notes on *Arctostaphylos Uva-ursi* Sprengel, and endorse your remarks. I know of no specimen or record of *Arbutus Uva-ursi* Linn. (*Arctostaphylos Uva-ursi* Spreng.) from N.E. Yorkshire. I have gathered it on Cronkley Fell, N.W. Yorkshire, and send a specimen to you.

" In 'North Yorkshire,' 256 (1863), J. G. Baker writes :—'(4) *Arbutus Uva-ursi* Linn. Native. Montane. Area 9. Range 350–500. In Teesdale on the Cronkley and Bleabeck Scars, and by the stream-side above the High Force.'

" This is repeated on p. 335, 'North Yorkshire,' 1906, by Baker with this addition—'Area 3,' evidently the result of his recognising Braithwaite's record. I cannot find any confirmation of this record, and should place the statement of *Arbutus Uva-ursi* as growing in Area 3, N. Yorkshire as doubtful. In fact, Baker ('North Yorkshire,' 56 (1863)), gives *Arbutus Uva-ursi* as one of the species in Class A—species confined exclusively to the western moorlands and slopes.

" It seems to me that in 1863 Baker associated *Arbutus Uva-ursi* with N.E. Yorkshire only on Braithwaite's authority."

A few days later, 6 July, 1932, Mr. Wilkinson wrote :—" I have looked through my notes and cannot find any information from my friend, the late Henry Ibbotson. He writes of finding *Arctostaphylos Uva-ursi* in Teesdale, but does not mention N.E. Yorkshire."

I have given much time and effort to the investigation of this record both in searching the district and making enquiries, and from the evidence submitted I feel justified in believing that *Arctostaphylos Uva-ursi* does not grow now in N.E. Yorkshire, and most probably never did. This plant must be considered very rare in the County of York.

OBITUARY.

Gustav Hegi

(1876–1932).

We are indebted to Prof. Hans Schinz for an appreciation of the work of Gustav Hegi in a biographical notice that appeared in the 'Neue Zürcher Zeitung' for June 21. Hegi, the son of a Swiss pastor, spent his early days in the Fischenthal in the Zurich Oberland, and later at the gymnasium in Winterthur the influence of a keen naturalist, Dr. Robert Keller, encouraged an inborn love for his native alpine flora. At the University of Zurich he studied systematic botany and plant-geography under Prof. Schinz, and in 1900 graduated with a dissertation entitled "The upper Tösztal and adjacent districts, from a floristic and plant-geographical aspect." After a period of study in Berlin he settled at Munich as Kustos of the Botanical Garden under Prof. Goebel. He was also in charge of the associated alpine garden in the Wettersteingebirge. The publication of his 'Illustrated Alpine Flora of Bavaria, Austria, and Switzerland,' and his 'Beiträge' on the Plant Geography of the Bavarian Alpine flora led to an appointment in the University of Munich as teacher in Systematics, Plant-geography, and Applied Botany in 1905. With his students he took botanical excursions at every opportunity to the Tirol, and to the Bavarian and Swiss mountains. Hegi's *magnum opus*, the 'Illustrierte Flora von Mittel-Europa,' planned originally for one volume, grew into thirteen during the twenty-four years which he spent on its production. His publisher, J. F. Lehmann states that two-thirds of the text of 7800 pages was written by Hegi himself, though during later years he was handicapped by a painful illness. He was appointed an Extraordinary Professor in Munich in 1910, and also acted for many years as Swiss Consul. In 1927 he retired to Switzerland a sick man, but continued to work at his 'Flora' up to the time of his death in April last.

SHORT NOTES.

New Records for Pembrokeshire, v.c. 45.—During a visit to St. Davids last August we came across the following species which are not recorded from vice-county 45 in Druce's 'Comital Flora' or Watson's 'Topographical Botany' and its Supplements, nor found in the rather exhaustive lists of plants of this interesting district compiled by A. G. More, Miss Armitage, and Revs. E. F. and W. R. Linton (see Journ. Bot. 1884, 43–46 ; 1901, 52–55 ; 1903, 245–247 ; 1905, 357–361).

Sedum roseum (L.) Scop. Very local in damp fissures of steep cliffs near St. Davids Head. The species is known in

adjoining Carmarthenshire, also in Glamorgan and Brecon, and in Co. Wicklow. Near by grew *S. purpureum* (L.) Link, which is plentiful and native in this part of Pembrokeshire.

Veronica hybrida L. In small quantity with *Rubia* on cliffs near Strumble Head. Recorded from Carmarthenshire.

Mimulus guttatus DC. Plentiful by the Solva River at Whitchurch, above Solva.

Pinguicula lusitanica L. In bogs below Carn-ingle, near Newport, with *Hypericum Elodes, Radiola, Carum verticillatum, Wahlenbergia, Scutellaria minor, Carex dioica,* and *C. fulva.* Apparently the first record for Wales, but its absence from the Pembrokeshire bogs and heathland, so rich in western and Lusitanian species, would be remarkable. *P. lusitanica* is more or less concentrated in three areas in South-west England (Wessex), Scotland, and Ireland. The Isle of Man station connects its Scottish and Irish areas, while this Pembrokeshire locality provides a link between Co. Wexford and Devon.

Orchis maculata L. (*O. ericetorum* Linton). Carn-ingle, near Newport. The aggregate species is recorded from the county in 'Topographical Botany.'

Juncus macer S. F. Gray (*J. tenuis* auct. angl.). Roadside near the New Inn, Precelly Range.

Carex dioica L. Bogs below Carn-ingle, near Newport. Another rather surprising record, the next nearest localities being apparently those in Glamorgan, Brecon, Merioneth, and N. Devon.

C. Pairaei F. Schultz. Very characteristic on dry banks at St. Davids. Possibly the *C. muricata* of E. F. Linton in Journ. Bot. 1905, 360.

We are indebted to the Rev. H. J. Riddelsdell and Mr. W. R. Sherrin respectively for the indentification of the following species of *Rubus* and *Sphagnum,* which are new to vice-county 45 :—

Rubus foliosus Weihe & Nees aggr. St. Davids, apparently rare.

R. mercicus Bagn. var. *bracteatus* Bagn. Roadside near Strumble Head.

Sphagnum Russowii Warnst. Near the summit of Carn-ingle, with other species.

The majority of the species recorded from St. Davids in previous lists were seen, but the following additional notes may be of interest :—

Valerianella dentata (L.) Poll. var. *mixta* (L.). In cultivated land at St. Davids with the typical form and *V. rimosa.*

Senecio Jacobœa L. var. *discoideus* L. Valley at Whitchurch, above Solva.

Veronica agrestis L. Cultivated land at St. Davids, with *V. polita* and *V. persica.*

Leonurus Cardiaca L. Not seen near the Cathedral ruins, where More saw it. Still about farm buildings at Whitesand Bay, St. Davids.

Stachys officinalis (L.) Trevis. var. *hirta* (Leyss.) Rouy. St. Davids. This is doubtless the shaggy form noted by Miss Armitage in Journ. Bot. 1903, 246.

Rumex conglomeratus Murr. × *pulcher* L. (×*R. Mureti* Hausskn.). With the parents on a slope above the ruins of the Bishop's Palace, St. Davids.

Sparganium neglectum Beeby. Not given for v.c. 45 in Druce's 'Comital Flora,' but recorded from there in Suppl. Top. Bot. ed. 2 (Journ. Bot. 1905) on Beeby's authority, and noted by W. R. Linton on Treladdyd Fawr Moor. It also grows in marshy fields at Whitesand Bay, St. Davids.

Cyperus longus L. This could not be found in the old locality at Whitesand Bay.—A. H. G. Alston, C. I. and N. Y. Sandwith.

Seeds and Tubercles in Ficaria verna Hudson.—The following observations on the occurrence of seed and tubercles in *Ficaria verna* (*Ranunculus Ficaria* L.) seem to show that the occurrence of the latter is influenced by both climate and soil, while the occurrence of seed is apparently only common in the warmest parts of the country. Round Saffron Walden, Essex, where the soil is chiefly though not exclusively derived from chalky boulder clay, the plant forms tubercles freely, especially in shady positions. Seedlings were not found, but were probably not looked for very carefully. In the neighbourhood of Newbury, Berks, careful search failed to find tubercles on the plants growing on soils overlying the gravels and Eocene clays, but they were found constantly on plants growing on chalky soil. Here careful search failed to find seedlings, though as the observations did not cover more than four years, seed may have been formed in exceptional years. Near Portsmouth, careful search has failed to find any plants with tubercles occurring naturally on any kind of soil, chalky or otherwise, but seed and seedlings are plentiful every year. Even after this (1932) cold unfavourable spring, plants show obviously good seed, sometimes as many as eight plump achenes having been produced from one flower.

In February of this year a plant was moved into a garden in full sun and with gravelly soil. It has never looked flourishing, it hardly flowered at all, and the leaves died off early, having all disappeared by the middle of May, but in the axils of many leaves were formed tubercles. This experiment will be repeated next year, but in the meantime these observations are published in the hope that others may be induced to add to them.—C. M. Gibson, Municipal College, Portsmouth.

[On the thin chalky soil in my garden at Fetcham, on the northern slope of the Surrey Downs, the plant is an aggressive weed ; the soil is full of tubercles, but I have not noticed seed.—Ed., *Journ. Bot.*]

RUBUS SAGITTARIUS Ridd. in Journ. Bot. 24 (1930). Exsiccata: Ref. nos. 2118–9, 2127 (typus), all in Herb. Bart. & Ridd. Set of British *Rubi*, no. 69, is a mixture of *sagittarius* with a more hairy form. This mixture may account for Sudre's treatment ('Rubi Europæ,' 132).—H. J. RIDDELSDELL.

REVIEWS.

Selecta Fungorum Carpologia of the Brothers L. R. & C. Tulasne. Translated into English by W. B. GROVE, M.A. Edited by A. H. REGINALD BULLER, F.R.S., and C. L. SHEAR. Roy. 4to. Vol. I, pp. 30, xxviii, 247, pls. 5; Vol. II, pp. xxiii, 302, pls. 34; Vol. III, pp. xvii, 206, pls. 22. Clarendon Press: Oxford, 1932. Price £6 6*s*.

THE publication of the 'Carpologia' by the Tulasne brothers marked an epoch in Mycology. In the words of the Editors of the English translation it stands beside de Bary's 'Comparative Morphology and Biology of the Fungi, Mycetoza, and Bacteria' as one of the great mycological classics. The 'Carpologia' appeared from 1861 to 1865; de Bary's work was published in 1884, and was followed promptly by the English translation by Garnsey and Balfour, issued by the Clarendon Press in 1887. It is a matter for congratulation that it should have been possible to reproduce in English form the rare and expensive work of the Tulasnes, which is, moreover, owing to its Latin text, not readily available to English botanists. The production of the work has been rendered possible through the munificence of Dr. Howard A. Kelly of Baltimore, U.S.A., to whom the translation is dedicated, and of four other generous donors, to whom the editors also express their thanks. The editors have also been fortunate in the translator. Mr. W. B. Grove is not only an experienced mycologist but an able Latinist whose aim has been "to retain somewhat of the archaic flavour of the work," and "to keep as close as possible to the text both in matter and in the varying styles of expression." It is of special interest to note that his work after more than five years of labour was completed on his eightieth birthday, 24 October 1928. Mr. Grove is an example of the longevity and continued virility enjoyed by many working botanists—the present volume of this *Journal* opened with the issue of part xii of his "New or Noteworthy Fungi."

The editors' and translator's prefaces are followed by reprints of eulogies of the work of the Tulasnes by P. Duchartre for the Académie des Sciences, Ed. Bornet for the Institut de France, S. Woronin for the St. Petersburg Society of Naturalists, and W. G. Farlow in the 'Botanical Gazette.' The brothers passed the later years of their life at Hyères in the south of France, where the younger, Charles, died in 1884, and the elder Louis

René in 1885. As Prof. Farlow remarks, they were so intimately associated in their lives and botanical work that botanists have almost come to use the name Tulasne as representing a single person. The illustrations in their botanical works were generally by Charles, and the text by Louis, though sometimes the joint work of both. Their active work extended from 1841–1872, a chronological list of their publications is given by M. Bornet, and included studies on the flowering plants, such as monographs on the Podostemaceæ and Monimiaceæ, but they are best known for their work on the structure and life-history of the fungi, especially the hypogæous forms, on which they published a folio volume, 'Fungi Hypogæi' in 1851, uniform with the present work. The authors' preface suggests the deeply religious atmosphere in which the brothers lived and worked, and at the same time is their apology for a life devoted to the investigation of the minuter things of the organic world, "of all the plants which have ever flourished upon the footstool of God (to use the biblical word, *Isaiah*, LXVI. 1) Fungi, of which we intend to treat here, lead the most humble life." The preface concludes with a word of thanks "to the accomplished and clever artist Philibert Picart, who formerly illustrated so well the 'Fungi Hypogæi,' and now again has exerted all his powers so that our new illustrations of fungi should be engraved on copper plate by his own hand, with the help of his brother."

The greater part of the first volume (pp. 1–194) is occupied with a number of introductory chapters, dealing with the origin and nature of fungi and their use in nature, but mainly with their methods of propagation by seeds and spores, the great variety of the structure and inter-relation of which is described in detail. These chapters are of special interest as showing the position of the knowledge of Ascomycetous fungi at the time and the great value of the work of the Tulasnes in advancing their study, and especially in demonstrating the pleomorphism of the group, which was not then generally accepted. The last chapter, X., on the Present Condition of Mycology, What is the Aim of Mycologists?, is introduced with the remark: "It is to be regretted that the knowledge of Fungi is still plunged in such darkness, and it is highly to be desired that this darkness may soon be dispelled. To know Agarics, however great and wonderful their abundance throughout the whole world, is not the half of mycology; many more points requiring investigation remain in the other species; but, above all, the highest skill and equal sagacity will be necessary for future investigators, that they may not rashly adopt new theories and be deceived by the semblance of truth."

The remainder of the volume deals with the Erysiphei, of which sixteen species are described in detail and illustrated in the plates.

The preface of the second volume is dated August 1863, and treats "only of the orders that belong most truly to the Pyrenomycetes"—Xylarei, Valsei, and Sphæriei. We cannot refrain from quoting one sentence which is as trite to-day as when it was written, "All students of botany know how great a pleasure it is to a botanist to come upon a new species and to expound its characters in the usual manner after careful inspection; but far greater will be his delight in enquiries by which he can investigate the habit of the whole order to which it belongs, discover organs hitherto unheard of and resemblances overlooked by all other observers, and above all to recognise and put together again the various scattered members of one and the same species." There is also a quaint apology for the use of Latin as an international medium of intercourse.

The brief preface of Volume III. (September 1865) is in the nature of a farewell, "To the Kind Reader, with all good wishes," regrets "the excessive thinness" of the volume compared with the preceding ones, due to failing strength, and expresses the hope that the authors "have brought forward a sufficient abundance of proofs concerning our doctrine of the multiple fecundity of fungi." It deals with three Orders—Nectrici, Phacidei, and Pezizei.

The value of the 'Carpologia' is well summed up by the editors as supplying the most detailed descriptions, which are remarkably complete and accurate, and the best illustrations of the morphology and life-history of the Ascomycetes yet produced. The connection which the Tulasnes believed that they had established between the different spore-forms in individual species was sometimes erroneous; but subsequent pure-culture studies have verified the correctness of many of their conclusions. The illustrations are marvellous in their accuracy, their detail, and their perfection of reproduction. No student of the Ascomycetes can afford to neglect this wonderful storehouse of information. The copper-plates of the original work have been excellently reproduced by collotype.

The production of the volumes is an example of the best work of the Clarendon Press, the authorities of which have added one other to the series of excellent publications for which botanists owe them a debt of gratitude.

Plants, what they are and what they do. By A. C. SEWARD, F.R.S., Professor of Botany, Cambridge University. Small 8vo, pp. x, 141, frontisp. and 31 text-figs. Cambridge University Press, 1932. Price 4*s.* 6*d.*

THIS handy little volume is described as an attempt to awaken in laymen an interest in some of the fundamental principles of biology. In spite of the plethora of elementary text-books on botany, the author has authority for stating that a dearth of

suitable books is a serious obstacle to teachers, who would like to give every pupil a chance of obtaining some knowledge of Natural Science as an essential part of education; this is the apology for the present volume.

Beginning with a brief comparison between plant and animal life, Professor Seward explains in simple language in twelve chapters the behaviour of plants as living organisms, the functions of the various members, the relation of their structure to these functions, and their method of response to external conditions. The nitrogen- and carbon-cycles in plant nutrition are clearly explained. A chapter is devoted to seeds and seedlings, and the two last chapters suggest the course of the earlier stages of evolution from the unicellular organism. A few books are suggested for further reading, and a glossary defines various technical terms that have been used in the text.

A refreshing change from the ordinary text-book.

Lehrbuch der Pflanzenphysiologie. Bd. II. Von Dr. S. KOSTYTSCHEW; unter mitwirkung von Dr. F. A. F. C. WENT. Crown 8vo, pp. vi, 459, with 72 text-figs. Springer: Berlin, 1931. Price R.M. 28.

THIS is a continuation of Professor Kostytschew's 'Lehrbuch' and with him Professor Went is associated.

The volume falls into two parts: the first five chapters are a consideration of the water economy of the plant and cognate subjects; they deal with the structure and properties of protoplasm, and then, in logical sequence, with the phenomena of osmosis, permeability, suction pressure, water absorption, root-pressure, the absorption of salts, transpiration, the translocation of food stuffs, and so on. The last two chapters, for which Professor Went is responsible, give a general account, all too short, of growth phenomena and irritability. There is a subject-index of 12 pages.—T. G. H.

Annales Bryologici, a Yearbook devoted to the Study of Mosses and Hepatics. Edited by FR. VERDOORN. Supplementary Volume II. CARL HELMUT: *Die Arttypen und die Systematische Gliederung der Gattung* Plagiochila *Dum.* Crown 8vo, pp. viii, 170, 13 text-figs. Vol. V., pp. 168. M. Nijhoff: The Hague, 1931, 1932. Price 6 gld. each.

CARL HELMUT'S revision of *Plagiochila*, a genus of over 1300 known species, introduces important differences from some previous methods. In his subdivision of the genus, the author has developed views put forward by Schiffner, while in his interpretation of the systematic value of individual characters he approaches Spruce, whose work on the Hepaticæ of the Amazon and of the Andes of Peru and Ecuador (1885) he regards as of the greatest significance.

The revision falls into four sections. In the first the author discusses the taxonomy of the earlier workers, Lindberg, Spruce, Schiffner, Stephani, and Dugas, and states the principles of his own method. The second deals with the Comparative Morphology of the genus, the vegetative and sexual organs, and with the taxonomic value of their characters. The third, which occupies the greater part of the volume, pp. 37–146, comprises the systematic revision. Three subgenera are recognised—*Cucullifoliæ*, *Oppositæ*, and *Eu-Plagiochilæ*, depending on the form and position of the leaves. The first is monotypic, the second contains a few species only, the third includes the rest of the genus, which is subdivided geographically as neotropic, palæotropic, and austral-antarctic. Under each subdivision is a key to the numerous sections within which the species are distributed. The sections (and subsections) are fully described, and under each are given the reference to the original description and the localities of the specimens investigated.

The fourth section is a discussion of the phylogeny of the genus and the relationships of the species-groups.

Volume V. contains thirteen separate papers. G. Chalaud gives a detailed account of the tubers and endophytic mycorrhiza in the north Indian species *Sewardiella tuberifera* Kashyap. This species is remarkable among the very restricted number of genera, scarcely a dozen, of Hepatics in which tubers have been described. H. N. Dixon describes a number of small collections of mosses from Sumatra contributed from various sources including the Herbaria at Kew and the British Museum. The number of species recorded for the first time is 73, in addition to 20 new species and one new genus. H. Gams discusses the distribution of some Splachnaceæ and of *Oreas Martiana* in the Alps, and Th. Herzog describes a number of new Bryophytes from Java, the Philippines, and Indo-Malaya. L. P. Khanna (Rangoon) describes and figures the germination of the spores of *Cyathodium Kashyappii* Khanna. L. Loeske discusses the relative importance for taxonomy of morphological and anatomical characters in the Liverworts; G. O. K. Sainsbury criticises the distinction of three closely allied New Zealand species of *Bryum*, and V. Schiffner contributes a description of and notes on *Scapania Degenii* Schiffn. In a short article on "The Future of Taxonomic Hepaticology," Fr. Verdoorn deplores the chaotic condition of the taxonomy of Hepaticæ outside Europe and North America, and enjoins the need for critical revisions of genera based on new collections of adequate material; he also contributes notes on his "Hepaticæ Selectæ et Criticæ," Series III. and IV. Werner Zwickel contributes some tables illustrating the distribution of Ocellæ in genera and species of Liverworts, and, finally, descriptions are given of five new Bryophyta, including a new genus, *Trocholejeunea* Schiffner, from the Himalayas.

MARINE ALGÆ OF KOREA AND CHINA, WITH NOTES ON THE DISTRIBUTION OF CHINESE MARINE ALGÆ.

By Violet M. Grubb, D.Sc.

(Concluded from p. 219.)

The Distribution of Chinese and Korean Marine Algæ.

In the accompanying table an attempt has been made to compare the distribution of the marine algæ on the coasts of China with that found on the coasts of Korea, with a view to throwing some light on the distribution of these algæ in the Pacific.

For this purpose the table has been divided into two main groups, China and Korea. The Chinese algæ have been subdivided into those found north of the Yangtze River (*i. e.*, N. China) and those found south of this river (*i. e.*, S. China). Algæ known from N. China are listed in Howe's paper (7), describing Cowdry's collection from Pei-tai-ho and Cheefoo; Collins's list (1) of Mrs. Spencer Lewis's collection from Pei-tai-ho; Reinbold (11), a collection made from the peninsular of Kiauchow; Cotton (2), the collection of Dr. Boyden at Wei-hai-wei and Pei-tai-ho, and part of the collection described by Gepp. Some of the species described by Debeaux come from this area and those recorded by Martens (8). In addition, there are the species recorded in this paper. Species from S. China are found in Cotton's lists (2) and Howell's collection from Swatow described by Gepp (6). Debeaux (5) mentions a few species from near Hongkong.

Korea is a peninsula running north-west and south-east, and algæ have been collected chiefly from the more accessible centres, Gensan (Wonsan) on the east, Fusan on the south-east, and Kunsan on the west (Okamura). Korean algæ have therefore been separated into these three subdivisions on the table.

A study of this table shows that of the 98 species of marine algæ known from China 31 are also found in Korea. The interest lies in the fact that 26 of these 31 species are found on the west coast—that is, more than three-quarters, 20 of them being confined to that coast and never spreading round to the south-east or east. As might be expected, these 20 species are all forms found in the *north* of China, with the exception of *Sargassum Horneri* Ag., *S. Ringoldianum* Harv., *Gracilaria corticata* J. Ag., and *Laurencia papillosa* J. Ag., and it might safely be predicted that in time these four will be recorded from N. China also.

The distribution of Chinese and Korean marine algæ is shown in the table which follows (pp. 246–248).

	N. China.	S. China.	Korea. E.: Tomanko-Gensan.	Korea. S.E.: Gensan-Fusan.	Korea. W.: Fusan-Kunsan.
CHLOROPHYCEÆ.					
Bryopsidaceæ.					
Bryopsis pennata Lam.	×				
B. plumosa (Huds.) Ag.	×	...	...	×	
Codiaceæ.					
Codium fragile (Suring.) Hariot	×				
Cladophoraceæ.					
Chætomorpha aërea Kütz.	×				
Ulvaceæ.					
Ulva lactuca L.	×	×			
U. rigida Ag.	×				
Enteromorpha compressa Grev.	×				
E. intestinalis Link	...	×			
E. Linza (L.) J. Ag.	×				
E. plumosa Kütz.	×				
E. prolifera (Muell.) J. Ag.	×				
Letterstedtia japonica Holmes	×				
PHÆOPHYCEÆ.					
Sphacelariaceæ.					
Sphacelaria furcigera Kütz.	×				
Ectocarpaceæ.					
Ectocarpus siliculosus (Dillw.) Lyng.	×	×			
Asperococcaceæ.					
Hydroclathrus cancellatus Bory	...	×			
Colpomenia sinuosa (Roth) Derb. & Sol.	×				
Endarachne Binghamiæ J. Ag.	...	×			
Scytosiphon lomentarius (Lyngb.) J. Ag.	×	×			
Chordariaceæ.					
Chordaria cladosiphon Kütz.	×	...	×		
C. firma Gepp	×				
C. flagelliformis (Fl. Dan.) Ag.	×				
Leathesia difformis (L.) Aresch.	×				
Myriactris pulvinata Kütz. (*Gonodia pulvinatum* Nieuwland)	×				
Desmarestiaceæ.					
Desmarestia viridis Lam.	×				
Stilophoraceæ.					
Carpomitra Cabreræ Kütz.	×				
Dictyotaceæ.					
Padina Commersonii Bory	×				
Dictyota divaricata Lam.	×				
D. dichotoma Lam.	×	...	...	...	×
D. indica Sonder	×				
Dilophus Wilsoni Ag.	×				
Neurocarpus divaricatus (Okam.) Howe	×				

	N. China.	S. China.	Korea. E.: Tomanko-Gensan.	Korea. S.E.: Gensan-Fusan.	Korea. W.: Fusan-Kunsan.
Laminariaceæ.					
Chorda Filum (L.) Stackh.	×				
Agarum Turneri Post. & Rupr.	×	...	×	×	×
Fucaceæ.					
Sargassum confusum Ag.	×				
S. Decaisnei Ag.	×	×			
S. glaucescens J. Ag.	...	×			
S. hemiphyllum J. Ag.	×	×	...	...	×
S. Henslowianum Ag.	...	×			
S. Horneri Ag.	...	×	...	...	×
S. linifolium Ag.	...	×			
S. macrocarpum Ag.	×				
S. microceratium (Mert.) J. Ag.	×	...	...	...	×
S. Ringoldianum Harv.	...	×	...	...	×
S. tortile Ag.	...	×	...	×	×
S. Thunbergii (Mert.) J. Ag.	×	×	...	...	×
Turbinaria trialata Kütz.	×				
Cystophyllum fusiforme Harv.	×	...	...	×	
C. Swartzii (Ag.) J. Ag.	×				
RHODOPHYCEÆ.					
Compsopogonaceæ.					
Goniotrichium elegans (Chauvin) Le Jolis	×	...	...	...	×
Helminthocladiaceæ.					
Nemalion elminthoides Batt.	×				
Gelideaceæ.					
Gelidium corneum (Huds.) Lam. (*G. australe* J. Ag.)	×	...	...	...	×
G. latifolium Born.	×	...	...	...	×
G. Amansii Lam.	×	...	×	×	×
G. pusillum (Stackh.) Le Jolis	×				
Gigartinaceæ.					
Endocladia complanata Harv.	×	...	...	...	×
Gymnogongrus flabelliformis Harv.	×	×	×	...	×
G. japonicus Suring.	...	×			
Rhodophyllidaceæ.					
Cystocloniun armatum Harv.	×				
Sphærococcaceæ.					
Gracilaria confervoides (L.) Grev.	×	×	×	×	×
G. lacinulata (Vahl) Howe	×				
G. corticata J. Ag.	...	×	...	...	×
Hypnea reticulosa J. Ag.	...	×			
Rhodymeniaceæ.					
Lomentaria sinensis Howe	×				
L. obtusa (Huds.) Lam.	×				
Champia parvula (Ag.) Harv.	×	...	...	...	×
Rhodomelaceæ.					
Laurencia obtusa (Huds.) Lam.	×	...	...	...	×

	N. China.	S. China.	Korea. E.: Tomanko-Gensan.	Korea. S.E.: Gensan-Fusan.	Korea. W.: Fusan-Kunsan.
Laurencia papillosa Grev.	...	×	...	...	×
L. venusta Yam.	×				
Acanthophora orientalis J. Ag.	...	×			
Chondria succulenta (J. Ag.) Falk.	×				
Polysiphonia japonica Harv. (*P. ferulacea* Suhr.)	×	×			
P. urceolata Grev.	×				
Symphyocladia gracilis (Martens) Falk.	×	...	×	×	×
S. marchantiodes (Huds.) Falk.	×				
Isoptera regularis Okam.	×				
Leveillea bidentata Mart.	×				
Rhytiphlœa tinctoria (Clem.) J. Ag.	×				
R. sinensis Debeaux	×				
Rhodomela subfusca (Woodw.) Ag.	×				
Dasya villosa Haw.	×				
D. pedicellata Ag.	×				
Ceramiaceæ.					
Pleonosporium Borreri (Sm.) Nägeli var. fasciculatum (Harv.) Holmes & Batt.	×				
Psilothallia siliculosa (Harv.) Schmitz	×				
Antithamnion cruciatum (Ag.) Näg.	×				
Spyridia filamentosa (Wulf.) Harv.	×				
Ceramium japonicum Okam.	×	...	...	...	×
C. rubrum (Huds.) J. Ag.	×	...	...	...	×
C. Boydenii Gepp	×	..	×	×	×
Campylæphora hypneoides J. Ag.	×				
Gloiosiphoniaceæ.					
Gloiosiphonia capillaris Carm.	×				
Gloiopeltis coliformis Harv.	×	...	...	...	×
G. tenax J. Ag.	×	...	...	...	×
Grateloupiaceæ.					
Grateloupia filicina (Wulf.) Ag.	×	×	×		
var. porracea (Mert.) Howe	×				
var. Lomentaria Howe	×				
G. affinis (Harv.) Okam.	×				
Dumontiaceæ.					
Hyalosiphonia cæspitosa Okam.	×				
Nemastomaceæ.					
Nemastoma Nakamuræ Yendo (*N. Cowdryi* Howe)	×				
Squamariaceæ.					
Lithophyllum zostericolum Fosl.	×	...	...	...	×
Corallinaceæ.					
Corallina officinalis L.	×	...	...	...	×

An explanation of the distribution of the marine algæ of China and Korea can be found in a study of the ocean currents in this area.* The main current in the W. Pacific is the Kuro Siwo, the " Black Current " or Japan Stream, which is a branch of the

* See map on p. 218.

northern Equatorial Stream. The larger portion of this branch flows up the east coast of Formosa, past the islands between Formosa and Japan, and along the south-east coast of Japan, turning east off the coast of Honshu towards America. Another portion flows along the east side of the China Sea and through the Korean Strait, where it divides ; one branch passes up the east coast of Korea as far as Gensan, where it is met by a cold dark current, the Kurile or Kamchatka Current ; the other branch flows along the west coast of the Japan Islands through the Strait of Soya into the Sea of Okhotsk. The three main islands of Japan are therefore washed on the west coast and as far north on the east coast as the Honshu Island by this warm Kuro Siwo Current, the mean temperature of which is 80°—that is, approximately 5°–15° warmer than the surrounding water.

This current affects also the coast of China and Korea. During the months of May to September the S.W. Monsoon is blowing. The current along the Chinese coast then sets roughly north-east. In S. China (between Hongkong and Foochow) this current is a branch of the southern Equatorial Current from the South Pacific Islands. It is joined by a branch of the Kuro Siwo which flows in a northerly direction up the west coast of the Yellow Sea, circling round the Shantung Peninsula into the Gulf of Chihli, where it flows in an anti-clockwise direction. It is therefore to be expected that the algal flora of N. China (*i. e.*, the coast of the Gulf of Chihli and the Yellow Sea) should show similarities to that of the west coast of Korea, since both these coasts are washed by the same current—and, as the table shows, this is the case. A different branch of the Kuro Siwo Current flows along the east coast of Korea, and the algal flora here shows little resemblance to that of the Chinese coast.

During the remaining six months of the year (October to April) the N.E. Monsoon is blowing strongly along the Chinese coast. The force of the wind stops the northward flow of waters from the southern Equatorial Current and a strong south-west current, beginning from the Korean Straits and circling round the Gulf of Chihli flows in a southerly direction down the coast of China. Here, again, the west coast of Korea and the coast of China are connected by the same current, while the east coast is separated from this group.

In connection with this distribution of the marine algæ it is of interest to note that a similar division of the species found on the east and west coasts of Korea together with the close relation of the west coast to the coast of China has been remarked for the marine fauna. Sowerby (12) says, "The Korean Peninsula seems to form a dividing line between two very distinct faunas . . . The range of certain marine molluscs will be found to extend from the Pacific as far south as the south-eastern coast of Korea where it abruptly ceases." Boyden in a letter to Mrs. Gepp (6) noted the absence of large seaweeds along the

Chinese coast—no species of *Fucus* or any of the larger Laminariaceæ has been recorded; he suggested that this might be due to the lack of cold currents. That this is so has been made clear from the fact that north of Gensan on the east coast of Korea and along the coast of Asiatic Russia (Primorskaya, Kamchatka Prov.) there are found great beds of kelp. These are also recorded for the Kurile Islands (Okamura, 10), where the chief plants are *Thalassiophyllum*, *Constantinea*, *Arthrothamnus*, *Odonthalia*, etc. These regions are all washed by the cold Kurile Current from the north.

It is not suggested that these conclusions are in any way complete. Our records of both Chinese and Korean algæ are too fragmentary. Yet it is hoped that the suggestions made here may stimulate further interest in the matter of the distribution of the Algæ in the Pacific and the correlation of their regions of occurrence with the tides and temperature. Prof. Okamura, though he has published little on the subject in English, has long been interested in the distribution of the marine algæ of Japan and the relationship of the algæ on the coast of the Japan Sea with those on the Pacific coast (10). The question of the relationship between the Chinese and the Japanese algæ still remains. Further, it is well known that the fauna and phanerogamic flora of China resemble in certain respects those of the eastern area of the United States of America, and it is highly probable that a comparison between the algal floras of these regions might point to the same resemblance.

My thanks are due to the authorities of the British Museum (Natural History) and to those of the Royal Botanic Gardens, Kew, for the use of their libraries and herbaria, and their willingness to assist in any way; and to Mr. Cotton for his advice.

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NEW AFRICAN SPECIES OF LEGUMINOSÆ.

By Edmund Baker, F.L.S.

The following novelties are from several collections which have been determined at the Natural History Museum during the last few months.

Five Indigoferas are from Berlin, and I am much indebted to Dr. Diels and Dr. Harms for kindly allowing me to study and describe those plants:—

Crotalaria (*Eucrotalaria*) **Burttii,** sp. nov. *Caulis* adscendens pubescens. *Stipulæ* lineares hirtæ. *Folia* trifoliolata petiolata; foliolis ellipticis vel elliptico-oblanceolatis, superne glabris, subtus sericeo-pubescentibus, 5–6 cm. longis, 1·6–2 cm. latis; petiolis pubescentibus 15–20 mm. longis. *Flores* mediocres in racemos dispositi. *Bracteæ* minutæ subulatæ. *Calyx* in toto ±5 mm. longus, extus sericeo-pilosus, dentibus acutis tubo subæquilongis. *Vexillum* glabrum lineis notatum, orbiculare, cum ungue ±10 mm. longum. *Alæ* oblongæ. *Carina* dorso rotundata cum ungue ±15 mm. longa. *Legumina* oblongo-clavata, breviter stipitata, extus hirsuta, cum stipite 18–20 mm. longa, plurisperma.

Hab. Tanganyika Territory: Kondoa District, near Sambala, alt. 4900 ft., locally common, *B. D. Burtt*, no. 2144. Herb. Mus. Brit.

Characterized by its elliptical leaflets, yellow flowers, with the carina 15 mm. long, and oblong-clavate, very shortly stipitate pods. It is allied to *C. Deflersii* Schweinf.

Indigofera (*Sphæridiophora*) **Burttii,** sp. nov. *Caulis* erectus herbaceus ramosus, 25–40 cm. altus. *Stipulæ* conspicuæ 6–12 mm. longæ, 1·5–3·5 mm. latæ, sericeo-villosæ ovatæ acuminatæ. *Folia* glauco-sericea trifoliolata; foliolis oblongo-lanceolatis acuminatis 6–10 mm. longis, 3–5 mm. latis. *Flores* parvi rosei sæpissime bini breviter pedicellati. *Calyx* cano-pilosus in toto 4–5 mm. longus, laciniis angustis tubo longioribus. *Vexillum* cuneato-obovatum ±4 mm. longum, ±3·5 mm. latum. *Carina* 4–5 mm. longa. *Legumen* breve oblongo-globosum 4–5 mm. longum pubescens sæpissime 2-spermum.

Hab. Tanganyika Territory: Manyoni District, Kazihazi, *B. D. Burtt*, no. 3434. "A scrubby pink-flowered, heavily pubescent herb of dry *Berlinia-Brachystegia edulis-itoliensis woods*, local." Herb. Mus. Brit.

Allied in some respects to *I. sericea* Benth.

Indigofera (*Tinctoriæ*) **Fairchildi,** sp. nov. Planta verisimiliter perennis erecta usque ad ±2·7 m. alta. *Caulis* pubescens. *Stipulæ* lineares 5–7 mm. longæ, stipellis minutis. *Folia* 3–6-juga cum impari; foliolis oblongo-ellipticis oppositis, acutis vel obtusis mucronatis 2·5–3·5 cm. longis 7–12 mm. latis subtus præcipue pubescentibus. *Racemi* folio breviores 2–2·5 cm. longi 8–12 flori. *Flores* parvi rosei. *Calyx* in toto ±2 mm. longus extus pilosus, dentibus lineari-lanceolatis tubo longioribus. *Vexillum* ovatum 5–6 mm. longum ±4 mm. latum. *Alæ* ±4 mm. longæ. *Carina* cum ungue 6–7 mm. longa naviculariformis extus sparse pilosa. *Legumen* rectum ±1·5 cm. longum 5–6-spermum.

Hab. French Guinea: Fouta Jalon, between Mamon and Dalaba, 1927, *David Fairchild*, no. 1275. Herb. Mus. Brit.

The distinguishing features of this plant are the imparipinnate leaves with 3–6 pairs of oblong-elliptic leaflets, the terminal leaflet distinctly petiolulate; flowers ±7 mm. long, 8–12-flowered racemes, shorter than the leaves; and pods straight, 5–6-seeded.

Indigofera (*Heterophyllæ*) **mittuensis,** sp. nov. *Suffrutex* erectus glandulosus, ramis tenuibus strigosis subangulosis glandulosis. *Stipulæ* lineares 3 mm. longæ. *Folia* trifoliolata vel 2-juga cum impari vel simplicia, sessilia; foliolis glandulosis strigosis 5–8 mm. longis 2–3 mm. latis obcuneatis apice rotundatis mucronatis. *Inflorescentia* 4–10 cm. longa. *Bracteæ* minutæ lineari-oblongæ 1·5–2 mm. longæ subpersistentes. *Flores* 4–5 mm. longi in racemos multifloros dispositi. *Pedicelli* ±5 mm. longi glandulosi. *Calyx* in toto 2 mm. longus strigosus glandulosus, dentibus ±1·5 mm. longis. *Vexillum* oblongum 4–5 mm. longum extus pubescens. *Carina* ±4 mm. longa. *Ovarium* subglabrum. *Legumen* ignotum.

Hab. Sudan: Mittuland, Ngama, *G. Schweinfurth*, no. 2777, 14/12/1869. Herb. Berol.

Indigofera (*Dissitifloræ*) **Conradsii,** sp. nov. *Annua* vel perennis. *Caules* teretes ramosi pubescentes procumbentes. *Folia* subsessilia 5–7-foliolata; foliolis 5–10 mm. longis 3–4 mm. latis oblanceolatis vel anguste ellipticis utrinque pubescentibus. *Pedunculi* graciles filiformes 10–15 mm. longi sæpissime ad apicem 2-flori. *Flores* rosei parviusculi. *Calyx* 2·5–3 mm. longus strigosus, dentibus acuminatis tubo longioribus. *Carina* naviculariformis apice obtusa. *Vexillum* ±5 mm. longum. *Legumen* rectum cylindricum 10–15 mm. longum multi(8-12)-spermum.

Hab. Tanganyika Territory: Ukerewe, *Conrads*, no. 165. Herb. Berol.

A close ally of *I. pentaphylla* L. from India and *I. geminata* Baker. Differs from the former by the shape of the leaflets and from the latter by the shorter pods.

Indigofera (*Dissitifloræ*) **mossambicensis,** sp. nov. *Annua* humilis cinereo-pubescens, ramis divaricatim ramosis. *Stipulæ* lineares. *Folia* parva imparipinnata breviter petiolata 3–4-juga cum impari; rachis 5–10 mm. longa; foliolis 3–6 mm. longis 1·5–2·5 mm. latis oblanceolatis vel lineari-ellipticis vel obovatis, lateralibus oppositis, terminalibus breviter petiolatis, utrinque cinereo-strigosis. *Flores* parvi ±3 mm. longi in racemos breves paucifloros vel plurifloros dispositi. *Vexillum* 2–3 mm. longum ±3 mm. latum ovatum vix unguiculatum. *Carina* 3 mm. longa apice ±obtusa. *Legumen* rectum subcylindricum extus cinereo-strigosum 8–10 mm. longum 4–5-spermum.

Hab. Mozambique, *Schlechter*, April 1895. Herb. Berol.

Indigofera Welwitschii Baker var. **simplicifolia,** var. nov. *Annua* gracilis 10–15 cm. alta. *Folia* simplicia lineari-lanceolata 30–40 mm. longa 1·5–3 mm. lata strigoso-pubescentia; petiolis 5–10 mm. longis. *Flores* parvi ±4 mm. longi in racemos laxos dispositi. *Calyx* 2–2·5 mm. longus strigosus, laciniis acuminatis tubo brevioribus. *Vexillum* 3·5–4 mm. longum ±3 mm. latum, ovatum glabrum. *Carina* ±4 mm. longa apice acuminata. *Legumen* 12–15 mm. longum 1·5–2 mm. latum leviter incurvum strigosum ±9-spermum.

Hab. S.W. Africa: Damaraland, Karibib, *Dinter*, no. 2523. Herb. Berol.

Differs from the species by the simple leaves, shorter inflorescence and shorter calyx-lobes. The carina is acuminate.

Indigofera (*Tinctoriæ*) **Ellenbeckii,** sp. nov. *Suffrutex* erectus albo-hirsutus 20–30 cm. altus. *Stipulæ* subulatæ 5–7 mm. longæ. *Folia* unijuga petiolata, petiolis 7–9 mm. longis, rachides 13–20 mm. longæ; foliolis ovatis vel ellipticis apice rotundatis vel emarginatis 1–2·6 cm. longis 7–18 mm. latis superne velutino-hirsutis subtus hirsutis, terminalibus petiolatis. *Flores* 6–8 mm. longi 12–20 in racemos dispositi. *Racemi* axillares 1–3 cm. longi subsessiles. *Pedicelli* ±0·5 mm. longi. *Calyx* albo-hirsutus in toto 4–5 mm. longus, dentibus subulatis 3–4 mm. longis. *Vexillum* ovale vel ellipticum 6–7 mm. longum 3–4 mm. latum. *Carina* naviculariformis 6–7 mm. longa. *Legumen* immaturum rectum albo-hirsutum ±12 mm. longum pluri-spermum.

Hab. Galla Highlands: Arusse Galla, *Ellenbeck*, no. 1047. Herb. Berol.

This is distinguished by its grey tomentose unijugate leaves and short inflorescence.

Ormocarpum (*Bibracteata*) **aromaticum,** sp. nov. *Frutex* erectus ±3·5 m. altus, ad *O. bibracteatum* Bak. accedens; ramis cortice griseo obtectis. *Folia* ex eodem puncto fasciculata 10–12 foliolis; foliolis oblongis vel elliptico-oblongis

glandulosis hirtis 5–7 mm. longis 3–4 mm. latis, petiolis brevioribus. *Stipulæ* lanceolatæ. *Flores* majusculi pedicellati bini. *Pedunculi* glandulosi brevissimi 5–10 mm. longi. *Bracteæ* ovatæ. *Pedicelli* 15–23 mm. longi glandulosi. *Bracteolæ* ovatæ dorso glandulosæ. *Calyx* campanulatus ±10 mm. longus extus glandulosus, dentibus subacutis. *Petala* flavido-rosea lineis purpureis venosa. *Vexillum* rotundato-obovatum, lamina ±14 mm. longa ±18 mm. lata, ungue ±5 mm. longo. *Alæ* inæquilateraliter ovatæ, lamina 14–15 mm. longa, ungue 5–6 mm. longo. *Carina* navicularifformis, lamina 12–13 mm. longa, ungue ±6 mm. longo. *Ovarium* lineare hirtum. *Legumen* ±6-spermum glandulosum hirtum, articulis inæquilateraliter oblongis 9–12 mm. longis.

Hab. TANGANYIKA TERRITORY: Kondoa District, Sambala in N. Sambala Hills, *B. D. Burtt*, no. 2000; 28/3/29. Herb. Mus. Brit.

Shrub 10 ft. high, with peeling papery bark on old wood. Flowers salmon-pink veined with purple. Aromatic glandular hairs on leaves.

Also *Burtt* nos. 1657, 1957, 1973, and 3363. The flowers in no. 1973 are white with salmon-red veins.

Allied to *O. bibracteata* Baker, but differs by the glandular hairs, fewer leaflets, and 2-flowered racemes.

Erythrina Burtii, sp. nov. *Arbor* ±7·5 m. alta, adspectu *Acaciæ spirocarpæ* Hochst.; ramis glabris, cortice plumbeo obtectis; spinis breviter curvatis, 5–7 mm. longis. *Folia* trifoliolata; foliolis utrinque glabris rotundatis transverse ovalibus vel obovatis, interdum latioribus quam longis, apice rotundatis vel emarginatis, terminalibus 3–5 cm. longis et latis, lateralibus 2–4 cm. longis et latis; petiolulis terminalibus 1·5–3 cm. longis; petiolis 6–12 cm. longis glabris sparsissime spinosis. *Flores* in racemos laxos dispositi, coccinei; pedunculis 6–12 cm. longis. *Bracteæ* 2–3 mm. longæ ovatæ acutæ. *Pedicelli* 5–10 mm. longi. *Calyx* spathaceus 1–2·5 cm. longus demum glaber. *Vexillum* amplum recurvum complicatum cuneatim obovatum glabrum 2·5–4 cm. longum 2–3 cm. latum. *Alæ* inæquilateraliter ovatæ vexillo breviores 1·5–1·8 cm. longæ. *Carinæ* petala libera inæquilateraliter ovata vexillo breviores 1·5–1·8 cm. longa. *Stamen* vexillare ad medium connatum. Stylus glaber. *Ovarium* velutinum multiovulatum stipitatum. *Legumen* ignotum.

Hab. TANGANYIKA TERRITORY: Kondoa District, 4300 ft., Mangoloma Village and Irangi District, *B. D. Burtt*, nos. 704 (type, flowers), 1944 (type, leaves), 1945; *Busse* no. 288, 1900–1901. Herb. Mus. Brit. Native name: Kichumbichumbi (Irangi). A locally distributed species.

A striking tree, always with a flat crown that resembles *Acacia spirocarpa* Hochst. Thorns persist on old wood of bole and are raised on growths of bark. The flowers appear before the leaves and are scarlet.

As the calyx is spathaceous it is best placed in the Sect. Dilobochilus Harms, but the apex is not bifid.

Albizzia (*Eualbizzia*) **amaniensis,** sp. nov. Verisimiliter arbor; ramis glabris vel subglabris, cortice nigro, juvenilibus fulvo-tomentosis. *Folia* bipinnata petiolata; petiolis 4–5·5 cm. longis, glandulis minus conspicuis, pinnis 3–4-jugis 4–10 cm. longis; foliolis 7–10-jugis oblique ovatis vel rhomboideo-ovatis, costa subcentrali, glabris 1·5–3 cm. longis 7–17 mm. latis; rhachibus sparse pubescentibus; petiolulis ±1 mm. longis. *Pedunculi* fulvo-tomentosi 3–5 cm. longi axillares et ad apices ramorum dispositi. *Pedicelli* 2–4 mm. longi graciles tomentosi. *Flores* 5-meri. *Calyx* campanulatus fulvo-tomentosus 2–3 mm. longus. *Corolla* extus fulvo-tomentosa 5–6 mm. longa, petalis ultra medium connatis. *Stamina* numerosa basi in tubum connata ±1·5 cm. longa. *Ovarium* glabrum lineari-oblongum. *Legumen* ignotum.

Hab. TANGANYIKA TERRITORY: Amani, *A. Zimmermann*, no. G 3026. Herb. Mus. Brit.

This is a very close ally of *A. coriaria* Welw. from Angola, but is at once distinguished by the smaller, pedicelled, fulvo-tomentose flowers and distinctly shorter stamens.

Lotononis (*Krebsia*) **Brierleyæ,** sp. nov. *Frutex* erectus; ramis cano-tomentosis teretibus. *Stipulæ* binæ inæquilateraliter oblongæ vel ellipticæ 5–8 mm. longæ. *Folia* trifoliolata petiolata; petiolis 2–5 mm. longis cano-tomentosis; foliolis oblanceolatis apiculatis utrinque sparse adpresse cano-pubescentibus 7–12 mm. longis 2–3·5 mm. latis. *Flores* ±2 cm. longi solitarii axillares. *Pedunculi* 3–7 mm. longi, pedicellis 2–5 mm. longis. *Calyx* pubescens in toto 10–12 mm. longus, dentibus deltoideo-acuminatis 7–8 mm. longis. Vexilli lamina 14–16 mm. longa ±16 mm. lata late orbicularis dorso griseo-sericea, ungue 3–4 mm. longo. *Alæ* oblique oblongo-lanceolatæ, lamina 10–11 mm. longa ±6 mm. lata, ungue 6 mm. longo. *Carinæ* lamina navicularifformis 10–11 mm. longa ±6 mm. lata, ungue 6 mm. longo. *Legumen* lineari-oblongum 3–3·5 mm. longum acutum extus cano-pubescens, multispermum.

Hab. ORANGE FREE STATE: Likatlong, kopjes and also veld, *Miss E. M. Brierley*, no. 34; May 1931. Herb. Mus. Brit.

A woody bush. Vexillum lavender-blue, carina and wings yellow tipped with blue.

This plant is allied to *L. Wyliei* Wood and *L. divaricata* Benth., but differs from the former by the less dense habit of the leaves and the shape and colour of the carina and wings, the wings of this species are obliquely clawed. It differs markedly from *L. divaricata* by the shape of the petals, especially of the vexillum and wings.

AUSTRALIAN ACACIAS IN CEYLON.

By T. Petch, B.A., B.Sc.

In the *Journal of Botany*, 1922, 121, Lynch referred to the Australian Acacias changing their flowering season when planted in India. As several Australian Acacias have been planted in Ceylon, it appeared to be of interest to determine whether any similar effect was observable in that country.

The most widely planted Australian Acacia in Ceylon is *Acacia decurrens* Willd. This was introduced about the year 1882, and has been extensively planted in the hill-districts in wind-belts and firewood reserves. A few years ago it was adopted as a green manure tree for tea, the trees being planted through the tea, and kept low by pollarding at a height of about four feet and subsequent periodic lopping. It was found, however, that *Acacia decurrens* was a host of a fungus, *Cercosporella Theæ*, which spread from the Acacias to the tea by means of spores and falling leaflets. Consequently, its use as a green manure has practically been abandoned. At the present time, practically the only use of *Acacia decurrens* in Ceylon is for firewood.

In Nuwara Eliya (elevation 6200 ft.) there are old trees and groves of *Acacia decurrens* everywhere. The tree seeds freely, and patches of waste ground may become dense thickets of young *Acacia decurrens*.

Preliminary observations from August 1926 to May 1927 showed that, although the principal flowering season, *i. e.* when all the trees were covered with blossom, was September–October, there were numerous trees in flower in all the other months. This was confirmed by later observations. In every month of the year, the majority of the trees in Nuwara Eliya are in flower to some extent.

Observations were then begun on a tree, probably forty years old, in the Nuwara Eliya Park, and on a group of three young trees, about six years old, elsewhere, to determine whether individual trees flowered during the whole year. These were carried on from May 1927 to September 1928.

The old tree bore flowers, first on one branch and then on another, until September 1927, when it came into flower as a whole. From September 1927 it continued sporadic flowering on different branches until September 1928, when it again flowered as a whole. It was never out of flower, though there were comparatively few flowers on it in July and August.

The three young trees were partly in flower from May 1927 onwards. In July and August they bore only a few flowers, but they were in full flower in September and October. They then reverted to their habit of partial flowering until July 15, 1928, when one of them ceased flowering. The last-named came into flower again on September 2, and all were in full flower on September 24, 1928.

These observations show that, at Nuwara Eliya,

(1) the principal flowering season of *Acacia decurrens* is September–October,
(2) a majority of the trees are partly in flower at any time of the year,
(3) some individual trees may be partly in bloom throughout the year.

Maiden, in ' The Forest Flora of New South Wales,' iii, p. 45, wrote as follows regarding *Acacia decurrens* var. *normalis* :—

" It has been thought that the period of flowering affords an infallible guide to the discrimination of at least two varieties, e. g., *normalis*, a winter, and *mollis*, a summer flower. Under each variety will be given notes as to the months of flowering of some specimens in the National Herbarium, Sydney. The present list is of var. *normalis*, and other varieties will be dealt with separately. It will be seen that the time of flowering is not an absolute criterion as to the variety. Knowledge of the flowering period is, however, often useful to people who have devoted particular attention to the wattles of a district. Sometimes the same tree flowers twice in a season, and the period of flowering is affected by climatic influences of a particular district, and a particular season."

For var. *normalis* Maiden gives June, July, August, September, October. For var. *mollis* he gives October, December, January, February for Tasmania ; September, October, November, December, March for Victoria ; and all months of the year, except May, for New South Wales. But one is left in doubt whether the specimens on which these records are based were collected from trees in full flower or trees partly in flower.

A few trees of *Acacia decurrens* var. *mollis* (*Acacia mollissima* Willd.) were introduced into Ceylon with the first introduction of var. *normalis*. It was re-introduced in 1913, but the trees in the latter instance were planted in an isolated group at Hakgala. The observations recorded above refer to var. *normalis*.

It will be seen that in Ceylon *Acacia decurrens* can scarcely be said to have changed its flowering season. Its principal flowering season is still September–October. But it has extended it by partial flowering throughout the year.

Australian visitors to Nuwara Eliya complain that the wattles (*Acacia decurrens*) there have no scent.

Acacia melanoxylon R. Br. is said to have been introduced into Ceylon about the year 1855. It has not been widely planted, but there are large old trees along roadsides, especially in Nuwara Eliya. It seldom produces seed, and is propagated by root suckers.

Several old trees along the roadside in Nuwara Eliya were observed to be in bud in July 1927. These, however, shed all their buds at the beginning of August, *i. e.*, at the close of the heavy rains of the south-west monsoon, and did not bear any flowers. In the Nuwara Eliya Park, a tree was in flower on its leeward side on August 14th, and three others, one on its windward side, on August 21st. Another tree, in a different locality, was in flower on September 10th. Only these five trees were seen in flower.

With one exception, these trees did not flower again until September 1928. The exception was the tree which came into flower on August 14th. It was in flower on both sides on October 7th, and continued to bear flowers here and there throughout the year, until it came into full flower again at the beginning of September 1928. This was a younger tree than the others, and it was growing on ground which became swampy in wet weather.

As so few trees of *Acacia melanoxylon* flowered in 1927–28, these observations are somewhat inconclusive. They appear to show that

(1) the flowering season of *Acacia melanoxylon* at Nuwara Eliya is August–September,
(2) many trees do not flower because they shed their buds at the close of the rains,
(3) most of the trees have a definite flowering period, but one has been observed to flower throughout the year.

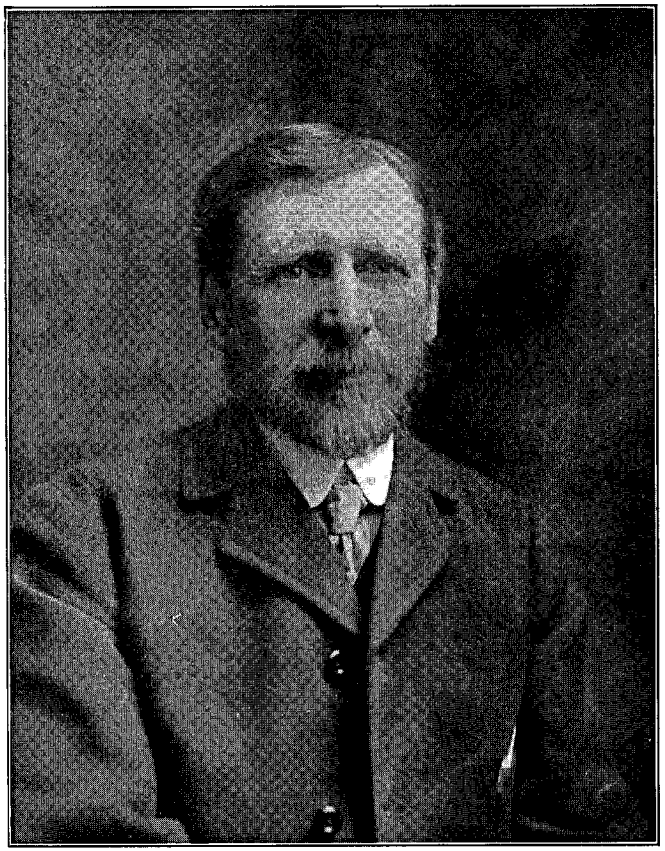
OBITUARIES.

Symers Macdonald Macvicar

(1857–1932).

(With Portrait.)

On February 27, 1932, there passed away at Invermoidart in the person of Dr. Symers Macdonald Macvicar one who had done more than anyone else for the students of British hepatics since the days of W. J. Hooker. He was born at Moffat December 27, 1857, his father being the Rev. John Gibson Macvicar, D.D., LL.D., and his mother Mrs. Jessie Robertson Macdonald Macvicar, the granddaughter of William Robertson the historian, and the great granddaughter of Donald Macdonald who lost his head and the property of Kinlochmoidart in the rising of '45. He inherited a taste for Natural History from his father, who was at one time Professor of Natural History at the University of St. Andrews, and I have a letter to him in 1828 from W. J. Hooker himself, from which it seems that he at one time thought of offering himself for the Chair of Botany at the "London University,"



SYMERS MACDONALD MACVICAR.

and had solicited W. J. Hooker's influence on his behalf. His father was also the author of 'A Sketch of Philosophy' and an 'Enquiry into Human Nature' and other scientific subjects.

S. M. Macvicar studied first at a private school at Moffat, then at Bedford, and afterwards at Edinburgh University, where he took the degrees of L.R.C.P. and L.R.C.S. After taking his degrees he took appointments on board various ships as doctor and saw a good part of the world.

In 1887 he married his cousin's widow, Mrs. D. Robertson-Macdonald (*née* Littledale), and they went round the world on their honeymoon. On their return he settled down at his home, Invermoidart, on the island of Shona, and he spent a good deal of his time in beautifying the island by planting trees and by other improvements. After settling at Invermoidart Dr. Macvicar did not practice as a medical man, but his unremunerated advice was constantly sought and willingly given for the alleviation, not only of human suffering, but also of the domestic animals in his neighbourhood. He seldom left Invermoidart, and on his death he was buried in the old family grave on Eilean Finnean, the beautiful "Green Isle" in Loch Shiel, familiar to all those who accepted his kindly hospitality.

Macvicar took up the study of botany seriously, and between 1896 and 1899 he published a number of papers, mostly in the 'Annals of Scottish Natural History,' on the flowering plants, the most important perhaps being "On the Flora of Tiree" (1898). These papers give a promise of that painstaking accuracy which was so characteristic of his later work. During this time he must also have been closely studying the hepatic flora of his district, since in August 1899 he published in this Journal "Hepaticæ of Moidart, West Inverness," which gives a list of 131 species as occurring in the district, and shows an accurate knowledge of the group. From this time onwards his publications appear to have been limited to the hepatics, and they followed one another in quick succession. In 1901 he published, also in this Journal, "A Key to British Hepaticæ," which was revised and published separately in 1906. In 1910 he published "The Distribution of Hepaticæ in Scotland" (Trans. Bot. Soc. Edinburgh), an important work unique of its kind, and dealing exhaustively with the subject. In 1912 appeared 'The Student's Handbook of British Hepatics,' a work which has done more to popularize and facilitate the study of these difficult plants than any other which has been published in this country. While bringing the subject within the range of the ordinary student, it is scientifically accurate, and reveals a very intimate knowledge of the group. A revised edition was published in 1926, and the book remains the standard work on the subject, both in this country and in the United States.

Of retiring disposition, and very modest about his own attainments, Dr. Macvicar was none the less most helpful, both

with advice and specimens to other students who sought his aid, and I have received a very warm encomium on his merits in this respect from Dr. A. W. Evans of Yale University.

He was President of the British Bryological Society in 1925 and 1926.

He is commemorated in *Lejeunea Macvicari* Pears., described by the late W. H. Pearson in this Journal in 1900, and I dedicated to him a new genus of hepatics, *Macvicaria*, from South-West China in 'Symbolæ Sinicæ' in 1930.

It is satisfactory to know that his valuable herbarium has found a suitable resting-place in the British Museum at South Kensington.

I am indebted to his sister, Miss K. B. Macvicar, for most of the personal details in the above notice, and to Mr. G. Taylor, of the Department of Botany, British Museum, for a few additional facts.

The following is a list of the principal publications of Dr. Macvicar, so far as I am acquainted with them :—

"Notes on doubtfully Native or Introduced Plants in Westerness." Ann. Scot. Nat. Hist., July 1896.

"On the Occurrence of *Eriocaulon* in Coll." *Ibid.*, Oct. 1896.

"On some Coll and Tiree Plants." Trans. Nat. Hist. Soc. Glasgow, Nov. 1897.

"Watson's Climatic Zones." Journ. Bot., Mar. 1898.

"On the Flora of Tiree." Ann. Scot. Nat. Hist., Jan. and Apr. 1898.

"Plants of Lismore." *Ibid.*, Jan. 1899.

"Hepaticæ of Moidart, West Inverness." Journ. Bot., Aug. 1899.

"New British Hepaticæ." *Ibid.*, Apr. 1900.

"*Pellia Neesiana* Limpr. in Britain." *Ibid.*, July 1900.

"A Key to British Hepaticæ." *Ibid.*, May 1901.

"Hepaticæ of the Ben Lawers District." Trans. Bot. Soc. Edin. 1902.

"Hepaticæ of Ardlui District, Loch Lomond." Ann. Scot. Nat. Hist., Apr. 1902.

"The Herbarium (Hepaticæ) of the late Mr. John Sim." *Ibid.*, July 1902.

"A New British Hepatic." Journ. Bot., Jan. 1903.

"Hepaticæ of Lochcarron District, West Ross-shire." Ann. Scot. Nat. Hist., July 1903.

"On the Distribution of the Atlantic Species of Hepaticæ in Scotland." *Ibid.*, Apr. 1904.

"Census of Scottish Hepaticæ." *Ibid.*, Jan. 1904.

"Notes on Scottish Hepaticæ." *Ibid.*, Oct. 1904.

"Census Catalogue of British Hepatics." Moss Exchange Club, 1905.

"Additions to Census of Scottish Hepaticæ, 1904." Ann. Scot. Nat. Hist., Apr. 1905.

'A Revised Key of the Hepatics of the British Islands.' Eastbourne, 1906.

"Hints on the Study of Hepatics." Trans. Edin. Field Nat. & Micros. Soc. 1906.

"Additions for 1906 to Census of Scottish Hepaticæ." Ann. Scot. Nat. Hist., Jan. 1907.

"New and rare British Hepaticæ." Journ. Bot., Feb. 1907.

"Notes on British Hepaticæ." *Ibid.*, July 1907.

"Additions for 1907 to Census of Scottish Hepaticæ." Ann. Scot. Nat. Hist., July 1908.

"The Distribution of *Lunularia cruciata*." Journ. Bot., Dec. 1908.

"List of Arran Hepaticæ." Glasgow Naturalist, Feb. 1910.

"The Distribution of Hepaticæ in Scotland." Trans. & Proc. Bot. Soc. Edin. 1910.

'The Student's Handbook of British Hepatics.' Eastbourne, 1912. Ed. 2, 1926.

WM. EDW. NICHOLSON, Lewes.

GUSTAV WEINDORFER.

BOTANISTS who have visited Tasmania will learn with regret of the death of Gustav Weindorfer, of The Chalet, Cradle Mountain. On the 6th May a casual prospector found his dead body lying a few hundred yards from The Chalet.

He was born in Carinthia in 1873, and went to Australia in 1899 to take up a position in the Austro-Hungarian Consulate in Melbourne. Keenly interested in natural history he joined the Field Naturalists' Club of Victoria in 1901, and for some years took an active part in the work of the Club, especially in the field excursions. "A Report on the Botany of the Buffalo Mountains" was given by him in the 'Victorian Naturalist' for March 1904 (xx. 152–9). This was followed in the same journal by "Some Contributions to the Origin of our Alpine Flora" (xxi. 6–8) and "A Botanical Trip to the Grampians" (xxii. 45–50).

In 1907 he resigned his position in Melbourne and went to live in Tasmania. In 1916, after the death of his wife, he gave up farming and settled at Cradle Mountain.

By botanists Gustav Weindorfer will be remembered for his ready help in obtaining material of Tasmanian alpine forms, his extensive knowledge of the botany of Tasmanian and Victorian mountain heights, and, above all, for his most charming and likeable personality.

A fuller account, by his close friend, Dr. C. S. Sutton, will be found in the 'Victorian Naturalist,' June 1932 (xlix. 34).

C. T. WHITE,
Government Botanist, Brisbane.

SHORT NOTE.

EUPHRASIA SCHINZII (p. 202).—In publishing this name I ignored the existence of ×*E. Schinzii* Wettst. (*E. salisburgensis*×*Rostkoviana*), which appears on p. 281 of Wettstein's monograph of the genus. Like other similar binominals for hybrid forms, this was not inserted in the 'Index Kewensis.' In Art. 51*bis* of the 'Recueil Synoptique' for the new rules of nomenclature, under which all homonyms are to be rejected, a homonym is defined as "duplicating an older name validly published for a group of the same hierarchic rank founded on a different type." My *E. Schinzii* is described as a species, while ×*E. Schinzii* Wettst. is a hybrid; and the two plants are therefore not of the same hierarchic rank, and the later name may consequently be regarded as no homonym. But (Art. 31) binominal names of hybrids, when once created, are subject to the same rules as those of species, and as the object of the elimination of homonyms is the avoidance of confusion, it would seem desirable to include among homonyms any binominals that duplicate the names of hybrids. This perhaps should be made clear in drawing up the wording of the new rules.

With this view it is proposed to substitute for *E. Schinzii* Pugsl. a new name, **E. cisalpina** Pugsl. (in allusion to the plant's occurrence on the Italian side of the Alps). A fresh name seems preferable in this case to the adoption of either of the epithets shown in the synonymy.—H. W. PUGSLEY.

REVIEWS.

Mesembryanthema. By N. E. BROWN, Dr. A. TISCHER, and M. C. KARSTEN. Edited by E. J. LABARRE. Crown 4to, pp. xxvi, 323, 2 pls. coloured and 180 figs. L. Reeve: Ashford, Kent, 1931. Price 36*s*.

THIS somewhat unusually planned book will have a strong appeal for all who are interested in this very remarkable group of plants. It is really three books, as the text is repeated in three languages—English, German, and Dutch. Miss Karsten, Secretary of the "Netherlands Society of Succulent Collectors," is responsible for the translation into Dutch of all that was originally in English (by Mr. Brown) and German (by Dr. Tischer), and has supplied a chapter on General Ecology, including an article on "Mimicry and Windowed Plants," and also a bibliography. Dr. Tischer has made the German translation and added some descriptions and a chapter of notes on cultivation. Mr. Brown, in a Foreword, gives a short account of the history of the Linnean

genus *Mesembryanthemum* and the reasons which led him to regard it as an aggregate of a number of genera. He is responsible for the descriptive text which, with the excellent photographic illustrations, occupies the greater part of the volume, and he has also supplied the originals of two coloured plates in which a number of species are illustrated. For her chapter on "General Ecology" Miss Karsten has drawn largely upon the late R. Marloth's published writings, and from these and other sources brings together an interesting account of the mimicry of the surrounding pebbles &c., which is so striking a feature of many of the *Mesembryanthema* and which, it has been suggested, act as a camouflage to protect them from ostriches and other animals seeking food on the dry veldt. Arguments for and against are discussed, and the conclusion is reached that "it will not be wise to overestimate its importance for the plant itself; the protection which the plant finds by its camouflage is not of such a prominent character as we should like to believe." The purpose of the book is to provide the cultivator with a means of identifying the less common or more interesting stemless or very dwarf species now in cultivation. Of these 146 are figured and described. The figures are excellent reproductions of the growing plant, many are photographed from Mr. Brown's type-specimens and have been taken by his daughter Miss Edith Brown. The genera are arranged in alphabetical order without key or description. It would have been helpful if a reference to the original description of the species had been given; according to the Editor some new species are described, but we find none indicated as new in the text. Synonymy is quoted and serves sometimes to indicate considerable difference of opinion as to generic position between present workers or even of the same worker at different times.

The Altitudinal Range of British Plants. By A. WILSON, F.L.S., F.R.Met.S. Crown 8vo, 105 pp. Buncle: Arbroath, 1931.

THIS is a supplement to the 'North Western Naturalist,' in which it appeared (in five parts) from September 1930 to to December 1931. As the author says in his introduction—"many observations have been made on the altitudinal range of plants in Britain, but there does not appear to have been any attempt to tabulate the records in a handy form for reference." A great deal of information has been brought together and compressed, and though "it does not claim to be exhaustive, and many of the less important records have had to be omitted to economise space," it should prove very useful to the field-botanist interested in this aspect of our flora.

In the present state of our knowledge of the interaction of the factors which control the distribution of British species

it is no doubt difficult to devise a satisfactory scheme for the condensation of these data. I cannot help feeling, however, that although H. C. Watson performed invaluable work for his contemporaries, his classifications and methods are liable to be a dead-weight to us to-day. To define the "mid-agrarian" zone by "*Rhamnus catharticus* without *Clematis*," for example, regardless of the relation of *Clematis* to the lime content of the soil, and so on, will not help us much to-day. The introduction, however, contains much interesting and relevant matter, although some of the explanations may be incomplete. For instance, the occurrence of *Dryas* and *Gentiana verna* at sea-level in the west of Ireland is only part of the widespread occurrence on limestones in Europe of alpine plants which came down during the glacial period and have since persisted side by side with thermophilous species which probably survived the last glaciation. The good winter drainage and summer warmth of these limestones are probably the chief factors in this wide-spread phenomenon.

This work, however, deals only with altitudinal range, and this is naturally affected by diverse factors, of which the daily atmospheric humidity may be the most important. In the colder north saturation is more frequent and mountain plants like *Saussurea alpina* grow practically at sea-level in Caithness. For this reason the use of the two categories "lowland" and "upland" would seem inadequate. Many British plants are montane (*i. e.*, hill country) plants—neither alpine nor lowland. To call *Trollius europæus, Ranunculus reptans, Circæa alpina, Pinguicula alpina, Cystopteris fragilis* and others "lowland" obscures fact, in my opinion. *Carex magellanica* Lam. is marked "lowland," though Marshall, doubting the "3000 in Breadalbane" says "it is only sub-alpine, I think." There is also little value in giving data for aggregate species, such as *Alchemilla vulgaris*. *A. alpestris* is a mountain plant, *A. pratensis* a hill-country plant, and *A. minor* a lowland plant, although their zones overlap, and thus interesting facts of altitudinal range are obscured. Similarly, the "*Thalictrum minus*" on Snowdon is a different plant from the "*T. minus*" of Ben Bulben, and again different from the *T. minus* of the sea-shore sands. What can be gained by lumping distributional data concerning different plants? Would it not be better to indicate, as is done in some cases, that precise data are lacking? Then perhaps someone will be stimulated to produce them and fill the gaps. How high does *Saxifraga hypnoides* ascend if we exclude, as we should, *S. cæspitosa* and others? Similarly, the *Ranunculus acer* which ascends above 3000 ft. is a quite different plant from other lowland *R. acer*.

This work is, however, a valuable beginning, and it is to be hoped that British botanists will furnish the author with the

data necessary for a subsequent edition in which the British Isles should be subdivided into more suitable zones than E., S., I., and W.

The print is clean, and misprints or minor errors few (*e. g.*, Kepel Cove Tarn; *Cypripedium calceolus* with small *c*, Ballyvaghan is in Co. Clare, not Mayo, see *Gentiana verna*, etc.). Field-botanists will probably be able to make various additions, *e. g.*, I have seen *Cerastium arcticum* to 3700 ft. on Ben Mac Dhui; *Hypericum undulatum* occurs in Pembrokeshire; *Sorbus arranensis* (omitted) and the "*S. fennica*" both grow at about 600 ft.; *S. scandica* is probably never native and the Brecon plant referred to is *S. anglica*; *S. minima* is not of "Hall.," and the locality is, I believe, above Llangattwg and not on Craig Cille as usually misstated; *Gnaphalium norvegicum* occurs near sea-level in Caithness; *Listera cordata* grows to the top of the screes above Loch-nagar, *i. e.*, above 2700 ft.; further data for *Epipogon* and others could be given by consulting the necessary maps. The author will doubtless gladly receive further information, for it is evident that a great deal of labour has gone into this work, and omissions are unavoidable in a first compilation such as this. It should stimulate further observation, and thus prove its usefulness.—A. J. W.

Conifers in Cultivation. The Report of the Conifer Conference held by the Royal Horticultural Society, Nov. 10–12, 1931. Edited by F. J. CHITTENDEN, F.L.S., V.M.H. Roy. 8vo, pp. 634, figs. 84. Royal Horticultural Society: London, 1932. Price 21*s.*

MR. CHITTENDEN, who has edited the Report, and the Royal Horticultural Society, under whose ægis it has been produced, are to be congratulated on the prompt publication of the results of the work of the Conference of last November, which was admittedly eminently successful. The various papers put before the members represent a wide variety of interest and provide a valuable record of the present position of Conifers in cultivation in Great Britain, the Dominions, and the United States. A useful introduction is the reference list of species and varieties from out-of-doors in the British Isles, compiled by W. Dallimore. The writer has been at some pains to indicate the names that are valid according to accepted rules of botanical nomenclature. Unfortunately, this means the replacement of some well-known names which have long been in use. The valid names are followed by the synonyms. Sir John Stirling Maxwell discussed the influence of Conifers on Silviculture in the British Isles, and Prof. Borthwick contributed some notes on diseases of

Conifers. The origin and cultivation of dwarf Conifers was treated by Murray Hornbrook, who brought up to date the material accumulated for his book on the subject published in 1923. Arthur D. Slavin supplied notes on some Conifers cultivated in the United States. Of special interest to botanists was a paper sent by Dr. L. Cockayne on polymorphy in New Zealand Conifers. The remarkable polymorphy shown by many members of the New Zealand flora may be assigned to three causes—heteroblasty or the occurrence of juvenile forms, epharmony or the effect of differences in external conditions, and hybridity. In discussing some problems connected with the natural reproduction and survival of New Zealand Conifers, which include such remarkable species as the Kauri Pine, Podocarps, and *Dacrydia*, A. C. Forbes regrets the progressive extinction of these interesting forms due to civilization and its attendant agriculture. F. R. S. Balfour's history of Conifers in Scotland and the Marquess of Headfort's 'Conifers in the Parks and Gardens of Ireland' gave interesting and useful historical and distributional information. Conifers of the temperate regions of the Far East by E. L. Hillier supplied notes on the origin of those species known in cultivation, and A. B. Jackson, in his 'Notes on Chinese Conifers,' discussed the taxonomic position of several species and varieties of *Abies* and *Picea*. Papers on "The Economic Value of the Coniferæ," "Conifer Chemistry," and the "Conifers of Kenya" were contributed respectively by W. Dallimore, Prof. Henry Armstrong, and H. M. Gardner. An abstract of a paper in the 'Empire Forestry Journal,' on the cultivation of exotic Conifers in South Africa by C. E. Legat, was also included.

A brief description is given of the well-arranged and very comprehensive exhibition held in the Society's Great Hall during the Congress.

Perhaps the most valuable part of the report is the "Statistical Returns of Conifers" grown in various parts of the British Isles, which fills 268 pages. Nearly 240 returns were sent in from various parks and gardens, and these have been grouped under Counties. For each species the age, height, girth, and spread are recorded, with brief remarks on general condition &c. The trees are listed under the name sent in, but the editor has added the valid name when necessary. As specimens have not been examined the editor cannot vouch for the names being correct. The Report ends with a list of the chief books on Conifers which may be consulted in the Society's library.

The value of the report is enhanced by the numerous photographic illustrations mainly representing growing species. The whole is a very good guinea's-worth.

BOOK-NOTES, NEWS, ETC.

POLLINATION IN VALLISNERIA.—In the 'Svensk Botanisk Tidskrift,' xxvi, H. 1–2 (1932), Nils Svedelius ("On the different Types of Pollination in *Vallisneria spiralis* L. and *V. americana* Michx.") shows that R. B. Wylie's statement (Botan. Gazette, lxiii. 1917) that Kerner's account of the method of pollination of *V. spiralis* in the 'Pflanzenleben' is inaccurate, does not hold good. Kerner's detailed description and figures have been so frequently referred to that it is useful to have them confirmed. Wylie's mistake arose from the fact that he was unknowingly dealing with a different species, *V. americana*. The position of the stamens in the male flower differs in the two species in conformity with a difference in the conditions necessary to ensure pollination. In *V. spiralis* the stamens, as depicted by Kerner, form a right angle with the depressed sepals and project from the flower. The European species grows in still waters, and the stamens, turned obliquely outwards, are brought into contact with the protruding margins of the stigmas of the floating female flower on the calm water level. In *V. americana* the stamens are upraised and are never widely separated, and a contact between the two forms of flower on level water cannot lead to pollen-transfer; but a slight depression of the female flower by a passing wave tips the surrounding male flowers more sharply inward and enables them to deliver their heavy pollen, which is then received by the large stigmas.

Prof. Svedelius observes that the pollination in the American species, effected by the waves by the intermittent pulling down of the female flower with its surrounding staminate flowers, shows in many respects a close analogy with the method of pollination that he has observed in *Enalus acoroides* in the Indian Ocean. Pollination is here effected by the submersion, through movements of the tide, of the female flower; the male flowers, which have been caught in the long petals, are turned over and drop their pollen upon the stigmas.

"THE BLACKBERRIES OF NORTH AMERICA" is the title of the recent number of L. H. Bailey's "Gentes Herbarum" (Vol. ii. Fasc. vi.). The number, which comprises 150 pages of text and 36 excellent illustrations, claims the interest of all batologists ("blackberry particularists"). Forty years ago when Prof. Bailey took up the study of *Rubus*, five species only were recognized in the *Rubus* flora of eastern North America, and the names of two of these were found on investigation to be misapplied. In the present review (the author disclaims the rank of monograph) eighty-five species are recognized and fully described. Prof. Bailey has approached his task with characteristic thoroughness. In order to form a clear idea of their habit and conditions of growth, he has visited the original habitats of many of the species, and his account of his travels is of special

interest. The work of previous writers is summarized, and excellent advice as to collecting suitable material &c. is tendered to would-be batologists. The term *phasis* is suggested to designate variations or colonies of *Rubus* that do not merit Latin names—it is a descriptive concept, not a taxonomic category. The assumption of miscellaneous hybridity is severely condemned, "hybrids there may be, but the first effort is to determine the species which are supposed to spawn into mongrels." It is well that evidence on hybridity should be sought in chromosome number and character, but material for such study should be taken only from carefully named growths, and then the identical plants should be preserved in the herbarium for verification and record.

Tautonyms.—The March number of the 'Bulletin of the Torrey Botanical Club' contains a list, compiled by Harold N. Moldenke, of these "double binomials," the use of which is contrary to the International Rules. 228 tautonyms are recorded, all except six of which have been published since 1880. Thirty-six botanists are responsible for these names. Karsten, the author of the "Deutschland Flora," heads the list with 86, followed by Huth (in *Helios*, xi. 1893) with 28. European and American authors figure in the list, the late Dr. Druce representing British botanists. The writer of the article points out that owing to lack of adequate search through previous publications, many of these botanists proposed combinations as new which had in reality been formed many years before. Thus *Abies Abies*, accredited in the 'Index Kewensis' (Suppl. vii., 1929) to Druce in 1925, was published by Rusby in 1892; similarly, *Meum Meum* Druce should read *Meum Meum* Karsten (Deutsch. Fl. 1882). Mr. Moldenke has done good service in publishing the result of his investigations into the literature. The names in his list are in alphabetical order, the original reference to each tautonym is cited, and is followed by the combination, with reference, valid under the International Rules.

British Mycological Society.—In vol. xvi. pt. 4 of the 'Transactions' of this Society, T. Petch continues his "Notes on Entomogenous Fungi"; a number of new species are described (without Latin diagnoses!). W. R. Ivimey Cook gives an account of a new species of Chytridiales, *Cystochytrium radicale*, which attacks the roots of *Veronica Beccabunga*, and T. A. Russell discusses a survey of the foot-rot diseases of cereals in the Cambridge district. Rebecca Lurie, investigating the causes of decay in timber from the Rand gold-mines, finds that Fungi Imperfecti are capable of infecting healthy wood, and that a fungus such as *Biospora effusa* may cause serious damage within a short time. F. Mary Green finds that *Cucurbitaria Laburni*, which frequently occurs on dead branches of laburnum trees, cannot be regarded as a wound parasite on normal vigorous trees. K. St. G. Cartwright contributes further notes on Basidiomycetes in culture.

NOTES ON LABIATÆ.
I. THE GENUS *FUERSTIA* T. C. E. Fr.

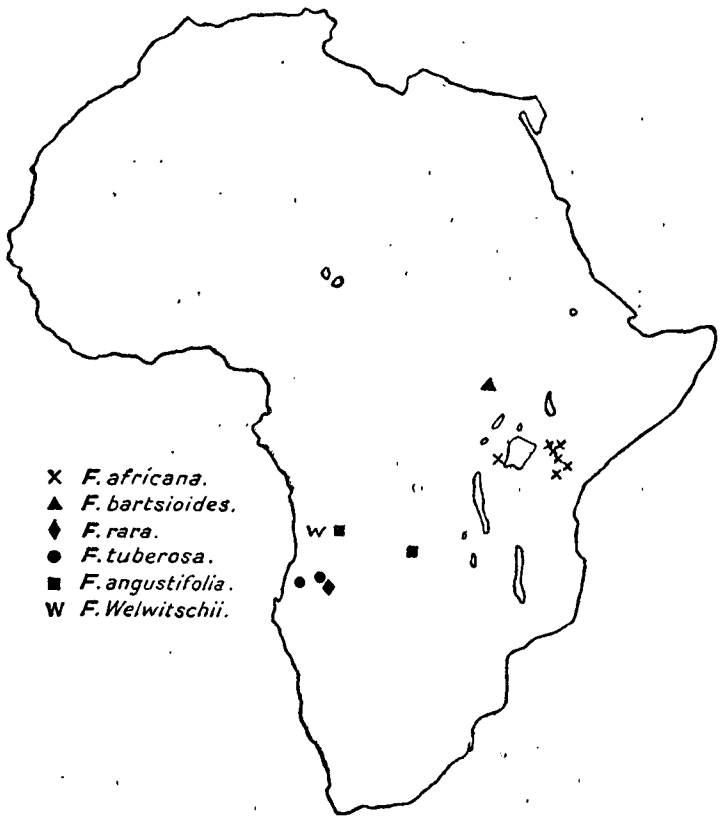
By G. Taylor, B.Sc., F.L.S.

The genus *Fuerstia*, named in honour of Professor Carl M. Fürst, an eminent Swedish anatomist and anthropologist, was established by T. C. E. Fries in 1929 on the single species *F. africana*. Fries's original species was gathered by himself, in company with his brother, R. E. Fries, in Kenya Colony, where apparently it is a common plant in certain parts. The original specimens have not been examined by the writer, but the excellent description and plates given by Fries have enabled a number of previously undetermined specimens to be referred with certainty to this species. In addition, several other species have been found which must also be included in *Fuerstia*, comprising two which were originally described under *Orthosiphon* and three which were undescribed. With these additions, *Fuerstia*, as at present known, consists of six species, but it is possible that others may have been described in neighbouring genera and thus have been overlooked.

Fuerstia belongs to the subtribe Moschosminæ of the subfamily Ocimoideæ, and appears to be most closely related to *Orthosiphon*. In the latter genus the construction of the inflorescence and flower varies very considerably. Some species have glandular bracts, pedicels, and calyces, the verticils 2–4-flowered, and the leaves sometimes ternate. *O. nigripunctatus* G. Tayl. embodies these characters, all of which are associated with species of *Fuerstia*. The fundamental distinction, however, between the two genera is to be found in the androecium which in *Fuerstia* has only two functional stamens, the posterior pair being sterile and much reduced with filaments pilose at the base, while the anterior two are fertile and have glabrous filaments. In *Orthosiphon* four functional stamens are present (in as many species as have been examined), all with glabrous filaments. Although the primary diagnostic character is intrafloral, the species of *Fuerstia* have a distinctive facies, by which they can usually be recognized at once. The aggregation of the immature flowers in glandular heads and their arrangement in 2–4-flowered verticils, and the glandular pubescence of the rhachis, pedicels, and calyces, are characters which in association suggest *Fuerstia*.

The genus, so far as known, is restricted to the drier savannah regions of eastern and south-western Tropical Africa. Two of the six species are found in the eastern area (south-western Anglo-Egyptian Sudan, south-western Kenya Colony, and northern Tanganyika Territory) and the others in Angola and north-

western Northern Rhodesia. The geographical range of the genus with the distribution of the individual species is shown in the accompanying map on which every known record is indicated.



Map showing the distribution of *Fuerstia* and its species.

An examination of the species of *Fuerstia* has shown that the original diagnosis, based on a single species, applies to all those now added, but since several additional characters have been observed these are incorporated in the amplified description given below.

FUERSTIA T. C. E. Fr. in Acta Univ. Lund., Nova Ser., Avd. 2, XXV. Nr. 17. 3 (1929).

Calyx 2-labiate, small and semi-erect during flowering, accrescent and declinate in fruit, densely glandular-pubescent outside especially when young; posticous lip broad, slightly

decurrent; lateral teeth narrow, subulate; anterior lip 2-lobed, the lobes narrow and subulate. *Corolla* 2-labiate; tube straight, not or only slightly exserted from the calyx-tube; posterior lip 4-lobed; anterior lip slightly concave, subequalling the posterior. *Posterior* 2 *stamens* sterile, the filaments free and laxly pilose towards the base; anterior 2 stamens fertile, the filaments free and glabrous; anthers dorsifixed, reniform in outline, the loculi confluent. *Ovary* 4-lobed; style arcuate-ascending, thickened and 2-lobulate at the apex. *Nucules* basi-fixed, surrounded by the gibbous disc.—*Perennial herbs* with ascending stems arising from a woody rootstock. *Leaves* opposite or 3–4-nate, sessile or shortly petiolate. *Inflorescence* consisting of terminal (and sometimes also axillary) simple racemes; verticils 2–4-flowered; flowers pedicellate, at first densely aggregated, later becoming separated as the rhachis elongates; rhachis, bracts, and pedicels (like the outer surface of the calyx) densely glandular-pubescent.

Species 6, confined to Tropical Africa. Type-species: *F. africana* T. C. E. Fr.

Key to the Species.

* Leaves opposite; verticils mostly 2-flowered.
  Lamina more or less crenate at the margin, at least towards the apex. (E. Tropical African species.)
    Leaves manifestly (though shortly) petiolate; lamina comparatively broad in shape (more or less ovate), at maturity about 0·5–2·8 cm. long and 0·3–2 cm. broad, densely pubescent at least on the lower surface, hardly scabrid ..... 1. *africana*.
    Leaves sessile; lamina comparatively narrow in shape (lanceolate to oblong), at maturity about 1·5–4·5 cm. long and 0·5–1·5 cm. broad, scabridly pubescent on the upper surface, densely and hardly scabridly pubescent on the lower surface ..... 2. *bartsioides*.
  Lamina entire or subentire at the margin; leaves sessile or subsessile. (S.W. Tropical African species.)
    Lamina at maturity glabrescent, slightly revolute at the margin, up to more or less 3 cm. long, somewhat rigid in texture, glands inconspicuous ..... 3. *rara*.
    Lamina setose-pilose on the margin and nerves of the lower surface, up to more or less 2 cm. long, thinner in texture, glands conspicuous ..... 4. *tuberosa*.

** Leaves ternate or quadrinate; verticils mostly 3–4-flowered. (S.W. Tropical African species.)
  Lamina more or less densely villous-pubescent on both surfaces, strongly revolute at the margin even when mature; stems conspicuously villous-pubescent ..... 5. *angustifolia*.

Lamina glabrous on the upper surface, at first minutely pubescent on the lower surface and glabrescent, at first more or less revolute at the margin but becoming less so and almost flat at maturity; stems shortly pubescent ..... 6. *Welwitschii.*

1. FUERSTIA AFRICANA T. C. E. Fr. in Acta Univ. Lund., Nova Ser., Avd. 2, XXV. Nr. 17. 3, tt. 1–2 (1929).

GEOGRAPHICAL RANGE.—South-western Kenya Colony and northern Tanganyika Territory, in grassland and scrubland, at about 1200–2100 m. altitude.

KENYA COLONY. Naivasha Prov.: Naivasha, 4 Apr. 1922, *R. E. & T. C. E. Fries* 2758 (not seen); Longunot, alt. about 2100 m., Mar. 1922, *Dummer* 5129 (Herb. Kew). Kenya Prov.: Nyeri, 18 Dec. 1921, *R. E. & T. C. E. Fries* 62 (not seen); same locality, 5 Mar. 1922, *R. E. & T. C. E. Fries* 2156 (not seen); Nairobi, 1901, *Blayney Percival* (Herb. Brit. Mus.); Nairobi and Mbagathi, alt. about 1700–1800 m., 13 Mar. 1930, *Napier* 81 (Herb. Kew); Mbagathi, alt. about 1700–1800 m., 15 Mar. 1931, *Napier* 813 (Herb. Brit. Mus.; Herb. Kew). Ukamba Prov.: Ukambani, alt. over 1200 m., Nov. 1893, *Scott Elliot* 6338 (Herb. Brit. Mus.; Herb. Kew); Wakilomi, Maka, Iveta Mts., 27 July 1893, *Gregory* 103 (Herb. Brit. Mus.).

TANGANYIKA TERRITORY. Bukoba Distr.: Karagwe, Dec. 1861, *Speke & Grant* 385 (Herb. Kew). Moshi Distr.: Moshi, Apr. 1907, *Mercker* 726 (not seen).

It is remarkable that this plant, a native of a comparatively well-known region and the most frequently collected member of the genus, should have remained undiagnosed until 1929. The species is subject to considerable variation, particularly in the size of the leaves. The character of the pubescence is a constant feature.

2. **Fuerstia bartsioides** (Bak.) G. Tayl., comb. nov. *Orthosiphon bartsioides* Bak. in Dyer, Fl. Trop. Afr. v. 367 (1900).

GEOGRAPHICAL RANGE.—South-western Anglo-Egyptian Sudan.

ANGLO-EGYPTIAN SUDAN. Bahr-el-Ghazal Prov.: Seriba Merdyan, *Schweinfurth* 3850 (type, in Herb. Kew).

3. **Fuerstia rara** G. Tayl., sp. nov. *Herba* perennis, altitudinis usque ad 21 cm. attingens; caules sulcati ex rhizomate lignoso subterraneo ascendentes, apicem versus glanduloso-pubescentes alibi plus minusve glabrescentes. *Folia* opposita, subsessilia; lamina lanceolata, basi cuneata, apice acuta, margine integra in sicco leviter revoluta, usque ad 3 cm. longa et 0·8 cm. lata, rigide chartacea, primum in margine et in costa nervisque hispidula deinde glabrescens. *Flores* breviter pedicellati, in racemos terminales dispositi, pedicellis usque ad 2·5 mm. longis dense glanduloso-pubescentibus. *Calycis* tubus cylindraceus, intus glaber, extus dense glanduloso-pubescens, circ. 3·5 mm. longus et 2 mm. latus; labium posticum orbiculare, basi leviter decurrens, 1·5 mm. longum et circ. 2·5 mm. latum; labium anticum bifidum, lobis subulatis circ. 1·5 mm. longis; dentes laterales deltoidei, apice acuminati, circ. 1 mm. longi et basi circ. 1 mm. lati. *Corollæ* tubus circ. 5 mm. longus, ex calyce vix exsertus, labium posticum apice trilobatum, extus dense pilosum, lobo medio maximo subquadrato bifido; labium anticum extus basin versus pilosum. *Stamina* in corollæ tubo inclusa, 2 postica sterilia filamentis liberis pilosis, 2 antica fertilia filamentis liberis glabris.

GEOGRAPHICAL RANGE.—Benguella Distr., Angola, in herb-grown stony ground.

ANGOLA. Benguella Distr.: infrequent near Kubango, 11 Sept. 1905, *Gossweiler* 1667 (type, in Herb. Brit. Mus.).

According to the field-notes accompanying the specimen the plant has creeping rhizomes, which give rise, at short intervals, to single flower-stems about 17 cm. high. The inflorescence is dusky violet-purple and densely covered with glandular hairs, while the corolla is violet purple in the throat and pale violet externally.

4. **Fuerstia tuberosa** (Briq.) G. Tayl., comb. nov. *Orthosiphon tuberosus* Briq. in Engl. Bot. Jahrb. xix. 172 (1894).

GEOGRAPHICAL RANGE.—Southern Angola, in dry scrubland and pasturage.

ANGOLA. Benguella Distr.: between Fte. Princess Amelia and R. Cubango, 13 Jan. 1907, *Gossweiler* 2512 (Herb. Brit. Mus.). Mossamedes Distr.: Huilla, near Lopollo, Jan. 1860, *Welwitsch* 5474 (type, in Herb. Brit. Mus.; Herb. Kew); same locality, alt. about 1500–1700 m., May 1860, *Welwitsch* 5497 (Herb. Brit. Mus.).

5. FUERSTIA ANGUSTIFOLIA G. Tayl. in Journ. Bot. lxix. Suppl. II. 155 (1931).

GEOGRAPHICAL RANGE.—Northern Angola to north-western Northern Rhodesia, in open woodland and grassland.

ANGOLA. Loanda Distr.: Malange, between Kitash and Soba Anguri, 25 June 1903, *Gossweiler* 1035 (type, in Herb. Brit. Mus.).

NORTHERN RHODESIA. Kasempa Distr.: Mwinilunga district, 13 Aug. 1930, *Milne-Redhead* 899 (Herb. Kew).

6. **Fuerstia Welwitschii** G. Tayl., sp. nov. *Herba* perennis cæspitosa, altitudinis usque ad 37 cm. attingens; caules primum minute (apicem versus glanduloso-) pubescentes, deinde glabrescentes. *Radix* lignoso-incrassata, radicibus lateralibus in tubera fusiformia dilatatis. *Folia* ternata sessilia; lamina anguste lanceolata vel elliptico-lanceolata, basin versus gradatim attenuata, apice acuta, margine integra juventute leviter

revoluta, usque ad 2·5 cm. longa et 0·3 cm. lata, supra glabra, subtus primum minute hispidula deinde glabrescens. *Flores* pedicellati, in racemos terminales axillaresque simplices dispositi, pedicellis usque ad 2·5 (ut videtur) mm. longis dense glanduloso-pubescentibus. *Bracteæ* lineares, plerumque circ. 1·5–2·0 mm, longæ. *Calycis* tubus cylindraceus, intus glaber, extus dense glanduloso-pubescens, circ. 3 mm. longus et ore 1·5 mm. latus, nervis primariis 5, secondariis 5; labium posticum late ovatum, basi leviter decurrens, apice acutum, 2 mm. longum et 1 mm. latum; labium anticum bifidum, lobis subulatis circ. 2 mm. longis; dentes laterales subulato-lanceolati, circ. 2 mm. longi. *Corollæ* tubus cylindraceus, 3 mm. longus, fauce vix ampliatus; labium posticum apice trilobatum, 3 mm. longum et circ. 2·5 mm. latum, lobo medio maximo subquadrato bifido; labium anticum ovatum, leviter concavum, apicem versus corrugativum, circ. 3 mm. longum. *Stamina* 2 postica sterilia filamentis liberis circ. 1 mm. longis basin versus laxe pilosis, 2 antica fertilia filamentis liberis glabris 1 mm. longis ex corollæ tubo vix exsertis, antheris confluentibus 1-locularibus ambitu reniformibus. *Stylus* circ. 2 mm. longus, apice breviter bilobatus.

GEOGRAPHICAL RANGE.—Loanda District, Angola, in sandy woods.

ANGOLA. Loanda Distr.: Pungo Andongo district, between Zamba and Cazella, 18 Oct. 1856, *Welwitsch* 1226 (type, in Herb. Brit. Mus.; Herb. Kew).

The type-gathering, *Welwitsch* 1226, was referred with uncertainty by Hiern (in Cat. Afr. Pl. Welw. i. 860 (1898)) to *Orthosiphon parvifolius* Vatke, owing to "the young state of the flower buds and the poor condition of the specimens which were collected by night." The material in the British Museum Herbarium, however, is ample to show that the plant belongs to *Fuerstia*, and represents a new species of the genus. Welwitsch's notes indicate that it is a very rare herb about 4·5 m. high, with tuberous roots and white flowers.

THE GENUS *CREPIS* IN GREAT BRITAIN.

BY E. DRABBLE, D.Sc.

CREPIS NICÆENSIS Balbis.

A description of *Crepis nicæensis* in our British Floras seems first to have appeared in Bab. Man. ed. ix. edited by H. and J. Groves (1904), and collectors have very naturally turned to this description in their endeavours to identify specimens of this genus. Since the appearance of this volume many records of the plant in Great Britain have been published. An examination of a large number of the specimens on which these records

are based shows that the recorder did not always understand the distinctive characters of *C. nicæensis* and had collected the common variety *anglica* of *C. capillaris* Wallr. (*C. virens* L.). The prevalent misconception of *C. nicæensis* is probably due to failure to include in the description in Bab. Man. ed. ix. a most important character, namely the well-developed winged and fringed border of the fovillæ in which the fruits are situated, in spite of the fact that this very distinctive character is admirably illustrated in Reichb. Icones, 1440—to which reference is made in Bab. Man.,—and clearly described by Reichenbach in the text (*loc. cit.* 43, 44): "receptaculi areis limbo elevatulo membranaceo-ciliatoque." This character, which at once distinguishes *nicæensis* from *capillaris* and all its varieties, is neglected also in many Continental Floras, though Rouy, Fl. Fr. ix. 228 (1905), clearly states "Réceptacle alvéolé, *fibrilleux*," and Thellung is quoted in Rep. B. E. C. 1922, 612, as writing "receptaculum profunde favosum fovearum marginibus elevatis fimbriato-ciliatis." In Bab. Man. ed. ix. under *nicæensis* we read also—stressed in italics—"*outer phyll. adpressed* . . ." This is definitely inaccurate and misleading. All the other descriptions we have seen in which this character is mentioned describe the outer phyllaries as spreading (Coste, Fl. Fr. ii., "folioles extérieures de l'involucre étalées"; Rouy, Fl. Fr., "les externes étalées"; Hegi, Syn. mitteleurop. Flora, "äusserer Hüllblätter abstehend," etc., etc.) as opposed to the adpressed condition in *capillaris* (*virens*) (Coste, "folioles extérieures de l'involucre appliquées"; Rouy, "les externes appliquées"; Hegi, "äusserer Hüllblätter . . . angedrückt"), and undoubtedly these authors are correct, though this character is not one, in the writer's opinion, on which great stress should be laid for diagnostic purposes.

Yet another statement in Bab. Man. (*loc. cit.*) calls for correction; the fruits are said to be "strongly-ribbed *scabrous*, as contrasted with those of *capillaris* (*virens*) with 'smooth ribs.'" This is not mentioned in Persoon, Syn. ii. 376 (1807), or in Reichenbach, *loc. cit.*, while Coste, *loc. cit.*, says the achenes are smooth, and Rouy, *loc. cit.*, writes, "Achaînes . . . à 10 stries lisses, mais un peu scabre . . . au sommet"; indeed, such a distinction as that made in Bab. Man. will not hold; in *nicæensis* the ribs may be rough throughout, or nearly smooth except at the top, while those of *capillaris* are often slightly rough.

Taking into consideration this inaccurate description, it is no great cause for surprise that there have been many wrongly based records of the plant in this country. In particular, for *nicæensis* has been mistaken the large, more or less hispid form of *capillaris*, which is covered not at all badly by the misleading description of *nicæensis* in Bab. Man.

G. C. Druce, seeing that this confusion had occurred, cleared the situation by describing this form of *capillaris* as a variety

to which the name var. *glandulosa* was given, afterwards withdrawn in favour of var. *anglica* Druce & Thellung; he also directed attention in this Journal, 1928, 363, to the characteristically margined alveoli of *nicæensis*, which at once distinguish this plant from *capillaris* and all its varieties. In addition, *nicæensis* is marked by the quite hispid lower part of the stem (though *capillaris* var. *anglica* may be definitely hairy below), often by its hispid leaves and more strongly ridged stem, and in general by its longer fruits—3·5–4·5 mm., as opposed to 2·5–3·25 in *capillaris*.

It is, however, to *biennis* that *nicæensis* shows most resemblance in habit (not to *taraxacifolia* as implied in Bab. Man.). From *biennis* it is distinguished by the glabrous internal face of the inner phyllaries, those of *biennis* being distinctly hairy, and by its smaller capitula.

By far the best description of *C. nicæensis* is that in Reichenbach's 'Icones,' xix. 43–44, which runs thus :—"*C. nicæensis* Balb. Misc. alt. bot. 28 foliis caulinis planis basi hastatis, involucri squamis extus glanduloso-hispidis ac laxe canis, intus glabris receptaculi areis limbo elevatulo membranaceo ciliatoque, acheniis fusiformibus pluricostatis, costarum interstitiis angustis. *Cr. scabra* DC. Prodr. vii. 163. *C. agrestis* Fries, Herb. norm. fasc. iii.: Præcedenti [i. e., *bienni*] sat similis ac cum illa sæpissime confusa, tamen gracilior, elegantior, et præsertim involucri squamis intus facillime distinguenda. Caulis striatus, pedalis usque bipedalis, vulgo tenue longius, brevius hispidulus. Folia runcinato-sinuato-dentata. Inflorescentia corymbosa. Occurit etiam integrifolia."

British specimens which are correctly named are :—

C. nicæensis Balb., Inworth, Essex, June 1880, E. G. Varenne, in Herb. Mus. Brit.

C. nicæensis Balb., Warnham, Sussex, June 1882, E. Straker, as *C. biennis*, in Herb. Drabble.

C. nicæensis Balb., Yeldersley, Derbyshire, June 1889, W. R. Linton, in Herb. Mus. Brit.

C. nicæensis Balb., nr. Rugby, July 1898, S. T. Dunn, in Herb. Mus. Brit.

Crepis capillaris Wallr. var. anglica Druce & Thellung.

This is the large upright variety of *capillaris* with more or less hairy lower part of the stem and with blackish or blackish-green glandular hairs on the involucral scales. The capitula are larger, generally much larger, than those of ordinary *capillaris*, but their size varies considerably. This plant was formerly confused with *C. agrestis* W. & K., owing to unwarranted modifications of Waldstein and Kitaibel's diagnosis. Their figure in Pl. rar. Hung, 244, t. 220, shows a large plant with upright stem which is not hairy below, and with the capitula not strikingly

large, while their description reads "Caulis . . . basi purpurascens; nudus, aut rarissimis setis purpurascentibus adspersus nitidus . . . Calyces [*sic*] . . . squamis carinatis, carina intermixto tomento setigeris, interioribus linearibus, exterioribus subulatis, triplo brevioribus, adpressis," no mention being made of any glandular hairs.

Our plant, on the contrary, is generally very hairy below, large-headed, and typically with abundantly developed glandular hairs on the phyllaries. As Druce pointed out in Rep. B. E. C. 1916, 574, our plant is clearly not *agrestis* of Waldstein and Kitaibel. Koch, Syn. 440 (1837) gives "capitula duplo majora habet. . . Involucrum plantæ spontaneæ glanduloso-hispidum fuit, in culta glabrum factum est," while Rouy, Fl. Fr. ix. 229, describes *C. agrestis* W. & K. thus :—"Diffère du *C. virens* par : Tiges plus robustes à port raide ; feuilles plus grandes ; *calathides* nettement *plus grandes* ; *folioles du péricline, pedoncules* (et parfois même rameaux) *hérissés de longs poils noirs, étalés*, entremêlés de quelques poils glanduleux ; . . ." Clearly Rouy's plant, at any rate, is not *C. agrestis* W. & K. Recognizing this fact, Druce in Rep. B. E. C. 1922, 611–12, gave our plant a distinctive varietal name—var. *glandulosa*. In Rep. B. E. C. 1923, 42 this name was withdrawn in favour of *C. capillaris* var. *anglica* Druce & Thellung, and the following description was published :—"Excellit capitulis majusculis, nigricantibus, et pedunculis pilis nigris elongatis glanduliferis ±abundanter vestitis ; indumentum griseum subnullum. Vera *C. agrestis* W. & K., ex descr. (see Rep. B. E. C. 1916, 574), differt involucri phyllis tomentosis et ad carinam setigeris (nec tamen glandulosis)." (Druce then goes on to distinguish between Rouy's *C. agrestis* and *capillaris* var. *anglica*, but in this distinction the present writer is unable to follow him, the plants seeming to him to be indistinguishable.) At the same time (p. 43) a form of this variety (f. *griseola* Thellung) was described : "Differt a typo varietatis involucro minus nigricante, indumento griseo copiosiore."

C. capillaris Wallr. var. *anglica* Druce & Thellung is common and widely spread in Great Britain and is readily recognised by its tall robust habit, generally hairy lower part of the stem, large capitula, and blackish or blackish-green hairs on the phyllaries, many or all of them glandular, and often also on the peduncles. It should be noticed that ordinary *capillaris* also often has glandular hairs on the phyllaries, though this is not mentioned in Bab. Man. ; Rouy, Fl. Fr. writes, "Péricline à folioles . . . parfois un peu glanduleuses," while Hooker, Stud. Fl. ed. iii. 230, goes so far as to say "inflorescence usually glandular-hairy," and with this the present writer is in agreement, though eglandular plants do certainly occur.

Crepis oporinoides Boiss.

As already noted in this Journal, July 1932, this plant has occurred in the Isle of Wight and in N. Yorkshire. In 1929

Dr. Druce sent me a sheet labelled in his own handwriting "*Crepis nicæensis* Balb., N. Yorks, June 1929, ex R. J. Flintoff." He was evidently dissatisfied with the name and invited my opinion. The material was not in a satisfactory state of preservation, no complete leaves being present, but there were a few ripe fruits, from one of which with great difficulty a plant was raised which formed a rosette of leaves in 1930, and in 1931 a long branched inflorescence-system.

In the same year a plant was found by the writer at Freshwater, I. of Wight, which resembled the N. Yorkshire plant in all essential characters. The plants were tall—up to 2 ft. 6 in. in height—with copiously branched inflorescence-system, long slender peduncles, very large capitula, and characteristically cut foliage leaves. That they were not *nicæensis* was at once clear—the phyllaries were hairy inside, the capitula up to 4·5 cm. in diameter, the fruits 7–8·5 mm. in length (*nicæensis* 3·5–4·5 mm.), the habit of growth with its long slender inflorescence branches was totally different, and the stems were glabrous, or nearly so, down to the base. These plants were identified as *Crepis oporinoides* Boiss., and resemble with striking completeness the figure in Boissier, 'Voyage botanique dans le Midi de l'Espagne,' ii. tab. 117 (1839–45). Boissier's description runs thus (pp. 388–9) :—"C. glaberrima cæspitosa, foliis ferè omnibus radicalibus elongatis pinnatifidis lobis retrorsis mucronatis subintegris, caulibus ramosissimis subaphyllis, pedunculis longis, involucro basi subfarinoso cæterum glabro caliculato, squamis calyculi subulatis cæteris dimidio brevioribus, achæniis subcompressis striatis lævibus. . . . Achænium badium, subcompressum, subincurvum, omni erostre, striatum, læve. Pappus niveus, plumosus, achænio fere dimidio brevior."

Boissier then gives two forms of the plant :—"var. *a major*. Caules erecti ramosissimi. Folia elongata acuta profundè pinnatifida"; and "var. *β prostrata*. Caules submonocephali, plus minusve prostrati. Folia inferiora sæpe integra, cætera minus profundè incisa lobo terminali subintegro obtuso."

Actually the first published description appeared in DC. Prodr. vii. 165 (1838) :—"*C. oporinoides* (Boiss ! ined.), glabra, caule ramoso subaphyllo, foliis radicalibus elongatis pinnatifidis, lobis lanceolatis mucronulatis subintegris, caulinis paucis linearibus, invol. calyculato subfarinoso-puberulo, squamis calyculi ferè subulatis. ♃ ?, ② ?"

"In Hispaniæ Granatensis Sierra Nevada legit cl. E. Boissier ! qui speciem valdè variantem observavit. In rupibus apricis ad radices montium caules erecti ramosiores, folia angustiora acuta magis laciniata. In lapidosis et excelsioribus scapi decumbentes, folia obtusiora et infernè tantùm incisa aut dentata. *Oporiniæ* habitum, præsertim var. *ramosior*, exhibet (DC. v.s. comm. à cl. inv.)."

Four points in these descriptions call for comment, and in this connection it should be noticed that the uncertainty as to the duration of the plant expressed by de Candolle and the absence of any reference to this by Boissier seem to render it evident that they had not observed *C. oporinoides* in cultivation :—

(1) "Caule subaphyllo" (DC.) ; "caulibus . . . subaphyllis" (Boissier) is not a happy description, as there may be several pinnatifid cauline leaves, and in this respect Boissier's figure agrees with our plants.

(2) The phyllaries for the most part are subfarinose puberulous as in de Candolle's description, but there may be a few dark hairs on the midribs. Our British plants show just the same amount of hairiness on phyllaries, peduncles, and leaves as do specimens from the Sierra Nevadas in Herb. Mus. Brit.

(3) "Achæniis . . . striatis lævibus" ; the fruits may be very nearly smooth or may bear some short stiff bristles, especially near the top. This is shown in Spanish specimens in Herb. Mus. Brit., as well as in our own plants.

(4) Boissier states, "Pappus . . . achænio ferè dimidio brevior." This is indicated in Boissier's figure, but we do not find such a relation constant in our plants, the pappus generally being nearly equal in length to the fruit. This character, however, may be subject to variation, and insufficient Spanish (or British) material has so far been available to render a definite statement possible.

In both Spanish and British plants the involucral scales are hairy on the inside, the receptacle is hairy, and the areolæ are strongly fringed ; these characters are not mentioned by Boissier or de Candolle. The plant cultivated by the writer from the fruit had all the leaves, even those of the first year's rosette, deeply pinnatifid. In the Freshwater plant the lowest leaves were less deeply divided, but the succeeding ones were exactly like those of the cultivated plant and of Boissier's figure. Moreover, Boissier found the leaves less divided in his var. *prostrata*. Indeed, our British specimens, particularly that raised from fruit of the N. Yorkshire plant, agree far more closely with Boissier's figure and description than do the Spanish specimens in Herb. Mus. Brit., which are small and apparently stunted plants.

These are Fl. Hisp. Austral., *Crepis oporinoides* Boiss., Sierra Nevada, 25 jul. 1864, legit del Campo.

Crepis oporinoides Boiss. *β prostrata* Boiss. Prodr. Fl. Hisp. ii. 250. Almeria in pascuis elatis ad rupes circa Sierra de Maria. Porta et Rigo, Iter. iii. 1890, no. 573. (This is *oporinoides*, but apparently not var. *prostrata* of Boissier's 'Voyage botanique.')

There can be no danger of confusion of *oporinoides* with *nicæensis*—the distinguishing characters have been sufficiently emphasized above (p. 276). It is to *biennis* that *oporinoides* shows

closest resemblance. It differs, however, in its nearly glabrous stems, more open and profusely branched habit, with long slender inflorescence-axes, non-auricled leaves which are nearly glabrous, except sometimes the basal ones, the long narrow ends of the leaves, and the narrower and more parallel-sided lateral divisions, the longer fruits, 7–8·5 mm. as contrasted with 5–6 mm. in *biennis*. (These measurements refer to fertile fruits; infertile fruits are often considerably longer in both plants.) But the resemblance to *biennis* is a close one, and probably also the relationship, and one is tempted to reduce *oporinoides* to varietal rank. It seems wiser, however, until much more material has been examined and more cultural work done, to retain the specific rank given to it by Boissier and de Candolle.

In drawing up the following description both British and Spanish specimens have been used.

Crepis oporinoides Boissier.—Plant biennial, reaching a height of 2 ft. 6 in. or even more, with basal rosette of leaves; stem deeply striate, nearly glabrous; inflorescence very open, with very long and slender branches, glabrescent or ±downy, especially just below the capitula; leaves glabrous or slightly hairy, especially the basal ones, with glabrous or ciliate margins, not auricled, all very deeply pinnatifid with long narrow retrorse mucronate lateral segments, and long (up to 6 cm.) and narrow (about 0·5 cm.) terminal segment; lowest leaves sometimes less deeply divided or merely sinuately toothed; bracts of inflorescence branches linear or setaceous ±entire; capitula large, up to 4 cm.; phyllaries and upper part of the peduncles lightly tomentose or nearly glabrous, outer ones spreading, inner subobtuse with scarious margins, downy inside; corolla yellow; fruits 7–8·5 mm., with 10–12 ribs, nearly smooth, or rough with short bristles especially above; receptacle hairy, alveoli strongly fringed.

Exsicc.—*C. oporinoides* Boiss. Cult. hort. Moons Hill, Freshwater, 1931, origin N. Yorks, 1929, in Herb. Drabble and Herb. Mus. Brit.

Certain specimens recently received from Mr. Major Lawson of Bridlington, though not in fruit, appear to belong to this species. They show extremely vigorous growth, attaining a height of 3 ft. or more, with stems up to ¾ in. in diameter at the base. The divisions of the leaves are broader than those given in the above description, but the general proportions are roughly maintained.

No evidence is yet available as to the mode of introduction of this plant into Great Britain. At Freshwater it grew in a meadow; in N. Yorkshire on waste ground. Attempts to induce seed-formation by pollinating the flowers on the cultivated plant proved completely unsuccessful, and this failure

may indicate self-sterility. The original N. Yorkshire plant, sent to the writer by Dr. Druce, which grew, it is understood, in company with many more of the same kind, had formed fertile fruit.

Etymologically the name should be written *oporinioides*, but both de Candolle and Boissier use *oporinoides*, though de Candolle wrote "Oporiniæ habitum . . . exhibet."

NOTES ON *SELAGINELLA*.

III. Notes on South American Species.

By A. H. G. Alston, M.A., F.L.S.

Thanks to the kindness of Prof. Humbert, I have recently been able to examine many of the types of Desvaux and Spring from the Paris Herbarium, which have enabled me to clear up many previously obscure species. A large collection sent for identification by Dr. Hoehne of the Instituto Biologico, São Paulo, also yielded a new species which is described here.

Selaginella valida Alston, sp. nov. Species heterophylla e turma *S. sulcatæ* (Desv.) Spring; *caule* stramineo glabro articulato prostrato supra sulcato usque ad 60 cm. longo distante ramoso; ramis distante breviterque pinnatis plerumque circa 4 cm. inter se distantibus; foliis ubique valde heteromorphis; *foliis lateralibus* usque ad 6 mm. longis 2·5 mm. latis contiguis vel subdistantibus integris inæquilateralibus, semi-facie superiore semi-oblongo-lanceolato, semi-facie inferiore semi-lineari-oblanceolato; *foliis axillaribus* ovatis exauriculatis; *foliis intermediis* inæquilateralibus obovatis integris basi auriculatis apice aristatis, aristis fere laminæ æquantibus; *strobilis* apice ramorum singulis tetragonis; sporophyllis elongato-triangularibus acuminatis.

Brazil: S. Jose do Barreiro, *Hoehne & Gehrt* 17698 (Hb. Mus. Brit. !).

Selaginella rosea Alston, sp. nov. Species insignis heterophylla, e turma *S. flabellatæ* (Linn.) Spring; *caule* roseo glabro erecto subterete usque ad 75 cm. alto; parte superiore ramosa, parte inferiore simplice; parte ramosa ambitu ovato-deltoidea; ramis ambitu anguste oblongo-lanceolatis pinnatis vel rariter basi bipinnatis; foliis partis simplicis homomorphis, ceteris valde heteromorphis; *foliis lateralibus* usque ad 3·5 mm. longis 2 mm. latis inæquilateralibus, semi-facie superiore semi-ovato, apice angustato, margine ciliato-denticulato; semi-facie inferiore oblongo-lanceolato; *foliis axillaribus* deltoideo-lanceolatis; *foliis intermediis* inæquilateralibus ovatis, apice breviter aristatis;

strobilis apice ramulorum singulis tetragonis; sporophyllis elongato-deltoideis.

COLOMBIA: Popayan, in dense forests on the River Huangibo, 1700–1800 m., *Lehmann* 875 (type, Hb. Kew!). Also from Ocateado, 2300–2600 m., *Kalbreyer* 1941 (Hb. Kew!).

SELAGINELLA DEMISSA Christ. This seems to be only a large form of *S. revoluta* Bak.

LYCOPODIUM FLABELLUM Desv. This is a form of *S. novæ-hollandiæ* (Sw.) Spring. It was called *S. radiata* (Aubl.) Bak. by Baker, but Aublet's specimen at the British Museum is *S. penniformis* (Lamk.) Hieron. Aublet quotes a figure of Dillenius's which is *S. Moellendorffii* Hieron.

SELAGINELLA DECOMPOSITA Spring. Guillemin's specimen at Paris, from the Serra das Orgaos, is *S. subsegregata* Baker.

SELAGINELLA FLAGELLATA Spring. This is the species recorded from Trinidad as *S. Purdiei* Hieron. and from Panama as *S. rhizophora* Baker.

LYCOPODIUM PELLUCIDUM Desv. The label "habitat ad fretum magellanicum" must be a mistake. The specimens are very fragmentary, but appear to be *S. plana* (Desv.) Hieron., a native of the Malay Archipelago.

Selaginella delicatula (Desv.), comb. nov. *Lycopodium delicatulum* Desv. ex Poir. Encycl. Suppl. iii. 554, no. 99 (1814).

This name should replace *S. brasiliensis* (Raddi) A. Br., non Spring.

NOVITATES AFRICANÆ.

(Continued from vol. lxix. 1931, p. 262.)

Oxalis (§ *Oblongæ*) **Louisæ** Salter, sp. nov. *Herba* acaulis glabra. *Bulbus* obclavatus pallido-brunneus; squamæ papyraceæ, exteriores crenulatæ, transverse rugosæ, interiores lanceolatæ acuminatæ glabræ. *Rhizoma* ad 25 cm. longum vel longius, squamis membranaceis pallido-brunneis. *Folia* ad 70, basalia petiolata 3-foliolata; in planta viva viridissima; petioli compressi, marginibus angüste cartilagineis, ad 4 cm. longi 1·5–2 mm. lati, manifeste prope basin articulati; foliola sessilia, apice petioli articulata, ad 2·1 cm. longa 1·1 cm. lata lato-cuneata, apice obcordato-incisa, venulis lateralibus conspicuis, utrinque minute nigro-punctata. *Pedunculi* uniflori 1–2 cm. longi teretes, apice bibracteati; bracteæ lineari-lanceolatæ membranaceæ 4 mm. longæ. *Sepala* lanceolata vel oblongo-lanceolata 7–8 mm. longa submembranacea. *Corolla* 2·5–3 cm. longa alba vel lutea pallidissima, tubo luteo. *Petala* limbis obliquo-obovatis 1·25–1·5 cm. latis rare venis paucis atris reticulatis. *Filamenta* 4–5·5 mm. et 6–10 mm. longa sparse glandulosa, interiora obtuso-denticulata. *Ovarium* oblongum 3 mm. longum, apice minute glandulosum, loculis 3-ovulatis; stylis minute glandulosis.

Hab. Namaqualand; Kamieskroon, June 6, 1931, *T. M. Salter*, no. 818 in Bolus Herbarium; also in Herb. Mus. Brit. and Herb. Kew.

This species seems to fall into the subseries *Oblongæ* R. Knuth, but in structure it is nearer to *O. lupinifolia* Jacq., which is sometimes 3-foliolate. It is easily distinguished from that species by the dense mass of leaves and the broad-cuneate bright green leaflets. It was first collected in Namaqualand without flowers, in August 1929, by Mrs. L. Bolus, after whom it has been named.

Crassula nuda R. H. Compton, sp. nov. *Planta* herbacea perennis, e basi ramosa, omnino glabra. *Caules* erecti vel decumbentes non ramosi teretes, infra albi, supra purpurei, 1–2 lin. diam., internodiis folia æquantibus. *Folia* ad 10-juga decussata leviter connata succulenta læte viridia erecto-patentia ovato-triangulata subacuta, gradatim in bracteis diminuta, maxima long. c. 6 lin. lat. 4–5 lin. crass. 2½ lin., infra convexa, supra leviter concava. *Inflorescentia* thyrsoidea. *Cymulæ* axillares patentes floribus paucis, pedunculis inferiorum 2–3 lin. long., superiorum brevioribus, pedicellis c. 1 lin. long. *Sepala* 1 lin. long., lobis ½ lin. long., succulentis, ovatis, obtusis. *Corolla* alba campanulata 1¼ lin. long. *Petala* limbis patentibus orbiculato-obtusis, infra apicem dorso minute apiculatis. *Filamenta* ½ lin. long. alba, antheris fuscis ⅕ lin. long. *Squamæ* breviter bicuspidatæ. *Carpidia* oblique ovoidea, stigmatibus sessilibus.

Hab. Grown in the Karoo Garden, Whitehill, *Compton*, no. 3953, where it has maintained its characters for several years. It occurs in the Ladismith Karoo among stones and under bushes, and flowers in February. In some localities it is associated with another species allied to *C. corymbulosa* Link with narrow acute leaves.

Closely related to *C. corymbulosa* Link, differing mainly in its shorter, thicker, and more convex leaves. Its stature is relatively small, well-grown plants only reaching 5–7 inches in height. The upper foliage-leaves do not fall off at flowering-time, as in some vars. of *C. corymbulosa*. The whole plant is glabrous, without cilia or emergences in any part, even on the bracts and calyx.

Crassula pyrifolia R. H. Compton, sp. nov. *Fruticulus* debilis vagans omnino glaber. *Caules* fragiles teretes, juventute albidi, ½–¾ lin. diam., internodiis ¼–¾ poll. long., maturitate rubro-grisei, nodis leviter gibbis. *Folia* carnosa patentia vel

parum deflexa sectione orbiculata obtusa obovata vel pyriformia ad basim angustata læte virentia 4–6 lin. long., 2–3 lin. lat. et crass. *Paniculæ* 1–3 irregulares terminales. *Bracteæ* minutæ foliis dissimiles obtusæ carnosæ subrubræ c. ⅓ lin. long.; bracteolæ similes sed minores, ad basin pedicelli lati. Pedicelli angusti teretes c. 3 lin. long. supra obconici. *Sepala* 1 lin. long., carnosa triangulata obtusa basi connata, sinibus obtusis. *Petala* 5 subrubra, basi libera, apice leviter recurva, 1½ lin. long., oblongo-ovata obtusa sub apicem minute gibbosa. *Filamenta* alba ⅘ lin. long.; antheræ ½ lin. long., polline flavo. *Squamæ* 1¼ lin. long. et lat. quadratæ emarginatæ. *Carpidia* libera, ovario singulo circa 12-ovulato. *Styli* subulati. *Capsula* c. 1 lin. long.

Hab. Little Namaqualand; Bitterfontein; collected by Mr. C. Moller of the South African Railways in 1930, and grown at the Karoo Garden, Whitehill (*Compton*, no. 3954, type; described from living material, Jan. 25, 1932). An earlier gathering, *Pearson*, no. 5517 in Herb. Bolus, was collected at Bakhuis, Little Namaqualand, Dec. 3, 1910. On the label Dr. Schönland wrote as follows:—"*Crassula expansa* (Soland.) forma robusta. The whole of the material under *C. expansa* (Soland.) requires revision. Probably material examined fresh would enable one to split it up satisfactorily."

Crassula pyrifolia is very distinct from *C. expansa* in being perennial—in fact, a soft subshrub,—in the remarkable form of its leaves, and in the characters of its inflorescence, pedicels, sepals, petals, and squamæ (see Schönland in Ann. Bolus Herb. ii. 55, 1916, figure). It, however, falls into the same section of the genus. The specific name is suggested by the shape of the leaf, which approximates frequently to that of a tiny green pear fruit.

Agathosma roodebergensis, sp. nov., R. H. Compton (*Rutaceæ-Diosmeæ*). *Frutex* aromaticus ad 3 ped. *Caules* tenues plerumque pseudodichotomi glanduloso-puberuli. *Folia* numerosa c. 2 lin. long. c. 1 lin. lat. coriacea patentia vel erecto-patentia imbricata breviter petiolata elliptico-lanceolata obtusa infra subcarinata supra leviter concava breviter glanduloso-puberula vel fere hispida præsertim in superficie inferiore, infra glandulis nonnullis immersis sparsis. *Inflorescentia* terminalis, in caulium furcis sessilis vel quasi lateralis, umbellata, floribus 10–20. *Pedicelli* c. 1½ lin. long. teretes, bracteolis 2 medianis oppositis erectis anguste linearibus ¾ lin. long. *Calyces* 1¼ lin. long. dimidio in segmentis divisi, segmentis erectis ovato-triangulatis obtusis carinatis, marginibus breviter ciliatis. *Petala* unguiculata spathulata alba, ungue copiose et lamina supra parce pilosis, ungue 2 lin. long., lamina 2 lin. long. ½ lin. lat. *Disci lobi* marginales, super ovarium arcuati. *Stamina* perigyna, filamentis albis glabris 2 lin. long., antheris ½ lin. long, glandula sessile apicale instructis. *Staminodia* filamentosa geniculata alba

1 lin. long., in parte media pilosa, alibi glabra, apice glandulifero. *Stylus* subruber glaber filiformis ad 3 lin. long., stigmate minuto. *Capsula* rugosa sparse glandulosa c. 3 lin. long., loculis 2–3.

Hab. Cape Province; Ladismith Division, Roodeberg, 4000 ft., Nov. 1, 1931, *Compton*, no. 3851.

This species belongs to the affinity of *A. riversdalensis* Dümmer and *A. Muirii* Phillips. It is characterised by its shortly glandular-pubescent, almost scabrid leaves, pedicels, and calyx, by its long filiform bracteoles, by the prominent midrib of its leaf, and by the position of its umbel, which is either in a fork of the stem or apparently lateral, owing to the precocious growth of the branches or branch immediately beneath it. The petals are of a clear pure white, this colour being retained for a long time in the dry state.

Acmadenia gracilis R. H. Compton, sp. nov. (*Rutaceæ-Diosmeæ*). *Frutex* aromaticus c. 5-ped. copiose ramosus. *Caules* angusti divaricati puberuli, foliorum cicatricibus ovatis. *Folia* numerosa decussata imbricata erecto-patentia glabra eciliata linearia triquetra, supra sulcata, infra convexa, obtusa, glandulis magnis paucis immersis et maculis stomatalibus onusta, basi parum angustiore, 2–3 lin. long., ½ lin. lat. *Flores* solitarii terminales. *Sepala* c. 3 lin. long., c. 2 lin. lat. late ovata, alis membranaceis latis, marginibus ciliatis, apice foliaceo obtuso viride. *Bracteæ* similes sed parum minores. *Petala* rosea 6–7 lin. long., 4 lin. lat., unguiculata, ungue supra piloso in laminam glabram ovato-lanceolatam dilatato. *Stamina* 5, filamentis 1½ lin. long., antheris dorsifixis ovatis ½ lin. long., appendicula conica glandulosa apicale ¼ lin. long. *Staminodia* 5 staminibus alternantia subulata acuminata 1 lin. long. *Ovarium* c. ½ lin. diam. *Stylus* brevis, stigmate globoso. *Capsula* 3 lin. long., sepalis persistentibus circumdata. *Semina* ovoidea nigra nitentia 1½ lin. long. ⅔ lin. lat.

Hab. Cape Province; Ladismith Division, Roodeberg, near Van Wyk's Dorp, 4000 ft. alt., Nov. 1, 1931, *Compton*, no. 3859.

Similar in general appearance to *A. obtusata* B. & W., but differs in having rather more slender growth, larger petals, good-sized staminodes, glabrous but conspicuously ciliate bracts and sepals, solitary flowers, and leaves which are narrower and less robust, are not ciliate, and do not broaden at the base. Large apical glandular appendages are present on the anthers.

Herbarium material shows some confusion with regard to *A. obtusata* B. & W. The true species is represented by Zeyher no. 2160 from Swellendam, and this is exactly matched (apart from differences in pubescence, which exist also among Zeyher's specimens) by Bolus Herb. Norm. no. 618, also from Swellendam. These plants have no long glandular appendages at the apex of the anthers, and the staminodes are about ⅓ lin. long.

Muir no. 930 from Albertinia is the type of *A. obtusata* var. *macropetala* Glover. Phillips no. 1416 from Seven Weeks Poort and Muir no. 2927 from Cloete's Pass are apparently the same. Apart from the size of the petals these plants also differ sharply from *A. obtusata* in having prominent conical glandular appendages at the apex of the anthers and in having much larger staminodes about ¾ lin. long: the leaves, moreover, are distinctly though shortly ciliate on the margins. These plants should, I think, be raised to specific rank and I propose to give them the name

Acmadenia macropetala (*Glover pro var.*) R. H. Compton, sp. nov.

Among these plants of somewhat similar physiognomy, therefore, I distinguish three species, viz.:—

A. obtusata B. & W.
A. macropetala Compton (*A. obtusata* var. *macropetala* Glover).
A. gracilis Compton.

Dicoma fruticosa R. H. Compton, sp. nov. (*Compositæ-Mutisieæ*). *Frutex* humilis aromaticus divaricate ramosus, ramis rigidissimis intricatis, omnino glaber. *Caules* leviter sulcati. *Folia* suberecta alternata simplicia oblongo-spathulata vel oblanceolata plana integra coriacea, sine nervis prominentibus, breviter apiculata 6–8 lin. long. 1–1¾ lin. lat. *Capitula* terminalia solitaria erecta, inter folia reducta pauca sessilia. *Involucrum* c. 8-seriatum 5–6 lin. long. 4 lin. diam., bracteis erectis appressis imbricatis glabris ovatis erecto-apiculatis purpureo-fuscis, marginibus scariosis lacerato-denticulatis. *Receptaculum* planum foveolatum. *Flores* radiales c. 3 ligulati asexuales, achæniis angustis abortivis glabrescentibus, cirro basale pilorum onustis, pappo e setis paucis longis inæqualibus barbellatis composito, ligula purpurea c. 4 lin. long. *Flores* disci c. 5 tubulares, corollis c. 4 lin. long. purpureis, segmentis quam tubo parum longioribus, antherarum appendiculis longe pilosis, achæniis 1½ lin. long. obconicis, sulcatis dense rigide pilosis, pappi setis numerosis c. 3-seriatis rigidis inæqualibus albis barbellatis ad 4 lin. long.

Hab. Cape Province; Ladismith Division, in karoo association, on shale slopes near the road from Ladismith to Barrydale, 2000 ft. altitude, October 30, 1931, *Compton*, no. 3897.

A very distinct species, which cannot be closely related to any other *Dicoma*, though it undoubtedly finds its place in this genus. Its distinguishing features are its rigidly shrubby habit, the glabrousness of its leaves and stems, its relatively small leaves without conspicuous veins, its involucral bracts which are not definitely spiny and whose apices are erect, its ligulate sterile ray-florets, the small number of ray and disc florets and the relatively small size of its capitulum. The aspect of the plant is similar to that of some *Pteroniæ*. From *D. radiata* Less., the only other South African species with ligulate ray-florets, it differs markedly in other respects, though it should probably be associated with that species in Lessing's section *Rhigiothamnus*. The pappus characters place it in the section *Barbellatæ* Wilson (Kew Bulletin, 1923, 377).

(To be continued.)

THE BRITISH ASSOCIATION.

THE Annual Meeting of the British Association was held in York from August 31 to September 7 under the presidency of Sir J. Alfred Ewing, K.C.B. In his address, which has been widely reported and discussed, Sir Alfred emphasized the dangers to civilization involved in the rapid increase in scientific knowledge and its applications.

Prof. J. H. Priestley, D.S.O., of Leeds University, presided over the meetings of Section K (Botany). In his address on "The Growing Tree" he departed from the usual practice of reading, giving instead a demonstration, illustrated by lantern-slides and experiments, on the problems involved in the study of the structure and growth of the tree. An interesting series of exhibits germane to his subject had been arranged, and were demonstrated and discussed later in the day. The address, which should be read in its entirety, dealt with the habit of the tree and the relation of its structural details to growth processes and to the movements of water and solutes in the stem. Work carried out in Professor Priestley's laboratories at Leeds supplied much of the material for the address. Recent studies have indicated that the key to the interpretation of the behaviour of the growing tree is to be found in the fact that the extension growth of the shoots from the buds and the formation of wood and bast on all the rest of the woody axis are inseparably and causally connected. The cambium layer, by the division of which new elements are added to the phloem and xylem, is an extension of the meristematic tissue at the growing apex of the shoot, and the continued radial increase in growth is initiated at successively higher levels in the extending shoot apex at the base of each new leaf-primordium. Recent work has confirmed and extended Hartig's statement in 1862 that new cambial activity on the dormant woody twig began at the base of the buds and worked basipetally downwards, and a new and simple method of following the renewal of cambial activity has been employed by Professor Priestley and his pupils in the present year. In the resting condition the cambium cells on the surface of the old wood are relatively firm and the bark will not slip. The first sign of renewal of cambial activity is a change in the condition of the cells, the contents of which become much more transparent and apparently semi-fluid, and after a few divisions

have taken place long strips of newly-formed cells can easily be peeled from the surface of the old wood. By the use of this method the resumption of cambial activity has been followed in a number of species of hard woods and soft woods. The general result confirms the conclusion that the renewal of cambial activity upon the surface of the old wood depends upon the commencement of growth in the buds. Activity always begins beneath the buds and spreads thence basipetally downwards. In the soft woods the basipetal spread is extremely active. In some hard woods (as oak, ash, sweet chestnut, and elm) it is also rapid, but in others (as sycamore and horse-chestnut) much slower. In birch, beech, and alder the buds have burst and the leaves emerged before there is any sign of cambial activity spreading down the twigs. There is evidently a connection between the ring-porous type of wood characteristic of oak, ash, and elm and early spread of cambial activity on the one hand and the diffuse-porous type of beech-wood and a later basipetal spread on the other.

The fact that cambial activity from the buds is only basipetal is illustrated in the practice of pruning. The cut is made immediately above a bud; any projecting length of stem left above the bud will make no further growth but withers and forms an unsightly "snag." The system of close planting to obtain straight-shafted timber supplies another illustration. When growth starts in the tree the buds in the light are moving first, and if their growth is sufficiently vigorous buds on lower branches, shaded by neighbouring trees, may never resume growth; these fail to make any radial growth also and lose their supplies of water and food to the vigorously growing regions of the crown and trunk. It is clear that the branch system of the tree is mainly determined by the close relation that exists between shoot growth and radial growth.

The texture of the wood in the woody shoot is still determined by growth characteristics of the cambium which are closely linked with its origin at the shoot apex, and which are strikingly different in soft woods and hard woods. Conifer and Dicotyledon have very different types of shoot apex. The former bears narrow leaf-primordia, many often growing simultaneously at the apex, and most of the subsequent growth of leaf and subtending segment of the axis is in a vertical direction. The Dicotyledon usually has few primordia sharing the growing apex, with a broader leaf-primordium the subsequent growth of which, whilst mainly longitudinal, also includes considerable tangential expansion. With these differences may be connected the contrast between the long narrow fusiform cambium initials of the Conifer and the shorter Dicotyledon initials, which are often not fusiform but more like elongated meristem cells which have retained their original polygonal faces. These characteristic forms of the cambium cells are closely related to the differences in the elements cut off from them—differences which affect the grain of the timber yielding the uniform grain and freedom from vessels of the soft woods and the more varied hard woods with vessels, fibres, &c., distributed throughout their texture.

The relation of these structural features to their formation from the cambium in the two classes of woods was briefly discussed. Incidentally Prof. Priestley rejects the necessity for the assumption of sliding growth in the development of the cambial initials in the soft woods:—"In view of the plastic walls and liquid contents of these meristematic initials it is difficult to understand how they readjust their relative positions by sliding past one another, while such a process is also difficult to reconcile with the presence of plasma connections and pits on the radial walls of the vascular elements differentiated from the cambium."

Examination of the differentiating tissues by the new method of stripping shows that in the formation of vessels the vacuolation which expands a series of vessel-segments takes place with extraordinary rapidity in cells whose walls are in a very thin "primary" stage, and that the assumption that the perforating cross-walls are gradually digested is untenable—stages in perforation are very difficult to find.

The opening of the buds in spring must be associated with the movement of water into their tissues. The facts of anatomy and development show that each differentiating vessel, common to leafy shoot and woody axis, must transfer water from the axis to the young shoot. Considerations were put forward in support of the view that this water movement takes place under the impulse of a mechanism that is actuated by the growth and differentiation which begins in the bud and spreads thence to the axis. As to the contents of the wood the President described experiments which support von Höhnel's view that in many of the tracheal elements, as the leaf-surface expands, water-vapour displaces water.

Finally, though the facts brought forward do not in themselves supply a complete explanation of the mechanism by which movement of water is effected through the complex tracheal system of the sapwood to the foliage of even the tallest trees they emphasise the consideration that water-movement is associated with the growth of the tree, and the mechanism is inseparable from the processes of growth and differentiation and is *not* equivalent to the passive flow of a liquid along a pipe driven by a pressure below or a tension developed above. Similarly, neither can the movement of solutes throughout the tree be adequately interpreted unless the growth-processes of the tree are borne in mind.

The Chairman of the Forestry Subsection, Mr. T. B. Ponsonby, took as the subject of his address "A System of Forestry for the British Isles":—

British woodlands must be economic and beautiful, and they must hold game. The existing system of clear-cutting followed by replanting results in monotonous and unpicturesque woods, which are very inefficient as game reserves, and their value as an economic investment is decidedly doubtful.

The Selection type of forest is more beautiful and of greater sporting value, and in the hands of experts can give returns, both as to quantity and quality, that are as good as, or better than, those yielded by the even-aged methods. The objection raised against the system by competent critics is not based on any sylvicultural insufficiency, but on the high standard of management required.

An outline was given of management suitable as the basis of large forests worked on the Selection system, and an indication was given for the management of smaller areas. It is very important to obtain some measure of natural regeneration which we, along with all countries which have adopted "clear" cutting methods, have so unfortunately lost. It is only by natural regeneration that we can obtain trees suitable to each of our very varying districts. The agricultural analogy for the importation of exotic seeds does not hold good in that it is not possible to alter the soil conditions, both chemical and physical, in the forest in the same way as can be done in agricultural land.

The meetings of Section K opened appropriately with a short address by the veteran Yorkshire ecologist, Dr. T. W. Woodhead, on Yorkshire plant ecology. With the aid of geological and plant-distributional maps he demonstrated the main features of the remarkably varied flora of the county. In the West are the Pennine uplands, which include Upper Teesdale with its rich and peculiar flora, the calcareous north-western dales, and the Millstone Grit and Coal Measures area of the Middle and Southern Pennines. Between it and the Central plain lies the Permian ridge, extending from north to south, an important factor in plant migration. The great central plain overlaid by glacial and post-glacial deposits is now extensively cultivated—Askham Bog, a relict of the original undrained area near York, was visited in the rain later in the day. To the north-east are the Oolitic Hambleton and Cleveland Hills and the eastern dales, to the south the Vale of Pickering and the chalk wolds and wold dales, and to the south-east the gently undulating plain of Holderness covered by glacial and alluvial deposits; and, finally, a coast-line ranging from precipitous cliffs to sand dunes and mud flats. The effect of the maximum glaciation and that of the last Ice Age on the history of the vegetation was also considered, and the speaker

emphasised the freedom from glaciation of large areas forming nunataks on which preglacial vegetation had survived to form an integral portion of present-day vegetation.

Dr. G. E. Du Rietz of Upsala, a guest of the section, discussed the problem of bipolar distribution:—

In New Zealand, Australia, and southernmost South America isolated populations are found of several boreal species, some of which occur also on high tropical mountains. Analogous types of distribution are found also in many genera and higher taxonomic units. Long-distance migration under present geographical conditions cannot explain all these bipolar populations, nor can the theory of transtropical migration during the Pleistocene glaciations, since fossil evidence shows that many bipolar distributions are much older. We must obviously go back at least to the more continuous connection between boreal and austral floras, probably formed by the high mountain-ranges of the Tertiary period. Some bipolar populations show evident traces of a transtropical connection along the American Cordilleras, others across the Malayan archipelago, still others along both these transtropical bridges. The occurrence of a bipolar population both in the Australasian and the Magellanic regions is no proof that both transtropical bridges have been used by this population, since there is ample evidence also of a trans-antarctic connection. Though there is an evident relation between bipolar distribution and the Alpine Orogen, or the great Mesozoic-Tertiary fault system, there are also facts suggesting that epeirogenetically uplifted highlands bordering the alpine geosynclinals may have formed transtropical bridges of still greater importance for the development of the present bipolar populations.

Mr. T. K. Rees described the algal associations of a small salt marsh on Lough Ine, Co. Cork. The marsh, which consists of eight islands separated by mud, is peculiar in that there is a sudden transition from a *Zostereturn* to a general salt-marsh association limited by a *Juncetum.* The main ecological factors appear to be biotic.

Dr. A. Raistrick and Dr. K. B. Blackburn gave an account of peat investigations in the north of England, which include hill-top, woodland, pond, and shore-line peats. A statistical investigation of tree pollen caught and preserved in the peat supplies evidence of the phases in post-glacial afforestation of the area, and the examination of individual peat deposits and bogs, using the pollen of plants that have grown *in situ* and the plant remains preserved in the peat, throws light on the botanical history of individual deposits and bogs. Results obtained agree well both among themselves and with those of similar work on the Continent. Detailed analyses of seventeen peats from the Nant Ffrancon valley and its tributary corries in Snowdonia were described by Mr. N. Woodhead and L. M.

Hodgson. They show an abundance of tree pollen and their pollen diagrams agree in the main with those established for the Pennines. The deepest peat in Cwm Idwal has *Pinus* and *Betula* dominant in the lowest layer so far investigated, with *Alnus* and *Corylus* in association. *Alnus* ousted *Pinus*, but soon died out completely, giving place to a *Pinus* association remarkable for its high frequency (71 per cent.). This maximum occurred, according to Scandinavian authorities, in the late Boreal time, the upper limit of which is marked by decreasing *Pinus* and increasing *Alnus*. The latter reached a second maximum in the moist Atlantic period, but *Pinus* seems to have lingered in Carnarvonshire long after it had died out in the North of England. As on the Pennines, *Betula* supplanted *Alnus* in the drier conditions of the sub-boreal period, but *Alnus* remained abundant in the wetter parts of the valley. *Corylus* appears more or less uniformly at all layers in all the peats. *Quercus* pollen is uncommon. In view of the present distribution of *Fraxinus* in woods near the sea, it is interesting to note that its pollen has been found only in the lower-lying peats near the coast. Historical records show that the Forest of Snowdon was laid waste in the reign of Elizabeth, and the valley is now almost treeless.

Prof. S. G. Paine gave an interesting account of the action of bacteria in the decay of stone. At the Glasgow meeting of the Association R. M. Buchanan showed that bacteria were associated with decaying stone; Stutzer and Hartleb, in 1899, suggested that nitrifying bacteria may contribute to the disintegration of cement, and the nitrifying bacteria were believed by J. E. Marsh (1923) to be responsible for a considerable part of the decay of college buildings at Oxford. The present paper embodies the results of seven years' investigation of the problem of stone decay under the ægis of the Building Research Department of the Scientific and Industrial Research Board. Common air and water organisms are nearly always present in decayed stone in surprisingly large numbers. It has also been clearly shown that organic matter present in rain-water is sufficient to allow of the development of acid bacterial products, which attack progressively the substance of the stone. The presence of nitrifying bacteria has been established, and perhaps most significant of all a new autotrophic bacterium capable of oxidising sulphides, sulphites, and thiosulphates has been discovered. Much of the formation of the sulphate incrustations previously believed to be due to sulphur dioxide of the atmosphere will probably be found to be due to the action of these micro-organisms.

Mycology was represented by several communications, including one by Dame Helen Gwynne-Vaughan and Mrs. Williamson on Variations in the formation of the fruit in the Ascomycetes, which may be homothallic or heterothallic in origin; it may originate in a normal sexual process or the sexual apparatus may have partly or wholly disappeared. Mr. C. G. C. Chesters described a Phycomycete of doubtful systematic position that was obtained from the roots and stems of diseased *Antirrhinum* seedlings. Its position is apparently close to the Zygomycetes, as its resting spore is formed by the conjugation of two hyphal branches, but it has not been observed to germinate. Mr. A. H. Campbell gave an account of an investigation of the black lines formed in timber by *Xylaria polymorpha*. It is suggested that these are the marginal zones of entostromata in the substratum comparable to those occurring in *Diaporthe*.

The sectional semi-popular lecture was by Dr. E. J. Butler, whose subject was "Tropical Plant Diseases, their Importance and Control."

Anatomical papers were given in part at a combined meeting with the Forestry Subsection. Dr. L. Chalk described and suggested a terminology for the various types of perforation of the end-walls of vessel-segments. Among the "less advanced" woods scalariform perforations are common—reticulate-scalariform and foraminate are variations of this type. Among the more highly specialised woods, *e. g.*, in the Bignoniaceæ, a pseudo-reticulate type occurs in a few of the vessels. Dr. H. Duerden commented on the variation in the presence or absence of the pit-closing membrane in the tracheids of certain fossil and living ferns.

Mr. B. J. Rendle discussed the study of wood anatomy as a link between botany and forestry. In studying the anatomical structure of wood, whether from the point of view of systematic botany, plant physiology, silviculture, or timber-utilisation, it is necessary to distinguish clearly between characters which are due to the influence of environment (biological characters) and those which remain unaffected by variations in conditions of growth (inherent characters). Certain of the anatomical characters of wood are eminently susceptible to climatic and edaphic influences. Intensive research in wood anatomy is required to formulate correlations between silvicultural factors and the technical properties of timber, and to establish the systematic anatomy of wood on a sound basis. A recently formed organisation designed to advance the study of wood anatomy by international co-operation between interested persons and institutions was outlined.

Dr. H. Bancroft, in studying a collection of fossil dicotyledonous woods from the slopes of Mount Elgon, found a number of specimens showing typically dipterocarpaceous structure, the outstanding features of which are secretory canals and heterogeneous uni-, bi-, and narrowly multiseriate rays. The

Dipterocarpaceæ are represented in Africa at the present day only by *Monotes* and *Marquesia*, two genera in which the wood-structure differs from that typically associated with the Dipterocarpaceæ in having (in the material so far examined) no secretory canals, and uniseriate rays only. The Elgon fossils, which are apparently of late Tertiary age, are therefore of interest, as indicating a former distribution of the true dipterocarpaceous type, more extended than at the present time.

In the Forestry subsection Miss M. M. Chattaway described the presence of a peculiar type of cell—Tile-cells—in the medullary rays of the Malvales, which are apparently the result of more frequent tangential divisions than the normal ray cell; they are devoid of contents, and differ from the erect cells of heterogeneous rays in shape and position in the ray. The function of these cells is uncertain. Dr. J. Burtt Davy described the results of his research into the systematy of the cricket-bat willow. There were indications that differences in quality might be correlated with botanical differences. It was found that at least four different strains of *Salix alba* var. *cærulea* occur in plantations of cricket-bat willows. Methods of cultivation were described, and attention was called to the need for further systematic and for genetical work, and for thorough practical tests of the timbers of the different strains, in both sexes.

Miss M. G. Ashton gave an account of the development, morphology, and anatomy of the winter bud of *Glaux maritima* L., and Prof. J. Doyle and Mr. W. T. Saxton supplied some contributions to the life-history of the monotypic Chilean genus of Conifers, *Fitzroya*. In general, this presents an interesting link between the strictly Cupressinean and the Callitrinean type.

The "over-wintering" of algal species, described as "summer annuals," had been investigated by Miss W. Parke and Dr. M. Knight in species of *Mesogloia* and *Castagnea*. Minute plantlets were obtained by cultivation of spores which seemed to maintain the existence of the species during the winter and at the same time represented the alternate haploid gametophytic phase of the life-cycle. Stages corresponding to those obtained in cultures were obtained from the localities where the summer form of the plants is normally distributed.

A joint discussion was held with the zoologists on Biological Balance in Fresh Water.

Whole-day excursions were taken to Newtondale and the high moorland beyond Pickering, on which the heather was in full flower; and also to Lake Gormire and Sutton Bank. The sectional dinner, which was well attended, provided a pleasant social evening. The local arrangements for the section were excellent, and hearty thanks were expressed to the indefatigable secretary, Mr. A. W. Ping.—A. B. R.

THE BRITISH BRYOLOGICAL SOCIETY.

THIS Society held its Annual Meeting and Excursion at Minehead, Somerset, from March 30 to April 6, 1932, under the Presidency of Dr. W. Watson—nearly thirty members and friends attending. Considering the early date and the lateness of the season, the weather was favourable, though Monday's drive over Exmoor found the moorland vegetation hidden under snow.

On March 31 a long coach drive served as a Regional Survey of the Exmoor, Blackdown, and Quantock Hills, Wellington, and Taunton, where the President and Mrs. Watson entertained the members to tea. Heavy rain prevented a visit to the *Sphagnetum* at Treborough, but some Sphagna were collected on the Blackdowns; the return was made by Broomfield and Bishops' Lydeard. Amongst other plants of interest the Cave Moss (*Schistostega*) was noted and antheridial and archegonial plants of *Lunularia*.

Next day the Quantocks were visited; the oak wood in Hodders Combe contained many mosses fruiting which rarely do so. The return journey was made by Halswey Combe, Crowcombe, and Stogumber, where *Leptodontium gemmascens* was collected on old thatch.

On Saturday, Dunkery Beacon, 1700 ft., was visited, and the rocky vale of the Horner, full of interesting plants. The next day there was a short ramble on the Warren at Minehead to study the Sandhill flora. On Monday a long coach drive led first to Porlock and up the wooded hillside to the moorland, where the county boundary was crossed into Devon. The steep descent of Countisbury Hill ended in Lynmouth. Thence up the narrow valley of the West Lyn, through steep woodland to Watersmeet, where a rich flora of mosses and hepatics was found among the rocks and tumbling waters. The last drive, on April 5, was by Porlock and Oare to Badgworthy Water, including a walk up the stream (here dividing v.c.'s 4, N. Devon, and 5, S. Somerset) to the Doone Valley.

As nearly all the plants now to be mentioned were collected in v.c. 5, they will not be arranged in localities; some of those from v.c. 4 will be specified; the few new records for the latter are starred. Among the Sphagna seen were *S. fimbriatum*, *S. rubellum*, *S. quinquefarium* var. *roseum*, *S. teres*, and *S. laricinum*:—

TRUE MOSSES: *Tetraphis pellucida*, c. fr.; *Polytrichum nanum*, *Diphyscium foliosum*, *Cynodontium Bruntoni* (Badgworthy Valley, 4*), *Dicranum majus*, plentifully, with fruit, *D. fuscescens*, *D. Scottianum* (Badgworthy, 4); *Fissidens pusillus*; *Grimmia Doniana*, *G. subsquarrosa* (Watersmeet, 4); *Rhacomitrium sudeticum*; *Tortula Vahliana* (Staplegrove), *Barbula convoluta* var. *Sardoa*; *Trichostomum tenuirostre*, *flavovirens*, and *nitidum*; *Cinclidotus fontinaloides* (c. fr. Badgworthy, 4 & 5); *Zygodon*

viridissimus c. fr. and var. *occidentalis* ; *Ulota crispa* var. *intermedia, U. Bruchii*, and *U. phyllantha* ; *Funaria Templetoni* (4) ; *Aulacomnium androgynum* ; *Bryum roseum* (Malmsmead, 4) ; a curious form of *B. pseudotriquetrum* was found on the sand on the Devon side of Badgworthy Water resembling *B. Mildeanum* ; *Fontinalis squamosa* (4 & 5), *Cryphæa heteromalla* ; *Neckera pumila* var. *Philippeana* ; *Pterygophyllum lucens* c. fr. ; *Hypnum ochraceum* (4 & 5), *H. eugyrium*, and var. *Mackaii* (Watersmeet, 4).

HEPATICS. *Aneura sinuata* ; *Fossombronia pusilla* and *Wondraczeki* ; *Lophozia bicrenata, incisa*, and *Floerkii* ; *Chiloscyphus polyanthos* var. *fragilis* (4 & 5) ; *Saccogyna viticulosa*, *Cephalozia media*, common on the Somerset side of Exmoor, 4* ; *Odontoschisma Sphagni* ; *Calypogeia fissa* and *arguta* ; *Bazzania trilobata* ; *Ptilidium ciliare* ; *Trichocolea tomentella* (4 & 5) ; *Blepharostoma trichophyllum* (4) ; *Scapania compacta* and *gracilis* ; *Lejeunea cavifolia* and var. *planiuscula* ; *Microlejeunea ulicina* ; *Marchesinia Mackaii* (Lynton, 4) ; *Frullania Tamarisci* var. *robusta* (4 & 5) ; *Anthoceros Husnoti* (5) ; *A. lævis* (4).

The Annual Meeting was held on April 2. The President, Dr. Watson, gave a very interesting address on " The Evolutionary Aspects of some Xerophytic Adaptations in the Bryophytes." The usual official business was transacted, and it was proposed to hold the next Meeting in August 1933 at the English Lakes ; the headquarters will probably be at Keswick.

The Society has sustained a heavy loss in the death last year of Mr. A. Sutton, who has for several years carried out the Distribution of the Mosses and the Editing of the Report with conspicuous zeal and efficiency.—ELEONORA ARMITAGE.

SHORT NOTE.

GNAPHALIUM NORVEGICUM Gunn. IN CAITHNESS.—Specimens of this are in Herb. R. Meinertzhagen from a rough field north of Killiminster Moss. When I visited the field I was only able to find *G. silvaticum* var. *nigrescens* Gren., but on my return Col. Meinertzhagen showed me both plants in his herbarium.—A. J. WILMOTT.

REVIEWS.

An Account of the Sempervivum *Group*. By R. LLOYD PRAEGER, D.Sc. Roy. 8vo, pp. 265, text-figs. 107. Royal Horticultural Society : London, 1932. Price (to non-Fellows) 21*s*.

IN 1921 the Royal Horticultural Society published an account by Dr. Praeger of the genus *Sedum* as found in cultivation. This has been appropriately followed by a similar treatment

of the Sempervivums, the species of which in our gardens and horticultural books are in a very confused state. This confusion, so far as concerns the European species, is to be imputed to the great variability and tendency to hybridize of the wide-spread *S. tectorum*, of which nearly fifty subspecies, varieties, and forms are segregated in Rouy and Camus's ' Flore de France.' In the other great group, the Canarian section, confusion is equally great, partly owing to the species being less known and partly from the fact that they too hybridize freely. Confused nomenclature in gardens is due mainly to distribution by seed, " which is seldom pure," instead of by offsets or cuttings, which are freely produced and most tenacious of life. A further obstacle in revising the genus arises from the difficulty in preparing satisfactory herbarium material of these very succulent plants and the frequent lack of comparative notes in original descriptions. Dr. Praeger's account, which has involved eleven years of study, including field-work on the individual species in their native habitats in Europe, the Canaries, Madeira, etc., and observation of plants under cultivation, goes a long way towards unravelling existing confusion, and will be invaluable alike to the botanist and the gardener.

The Sempervivums fall into two groups: the hardy Sempervivums or *Sempervivum* proper (the European alpine group extending eastwards to the Caucasus—one species only, *S. atlanticum*, is found in Morocco) and the tender Sempervivums, mainly endemic in the Canaries, but with allied species in Madeira, the Azores, and the Cape Verde Islands, and with single species in Morocco, Abyssinia, and Nubia. These comprise the genera *Monanthes, Aichryson, Aeonium*, and *Greenovia*. In the *Sempervivum* group specific characters are not so distinctive as generally, " floral evolution appears to have lagged behind evolution of other parts ; and in many instances it would be difficult or impossible to name the species, as at present defined, from the flowers alone," the best characters often lie in the vegetative parts, and this divergence corresponds in some degree to past history and present range.

Dr. Praeger recognises twenty-three species of *Sempervivum*, with many hybrids and varieties. The tender Sempervivums include 62 species, 52 of which are endemic in the Canaries, and 36 belong to the genus *Aeonium*. These generally differ in habit from the low tufted perennial form of the European mountains, and include sub-shrubs and annual or biennial herbs. The treatment of the individual species is very full—synonymy is given, and references to previous descriptions and figures, a good botanical description, and notes on distinctive characters, affinities, history, and cultivation are included. A special word of praise is due to Miss Eileen Barnes for the numerous line-drawings illustrating habit and leaf and floral analysis.

An addendum supplies a long list of the *nomina nuda*, which are unusually frequent among the Sempervivums, especially the hardy group, and of constant occurrence in gardens and in nurserymen's lists. No attempt is made to determine them; they are pilloried merely that they may be ignored.—A. B. R.

Chromosomes and Plant-Breeding. By C. D. Darlington, D.Sc. With Foreword by Sir Daniel Hall, K.C.B., F.R.S. 8vo, pp. x, 112, 25 figs. Macmillan & Co.: London, 1932. Price 7*s.* 6*d.*

This book is based on a series of articles that appeared last year in the 'Gardeners' Chronicle.' They were intended primarily for the horticulturists, but some additions have been made to show the importance of chromosome studies to botanists in general. In his Foreword, Sir Daniel briefly recapitulates the history of Mendelism and the development of cytology, which has provided in the chromosomes a physical basis for the Mendelian generalisations.

The text contains seventeen short chapters. Dr. Darlington introduces the subject with a brief account of the cell and its nucleus, and an explanation of mitosis. Clones, apomixis, fertilisation and the origin of haploidy, and reduction or meiosis attending the sexual generation and its bearing on Mendel's laws of inheritance are succinctly explained. The chromosomes having been demonstrated as the important organs of heredity, the author passes to their use in the study of variation and improvement in plants by breeding, and tetraploidy and polyploidy are treated in some detail.

This little volume will serve a useful purpose as a concise account of our present knowledge of genetics and its value in plant-breeding.

Praktikum der Gallenkunde (Cecidologie). By Prof. Dr. Hermann Ross. Crown 8vo, pp. x, 312, text-figs. 181. Springer: Berlin, 1932. Price R.M. 24.

This volume, which forms part xii. of the 'Biologische Studienbücher' edited by Walther Schoenichen, is dedicated to Geheimrat Prof. Dr. Karl von Goebel, the tireless promoter of biological investigation. The author claims that, owing to the many-sided interest of the study of galls, the book should appeal not only to the botanist and zoologist, but also to the physician, from the resemblance between the diseases of certain plant-tissues and those affecting the bodies of men and other animals. And it should supply the want of a handy volume treating of the general biology of galls in a practical manner.

A general account (pp. 1–29) precedes the descriptive account of special examples which occupies the greater part of the text. The Seed-plants and Vascular Cryptogams supply the greater number of hosts, in all parts of which galls may develop; in the lower Cryptogams they are less frequent. The gall-producing organism may be an animal (Cecidozoa) or, less frequently, a plant (Cecidophyta). The Mistletoe represents the higher plants as a gall-producer; bacteria and fungi are responsible for the great majority of the plant-parasites.

In the special portion specific cases are worked out in detail—for instance, bottle-galls on leaves of elms, poplars, beech, and others; the structure and development of the gall, and the mode of attack and life-history of the infecting organism are described. Other headings deal with the effects of various parasites on individual plant-organs—*e. g.*, one chapter discusses the deformation of the whole or greater part of the leaf-surface. The descriptions are aided by a profusion of good text-figures.

A final chapter describes methods of collecting and preparation of the gall, and investigation of the animal parasite. A copious bibliography is followed by a list indicating the months of the year in which the galls of the various plant-genera may be collected, and a subject-index concludes the volume. Botanists will find much of interest in its pages.

Botany for Schools. By E. R. Spratt, D.Sc., and A. V. Spratt, M.Sc. Small 8vo, pp. viii, 363, text-figs. 407. University Tutorial Press: London, 1932. Price 4*s.* 6*d.*

This is described as a text-book suitable for School Certificate and similar examinations. The authors, respectively head of the botanical department of a London technical school and science mistress at a school, are evidently experienced in preparing pupils for these examinations and conversant with the difficulties. The text-book is planned to provide a two years' educational course beginning in September, arranged so that ample material will be available in successive seasons.

The paragraphed arrangement of the text usual in books of this kind is adopted; and the numerous text-figures, though devoid of artistic merit, are a helpful addition and such as would be expected from candidates in their examinations.

The authors start with a study of the Corncockle as a typical plant and the order followed through the book is such that considerations of the various physiological processes are intercalated among the chapters dealing with form and structure. The style is simple, and some of the chapters—for instance, that on Trees—are within the powers of an intelligent general reader. The experiments described are such as can be done without elaborate apparatus.

Some points call for criticism, such as the representation of the gynœcium in the floral diagrams—that of the Labiate suggests a 4-carpellary ovary; and the statement on page 7 that the parts of the flower are leaves "since they arise on a stem" needs elaboration. Some explanation of the diagram on p. 187 illustrating symbiosis should have been given; and the statement on p. 38 that the great majority of rockery plants have very hairy leaves is rather misleading.

BOOK-NOTES, NEWS, ETC.

BOTANICAL MUSEUM LEAFLETS, HARVARD UNIVERSITY.—The first number of this publication (11 pages), dated June 7, 1932, comprises some 'Nomenclatorial Notes' on plants growing in the botanical garden of the Atkins Institution of the Arnold Arboretum at Soledad, Cienfuegos, Cuba, by F. Tracy Hubbard and Alfred Rehder. In preparing a list of the plants in the garden, several cases of nomenclatorial difficulty have arisen. These notes have been issued to publish those new combinations which are necessary and to clarify those points which seem involved and uncertain. Species in some fifteen genera are involved. The authors cannot accept Prof. L. H. Bailey's replacement of *Stevensonia* Duncan, for the genus of Palms, *Phœnicophorum* Wendland; an alteration in the initial letter is also deemed necessary in the Palm genus *Zalacca* Rumphius (1747), the oldest valid post-Linnean spelling is *Salacca* Reinwardt in Syll. Ratisb. ii. 3 (1825).

'THE HONGKONG NATURALIST' for May contains a second instalment of the Editor's (Dr. G. C. Herklots) descriptions and illustrations of the flowering shrubs and trees of Hong Kong. Three genera of Apocynaceæ—*Melodinus* with three species, *Cerbera*, and *Strophanthus*—and the Myrtaceous genus *Rhodomyrtus* are included. Dr. Herklots also writes on the native Lily, *Lilium Brownei* var. *colchesteri* Wilson. V. H. C. Jarrett gives the history of "Plant Protection" by Government in the Colony, and suggests some additions to the list of eleven genera, species of which are at present protected; he also adds a note on the pink-flowered variety of *Ehretia longiflora* Champ.

FLORA OF NEW CALEDONIA AND THE LOYALTY ISLANDS.—In the 'Mitteilungen aus dem Botan. Museum der Univers. Zurich,' clxii. pt. 4, Dr. A. U. Däniker gives a list of the Pteridophytes and Monocotyledons collected in his expedition to New Caledonia and the Loyalty Islands, 1924–26. Several novelties are described in the family Cyperaceæ.

CORRECTION.—The last sentence but one in Mr. Flintoff's article on "Arctostaphylos" in the August number, p. 236, should read:—"... and from the evidence submitted I feel justified in believing that *Arctostaphylos Uva-ursi* does not grow now in the Cawthorne-Levisham area of North Yorkshire."

LOCAL SOCIETIES AND THE CONSERVATION OF WILD LIFE.

"LOCAL Societies and the Conservation of Wild Life" was the subject of the address to the Conference of Delegates of Corresponding Societies at the recent meeting of the British Association by the President of the Conference, Lt.-Col. Sir David Prain, C.M.G., C.I.E., F.R.S. In the deeply regretted absence of the President through illness, the address, extracts from which follow, was read by Dr. A. B. Rendle.

Last year the Corresponding Societies' Committee recommended the Council of the British Association to instruct the President of the York Conference to direct attention to "the assistance local societies can render to the preservation of the amenities of their own areas and especially of the flora and the fauna of the countryside." The Council of the Association acted upon the recommendation, and on November 27, 1931, the Council for the Preservation of Rural England set up a Wild Plant Conservation Board.

Sir David explained that delegates to the present Conference are asked to consider how they *can* assist in preserving the amenities of their own areas and especially the flora and the fauna of their own sections of the countryside. A difficulty with which a local society will often have to contend is a lack of sympathy and understanding between its members and those of their neighbours who manage local public affairs. Efforts to establish mutual sympathy and understanding must as a rule originate with local societies. The mere existence of a local society should suffice to show a local community that the pursuit of knowledge and the management of public affairs are closely related activities. Nothing but good can accrue to a local area in which those elected to conduct its public business hold friendly intercourse with and make it their practice to consult those of their neighbours who may be engaged in adding to knowledge of any kind.

But there are difficulties with which neither local authorities nor local societies can cope, the main cause of which is a divergence of interest between dwellers in towns and those that reside in the country. The ancient divergence of urban and rural interests disappeared for a time as a result of the appeal to English rural economy, made by the captains of industry in manufacturing towns who were directly responsible for that Industrial Revolution which has done so much to destroy the amenities and the flora and fauna of the countryside. The migration to towns of a proportion of the population of the countryside explains the appeal made by urban interests to rural economy to meet the needs of workers no longer able to share in the task of raising food for themselves.

Compliance with the request involved extension of cultivation and legislation for the tillage of manorial waste and the enclosure of common land. Improvement of highways for transport, attention to afforestation, lines and belts of trees converting exposed highways into shady avenues and supplying shelter for fields in which crops were grown and herds were tended, conversion of open spaces into woodland glades were activities to which many areas in England owe their present amenities and shelter for the flora and fauna of the countryside.

But " if, twenty years ago, it could be said with some justice that, thanks to her rural economy, England could boast amenities which went far to compensate for the outrages inflicted on the countryside by her industrial system, we can hardly say this now. We have seen the effects of the substitution, in the utilisation of our timber supplies during the war, of the methods of commercial exploitation for those of forest management. We know that much of this damage is reparable, and that a sympathetic Forestry Commission has the requisite work in hand. But we also know that the damage done during a season of exploitation often takes a century to repair, and there are many local areas where few of us may hope to see again the countryside we once knew. Nor is this all. We have seen, since the war ceased, and still see every day, damage done to our amenities that might easily have been avoided, but that never can be repaired. This damage is not wholly due to the unrestrained activity of speculative builders. We observe public authorities taking an active part in the destruction of groves and avenues while engaged in modifying highways to meet the requirements of modern traffic, yet remaining powerless to prevent the conversion of their 'improved routes' into 'ribbon communities.' This particular result is one of the indications that urban interests no longer sympathise with or desire to understand rural requirements."

" Our hearts need not be unduly cast down because, for the past half-century, urban and rural aims and interests have been out of tune once more: we can, like our forbears, school ourselves to endure what we cannot cure. But most local societies, anxious to preserve the amenities of their own areas, must be prepared to face the opposition of convinced and earnest members of an influential school of thought, and may find that opposition supported by skilful propagandists who manifest their real feelings most clearly when they profess urban sympathy with rural wrongs as a means of enlisting rural support for urban policy."

" The most outstanding statistical consequence of the Industrial Revolution in this country has been that with us the urban population now out-numbers the rural population. The most important political effect of this statistical fact has been that we now enjoy a franchise which makes it expedient for our legislators

so to regulate taxation as to lose fewest votes. To meet this requirement as far as possible, they have adopted the expedient of taxing the dead. . . . The practical effect of this legislative discrimination, applied under the pretext of uniformity, in the treatment of rural as contrasted with urban interests, which directly concerns local societies, is the sure and by no means slow elimination of what has, ever since the Industrial Revolution began, been the greatest safeguard of our amenities and especially the flora and the fauna of the countryside.

" The appeal of our Organising Committee to the delegates of the corresponding societies now present in conference is, therefore, in essence, the expression of a hope that henceforth local societies may be prepared to undertake, on behalf of their own areas, a duty that has hitherto been carried out by that type of rural economy which our urban electorate has succeeded in paralysing and is determined to destroy."

" There are other difficulties which deserve the attention of local societies. . . The use of petrol engines on the old public highways now enables urban residents to visit ' places of historic interest or natural beauty ' with ease and comfort. . . These visits would be more welcomed by country dwellers if the visitors could be induced to take back to town the unsightly litter with which they love to lard the countryside. Local societies who endeavour to modify this urban custom may find ample scope for the exercise of their powers of persuasion.

" Thanks to the energy of the Commons, Open Spaces, and Footpaths Preservation Society it is now in the power of rambling clubs, hiking parties, and stray wayfarers to plan outings free from fear of finding that some speculative builder or sporting tenant has meanwhile barred against them some ancient right of way. This advantage carries with it increased risks to the flora and the fauna of the countryside, the prevention of which may call for all the judgment and tact that local societies can command.

" The public spirit of many modern teachers has led to the creation of an energetic Nature Study Union which, notwithstanding its many merits, has the disadvantage of endangering the flora and the fauna of the countryside. Local societies, anxious to conserve the wild life of their own areas, must now be at pains to guide the enthusiasm and temper the zeal which are apt to prompt earnest teachers to provide material for study, and to encourage pupils to make competitive collections, on a scale so lavish that little of what is rare in the wild life of a particular locality is likely to be left for ' those that come after.' "

A local society which has established a sympathetic understanding with its public authorities " will be in a position, when the amenities of its own area are menaced, to seek the aid of its own local authority as well as of some appropriate national

organisation. The local appeal should at least defer precipitate local action; the national appeal will ensure sympathetic attention, and may bring helpful advice. Whether the threat be to the general amenities of the area or to some special view-point or beauty-spot, a local society can hardly fail to benefit by the experienced advice of the Council for the Preservation of Rural England or of the Executive Committee of the National Trust. If the damage be due to the modification of an existing thoroughfare or the making of a new one, it is probable that it will be beyond the power of a local authority or a local society to do more than palliate the mischief. In such a case a local society can count upon advice as to means and methods from such organisations as the Road Beautifying Association, the Green Cross Society, and the Men of the Trees.

"Experience shows that there is only one safe course possible if the amenities of a local area are to be preserved: the threatened view-point, beauty-spot, or piece of landscape must be purchased outright and rendered inalienable. The price demanded will usually exceed what a local society can afford to pay, but this drawback need not deter a courageous local society from securing an option to purchase, and thus preventing the immediate desecration of the threatened amenity. The right to buy having thus been secured, an appeal for funds to complete the transaction can now be made, and in launching that appeal the moral support of the National Trust for Places of Historic Interest or Natural Beauty and of the Council for the Preservation of Rural England will be of vital consequence to the local society concerned.

"Such a property having been acquired, and the amenities of its local area thereby preserved, the local society responsible must consider the question of ownership." The obvious procedure is to request an organisation like the National Trust to accept the property. Acceptance will be dependent on two conditions: "the local society offering the property must be able to satisfy the Trust that the property offered is in fact 'a place of natural beauty,' and must provide evidence that funds adequate to meet the recurrent expenditure the proper maintenance of the property must entail are in fact available."

"The more especial appeal of the Organising Committee that local societies should assist in conserving the wild life of the countryside raises questions more difficult to resolve than those connected with the safeguarding of local amenities. If a property acquired to safeguard a local amenity be handed over to the National Trust, the Trust, through its managing committee, will endeavour to conserve the wild life in the property: if a local society be compelled to assume ownership, we may anticipate it will endeavour to do what the Trust would otherwise have done. But absolute protection of wild life in

properties acquired to safeguard amenities is not easily provided: properties acquired to safeguard amenities must remain accessible to the public they benefit. If, however, the funds required for the maintenance, as apart from the acquisition, of such properties be adequate, indirect protection of this wild life can in time be made reasonably effective, especially if the local area is so fortunate as to possess a local society on good terms with its local authorities: the society will know what should be done, the public authorities will be in a position to enforce the necessary regulations.

"Delegates may think, and indeed may hope, that local societies can count upon the help of their local press in their efforts to safeguard the amenities of their own areas. There is some reason for such hope."

"But whatever sympathy the press may express with efforts to safeguard amenities it is not to be counted upon yet to lend its aid to those anxious to conserve wild life.... Fortunately we now possess, thanks to the action of the Council for the Preservation of Rural England, an efficient Wild Plant Conservation Board, which includes representatives of most of the organisations that have the preservation of the flora of the countryside at heart," and local societies can now depend on the assistance of a body able and willing to aid them in conserving the flora of the countryside.

"The conservation of 'a place of natural beauty,' secured in order to safeguard the amenities of a local area, can never be passive. Passive management of an estate means mismanagement, and is as detrimental to its appearance as it is to the fauna it may shelter and to the flora which adorns it. Those entrusted with its conservation will doubtless keep in mind the sound maxim that 'when it is not necessary to change, it is necessary not to change.' But they will observe, what the casual visitor may be pardoned for failing to notice, that 'change and decay' are as inevitable in wild nature as in human affairs, and that 'leaving things to take their natural course' means that gradual replacement of forms of plant and animal life which it is desirable to maintain, by forms whose increase must be carefully watched and may need to be rigidly controlled. If the approval of intelligent visitors is to be merited, those in charge of such a property must exercise an unceasing 'constraint of nature': if the criticism of visitors whose emotions are untempered by knowledge is to be avoided, those in charge of such a property should, in doing what is necessary, strive to use 'the art that conceals art.'

"But the conservation of the wild life of a local area may call for something more than the protection of the flora and the fauna present in a property acquired to safeguard local amenities. That local area may include places which the National Trust

might not feel justified in regarding as places of natural beauty, yet which the Linnean, the Zoological, or the Entomological Societies might agree with a local society in thinking worthy of protection as being the home of some rare plant, the haunt of some rare bird, the breeding-ground of some rare insect; the place where birds of passage assemble prior to migration or seek repose when they return. Again, the only hope of preserving such a spot may be to purchase it and convert it into a 'sanctuary.'"

But "while the acquisition of a sanctuary is indistinguishable from the acquisition of an amenity, the management of the two differ in principle. While an amenity must remain accessible to the public, a sanctuary must be made as nearly as possible inviolate: the conservation and supervision by competent caretakers of any sanctuary must be more rigid and relatively more expensive than in the case of a property secured to safeguard local amenities. . . . Local societies may approach the Society for the Promotion of Nature Reserves, a body empowered by charter to own sanctuaries of the kind. That Society will require to be satisfied that the property offered to it is, in fact, suitable as a sanctuary, and will be as careful as the National Trust to satisfy itself that the funds provided for its maintenance are adequate. . . . In connection with a proposed sanctuary it must be remembered that questions of expenditure may arise which do not occur in the case of properties acquired to safeguard amenities. Where a stretch of woodland, subject in the past to a periodic 'coppice-fall,' is acquired so as to ensure the continued existence of some rare plant, it may be essential to maintain the old practice, even if there be no longer any demand for hoops and faggots, lest the species whose preservation is aimed at be choked and disappear. Similarly, where a piece of fenland is acquired because it is the breeding-ground of some rare insect, the invasion of shrubby vegetation must be carefully and constantly checked, while there must be a seasonal cutting of reed and sedge, though there may no longer be a demand for thatch, lest the conditions become unsuitable for the insect-life the 'sanctuary' was acquired to preserve. Necessities of the kind—those quoted are mentioned from actual experience—will enable local societies to satisfy the friends to whom they may appeal for funds that, in the case of a 'sanctuary,' money for maintenance is as essential as money for purchase, and that the endowment of a 'sanctuary' may call for more capital than its acquisition. These necessities enable us to realise, further, that to acquire a 'sanctuary' and then leave it without adequate protection and careful management means an unpardonable waste of effort and resources."

"Local societies will sometimes find, and as time goes on will do so more often, that the agencies inimical to wild life in their own areas have become so powerful that the establishment of a 'sanctuary' is impracticable, and that the only means of conserving the wild life once characteristic of the neighbourhood is to acquire a suitable site and convert this into an 'asylum' for such plants, insects, and birds, known to have at one time been native there, as can be placed in or attracted to the 'asylum.' The question is sometimes asked whether and, if so, how far it is permissible to treat a 'nature reserve' as both a 'sanctuary' and an 'asylum.' The answer must be left to the judgment of individual local societies: the only practical general consideration is the bearing of the decision on ownership. A 'sanctuary' is no longer such when access to it ceases to be strictly limited, whereas an 'asylum for wild life' must be at least as freely open to the public as 'a place of natural beauty.' Its accessibility to the public should prevent the Society for the Promotion of Nature Reserves from accepting ownership of any 'asylum for the conservation of local wild life'; its artificial origin should preclude the National Trust from doing so.

"Another question sometimes raised is whether, and how far, a collection of plants representative of a local area may be appropriately included in a 'public garden.' In this case the answer is simple: provided the local authority owning and maintaining the 'public garden' can be persuaded by its local society to permit the collection of local plants to be treated as a distinct section of the establishment, the suggestion, ideal in itself, has the added advantage of solving the otherwise difficult question of ownership, since this would be vested in the appropriate 'local authority.'"

"In connection with the question of establishing, wherever possible, a series of 'asylums for local wild life' it may be possible for local societies to render the cause we have at heart a further service. Since such an asylum must be, on a small scale, a combined zoological and botanical garden, there must of necessity be vivaries and nurseries attached. In these vivaries and nurseries can easily be raised not only all the material required for the maintenance of the collections in the 'asylum,' but also all the material required by the teachers of nature study and their pupils in the local schools. It may well be that on a local society may fall the burden of collecting the funds required, not only for the establishment, but also for the maintenance, of an 'asylum for wild life.' But this task accomplished, it ought not to prove difficult to obtain the consent of a local council to accept the burden of ownership.

"Delegates present will, it is hoped, understand that what has been said must not be regarded as committing in any way the members of the Organising Committee who have suggested the subject now dealt with, or the members of the Council of the British Association who have asked that the subject be considered

at this conference. If what has been said be objected to, the fault lies with the speaker. Briefly summarised, his belief is that local societies can best help to safeguard the amenities of their own areas by taking a more active part than many of them have taken in the past in securing possession of ' places of natural beauty ' and handing these over, with adequate endowment funds, to the National Trust. His belief also is that local societies can best help to preserve the flora and the fauna of the countryside by securing, whenever possible, suitable ' sanctuaries for wild life ' and handing these over, with adequate endowment funds, to the Society for the Promotion of Nature Reserves. They can do something to repair the damage already done, and the destruction already caused, by establishing and if possible endowing local gardens and parks, equipped with adequate vivaries and nurseries, and persuading their local authorities to take over these ' asylums for the conservation of wild life.' Local societies should avoid, at all costs, the burden of ownership of any of these safeguards : it is always an unsound principle to possess watch-dogs and bark oneself.

" Local societies may anticipate many difficulties and much opposition, some of it due to self-interested motives, but more of it due to misunderstanding. This need not discourage them, provided they are on good terms with and enjoy the sympathy of their own local authorities. With that behind them, local societies can do much : if they neglect to establish cordial and sympathetic relationships with their own local authorities, local societies can hardly hope to render much assistance either in the preservation of the amenities of their own areas or in the conservation of the flora or the fauna of the countryside."

THE GYNŒCIUM OF THE FAMILY CRUCIFERÆ.

By Ethel Rose Spratt, D.Sc., F.L.S.

The order Cruciales, represented by the family Cruciferæ, is placed by Hutchinson* at the present end of an ascending series from the Ranales, and is specialised in many ways, *e. g.*, in the isobilateral symmetry present in the floret and in the vascular system of the pedicel, leading to zygomorphy, which sometimes occurs in both.

In 1857 Payer † said the posterior-anterior sepals arose first, but Arber ‡, in 1931, with the newer technique of microtomed serial sections, showed that the lateral sepals arise first. Payer

* Hutchinson, ' The Families of Flowering Plants,' London, 1926.
† Payer, J. P., ' Traité d'organogénie comparée de la fleur,' Paris, 1857.
‡ Arber, A., " Some Structural Features of the Cruciferous Flower," New Phyt. xxx. no. 1 (1931).

describes the primordia of the two carpels as being lateral, Church* says the primordia are barely indicated, becoming almost immediately gamophyllous. The two stigmas in the posterior-anterior positions, by comparison with other families, should indicate two carpels lying in the posterior-anterior plane.

Usually ovules arise on the carpel margins, in many cases they have travelled towards the midribs as in *Papaver*. Kerner and Oliver † describe four carpels in the Cruciferæ with the ovules on the midribs of two reduced carpels. I venture to suggest that the ovules are on the midribs of the only two carpels present, indicated by the stigmas. If the ovules are on the margins the apparent stigmas are comprised of half the stigma from each of the two carpels fused.

In an attempt to substantiate the view that the ovules are attached to the midribs of the carpels, and the replum which grows across the ovary joins the midribs of the two carpels, a considerable number of flowers and gynœcia of different genera have been examined. Many sections have been cut, including serial microtomed sections of the following :—*Brassica alba*, *Brassica Sinapis*, *Capsella Bursa-pastoris*, *Cheiranthus Cheiri*, *Iberis amara*, *Matthiola incana*, *Raphanus sativus*, *Sisymbrium officinale*, and *Thlaspi arvense*.

Neither in the macroscopic examination of gynœcia nor in the sections have I found the smallest suggestion of any such fusion of stigmas as mentioned above. Each apparent stigma appears to be a well-defined single structure and each has one well-developed vascular bundle at its base (see fig. 1), such as one would expect to find from the continuation of the midrib vascular bundle to the tip or stigma of the carpel, just as it usually continues to the tip of the foliage leaf.

In cases like *Thlaspi arvense*, *Capsella Bursa-pastoris*, and *Iberis amara* there is a strong resemblance in section to two leaves joined by their margins with their midribs occupying the central positions in the long sides (fig. 2). The ovules are attached to these apparent midribs and the replum is stretched across between them. In these cases no trace of vascular tissue has been found in young gynœcia in the two positions alternating with the replum origins, which have been termed the valve positions by Arber, and it is proposed to retain that terminology here. In contrast to this absence of vascular tissue in the valve position, at all times and in all cases the vascular bundle in the replum position is well defined and well developed. A similar condition has been found in *Nasturtium officinale* by Arber, who says that the replum bundle positions are marked out before those of the valve bundles. However, little importance can be attached to the anatomical structure of gynœcia, on account of their very

* Church, A. H., ' Types of Floral Mechanism,' Oxford, 1908.
† Kerner and Oliver, ' Natural History of Plants,' London, 1904.

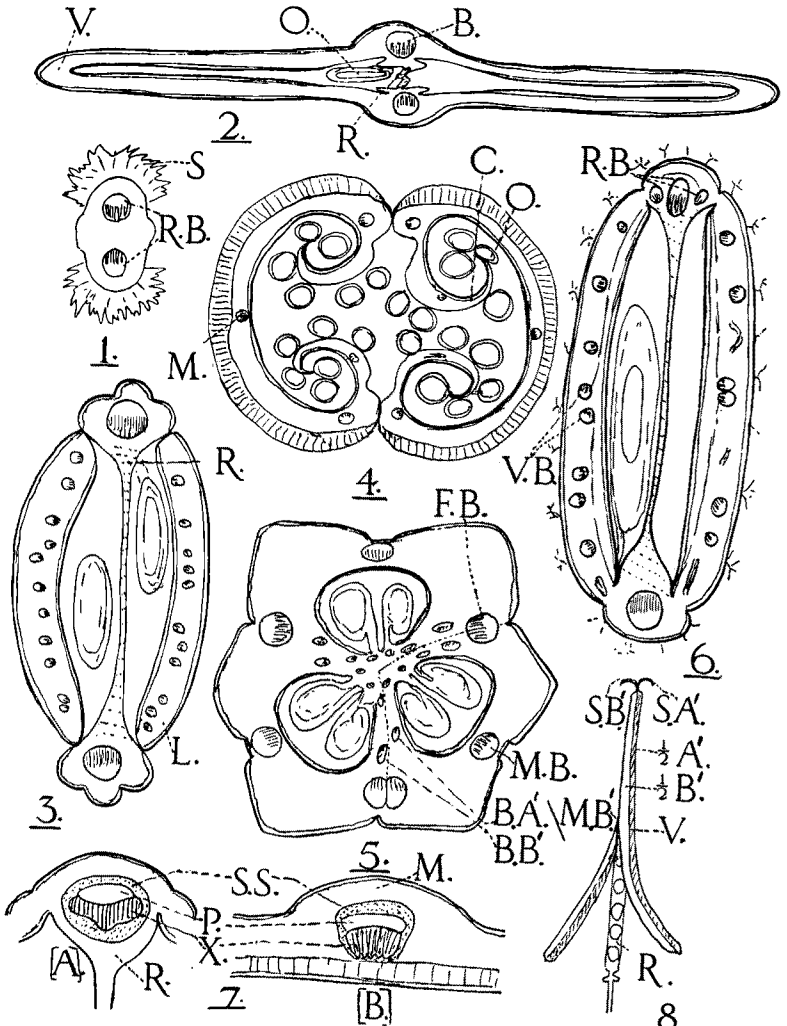


Fig. 1.—Transverse section of gynœcium of *Sisymbrium officinale* at the base of the stigmas.
Fig. 2.—Transverse section of ovary of *Thlaspi arvense*.
Fig. 3.—Transverse section of ovary of *Cheiranthus Cheiri*.
Fig. 4.—Transverse section of ovary of *Chlora perfoliata*.
Fig. 5.—Transverse section of ovary of *Lilium*.
Fig. 6.—Transverse section of ovary of *Matthiola incana*.
Fig. 7.—A. Transverse section of end of replum of *Matthiola incana* with vascular bundle; B. Transverse section of midrib of leaf of *Matthiola incana*.
Fig. 8.—Fruit of *Cheiranthus Cheiri* dehisced to show the distribution of the carpels.

V. denotes valve, *B.* vascular bundle, *R.* replum, *O.* ovule, *S.* stigma, *L.* laminal region, *M.* midrib, *C.* carpel margin, *F.B.* fused vascular bundles of two carpels, *S.S.* strengthening sheath, *X.* xylem, *P.* phloem. In figs. 5 and 8 *A'B'* denote two carpels.

specialised function; the absence of vascular tissue in the midribs position, and its presence as one vascular bundle where the margins of two carpels meet, does not seem to provide very good comparison between the structure of the two carpels and that of the two leaves with which they are homologous. That the replum bundles correspond with the midrib bundles, rather than marginal ones, seems further borne out by the fact that in some cases, e. g., *Thlaspi arvense*, only these two bundles are actually continuous from the base of the gynœcium into the axis.

In other cases, e. g., *Cheiranthus Cheiri* and *Matthiola incana*, the replum region has a specialised outline resembling that of a midrib of a leaf (see fig. 3), and comparing with the midrib of carpels so frequently distinctive in other plants, e. g., *Nicotiana*, *Caltha*. In no case have I been able to discover any suggestion of two margins where the ovules occur, comparable with many other cases of parietal placentation, e. g., *Chlora* (fig. 4).

In many sections it has been observed that two vascular bundles lie close together in the valve position, suggestive of one from each carpel (fig. 6). The fusion of vascular bundles from the laminal region of two carpels is very common. It occurs, for instance, in Liliaceæ, where the two carpels meet on the outer surface of the ovary, producing a vascular bundle between two midrib bundles, which compares exactly with the arrangement in Cruciferæ; in Liliaceæ the vascular bundles of the two carpels again separate in the partition of the ovary, each loculus containing ovules attached to two carpels and each carpel supplying the vascular tissue necessary to its own ovules (see fig. 5). In the members of the Cruciferæ examined the replum bundle has not been observed to divide into two comparable with this; instead three bundles are formed (fig. 6). One of these bundles becomes associated with each of the two successive ovules. Even if these two bundles for the ovule supply do not arise on quite the same level they arise quite clearly on the two opposite sides of one main vascular strand, which is left in the central position. This behaviour is also suggestive of midrib development.

Arber has observed that the placental bundles often receive communications from both the replum and valve strands, and my observations agree with this. Bearing in mind that the plant is a Dicotyledon, with reticulate veining in the leaves, there seems no reason why a vascular bundle arising from the midrib should not fuse with one from a marginal strand. The actual positions of fusions of this type, one would think, need not necessarily be entirely at random, but rather correlated with some function and occurring in response to some need, either physiological or anatomical. In the case of the carpels the greatest need for vascular tissue appears to be to supply the developing ovules and later the seed with the requisite food, consequently the vascular bundles anastomose towards the replum in response to this.

The configuration of the vascular bundle at the replum position may also be advanced as supporting its homology with the midrib of the leaf. In both cases, additional strengthening tissue is quite commonly present in the form of a bundle sheath, e. g., *Matthiola* (fig. 7). Sheaths of this kind are not common in the bundles of the lamina in the genera in this family, which have small leaves.

The replum is usually considered to be a false septum in the ovary. If the carpels are placed laterally, and the replum is therefore situated between them, there seems no very special reason for calling it a false septum. There are other quite common cases where false septa arise, for instance, in the families Labiatæ and Boraginaceæ, and they do not here coincide with the divisions between the carpels, but develop from the midrib region. Why in the family Cruciferæ should not the false septum join the midrib of the two carpels? If the ovules are attached to the midribs of the carpels the replum joins these midribs, and thus the ovary agrees in this respect with the other ovaries where false septa arise.

The placing of the ovules on the midribs of the carpels would mean that dehiscence occurred at the midrib. This, however, cannot be considered to present a difficulty because dehiscence at the midrib is quite common. To quote a few examples; it occurs in the family Violaceæ where the ovules remain attached to the joined margins in the valves after the capsule has opened. This means that each valve is composed of half of each of two carpels in the same way as it is in Cruciferæ if the ovules are attached to the midribs (see fig. 8). In the family Iridaceæ loculicidal dehiscence is characteristic. *Datura* in the Solanaceæ is a familiar example of dehiscence along both joined margins and midribs, which also occurs throughout the Leguminosæ.

It is interesting to notice that where the gynœcium is composed of two joined carpels they are very often in the posterior-anterior position. This is particularly noticeable in the families which, at present, like Cruciferæ, terminate the evolutionary lines from the Ranales as described by Hutchinson. Amongst these may be cited the Polygalales, Umbelliferæ, the Lobeliaceæ, Labiatæ, Scrophulariaceæ, Boraginaceæ, Verbenaceæ, Oleaceæ, and Compositæ, all occupying at any rate an advanced phylogenetic position.

During recent years the quadricarpellary theory with regard to the Cruciferæ has been revived by Eames and Wilson* and also Saunders†, but these investigators do not agree with one another. The former suppose the valve carpels to be open and

* Eames and Wilson, "Carpel Morphology in the Cruciferæ," Amer. Journ. Bot. 1928, 1930, 1931.

† Saunders, E. R., "On a New View of the Nature of the Median Carpels in the Cruciferæ," Amer. Journ. Bot. 1929.

sterile, and the two others to be solid and fertile. This necessitates the ovule being pushed out through the wall of the carpel in which it is produced, so that it comes to lie in the loculus of the sterile valve carpel. Saunders describes two semi-solid carpels and two sterile carpels. This idea involves different interpretations for a siliqua and a silicula, because the typical narrow siliqua on dehiscence detaches the lateral sterile carpel, whilst in the silicula of *Lunaria* the valve, which falls off, is described as representing one much reduced sterile, lateral carpel together with half of each of two fertile, semi-solid, median carpels. Both these views seem to postulate very unusual phenomena. The behaviour of the ovules as described by Eames and Wilson seems very extraordinary and the distinction between a siliqua and silicula made by Saunders does not seem very readily acceptable. Saunders in her figures of young ovaries of *Lepidium sativum* shows only two—namely, the replum bundles, as shown in fig. 2 for *Thlaspi arvense*; Arber describes the valve bundles of *Capsella Viguieri* as being "wholly derived from replum strands." These facts seem to support the bicarpellary rather than the quadricarpellary theory.

The inverted orientation of the placental bundles to which Eames and Wilson attach such importance has been mentioned for some cases by Arber. My observations of this inversion suggest that the reason for it is associated with the fact that they are placental bundles. Similar inversion is quite common in ovaries with axile placentation in connection with the strands directly attached to the ovules.

I agree entirely with Arber that "the bicarpellary rather than the quadricarpellary theory should be retained as an instrument of description." This was supported by de Candolle, Schleiden, Payer, Eichler, Lignier, Van Tieghem, and many others, and is commonly held to-day, and as Arber says "on this theory an underlying unity can be traced in the gynœcium throughout the Crucifers, despite the variations of form to which the gynœcium is subject."

Summary.

1. The posterior-anterior position of the stigmas of the gynœcium in the family Cruciferæ indicate that there are two carpels in the posterior-anterior position.

2. If this is so the ovules are attached to the midribs of the carpels.

3. This possibility is supported by :—

(*a*) The Cruciferæ being the present last family of one line of evolution in the course of which, in the Papaveraceæ, the ovules had already moved along the lamina from the margins.

(*b*) The replum bundles extend to the stigmas and usually the midrib bundles terminate the leaf, rather than the marginal ones.

(*c*) The replum bundles show no sign of being two fused bundles from the respective margins.

(*d*) The replum bundles may be the only ones present, which suggests midrib rather than anything else.

(*e*) The replum bundles are usually the largest and most well developed, frequently having a strengthening bundle sheath similar to those found around the midrib bundles of foliage-leaves.

(*f*) The replum would not separate the two carpels but join their midribs, which compares with the false septa in other families.

(*g*) Dehiscence would occur at the midribs, which is common in other families.

(*h*) The posterior-anterior position of two carpels is common in other phylogenetically advanced families.

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NOTES ON SURREY PLANTS.

By C. E. Britton.

The following notes have been brought together in the hope of adding a little to the knowledge of the distribution of flowering plants and ferns in the county of Surrey. It will be seen that many varieties mentioned do not find a place in the flora of the county issued last year, although most of them have been published elsewhere. In addition, there are a few varietal names which, I believe, are unfamiliar to students of the native flora. Apart from these, the following plant-forms appear to have previously escaped notice in the county: *Cnicus acaulis* × *arvensis*, *C. arvensis* × *palustris*, *Hieracium acuminatum* Jord., and *Zannichellia pedicellata* Fr.

All the records are based upon the writer's observations and gatherings. Grateful acknowledgments are due to Lt.-Col. A. H. Wolley-Dod for kindly naming the roses, and to Mr. H. W. Pugsley for examining and reporting upon the writer's gatherings of *Euphrasia*.

No distinction has been attempted between indigenous and adventive species, as the status of the latter is at once apparent. The roman numerals denote the divisions into which the county is divided in the 'Flora of Surrey':—

Clematis Viticella L. Not included in the 'Flora.' VI. "Thickets by R. Mole opp. Esher Paper Mills. Quite naturalised and flowering freely, 29. vii. 1880," W. H. Beeby in Herb. S. Lond. Bot. Inst. Also established on road-side banks beyond Esher, originating from a garden.

Ranunculus repens L. var. *glabratus* DC. VII. By the Thames between Putney and Barnes.—*R. auricomus* L. The usual form in Surrey would appear to be var. *reniformis* Kitt.; var. *cervicornis* Kitt., with radical leaves cut into narrow segments, grows in VIII. at Holt Wood and at Warlingham.—*R. Flammula* L. var. *serratus* DC. II. Near Town Row; VII. Ham Common.—*R. lutarius* Bouvet. II. Pond near Chobham Park.

Helleborus viridis L. The forma *maculatus* occurs in the company of plants which do not show the purple coloration at the base of the sepals. Both forms, however, display the bases of the leaflets and petioles marked with purple. The colour at the base of the calyx is most conspicuous on the opening of the flowers, becoming less prominent as the stamens and petals fall.—*H. fœtidus* L. A true southern plant, peculiarly susceptible to the effects of frost. At its better-known locality, in Mar. 1930, about twenty plants were seen killed by exposure, owing to the clearance of trees and undergrowth from the vicinity.

Berberis vulgaris L. I see no good reason to question that this is native in Surrey, as in VI. Esher, Headley, and Mickleham Downs. The status of this plant has, no doubt, been obscured by the well-founded prejudices entertained towards it by agriculturists.

Papaver Rhœas L. var. *Pryorii* Dr. VIII. Chipstead.—Var. *caudatifolium* Fedde. VI. Fetcham; VIII. Warlingham.

Corydalis claviculata DC. II. Near Trump's Green.

Nasturtium palustre DC. var. *microcarpum* (Beck). VII. Between Mortlake and Kew.

Teesdalia nudicaulis R. Br. VII. Was still in existence at Barnes Common in 1910.

Helianthemum Chamæcistus Mill. VII. A form on Banstead Downs in 1931, with narrow distant petals. At this locality occur plants showing petals with blotches of orange-colour at the base. A similar variation is mentioned by H. J. Riddelsdell in his "Field Notes" in Journ. Bot. 1931, 241. Sweet figured flowers with similarly marked petals in his 'Cistineæ,' t. 34.

Viola odorata L. var. *subcarnea* (Jord.). VI. Headley.—*V. Riviniana* Reichb. var. *nemorosa* Neum. VI. Abundant in woods by Ranmore Common, Bookham Common; VII. Cuddington. This variety bears a great resemblance to *V. silvestris* Lam., but occurs where this last species is absent. Microscopic

examination shows that the pollen is uniform.—*V. Lloydii* Jord. VII. Lower Morden.—*V. variata* Jord. var. *sulphurea* Drabble. IV. Pyrford.—*V. agrestis*. III B. Shere; VI. Ashtead, Headley; VII. Lower Morden, Ham.—*V. segetalis* Jord. IV. Ockham, Send, Pyrford.—*V. obtusifolia* Jord. VII. Walton-on-the-Hill.—*V. Déséglisei* Jord. III B. Wotton; VIII. Coulsdon.—Var. *subtilis* (Jord.). IV. Field by Clandon Downs.—*V. ruralis* Jord. III B. Near Farley Heath. IV. Wisley.—*V. anglica* Drabble. IV. By Clandon Downs; VII. Field by Farthing Downs.—*V. latifolia* Drabble. VI. Headley.

Polygala dubia Bellynck. IV. Common-land by Wood Street; VIII. Banstead Heath.

Silene anglica L. VI. Little Bookham.

Cerastium semidecandrum L. var. *glandulosum* Koch. VII. Banstead Downs.

Stellaria Boræana Jord. VII. Road-side near Epsom Downs.—*S. neglecta* Weihe. III B. Abundant in woods by St. Martha's.—*S. graminea* L. VI. Littleworth Common, a form with greenish entire petals.

Montia chondrosperma Fenzl. II. Chobham Common.—Var. *intermedia* Beeby. VII. Richmond Park.

Hypericum dubium Leers. IV. Pray Heath, Pile Hill, Send; VII. Banstead Heath.—*H. montanum* L. The usual Surrey form is var. *scabrum* Koch.

Linum angustifolium Huds. VII. Pasture near Bonesgate, Chessington.

Geranium phæum L. VI. Established near Esher.—*G. Endressi* Gay. VI. Littleworth Common; VIII. Chelsham.

Erodium pimpinellifolium Sibth. IV. Send; VI. Hersham; VII. Ham.

Oxalis stricta L. VI. Esher.

Impatiens parviflora DC. IV. Mayburyhill. VI. Littleworth Common.

Ononis repens L. VII. The spinose form of this occurs at Epsom Downs.

Trifolium agrarium L. IV. St. George's Hill.—*T. procumbens* Schreb. var. *majus* Koch. VI. West Molesey.

Lotus uliginosus Schkuhr. III B. In swamp by Friday Street var. *glabriusculus* Bab. is well marked. VII. The very hairy form (var. *villosus* Lamotte) is abundant at Lower Morden.

Vicia Cracca L. var. *incana* Thuill. VII. Langley Bottom.—*V. tenuifolia* Roth var. *stenophylla* Boiss. (*V. elegans* Guss.). I identify as this a very showy large-flowered Vetch with extremely narrow leaflets, growing on a rough hill-side near Woldingham (VIII.), where it was shown me by the finder, Mr. A. Beadell, who had observed it for some years previously.

Lathyrus pratensis L. var. *pubescens* Beck. VIII. Warlingham.—*L. latifolius* L. VII. Epsom Downs. This is peculiarly a plant of railway-banks. Under these conditions I have seen it by the Southern Railway in various localities between Meopham in Kent and Weybridge in Surrey.

Prunus spinosa L. var. *fruticans* Weihe. VI. Headley.—*P. cerasifera* Ehrh. Not infrequent as a hedge-row shrub, and occasionally seen as a small tree along field-borders as (VII.) above Ashtead.

Spiræa Douglasii Hook. II. Chobham Ridges.

Fragaria chiloensis Duch. II. Near Ottershaw, by road-side, 1922–1931.

Rosa stylosa Desv. var. *lanceolata* Lindl. V. Merstham.—*R. canina* L. var. *dumalis* Dum. f. *cladoleia* Rouy. IX. Open Downs near Marden Park.—*R. dumetorum* Thuill. var. *calophylla* Rouy. IV. Near Whitmoor Common.—*R. obtusifolia* Desv. var. *Rothschildii* (Druce) W.-Dod. VII. Morden Park.—*R. tomentosa* Sm. var. *Brittoni* W.-Dod. VIII. South Hawke.—*R. rubiginosa* L. var. *rotundifolia* Rau; VII. Banstead Downs.—*R. micrantha* Sm. var. *typica* Chr. VIII. Farden Downs.—Var. *operta* (Pug.) W.-Dod. IV. Near Effingham Junction.—Var. *septicola* (Déségl.) W.-Dod. VII. Banstead Downs.

Cratægus monogyna × *oxyacanthoides*. VIII. Warlingham.

Amelanchier canadensis Med. II. Chobham Common, Chobham Ridges.

Sedum Telephium L. Seen in many districts of the county, and always as the form *S. purpurascens* Koch. No plant at all resembling *S. Fabaria* Koch has hitherto come under my notice in Surrey. I have collected the last-named plant in Sussex and have cultivated it for some years past. Besides the distinguishing feature of the leaves, *S. Fabaria* commences growth some weeks before its ally, with the result that the elongating stems usually suffer from the effects of frost, which the later-developing *S. purpurascens* escapes.—*S. reflexum* L. VII. Downs Lane, Epsom.

Hippuris vulgaris L. IV. Still in pond at Clandon Park.

Epilobium hirsutum × *parviflorum*. VII. New Malden (*teste* E. S. Marshall).—*E. montanum* × *obscurum*. VI. Ashcombe Copse.—*E. Lamyi* F. Schultz. VII. Morden Park, Mitcham.

Circæa lutetiana L. var. *cordifolia* Lasch. VII. Chessington.

Sambucus nigra L. var. *laciniata* (Mill.). VI. Headley Heath; characteristic. The plant from this locality referred to var. *laciniata* in the 'Flora of Surrey' is quite a different form of *S. nigra*.

Galium erectum Huds. V. Downs above Westcroft; VII. Downs Lane, Epsom; VIII. Banstead Heath, Woldingham.—*G. Mollugo* L. var. *insubricum* Gaud. VIII. Chipstead Valley.—*G. palustre* L. var. *lanceolatum* Uechtr. IV. Near Ripley.—Var. *Witheringii* Sm. VI. Ashtead Common, Little Bookham Common.

Scabiosa Succisa L. var. *glabrata* Schult. VI. Epsom Common.—*S. arvensis* L. var. *integrifolia* Coult. VI. Grays Lane, Ashtead.

(To be continued.)

SHORT NOTES.

Abnormal Panicles of Rubus argenteus Wh. & N.—In 1927 I distributed through the British Exchange Club some sheets of the common west-country form of *Rubus argenteus* Wh. & N. showing panicles of two kinds: viz. (1) the normal form as described in Rogers's 'Handbook,' and (2) a very lax, comparatively few-flowered panicle with flowers borne on long, slender, often very prickly pedicels. Both of these occurred on the same bush and even on the same stem. At that time I knew the abnormal panicles only from West Cornwall, though there they were fairly frequent. They are, however, of widespread occurrence. On a sheet now in my herbarium showing a similar growth gathered at Rosewarrick, near Bodmin, in 1905, by Dr. C. C. Vigurs, is the following note in the Rev. Moyle Rogers's handwriting:—"This *form*—with broad straggling panicle—is fairly frequent in S. and W. England. W. M. R."

Another sheet, from Colan, near Newquay, also gathered by Dr. Vigurs (1907), shows two panicles still attached to the same stem-piece, and about three inches apart, one the normal *argenteus* panicle, the other the lax, slender-pedicelled form.

Recently I have seen exactly similar lax panicles near Milford Haven in Pembrokeshire, and near Newcastle Emlyn in the north of Carmarthenshire. *Rubus argenteus*, the same form precisely as that found commonly in Devon and Cornwall, is abundant—over considerable areas apparently quite the dominant bramble—in Pembrokeshire and Carmarthenshire. Eastward it seems scarcer; I have not noticed it in Brecon or Radnor.

The abundance of this bramble over the extremities of the two south-western peninsulas of Britain suggests an origin for the bramble species equally remote in time with that of other plant species common to the two areas, e. g., *Hypericum undulatum*.

The reason for the frequency of lax panicles in this species is not apparent. The pedicels are sometimes rust-infected, but are oftener apparently clean and healthy.—F. Rilstone, Polperro, Cornwall.

Rust Infection in Species of Rubus.—Species of *Rubus* are subject in varying degrees to rust infection (usually *Phragmidium*) in leaf and panicle, but glandular brambles seem on the whole less susceptible to attack than eglandular forms. In Cornwall *Rubus adscitus* suffers far more than any other. Roadside thickets of this species may often be seen in truly lamentable condition, every leaf curled and smothered with the yellow fructifications of the fungus.—F. Rilstone.

New Records for Mosses in Scotland.—While spending two weeks in Scotland I was able to pay attention to the mosses of Nairn, Morayshire, and North Aberdeenshire, with special care to keep well within the county boundaries. Time permitted only very hasty visits to the different localities; but the resulting 60 new county and vice-county records show how much these parts require further investigation. Although nothing of outstanding interest among the true Mosses was collected, a number of the common species hitherto overlooked were secured. Amongst the Sphagna some very beautiful plants of *Sphagnum squarrosum* vars. *subsquarrosum* and *imbricatum* were found along with the rare *S. molle*. The mosses listed have been incorporated in the British Museum Herbarium.

N. Aberdeenshire, v.c. 93, near Fraserburgh.—*Polytrichum formosum* Hedw., *Campylopus flexuosus* Brid., *C. flexuosus* var. *paradoxus* Husn., *Rhacomitrium aciculare* Brid., *R. fasciculare* Brid., *R. heterostichum* Brid., *Barbula rubella* Lindb., *Aulacomnium palustre* Schwaeg., *Brachythecium purum* Dixon, *Eurhynchium myosuroides* Schp., *Hypnum cupressiforme* var. *resupinatum* Schp., *H. stramineum* Dicks., *H. cuspidatum* L., *H. Schreberi* Willd., *Sphagnum rubellum* Wils., *S. quinquefarium* Warnst., *S. plumulosum* Röll., *S. recurvum* vars. *robustum* Breidler and *majus* Ångstr., *S. cuspidatum* vars. *falcatum* Russ., *submersum* Schimp., and *plumosum* Schimp., *S. inundatum* Warnst., *S. cymbifolium* Ehrh., *S. papillosum* vars. *normale* Warnst. and *sublæve* Limpr.

Morayshire, v.c. 95, near Elgin.—*Sphagnum fimbriatum* var. *validius* Card. and var. *intermedium* Russ., *S. amblyphyllum* var. *mesophyllum* Warnst., *S. recurvum* var. *majus* Ångstr., *S. cuspidatum* var. *submersum* Schimp., *S. aquatile* Warnst.

Nairnshire, v.c. 96, near Nairn:—*Dicranum scoparium* var. *spadiceum* Boul., *Tortula ruraliformis* Dixon, *Barbula vinealis* Brid., *B. unguiculata* Hedw., *Hypnum exannulatum* var. *brachydictyon* Ren., *Sphagnum fimbriatum* var. *validius* Card., *S. Girgensohnii* var. *gracilescens* Grav., *S. rubellum* Wils., *S. subtile* Warnst., *S. quinquefarium* Warnst., *S. tenerum* Warnst., *S. molle* Sulliv., *S. compactum* var. *subsquarrosum* Russ., *S. squarrosum* vars. *subsquarrosum* Russ. and *imbricatum* Schimp., *S. teres* var. *imbricatum* Warnst., *S. pulchrum* Warnst., *S. recurvum* var. *robustum* Breidler and var. *majus* Ångstr., *S. cuspidatum* vars. *falcatum* Russ., *submersum* Schimp., *plumosum* Schimp., and *plumulosum* Schimp., *S. inundatum* vars. *robustum* (Warnst.) Sherrin and *eurycladum* (Warnst.) Sherrin, *S. papillosum* var. *normale* Warnst., *S. cymbifolium* Ehrh.—W. R. SHERRIN.

REVIEWS.

A Manual of the Flowering Plants and Ferns of the Transvaal with Swaziland, South Africa. By JOSEPH BURTT DAVY, M.A., Ph.D., F.L.S. Part II. *Malvaceæ to Umbelliferæ.* Crown 8vo, pp. xxxvi, 273–529, figs. 41–80. Longmans, Green & Co.: London, 1932. Price 25*s*.

THERE is an interval of more than six years between the appearance of Parts I. and II. of Dr. Burtt Davy's Manual. The author's work in the organisation and building up of a Department of Forest Botany at the Imperial Forestry Institute, Oxford, and his teaching work in Systematic Botany have left no leisure for the Transvaal Flora. Much of the work on Part II. was finished when Part I. went to press, but a few large and critical genera remained. These have been completed with the help of Mr. N. E. Brown (*Thesium* and *Indigofera*), Mr. C. A. Smith, and Miss I. C. Verdoorn of the National Herbarium, Pretoria (*Crotalaria*), and others. The drawings are the work of Mrs. Burtt Davy, the late Miss Matilda Smith, and Mr. W. E. Trevithick. Reference to the plan of the work will be found in the notice of Part I. in this Journal, 1926, 194.

Part II. completes the Archichlamydeous Dicotyledons, leaving the Metachlamydeæ for Part III. and the Monocotyledons for Part IV. As in Part I. the Latin diagnoses of new species and varieties—154 in number—precede the systematic text. The genera *Cissus*, *Indigofera*, and *Thesium* are specially rich in novelties. Leguminosæ, which Dr. Davy treats as three separate families, represents the heaviest piece of work, its elaboration occupying 108 pages. A tabular synopsis of the families indicates that the flora includes, in the families treated, 193 genera and 960 species, native, in addition to 23 genera and 52 species, alien. The total number of species and varieties in Parts I. and II. is 2047, which contrasts with 1301, the number included in the first check-list. We sincerely hope that Dr. Burtt Davy will be able to find time to complete, in the near future, this much-needed flora.

No explanation is given for the increase of price from 15*s*. to 25*s*. per part.

The Medicinal and Poisonous Plants of Southern Africa, an Account of their Medicinal Uses, Chemical Composition, Pharmacological Effects in Toxicology in Man and Animal. By JOHN MITCHELL WATT, M.B., Ch.B., and MARIA GERDINA BREYER-BRANDWIJK. Large 8vo, pp. xx, 314, 26 pls. (12 in colour). E. & S. Livingstone: Edinburgh, 1932. Price 25*s*.

THE authors of this book, respectively Professor and Lecturer in Pharmacology in the University of the Witwatersrand, Johannesburg, have brought together a vast amount of information on popular remedies, both native and European, and on plants poisonous to man or animals in South Africa. Their aim has been to give all available information on the medicinal uses, chemical composition, pharmacological effects, and human and veterinary toxicology of the flora of Southern Africa. It is indeed "an amazing record." It is hoped that the book will be an impetus to research and a stimulus to medical practitioners to record cases of plant-poisoning which come their way. The plant-specimens, over 2500 in number, have been determined by the Staff of the Division of Plant Industry at Pretoria. The financial support of the Bantu Research Committee of the University of the Witwatersrand has made the work possible.

The arrangement of the text is under the plant-families following the German system as used by Phillips in 'The Genera of South African Flowering Plants.' The families of flowering plants number 122; non-flowering plants, mainly Ferns and Fungi (the latter briefly treated), follow at the end. A list of references is given at the end of each family and an Appendix supplies a list of general works. There are four indexes, giving respectively the botanical names of the plants, the common names from European languages, the native names, and the names of active principles. As botanical descriptions of the plants are not included in the text, it is necessary when using the book to know first the name of the plant.

The general "get-up" of the book is excellent. Some of the plates illustrate the effect of poisoning in stock; the majority are good representations of a few of the species under consideration. The authors invite the co-operation of correspondents in accumulating further information, and give in an Appendix a method for reporting and sending specimens.

Recent Advances in Botany. By E. C. BARTON-WRIGHT, M.Sc. Crown 8vo, pp. viii, 287, 60 text-figs. J. & A. Churchill: London, 1932. Price 12*s.* 6*d.*

THIS addition to Messrs. Churchill's "Recent Advances" Series is intended to cover only a limited aspect of the subject. The author has already published a volume on 'Recent Advances in Plant Physiology,' which was noticed in this Journal in 1930 (p. 188). In view of this publication and the admitted limited aspect of the present work, 'Some Recent Advances' would have been preferable as a title. But as it stands the volume brings together the results of much investigation and will be a great help to students in supplementing the information supplied by their text-books. Chapter I., "Some Theories regarding Plant Structure," presents Professor Bower's views on "Size and Form" in plants, a *résumé* of the phyllode theory of the Monocotyledonous leaf and a brief discussion of the nature of the single cotyledon, and a review of Miss Saunders's work on carpel polymorphism—but much has been written on the last subject since 1926, the date at which the author leaves it. Chapter II., dealing with Palæobotany, includes a description of recent development in technique. Chapter III., the "Species Concept," centres round Turesson's work. Three chapters are devoted to Fungi (discussing, respectively, Reproduction, Heterothallism, and Mycorrhiza), two to Algæ (Phæophyceæ and Florideæ), and a final chapter to the "Virus Diseases of Plants." References to germane papers are given at the end of each chapter and there are author and subject indexes.

It is to be regretted that more care was not taken to ensure correct spelling of names. Such mistakes as *Lolium perrene*, *Goodyera prosera*, *Cystoceira*, *vesiculosis*, *siliculosis*, and others similar, raise a suggestion of carelessness.

Die Blattrollkrankheit der Kartoffel. By Dr. F. ESMARCH. 8vo, pp. i, 91, 6 figs. Springer: Berlin, 1932. Price R.M. 9.90.

THIS is a sane and well-balanced review of our present knowledge of Leaf-Roll of the potato. It is the more welcome in this country as being written by a German, because there is a sharp cleavage of opinion on the nature of this disease between Germany and other countries. In Germany, the great preponderance of opinion is still in favour of the view that it is a physiological condition, a degeneration which is transmitted through the tuber because the plant has acquired a relatively stable habit of growing in this manner, although views differ as to the origin and the nature of this habit. In Holland, England, and America, this idea of a physiological degeneration has long been abandoned, and it is held almost universally that Leaf-Roll is a virus disease

with the characters of the group well marked. The opposing points of view are clearly stated here with the arguments on either side, and it is convenient to have the German position marshalled and summarised. After a historical survey of the earlier accounts, which traces the progressive analysis and disentanglement of the many diseases at one time included under the term leaf-roll, a description is given of the symptoms and histology of the true disease, with due attention to the varying effects in different varieties of potato. The physiology, transmission, and effect of environmental factors are treated in different chapters, and there is some consideration of methods of control of this disease, whose severity varies in different seasons and in different localities, but is nowhere negligible and is sometimes devastating.

The volume is one of the series of "Monographien zum Pflanzenschutz," edited by Prof. Dr. H. Morstatt.—J. HENDERSON SMITH.

BOOK-NOTES, NEWS, ETC.

'JOURNAL OF THE LINNEAN SOCIETY, BOTANY.'—The recent issue of the Journal (vol. xlix. contd.) contains an account of the Burmese Charophyta by B. P. Pal, M.Sc., of the University College, Rangoon. For a tropical region Burma is quite rich, the number of species recorded approaching that for the whole of India. Twenty-nine species, nine of which are new, are described—the novelties are illustrated. Distribution and ecology are discussed, and the supposed larvicidal properties of Charophyta are examined in detail. It is suggested that the absence of mosquito larvæ in presence of Charophyta may be due to the presence of larvæ-eating insects. The Latin diagnoses are merely literal translations, sometimes faulty, of the English descriptions.

Mr. H. W. Pugsley contributes further notes on *Fumaria* and *Rupicapnos*, due mainly to recent exploration and collection in Morocco. Several new species and varieties are described. Drs. L. Cockayne and W. A. Sledge give the results of their study of the repopulation of an area in the Southern Alps of New Zealand, the subalpine *Nothofagus cliffortioides* forest in which was destroyed by fire twenty-four years ago.

FLORA'S LEAGUE.—The annual report of the Society for the Protection of Wild Flowers, Ferns, and Trees for the year ending March 1932, by the Hon. Organising Secretary, Lady Abbot-Anderson, describes the acitivites of the Society during the preceding fourteen months. Mr. Henry Salt, in a Foreword, refers to the establishment by the Council for the Preservation of Rural England of a Wild Plant Conservation Board, a step for which the League was largely responsible. The chief danger to rare species is now the amateur collector—"for private

collections (unless for definite scientific purposes) there is neither need nor excuse." The League now numbers over 18,000 members, and is steadily increasing in membership and influence. A number of local branches have been established throughout the country, and lantern-lectures have been given to various societies, schools, and institutions. The By-Law prohibiting the uprooting of wild plants has already been adopted by thirty-four counties. The address of the Society is c/o, The Council for the Preservation of Rural England, 17 Great Marlborough St., London, W. 1.

'THE JOURNAL OF MYCOLOGY,' vol. xvii. pts. 1 & 2, reproduces the Presidential Address by A. A. Pearson, entitled "Modern Work on the Hymenomycetes." There are also accounts by E. M. Wakefield of the 1931 forays at Horsham and Belfast, and a number of papers on special subjects. Carleton Rea supplies a second Appendix to his work on British Basidiomycetæ (1927)—four new species are described; and J. H. Miller continues his revision of the British Xylariaceæ. J. H. Corner describes his study of a *Fomes* with two systems of hyphæ; B. Barnes and R. Melville contribute notes on British Aquatic Fungi; and R. W. Butcher writes on the "Ecology of Sewage Fungus."

SOCIETY FOR THE PROMOTION OF NATURE RESERVES.—The Handbook for 1932 reports the work of the Society for the year ending March 31, and gives a list of members, and a concise account of its objects and achievements. The death of Mr. J. R. B. Masefield who worked so zealously for the acquisition of Hawksmoor, in Staffordshire, as a nature reserve, is a severe loss to the Society. It is proposed to commemorate his services by the erection of a memorial at Hawksmoor. The President of the Society is Lord Rothschild, F.R.S., and information as to its activities may be obtained from Dr. G. F. Herbert Smith, Natural History Museum, London, S.W. 7, one of the Honorary Secretaries.

'THE LONDON NATURALIST.'—This Report (price 3*s.*) of the London Natural History Society for 1931 describes the various activities of the Society during that year. The work of the botanical section has filled a number of gaps in the divisional records, and *Euphrasia stricta* Host is new to the whole area. The records, as a whole, comprise about 25,000 entries, and give a fair idea of the flora of the London area within twenty miles of St. Paul's, both as regards distribution and frequency. A continuation of the records forms a supplement to the Report. H. J. Burkill contributes an "Introduction to the Study of Plant Galls" and a list of records for the year; and R. W. Robbins in "Some Preliminary Remarks on Brambles" gives useful advice to would-be students of this "complex and baffling but vigorously live group." Information as to the work of this useful Society may be obtained from the Secretary, Mr. A. B. HORNBLOWER, 91 Queen's Road, Buckhurst Hill, Essex.

VARIATION IN *ANEMONE NEMOROSA*.

BY E. MILNE-REDHEAD, B.A., AND W. B. TURRILL, D.SC.

ANEMONE NEMOROSA, as it occurs in the British Isles, is known to be decidedly polymorphic, if one uses the term in a broad sense. Druce, 'British Plant List,' ed. 2, 1 (1928), records four varieties additional to the type. Salisbury, in Ann. Bot. xxx. 525 (1916), described from Hertfordshire three variations which he named *Anemone nemorosa* var. *genuina*, *A. n.* var. *robusta*, and *A. n.* var. *apetala*, respectively. Salisbury also records the last from Carnforth, Lancashire (coll. Worsdell). Plants showing other variations of both foliage and floral characters are in cultivation, and are occasionally referred to in taxonomic and horticultural literature (see, for example, Journ. Bot. lvi. 11, 1918, and lxii. 265, 1924).

Prof. M. C. Potter sent to Kew on April 26, 1932, several specimens of a large white-flowered *Anemone* collected in a small wood near New Milton, Hants. The material appeared to represent a very robust variation of *A. nemorosa*, but did not exactly fit the description provided by Salisbury for his var. *robusta*. At the kind invitation of Prof. Potter the writers visited the wood in his company and that of the owner, Mr. L. Burt. The wood was a mixed one of *Quercus Robur*, *Betula pubescens*, and *Fagus silvatica*, with an undergrowth of *Ilex Aquifolium* and *Corylus Avellana*. The field-layer was markedly dominated by *Anemone nemorosa*, with smaller numbers of plants of *Scilla non-scripta*, *Luzula pilosa*, *Pteridium aquilinum*, *Hedera Helix*, and *Rubus* sp.

Scattered here and there in the general population of the *Anemone* there occurred plants of the "abnormal" kind. A good series of these was collected and is preserved in the Ecological Herbarium at Kew. As compared with "normal" plants the "abnormal" ones have broader segments to the basal leaves, very much broader and more shortly petioled involucral bracts with broader segments, larger flowers with white to virescent sepals, and normal to somewhat abnormal reproductive parts. The single involucral leaves are up to 4·5 cm. broad, and the flowers up to 7·5 cm. diam. The sepals are often strongly unequal in size and shape, even in the one flower, and on different plants the flowers range from the given maximum down to 4 cm. diam. In another direction a line of variation can be arranged to end in plants with virescent sepals showing partial phyllody. The largest-flowered specimens do not fit Salisbury's description of his var. *robusta*, but agree with that given by Rouy and Foucaud, 'Flore de France,' i. 44 (1893), for their var. *grandiflora*. On the other hand, we are unable to find any sharp line of demarcation between these two described varieties.

On May 14, 1932, Mr. P. Weathers sent a very large-flowered *Anemone* (corolla diam. 8 cm., sepals up to 3 cm. broad) collected " from a wood carpeted with *A. nemorosa* near Fareham, Hants, collected by Com. Antony Morse." The specimen obviously belongs to the same type of variation as the New Milton specimens.

A third series of specimens has been received through Mr. J. W. Walton of the Borough Museum, Folkestone. These were collected by Dr. Edith Gould in Lady Wood, about $1\frac{3}{4}$ miles north of Folkestone, on the top of the North Downs, on Lenham Sands, overlying Chalk. The important features of the individual specimens of this third series can be given as follows :—

(1) Bracts 3, trifid to base, every segment 2–3-lobed, 2·3–4 cm. broad, flat ; pedicel 11 cm. long. Flower 5·5 cm. diam., of 3+3 sepals, broad below, narrowed above, the inner 3 larger, petaloid except for a slight virescence of one of the inner ones ; stamens not producing good pollen ; carpels with imperfectly formed ovules.

(2) Bracts similar to those of (1), but rather more lobed and one smaller than the other two ; pedicel 8 cm. long. Flower 6 cm. diam., of 3+5 petaloid sepals of rather unequal size ; stamens with very short filaments, anthers dehiscing to produce well-formed pollen ; carpels with exposed ovules, these having burst through the ovary-walls.

(3) Bracts 3, one 3-fid, another 4-fid, the third imperfectly bifid, secondary lobing well marked ; pedicel 8·5 cm. long. Flower 7·5 cm. diam., of 3+3 petaloid sepals, very unequal in size, lobed in an irregular, almost fimbriate manner and showing traces of virescence ; stamens apparently normal ; receptacle 3-lobed separating the carpels into three groups, in two groups carpels normal, in the third ovules exposed.

(4) Bracts 3, 5-fid to or nearly to the base, nearly flat ; pedicel 14 cm. long. Flower 8 cm. diam., of 2+4 petaloid sepals, very unequal in size, irregularly crenate, suffused with green and purple, 1·5–4·5 cm. broad. Receptacle irregularly 6–8-lobed with mostly abnormal stamens and carpels mixed together, one carpel replaced by a small foliage-leaf.

(5) Three bracts, trifid to base, the segments again deeply lobed, 1·8–3 cm. broad ; pedicel 3·8 cm. long. Flower 6 cm. diam., 3+5 petaloid sepals, slightly inrolled, undulate, entire or slightly lobed, 1–1·7 cm. broad. Stamens not polliniferous. Outer carpels fertile with good ovules, inner contorted, reduced, and some with exposed ovules.

(6) Three bracts, trifid to base and again deeply lobed, one bract much larger than the other two, nearly flat ; pedicel 1·5 cm. long. Flower 8 cm. diam., of 3+4 petaloid sepals of various sizes and shapes and in part lobed. Stamens with long filaments, anthers not polliniferous. Carpels all abortive.

(7) Bracts 3, nearly sessile, with very broad bases, trifid to base, and with numerous secondary lobes, not flat, but the segments and lobes so pressed against one another as to cause concave growth and a general " cockscomb " appearance ; pedicel 3 cm. long. Flower 6 cm. diam., of 2+3+1 sepals, subpetaloid, all more or less virescent and the outermost subfoliaceous. Stamens and carpels abortive and scarcely developed at all.

(8) Bracts 3, trifid to base and segments irregularly lobed, very shortly petioled and with broad bases, rather " crimped " ; pedicel 8 cm. long. Flower 4·5 cm. diam., of 3+4 subpetaloid, nearly virescent, rather thick sepals. A few short abortive stamens, many carpels with anthers at the end and diminutive ill-formed carpels between them.

(9) Bracts 3, trifid to base and segments again lobed, flat but segments overlapping ; pedicel 8 cm. long. Flower totally abnormal, a mixture of abortive and variously ill-formed stamens and carpels on the outside and 4 foliaceous lobed bracts and one subpetaloid " sepal " near the centre, and a few very diminutive stamens and carpels in the centre.

In addition to the above the following are preserved at Kew and come within the general range of variation described in this paper :—

(1) " In a wood with *A. nemorosa*," Gainsborough, Lincs, *Rev. C. E. Cochin*, April 28, 1880.

(2) " From Rev. S. W. Kettlewell, Grafton Vicarage, Marlborough, Wilts, 21 May 1909 " (drawing and specimen ; sepals multiplied in number).

(3) " Wild in Sussex," comm. G. C. Druce, 14. 5. 1921.

(4) " Comm. Canon J. W. Horsley, 16. 5. 14, exhibiting partial phyllody of the calyx."

In the British Museum (Natural History) Herbarium the following extra-British specimens approximate to the variations described above :—

Norway : Grodalen, c. 1000 ft., *A. W. Trethewy*, 1923. Three flowering stems whose solitary flowers have enlarged sepals, one without normal carpels but with bract-segments somewhat wider than normal.

Bornholm, 3. 8. 81, *E. Rostrop.*

Fyn, Tango, Skoo, 30. 5. 82, *E. Rostrop.*

Unfortunately this extra-British material is either too imperfect or not sufficiently well preserved for us to state definitely that it is to be included in the same range of variation as the British specimens.

Living material has been transplanted from the New Milton and Folkestone localities and it may be possible to conduct some

experiments which should throw light upon the " causes " of the variations. It is possible that these are ctyological, and in one sense genetical. No traces have been found of their being due to disease or insect attack, and hybridization with a cultivated species seems unlikely.

The writers would be grateful for any further records, and especially for specimens, of plants of *Anemone nemorosa* differing in any characters from the kind common in this country.

Royal Botanic Gardens, Kew.

SOME NEW NAMES IN THE MONOCOTYLEDONES.—II.

By J. E. Dandy, M.A., F.L.S.

The first of these contributions appeared in Journ. Bot. lxix. 53–55 (1931).

Hydrocharitaceæ.

Hydrocharis dubia (Bl.) Dandy, comb. nov. *Pontederia ? dubia* Bl. Enum. Pl. Jav. 33 (1827). *Hydrocharis cellulosa* Buch.-Ham. ex Wall. Numer. List, 176, nomen nudum (1831–32); Prain, Bengal Pl. ii. 997 (1903). *H. asiatica* Miq. Fl. Ind. Batav. iii. 239 (1855). *Sagittaria triflora* Hort. ex Miq. *l. c.*, nomen synonymum—non *S. triflora* Nor., nomen nudum (1790). *Pontederia obtusissima* Hort. ex Miq. *l. c.*, nomen synonymum. *Monochoria ? dubia* Miq. *l. c.* 549. *Boottia renifolia* Merr. in Philipp. Journ. Sci. iv. C. 247 (1909).

This species, when treated as distinct (in some works it has been united with *H. Morsus-ranæ* L.), has generally been known by Miquel's name *H. asiatica*. It is here regarded as a valid species, and as such must bear Blume's epithet *dubia*. *Pontederia ? dubia* was identified with *H. asiatica* by H. G. Hallier in 'Nova Guinea,' viii. 909, 917 (1913).

Orchidaceæ.

Herminium macrophyllum (D. Don) Dandy, comb. nov. *Neottia macrophylla* D. Don, Prodr. Fl. Nepal. 27 (1825). *Spiranthes macrophylla* Spreng. in L. Syst. Veg., Ed. 16, iii. 708 (1826). *Herminium congestum* Lindl. ex Wall. Numer. List, 241, nomen nudum (1832); in Edw. Bot. Reg. xviii. sub t. 1499 (1832).

Zingiberaceæ.

Cautleya gracilis (Sm.) Dandy, comb. nov. *Roscoea gracilis* Sm. in Trans. Linn. Soc. xiii. 460 (1822). *R. elatior* Sm. *l. c.* *R. lutea* Royle, Illustr. Bot. Himal. Mount. i. 361 (1839). *Cautleya lutea* Royle, *l. c.* 499, nomen synonymum (1840); Hook. f. in Curt. Bot. Mag. cxiv. t. 6991 (1888).

Hæmodoraceæ.

Lachnanthes caroliana (Lam.) Dandy, comb. nov. [*Anonymos tinctoria* Walt. Fl. Carol. 68 (1788).] *Dilatris Caroliana* Lam. in Tabl. Encycl. et Méth., Bot. i. 127 (1791). *Heritiera tinctorum* J. F. Gmel. in L. Syst. Nat., Ed. 13, ii. 113 (1791). *H. Gmelini* Michx. Fl. Bor.-Amer. i. 21, t. 4 (1803). *Dilatris Heritiera* Pers. Synops. Pl. i. 54 (1805). *Gyrotheca Tinctoria* Salisb. in Trans. Hort. Soc. i. 327 (1812). *Dilatris tinctoria* [Walt.] Pursh, Fl. Amer. Sept. i. 30 (1814). *Lachnanthes Tinctoria* [Walt.] Ell. Sketch Bot. S.-Carol. & Georgia, i. 47 (1816). *Heritiera tinctoria* Kuntze, Revis. Gen. Pl. ii. 699 in obs., err. pro *tinctorum* (1891). *Gyrotheca capitata* Morong in Bull. Torr. Bot. Club, xx. 472, err. pro *tinctoria* (1893).

This species has commonly been known by the epithet *tinctoria*, for the reason that it was first described, by Walter (Fl. Carol. 68 (1788)), under the " name " *Anonymos tinctoria*. Walter's combination, however, and all others published under *Anonymos*, should be rejected as having no nomenclatural status. *Anonymos* was a convenient heading for species of whose genus Walter was uncertain; it is not a generic name, and combinations made under it must therefore be regarded as illegitimate. The earliest legitimate names for the species under consideration are Lamarck's *Dilatris Caroliana* and J. F. Gmelin's *Heritiera tinctorum*, both published in 1791, and from these the epithet *Caroliana* is here chosen for transfer to *Lachnanthes* so as to avoid the nomenclatural confusion which would otherwise arise between *tinctorum* and *tinctoria*, and in their citation. In my opinion these two epithets are distinct and should not be considered as mere orthographic variants: *tinctorum* is the genitive plural of the noun *tinctor* (a dyer), while *tinctoria* is the nominative feminine singular of the adjective *tinctorius* (pertaining to dyeing). Gmelin's generic name *Heritiera* is obviously feminine, and there is nothing to show that his epithet *tinctorum* is an error for *tinctoria*.

Amaryllidaceæ.

Ixiolirion ixiolirioides (Regel) Dandy, comb. nov. *Kolpakowskia ixiolirioides* Regel in Acta Horti Petropol. v. 635 (1878). *Ixiolirion Kolpakowskianum* Regel, *l. c.* vi. 494 (1880).

Liliaceæ.

Tupistra tupistroides (Kunth) Dandy, comb. nov. *Macrostigma tupistroides* Kunth in Index Semin. Hort. Bot. Berol. 1848, 12 (1848); in Ann. Sci. Nat., Sér. 3, Bot. xi. 221 (1849). *Tupistra macrostigma* Bak. in Curt. Bot. Mag. ciii. t. 6280 (1877).

Gagea græca (L.) Dandy, comb. nov. *Anthericum græcum* L. Sp. Pl., Ed. 2, i. 444 (1762). *Phalangium græcum* Poir. in Encycl. Méth., Bot. v. 250 (1804). *Lloydia græca* Endl. ex Kunth, Enum. Pl. iv. 245 (1843). *L. cretica* Boiss. ex Bak. in Journ. Linn. Soc., Bot. xiv. 301, nomen synonymum (1874).

This species, along with two others, formed the basis of *Lloydia* subgen. *Gageopsis* Bak. (*l. c.* 300). The subgenus was defined as follows: "Bulbus rectus globosus. Segmenta [perianthii] unguibus haud foveolatis"; and in a footnote concerning it Baker remarked: "Ab *Gageis* floribus corymbosis bracteis segregatis, inferioribus caulinis, præsertim differt perianthii segmentis albidis, venis purpurascentibus haud in carinam confertis." In the diagnostic characters given by Baker the group agrees with *Gagea* and differs from typical *Lloydia*; in fact the only noticeable difference between it and typical *Gagea* lies, as pointed out by Baker's footnote, in the coloration and venation of the tepals, which in appearance resemble those of *Lloydia*. The group therefore seems better referred to *Gagea* than to *Lloydia*. Besides the species renamed here it includes *G. triflora* (Ledeb.) J. A. & J. H. Schult. (*L. triflora* Bak.) and *G. rubro-viridis* Boiss. & Kotschy (*L. rubro-viridis* Bak.).

Parduyna undulata (R. Br.) Dandy, comb. nov. *Schelhammera undulata* R. Br. Prodr. Fl. Nov. Holland. i. 274 (1810).

The generic name *Schelhammera* R. Br. (*l. c.* 273), being invalidated by *Schelhammeria* Moench (1802), must be replaced by *Parduyna* Salisb. Gen. Pl. 58 (1866), which was based on *Schelhammera multiflora* R. Br. [*P. multiflora* (R. Br.) Salisb. ex B. D. Jackson*]. *S. multiflora* was R. Brown's second species of *Schelhammera*, the first being *S. undulata*.

CENTROLEPIDACEÆ.

PSEUDALEPYRUM Dandy, nom. nov. *Alepyrum* Hieron. in Abhandl. Naturforsch. Gesellsch. Halle, xii. 217 (1873)—non *Alepyrum* R. Br. (1810).

Type-species: *P. pallidum* (Hook. f.) Dandy (*A. pallidum* Hook. f.).

The name *Alepyrum* was originally proposed by R. Brown (Prodr. Fl. Nov. Holland. i. 253 (1810)) for a genus containing three species, namely *A. polygynum* R. Br., *A. pumilio* R. Br., and *A. muticum* R. Br. In 1853 J. D. Hooker (Bot. Antarct. Voy., pt. 2, i. 268) added a fourth species, *A. pallidum* Hook. f., and in 1857 (*l. c.*, pt. 3, ii. 77–78) described three further species, *A. monogynum* Hook. f., *A. muscoides* Hook. f., and *A. Muelleri* Hook. f. Hieronymus, in his 'Beiträge zur Kenntniss der Centrolepidaceen' (1873), included *Alepyrum* R. Br., with its three original species, under *Centrolepis* Labill., but retained the name *Alepyrum* ["Hooker fil., Flora of New Zeal. p. 268 ex parte, non Rob. Brown, Prodr."] for a monotypic genus based on Hooker's *A. pallidum*. Of Hooker's three other species, *A. monogynum* was referred by Hieronymus to the genus *Aphelia* R. Br., whilst *Alepyrum muscoides* and *A. Muelleri* were placed in *Centrolepis*. Hieronymus's use of the name *Alepyrum* is, of course, illegitimate, and the above new name is therefore proposed for his genus, which as now known appears to comprise the following four species.

* This combination was first published by B. D. Jackson (Index Kew. ii. 425 (1895)), who attributed it to Salisbury (*l. c.*). The latter author, however, did not actually make the combination; he merely cited *S. multiflora* as the basis of his genus *Parduyna*, which he diagnosed on the following page (Salisb. *l. c.* 59) in a discussion of the genera of Uvulareæ.

Pseudalepyrum pallidum (Hook. f.) Dandy, comb. nov. *Gaimardia pallida* Hook. f. Bot. Antarct. Voy., pt. 1, i. 86 (1844). *Alepyrum pallidum* Hook. f. *l. c.*, pt. 2, i. 268, t. 62 C (1853). *Centrolepis pallida* Cheesem. Man. New Zeal. Fl. 757 (1906).

Pseudalepyrum ciliatum (Hook. f.) Dandy, comb. nov. *Gaimardia ciliata* Hook. f. *l. c.*, pt. 1, i. 85 (1844).

Var. **genuinum** Dandy, var. nov. *Gaimardia ciliata* Hook. f. *l. c.* *Alepyrum viride* Kirk in Journ. Linn. Soc., Bot. xix. 286 in obs., nomen synonymum (1882). *Centrolepis viridis* Kirk in Trans. & Proc. New Zeal. Inst. xxiii. 441 (1891).

Material of this variety was identified with the Tasmanian *P. monogynum* (Hook. f.) Dandy (*Centrolepis monogyna* Benth.) by Kirk in Journ. Linn. Soc., Bot. xix. 286 (1882), but was later described by him as a distinct species, *C. viridis*.

Var. **ligulatum** (Kirk) Dandy, comb. nov. *Centrolepis viridis* var. *ligulata* Kirk in Trans. & Proc. New Zeal. Inst. xxiii. 442 (1891). *Gaimardia ciliata* var. *ligulata* Cheesem. Man. New Zeal. Fl., Ed. 2, 289 (1925).

Pseudalepyrum minimum (Kirk) Dandy, comb. nov. *Centrolepis minima* Kirk, *l. c.* 441 (1891). *Gaimardia minima* Cheesem. *l. c.* 288 (1925).

Pseudalepyrum monogynum (Hook. f.) Dandy, comb. nov. *Alepyrum monogynum* Hook. f. Bot. Antarct. Voy., pt. 3, ii. 77, t. 138 B (1857). *Aphelia monogyna* Hieron. in Abhandl. Naturforsch. Gesellsch. Halle, xii. 208 (1873). *Centrolepis monogyna* Benth. Fl. Austral. vii. 205 (1878).

CYPERACEÆ.

Lipocarpha senegalensis (Lam.) Dandy, comb. nov. *Scirpus Senegalensis* Lam. in Tabl. Encycl. et Méth., Bot. i. 140 (1791). *Hypolytrum senegalense* Rich. in Pers. Synops. Pl. i. 70 (1805). *Hypœlyptum argenteum* Vahl, Enum. Pl. ii. 283 (1806). *Hypo-*

lytrum argenteum H. B. K. Nova Gen. et Sp. Pl. i. 218, quoad syn. (1816). *Tunga lævigata* Roxb. Fl. Ind., Ed. Carey, i. 188 (1820). *Hypolytrum lævigatum* Spreng. in L. Syst. Veg., Ed. 16, i. 233 (1825). *Lipocarpha lævigata* Nees ex Wight, Cat. Pl. 110 (1834). *Schœnus lævigatus* Roxb. ex Nees in Wight, Contrib. Bot. Ind. 92, nomen synonymum (1834). *Lipocarpha argentea* R. Br. ex Nees in Linnæa, ix. 287 (1835). *Hypœlyptum albidum* Willd. ex Kunth, Enum. Pl. ii. 266, nomen synonymum (1837). *Kyllinga albescens* Steud. Synops. Pl. Glum. ii. 68 (1855). *Hypœlyptum senegalense* K. Schum. in Engl. Pflanzenw. Ost-Afr. C. 127 (1895).

NOTES ON SURREY PLANTS.

By C. E. Britton.

(Concluded from p. 318.)

Aster novi-belgii L. VII. At intervals established by the Thames between Putney and Kew. Seen also at Littleworth Common, Headley, and by the River Mole above Leatherhead (all in district VI.).—*A. paniculatus* Lam. VII. Cottenham Park.—*A. Tradescanti* L. VI. Littleworth Common; well established and spreading in peaty soil. (This plant is elsewhere ascribed to *A. paniculatus* Lam.). VII. Established in a little-used lane at Raynes Park.

Erigeron acre L. VI. Molesey Hurst. Not often seen in N. Surrey.

Bidens cernuus L. var. *minimus* DC. VI. Westend, Esher.—*B. tripartitus* L. var. *minus* Wimm. & Grab. VI. Westend, Esher.

Artemisia Absinthium L. VII. Near Raynes Park.

Tussilago Farfara L. In the autumn of 1930 this flowered precociously during November at West Barnes, Merton (VII.).

Senecio squalidus L. An increasing species in Surrey. VI. Leatherhead; VII. New Malden, Raynes Park, Lower Morden, Thames-side about Mortlake; VIII. Wimbledon.

Carduus nutans L. var. *simplex* Coss. & Germ. VII. Banstead Downs; VIII. Warlingham.—*C. crispus* L. var. *litigiosus* Gren. & Godr. VIII. Chipstead Valley.—*C. crispus*×*nutans*. VI. Near Fetcham Downs; VII. Banstead Downs, Epsom Downs.

Cnicus lanceolatus L. VII. On Banstead Downs this thistle varies in the colour of its flowers, purple, mauve, carmine, or white.—*C. palustris* Willd. The very tall much-branched form (var. *nemorale* Maass) has been seen in Owl's Wood, Chelsham (VIII.).—*C. arvensis*×*palustris*. VI. Westend, Esher; VII. Wimbledon Common.—*C. acaulis*×*arvensis*. VIII. Alderstead Heath; one plant.

Arnoseris pusilla Gaertn. II. Near Ottershaw.

Lactuca Scariola L. VI. Molesey Hurst.—*L. muralis* Gaertn. VII. Walls, Richmond Park; uncommon in N. Surrey.

Sonchus oleraceus L. var. *glandulosus* Coss. & Germ. VII. West Barnes, Merton.—*S. asper* Hill var. *integrifolius* Lej. VII. West Barnes, Merton.—Var. *glandulosus* Coss. & Germ. VII. West Barnes, Merton.—*S. arvensis* L. var. *lævipes* Koch. VIII. Near Kingswood.

Tragopogon pratensis L. VI. Headley; the usual form in this neighbourhood.—*T. minor* Huds. VI. Headley, but uncommon.

Hieracium grandidens Dahlst. II. Ottershaw; IV. Near Clandon Downs.—*H. Lachenalii* Gmel. II. Ottershaw; III B. N. of Winterfold Heath; IV. Pirbright; VI. White Downs.—*H. acuminatum* Jord. VIII. Worms Heath. Identified by Rev. J. Roffey.—*H. chlorophyllum* Jord. II. Whitmoor; V. Downs above Westcott.—*H. deductum* Sudre. IV. Pirbright.—*H. maculatum* Sm. VIII. Banstead Heath.—*H. tridentatum* Fr. II. Ottershaw; III B. Hurt Wood; VII. Epsom Common.—*H. acrifolium* Dahlst. II. Chobham Lane.—*H. rigidum* Hartm. II. Ottershaw.—*H. perpropinquum* (Zahn.). III B. Hurt Wood; VI. Littleworth Common, Oxshott Heath; VII. Epsom Common; VIII. Chipstead, Banstead Heath.—*H. obliquum* Jord. IV. Byfleet, Worplesdon.—*H. umbellatum* L. var. *coronopifolium* (Bernh.). IV. Worplesdon Common.

Campanula rotundifolia L. White-flowered plants occur at Banstead Downs (VII.).

Oxycoccos quadripetala Gilib. III A. Shown me many years ago at the Devil's Punch Bowl.

Monotropa Hypopitys L. var. *glabra* Roth. VI. Ermyn Street, near Mickleham Downs. Downs above Leatherhead.—Var. *hirsuta* Roth. VI. Woods, Ranmore.

Lysimachia vulgaris L. var. *maculata* Druce. IV. By the Basingstoke Canal between Woking and Byfleet; most plentiful towards the first-named locality. The name *maculata* published in 1918, appears to be antedated by var. *Klinggraeffii* Abromeit in Phys.-Oek. Ges. Königsberg, xxxii. (1891), 71, described as "Blten B. am Grunde mit braunrotem Fleck," in Koch's 'Synopsis,' ed. iii. 2163 (German edition).

Erythræa pulchella Fr. var. *subelongata* (Wittr.). VI. Nower Wood.

Gentiana Amarella L. VIII. At Banstead Heath this is plentiful with pale mauve flowers.

Cynoglossum officinale L. VII. Still occurs in Richmond Park.

Myosotis versicolor Sm. var. *Lloydii* Corb. VIII. Banstead.—Var. *dubia* (Arrond.). VI. Fairmile Common.

Calystegia sepium Br. VI. With corollas pink-and-white striped as in *C. arvensis*, at Claygate.

Convolvulus arvensis L. The colour-variations f. *annulatus* Pihl (white corolla with a purple ring towards the base) and f. *purpurascens* Lindm. (corolla purplish rose) have been seen near Epsom Downs (VII.) and downs above Abinger (III. B), respectively.

Solanum Dulcamara L. var. *villosissimum* Desv. VII. West Barnes, Merton, Epsom, Banstead Downs.—*S. nigrum* L. var. *chlorocarpum* Spenn. VII. Hook.

Hyoscyamus niger L. VII. Many plants at Hogtrough Bottom, Banstead Heath, 1930.

Linaria spuria Mill. VIII. In 1924 plants with peloric flowers occurred in a cultivated field near Farley. The corollas were elongated tubular, the throat closed by five folds, the spurs three or five in number, slender, and smaller than usual.

Veronica polita Fr. The usual form in Surrey is var. *Thellungiana* (E. Lehm.).—*V. agrestis* L. var. *Garckeana* P. Fourn. includes the usual form met with, but var. *Boreana* P. Fourn. has been met with at West Barnes, Merton (VII.).—*V. persica* Poir. var. *Aschersoniana* (E. Lehm.). VIII. Banstead; very well marked. In most Surrey plants the leaves are too deeply incised for this var.—Var. *Corrensiana* (E. Lehm.). VI. Ashtead; VII. Hook, Lower Morden, Banstead.—Var. *Kochiana* (Godr.). VI. Ashtead.—*V. Chamædrys* L. var. *lamiifolia* Beck. VI. Mickleham Downs, Bagden Valley (very well marked).—*V. Anagallis* L. var. *ambigua* (Krösche). VII. By the Thames at intervals from Mortlake to Kew and Richmond. Flowers pinkish. It is erroneous to assume that floral colour is any distinction between restricted *V. Anagallis* and *V. aquatica* Bernh. The latter is the plant recorded in the 'Flora' from VII. Lower Morden and Cheam.

Bartsia Odontites Huds. var. *divergens* Jord. VII. Lower Morden.

Orobanche minor Sm. var. *concolor* Duby. VI. Ashtead.

Lathræa Squamaria L. VI. Woods, Ranmore.

Euphrasia nemorosa Löhr. IV. Pray Heath, Hook Wood; VI. Fetcham Downs; VII. Banstead Downs ("near var. *collina* Pugsl."); VIII. Addington.—Var. *calcarea* Pugsl. VII. Banstead Heath.—Var. *transiens* Pugsl. II. Horsell Common (Ref. No. 3687); VIII. Woods between Addington and Farley. The plants from this locality were named by Townsend as *E. stricta* Host, and are so entered in the 'Flora of Surrey.'—*E. micrantha* Reichb. VI. Oxshott Heath, Ranmore Common.—*E. anglica* Pugsl. IV. Ockham Common, Whitemoor Common; VII. Epsom Common; VIII. Banstead Heath.—*E. Pseudo-Kerneri* Pugsl. VI. Fetcham Downs; VII. Epsom Downs, Banstead Downs.—*E. nemorosa*×*Pseudo-Kerneri*. VI. Fetcham Downs.—*E. nemorosa* var. *calcarea*×*Pseudo-Kerneri* ("apparently"). VII. Banstead Downs.

Thymus pycnotrichus Uechtr. VII. Walton Downs; VIII. Banstead Heath.—*T. britannicus* Ronn. III B. Downs above Abinger, Hackhurst Downs; VII. Walton Downs, Banstead Downs.—*T. pulegioides* L. (Ronn.); VI. Littleworth Common; VII. Walton Downs.—*T. glaber* Mill. f. *glaber* Ronn. IV. Worplesdon, Whitmoor Common; VII. Near Tattenham Corner, Walton Downs, Lower Morden.—f. *Chamædrys* Ronn.; VII. Banstead Downs.

Prunella vulgaris L. var. *nemorosa* Béguin. VIII. Owl's Wood, Chelsham.—*P. laciniata*×*vulgaris*. IV. Golf Links, Pyrford.

Stachys palustris×*sylvatica*. VII. Between Ashtead Common and Lower Malden. Between New Malden and Surbiton.

Galeopsis bifida Boenn. IV. Brookwood; VI. Littleworth Common; VII. Burgh Heath.

Lamium hybridum Vill. var. *dissectum* Mutel. VI. Claygate, Molesey Hurst, Oxshott.—*L. Galeobdolon* Crantz var. *typicum* Beck. VI. Ermyn Street, above Ashtead, Headley, Ranmore, etc.; VIII. Chipstead Valley.

Plantago lanceolata L. var. *sylvatica* Pers. VII. Lower Morden, Ewell.

Atriplex patula L. var. *bracteata* Westerl. VII. Blue House, Merton.

Polygonum dumetorum L. IV. Wisley Common.—*P. minus* Huds. VII. Ham Common.—*P. lapathifolium*×*Persicaria*. IV. Wisley.—*P. Hydropiper*×*Persicaria*.—IV. Near Brookwood.—*P. cuspidatum* Sieb. & Zucc. VI. Established on Littleworth Common.

Viscum album L. VIII. Wimbledon, on *Ulmus sativa* Mill.

Populus Lloydii Henry. VII. Tow-path above Putney.

Epipactis latifolia All. II. Horsell Common.

Orchis purpurea Huds. Mr. A. Beadell informed me that this flowered in 1931 in the locality near Warlingham.—*O. incarnata* L. II. Near Colony Bog. IV. Near Wisley. The plant recorded under this name in the 'Flora' from Wimbledon Common, is *O. praetermissa* Druce.—*O. elodes* Gris. VI. Fairmile Common. The hybrid orchis recorded in the 'Flora' under the name of *Gymnadenia conopsea*×*O. elodes* should read *Gymnadenia conopsea*×*Fuchsii*. *O. elodes* is not known to occur on the chalk formation in Surrey.

Habenaria viridis R. Br. IV. Still at Clandon Downs in 1931.

Iris fœtidissima L. Certainly local and uncommon in the county, and very doubtful whether it is "frequent" in any district. VI. Polesden Lacey and outskirts of Ranmore; VII. Near Old Malden Lane; IX. Titsey.

Juncus tenuis Willd. Additional localities are IV. Pray Heath, Brookwood; VII. Richmond Park.—*J. effusus* L. var. *compactus* Lej. & Court. VI. May's Green.—*J. conglomeratus* L. var. *subuliflorus* (Drejer) (cymes lax, compound, lateral branches elongated, bearing smaller cymes, capsules abrupt, retuse, mucronate). IV. Wisley.

Luzula maxima DC. (*L. sylvatica* Gaud.). In Southern England, certainly abundant where it occurs, but the localities very infrequent. IV. Hook Wood; VIII. Between Selsdon and Farley, Chiphouse Wood, Highurst Wood.

Sagittaria sagittifolia L. var. *vallisneriifolia* Coss. & Germ. IV. Stream south of Pyrford.

Zannichellia pedicellata Fr. VII. Merton.

Eleocharis multicaulis Sm. II. Chobham Common; IV. Wisley; VI. Esher Common.

Carex vulpina L. var. *nemorosa* (Rebew.). VII. Epsom Common.—*C. hirta* L. var. *spinosa* Mort. IV. Heathland near Wood Street; VII. New Malden.—Var. *subhirtiformis* Kneucher (leaves sparingly hairy; sheaths hairy only at the mouth, utricles closely pubescent). VII. Epsom Common.—*C. inflata*×*vesicaria*. II. Chobham Common (*teste* Marshall).

Alopecurus pratensis L. var. *cæsius* Schwarz. VII. Lower Morden.

Phleum pratense L. var. *intermedium* Jord. VII. Lower Morden.

Aira caryophyllea L. var. *aggregata* (Timeroy). VIII. Chelsham.

Arrhenatherum tuberosum (Gilib.) Dr. VII. Epsom Common.

Kœleria gracilis Pers. var. *britannica* Domin. VII. Epsom Downs; VIII. Banstead Heath.

Poa pratensis L. var. *subcœrulea* (Sm.). VII. Banstead Downs.—Var. *angustifolia* (L.). VII. West Barnes Lane, Merton.

Glyceria declinata Bréb. VII. Wimbledon Common, *C. E. B. & W. R. Sherrin.*

Festuca bromoides L. var. *intermedia* Hackel. VI. Near the Thames, W. Molesey.

Bromus erectus Huds. var. *typicus* Syme. III B. Albury Downs; VII. Banstead Downs; VIII. Banstead Heath.—Var. *villosus* Syme. II. Thorpe; III B. Albury Downs; VII. Banstead Downs; VIII. Banstead Heath.—*B. britannicus* Williams. VII. Near Raynes Park, 1931.—*B. arvensis* L. VII. Cultivated field, Lower Morden.

Brachypodium sylvaticum R. & S. var. *glabrescens* Coss. & Germ. VI. Westhumble.

Asplenium Trichomanes L. V. Near Dorking; VII. Richmond Park.

Scolopendrium vulgare Symons. VII. Wood near Chessington (1927).

Polystichum angulare Presl. VI. North of Ranmore Common.

Lastrea Thelypteris Bory. II. Near Colony Bog.—*L. Oreopteris* Presl. III B. Leith Hill; IV. Pirbright.

Osmunda regalis L. II. Near Colony Bog.

Ophioglossum vulgatum L. IV. Ockham Common; V. Reigate Hill, White Downs; VIII. Banstead Heath, Marden Park.

Lycopodium clavatum L. VI. This was still in existence at Blackstone's locality near Esher, in 1913, and for aught that I know to the contrary may still persist there.

Equisetum maximum Lam. This plant has spread extensively in recent years on railway embankments and on the sides of railway-cuttings in the county.

NOVITATES AFRICANÆ.

(Continued from p. 287.)

Rosenia angustifolia R. H. Compton, sp. nov. (*Compositæ-Inuleæ*). *Fruticulus* rigidus, caulibus divaricatis. *Caules* angusti teretes, juventute leviter pilosi glandulosique, glabrescentes, foliis oppositis et in fasciculis axillaribus. *Folia* patentia vel recurvata linearia infra carinata supra sulcata obtusa utrinque griseo-lanata, glandulis sessilibus paucis in marginibus carinaque, 2–2½ lin. long., ¼–⅓ lin. lat. *Internodi* caulium primariorum elongati, lateralium brevissimi. *Capitula* in apicibus caulium

lateralium sessilia. *Involucrum* c. 3 lin. long., c. 1½ lin. diam., bracteis c. 13. *Bracteæ* glabræ ovatæ, externæ castaneæ marginibus scariosis, intimæ scariosæ, c. 3 lin. long., c. 1 lin. lat. *Flores* radiales c. 3, feminini, stigmatibus filiformibus, ovario setuloso, pappo uniseriato setis brevibus anguste squamiformibus ; corolla ligulata flava c. 3 lin. long. *Flores* disci c. 8, tubulares, corolla flava c. 2¼ lin. long., antheris caudatis, ovario pilosulo, stigmatibus brevibus truncatis penicillatis, pappo biseriato, setæ exteriores plurimæ breves anguste squamiformes, interiores 1 vel 2 c. 2 lin. long. *Paleæ* rigidæ scariosæ anguste triangulatæ acutæ c. ¾ lin. long.

Hab. Cape Province ; Worcester Division, in the karoo association at Jandeboers, 2800 ft. alt., Sept. 19, 1931, *Compton* no. 3775.

A typical member of this small genus, having in addition to other characters the biseriate pappus of short outer scales and long inner bristles. The type-species of *Rosenia* is *R. glandulosa* Thunb. (Fl. Cap. Ed. Schultes, 692, 1823), Thunberg wrote "Pappus capillar paleaceus," as he had done in his definition of the genus in his ' Prodromus, nov. gen,' lxix. He gave no exact locality for his plants. Lessing (Syn. 369, 1832) working on Thunberg's plants amplified the description of the genus and of the species *R. glandulosa*. There is a discrepancy between the two descriptions in that Thunberg wrote "folia . . . ovata . . . semiunguicularia," whereas Lessing wrote "folia . . . oblongo-obovata . . . 1½–2‴ longa, ⅓–⅔‴ lata." Harvey (Fl. Cap. iii. 294, 1865) also saw Thunberg's plant, which he described as being, even then, in a very imperfect state. He described the leaves as oblong-obovate, 2–3 lin. long and 1 lin. wide.

From *R. glandulosa* Thunb., as described by Thunberg, Lessing, and Harvey, *R. angustifolia* differs in the size and shape of the leaves and in the size of the capitulum, though the greater part of Lessing's description would be applicable to it.

Oliver (Hook. Icon. no. 2228, 1892) described as *R. glandulosa* certain plants of Burchell's, viz., no. 1390 from between Reed River and Stinkfontein and no. 1456 from between Klein Quaggafontein and Dwaal River (both localities are near the present town of Fraserburg). Oliver did not see Thunberg's plants, but the identity of Burchell's with Thunberg's was vouched for by Mr. N. E. Brown. Oliver pointed out various discrepancies in the paleæ and pappus and wrote that "it is clear we must allow considerable variation in these characters." My own impression is that Burchell's plants are not conspecific with Thunberg's, judging from the descriptions, though I have not seen the actual specimens as Mr. N. E. Brown did : I suspect that a re-examination of the material will lead to a separation of Burchell's plants under a different name and possibly their removal from the genus *Rosenia*.

There are subsequent gatherings which may prove to be identical with Burchell's, viz., Pole-Evans no. 2332 (25 miles from Kenhardt to Pella) in Herb. Bolus sub nom. *Nestlera humilis* Less. : Pearson nos. 1319 and 1473 (Courlands Kloof, Nelspoort) in Herb. S. Afr. Mus., in which I could find no inner pappus : Worsdell in Herb. S. Afr. Mus., no. 5487 (Wilgenboschfontein, Roggeveld, *i. e.*, perhaps a few miles north of Sutherland), which is very imperfect, and a still more imperfect fragment in Herb. Bolus.

Another species of *Rosenia* is *R. nestleroides* Compton from the Whitehill karoo, full notes on which I published in Trans. Roy. Soc. S. Africa, xix. 318, 1931.

Rosenia spinescens DC., on the other hand, has been correctly transferred to the genus *Nestlera* : it is *N. Dregei* Harvey in Fl. Cap. iii. 296 (see Oliver, *loc. cit.*, and Compton, *loc. cit.*).

Another gathering of my own, Compton no. 3664, from the Whitehill karoo, is of very similar general appearance to *R. angustifolia*, but dissection shows that it lacks the paleæ and the inner pappus bristles : Mr. J. Hutchinson regarded it as *Nestlera prostrata* Harv. (see note in Trans. Roy. Soc. S. Africa, xix. 318, 1931) and stated that "in this species, although the point was missed entirely by Harvey, there are two rows of pappus, an outer short row and an inner row of two or three long bristles. Yours [*i. e.*, Compton no. 3664] has not these inner bristles, but the character may well be variable. We [*i. e.*, the Kew Herbarium] have *N. prostrata* collected by Burchell in the Sutherland Division : the type by Drège being from the Sneeuwbergen in Graaf Reinet. I have examined them carefully, and they are the same, though rather far apart geographically." I have also examined the specimen of Drège's Sneeuwberg plant in Herb. S. Afr. Mus. (the type of *Polychætia oppositifolia* DC., renamed *Nestlera prostrata* by Harvey), this agrees well with the descriptions by Harvey in Fl. Cap. and by de Candolle, and there are no signs of long inner pappus setæ. Tyson no. 222 in Herb. Bolus (Murraysburg, *i. e.*, not far from the Sneeuwberg) is the same. In spite of the similar physiognomy of Compton no. 3775 to *Nestlera prostrata*, I find it difficult to believe that they can be identical and that characters of pappus and paleæ can vary to such an extent. I regard it as much more likely that the material examined by Mr. Hutchinson was a mixture.

To sum up my conclusions as to the genus *Rosenia*, we have the three following species :—

R. glandulosa Thunb., locality uncertain, and probably not collected again.

R. nestleroides Compton from the Whitehill karoo.

R. angustifolia Compton from Jandeboers.

In addition to these three species, the following plants have entered into the discussion :—

Nestlera Dregei Harv. (*Rosenia spinescens* DC.).

Rosenia glandulosa Oliver (non Thunb.) which requires further study.

Nestlera prostrata Harv., which is of similar physiognomy to *R. angustifolia* and is liable to be confused therewith.

Erica (§ *Chlorocodon*) **glandulipila** R. H. Compton, sp. nov. (*Ericaceæ-Ericoideæ*). *Frutex* expansus 1–2-pedalis, caulibus, foliorum superficie superiore, bracteis calycibusque dense et breviter puberulis, etiam pilis longis albis expansis, glandulis præpilatis sparsis indutis. *Folia* 3-nata patentia, supra saturate infra pallide viridia, oblonga, obtusa, non sulcata sed marginibus reflexis, 2½–3½ lin. long., ½ lin. lat. *Flores* maxime laterales in extremitatibus ramulorum. *Pedicelli* curvati ½ lin. long. *Bracteæ* remotæ 3 vel aliquando 2 vel 1 minutæ lanceolatæ scariosæ, apicibus pilo glandifero terminatis. *Sepala* subæqualia, ad corollam adhærentia, viridia lanceolata ½ lin. long., pilis glandiferis marginalibus onusta. *Corolla* glabra cyathiformis, long. et diam. ¾ lin., circa ad medium divisa, segmentis 4 latis obtusis, nec expansis nec incurvatis. *Filamenta* ¼ lin. long., antheris manifestis muticis lævibus ovoideis terminalibus ¼ lin. long., poris ⅛ lin. long. *Ovarium* sessile depressum crenatum glabrum, stylo ⅓ lin. long. *Stigma* breviter exsertum peltatum, supra papillis 4. Ovula numerosa.

Hab. Cape Province ; Montagu, on north side of a kloof in the Langeberg Range, 1000 ft. altitude, July 16, 1931, *Salter* no. 1121.

Most nearly related, among known species, to *E. mæsta* Bolus, but well distinguished by its spreading habit, its leaves which are patent and of a different shape, and the remarkable gland-tipped hairs which accompany the short velvety pubescence throughout the plant.

Anomalanthus Salteri R. H. Compton, sp. nov. (*Ericaceæ-Ericoideæ*). *Frutex* parvus dense ramosus, internodiis omnibus brevibus, ramulis axillaribus, subfasciculatis. *Caules* juvenes puberuli. *Folia* breviter petiolata imbricata 3-nata saturate viridia, linearia leviter arcuata, 1 lin. long., utrinque glabra, supra plana, infra convexa, sulcata. *Flores* 2- vel 3-nati in apicibus ramulorum brevium. *Pedicelli* ¼ lin. long. *Bracteæ* 3 ad calycem appressæ, oblongæ ciliatæ, ⅕ lin. long. *Calyx* ½ lin. long., campanulatus glaber subcarnosus rubidus, segmentis 4 vel 5 triangulatis obtusis erectis vel incurvatis, marginibus ciliatis, c. ⅙ lin. long., post florentem aliquanto amplificans. *Corolla* rubra tubulata velutina, c. 1¼ lin. long., c. ½ lin. diam., basi multum angustiore, segmentis brevibus incurvatis. *Stamina* 4, filamentis 1½ lin. long., antheris

terminalibus angustis, ad basin angustatis, muticis longe exsertis, ⅔ lin. long. *Ovarium* sessile ovoideum, supra pilosum, 1-loculatum, ovulo solitario pendulo, stylo 3 lin. long., stigmate ultra antheras exserto minuto capitato.

Hab. Cape Province ; Caledon Division, Villiersdorp, on a hill-side to the west of the town, 1000 ft. altitude, July 12, 1931, *Salter* no. 1155.

Most nearly related to *A. collinus* N. E. Br., but differs there from in general appearance and in floral and leaf characters. The calyx-segments are more prominent and the corolla-tube is less suddenly contracted to the base. The calyx is usually 4-lobed, but a small extra lobe is often present, and in some cases the calyx may be regularly 5-merous. Ripe fruits were not seen, but the calyx shows a distinct enlargement after flowering.

(To be continued.)

OBITUARY.

Sir Everard Ferdinand Im Thurn.

Sir Everard Im Thurn, who died at Prestonpans on October 8, at the age of 80, was educated at Marlborough College, where he published his first paper on the Birds of Marlborough in 1869, and at Exeter College, Oxford, where I first met him. After taking his degree in 1875 he went to Demerara in 1877, and took charge of the local Museum. He took a great interest in botany and anthropology, and founded and edited the scientific journal 'Timehri' in 1882, remaining editor till 1886. He explored the Kaieteur Falls in 1878 and again in 1879, and published accounts of those expeditions in the same years, and a work 'Among the Indians of Guiana' (1883). He made an expedition to Roraima Mountain in December 1884, obtaining an extensive collection of plants fully described in Trans. Linn. Soc. ser. 2, ii. 249 (1887), by Prof. Oliver and other botanists. He also published an account of the expedition ('Timehri,' iv. 1885) and, in the same journal, "Notes on the Palms of British Guiana" (iii. 1884) and "Notes on Plants observed in Roraima" (v. 1886). He became Special Magistrate of the Pomerun River in 1882, and Government Agent in the North-Western District in 1890. Leaving Guiana he joined the Colonial Office staff in 1899 and became Colonial Secretary in Ceylon 1901, and Governor of the Fiji Islands in 1904, retiring in 1910. From these islands he sent home a considerable collection of herbarium specimens from 1905 to 1907, described in Journ. Linn. Soc. (Bot.), xliii. (1915).

The genera *Thurnia* Hook. fil. (Juncaceæ) and *Everardia* Ridl. (Cyperaceæ) were named after him.

He was president of the Royal Anthropological Institute in 1919–20 and was an honorary LL.D. of Edinburgh University. In 1925 he was elected an Honorary Fellow of his old college, Exeter, Oxford. For his colonial services he was awarded the C.B. (1900), K.C.M.G. (1905), and K.B.E. (1918). An appreciation of his services appeared in the 'Times' of Oct. 11.—H. N. RIDLEY.

BOTANICAL EXCHANGE CLUB REPORTS.

WATSON BOTANICAL EXCHANGE CLUB.

THE Forty-eighth Annual Report (1931–32), edited by the Hon. Sec., Mr. H. Stuart Thompson, indicates an increase in the Club's activities in comparison with recent years, 2685 specimens having been contributed by 21 members. Mr. G. Goode, the Hon. Treasurer, has this year acted also as Distributor.

The Report contains obituary notices of the late A. J. Crosfield, Mrs. E. S. Gregory, and John Comber, and, as usual, a large number of notes on critical forms. Among these the following seem of special interest :—

Thalictrum majus Crantz. By the stream at Wanthwaite Bridge, Keswick, Cumberland, July 3, 1895. So named for me by the late E. F. Linton. Baker ('Flora of Lake District') under *T. flexuosum* calls the Wanthwaite Bridge plant *T. Kochii*, on the authority of Babington, but cannot distinguish it from *flexuosum*. Hodgson (Fl. Cumberland) says that a plant gathered by him near Wanthwaite Bridge was identified by H. C. Watson as *T. saxatile* DC., but that he himself failed to discover any striking differences between it and some of the larger specimens of *T. flexuosum*.—J. W. CARR.

This is a somewhat frequent plant in the Lake District and comes under *T. elatum* Jacquin (Cambr. Brit. Fl. iii. 122) (*T. umbrosum* Butcher, Furth. Illustr. Brit. Pl. 1930, 7). The lower leaflets are larger and more obtuse than in *majus* and quite glabrous. The stipules are spreading and fringed, and the sepals broadly ovate with few glands. The achenes are rather young and in their present condition closely resemble those of *T. majus*. According to Dr. Moss this is not the *T. elatum* Jacquin of continental authorities but quite distinct and authentic (see W. B. E. C. 1913–14, 428). Babington's *T. flexuosum* includes at least two distinct forms, and is, moreover, not the *T. flexuosum* of either Bernhardi or Reichenbach, so the name is not now used.—W. H. PEARSALL.

This is not *T. majus* of Crantz and Jacquin. The specimen in Herb. Jacquin now in the British Museum herbarium exactly matches the figure in the 'Flora Austriaca,' and is not our plant. This is presumably the plant figured by Butcher, *l. c.* pl. vi., as *T. majus*, although it does not appear glandular.

As regards the glandulosity of the foliage in these *Thalictra*, it does not appear to have been noticed that the leaflets of the lowest leaf on the shoot (the first of the year) are always practically or quite glabrous, although the later leaves may be densely glandular. On the contrary, the uppermost leaf or two leaves, often very reduced, nearly always bear a considerable number of glands, even when the plant is otherwise eglandular. Such, however, is my experience, and care is therefore required in observing the glands.—A. J. WILMOTT.

Stellaria neglecta Weihe [2623]. Roadside bank, N.E. of Stanton Drew, N. Somerset, May 31, 1931. Extending thickly for over 400 yards on the S. bank. Calyx and pedicels hirsute. Seeds bluntly tubercled, orange brown. Flowers smaller than in var. *Elizabethæ*. Further observation indicates that this is far less common in N. Somerset than the following variety, but Dr. Walter Watson reports that in S. Somerset they are equally frequent.—H. S. THOMPSON.

Yes, *S. neglecta* Weihe. There is an interesting note on this species on p. 183 of Salmon's 'Flora of Surrey.' In Marshall's original account of his *S. umbrosa* Opiz var. *decipiens* (Journ. Bot. xl. 214 (1902)) *S. neglecta* Weihe is cited as a synonym, and the plant is said to differ from *S. umbrosa* only in having hairy pedicels and calyx, blunt seed-tubercles and less acuminate lower leaves. This apparently holds good for typical *S. neglecta*, except for the seed-tubercles, which are much like those of *S. umbrosa*. There is a further paper on these plants by Marshall in Journ. Bot. xlii. 151 (1904). In the Club's Report for 1906–7 (p. 82) Marshall modified his views and states that there are three forms of this plant in Britain :—(1) *S. neglecta* Whe., (2) *S. umbrosa* Opiz, and (3) *S. neglecta* var. *decipiens*, the last "like *neglecta* but for bluntly tubercled seeds. Habit usually rather different—nearer *S. media*." The criterion of acutely or bluntly tubercled seeds in distinguishing these plants is not entirely satisfactory, for though in living examples of *S. neglecta* the ripe seeds may be acutely tubercled, in dried material the tubercles often become more or less blunt. The original descriptions both of *S. neglecta* and of *S. Elizabethæ* F. Schultz (*S. umbrosa*) give the seeds as marginally muricate, while in contrast those of *S. media* are termed rugulose ; and this seems better to represent the actual points of distinction. Marshall's later remark that the habit of his var. *decipiens* approaches *S. media*, taken in conjunction with the seed character, suggests that he had then in view a luxuriant form of *S. media* with elongate pedicels, such as may frequently be seen in summer and autumn, and which may closely simulate *S. neglecta*. Salmon (*l. c.*) says that he cannot find Marshall's third form, and that all of his *neglecta*-like examples with this fruit character seem to be "just luxuriant *media*, which can possess sometimes remarkably long peduncles."

This coincides with my experience. Marshall does not seem to have appreciated what appears to be an important criterion with this group—the plant's life-cycle. Babington, Townsend, and others have treated *S. neglecta* (sensu lato) as a perennial, but I believe it to be an ephemeral annual, as shown by Moss (Camb. Brit. Fl.), producing yearly one generation only and flowering from spring till early summer. *S. media*, on the other hand, is an annual that flowers in any month, constantly reproducing itself and often passing through several generations in a single year. Marshall's varietal name *decipiens* cannot be transferred from typical *S. neglecta*, to which it was originally intended to apply, and I doubt whether the luxuriant form of *S. media* that sometimes resembles it is really more than a state due to environment.—H. W. Pugsley.

Lathyrus tuberosus L. Thicket on south-western slope above Cheddar, N. Somerset, July 10 and Sept. 19, 1931. Established there very locally during the last few years, this apparently being the first record at Cheddar. Enquiry in the village proved that before the War the land was cultivated with strawberries, and afterwards pigs were fed there by a miller. On September 19 extremely few pods were seen, probably owing to the showy flowers having been gathered. And on July 10 few flowers were seen in blossom.—H. S. Thompson.

H. W. P.

The Botanical Society and Exchange Club of the British Isles.

The Annual Report for 1931 is printed, as usual, in two parts. The smaller Report is that of the Exchange Club, edited by the Distributor for the year, Mr. P. M. Hall. Twenty-six members sent in 2845 specimens, which is a considerable falling off from the numbers usually contributed. The chief critical genera are not largely represented, but many interesting notes are scattered through the part.

The Secretary's Report shows the usual features and appears to have been written or edited mainly by the late Dr. Druce. Sixty-nine pages are devoted to plant-notes and new records. Fewer new groups than usual appear in the notes, and in some cases, owing to the omission of Latin diagnoses, their names are invalid. Long Latin descriptions by Dr. Dahlstedt of seven new species of *Taraxacum* (six of which grow at Hitchin, Herts) are included, but as they show no salient contrasting features, and there is no English work in which the affinities or group-characters of the many recent species are dealt with, the publication of further new species seems of little present value, although it may afford some solid matter for the digestion of future generations of Taraxaciarchs. The new records, many of which refer to aliens, are not always new. Ilfracombe, the *locus classicus* (Journ. Bot. 1902, 135) is given for *Fumaria purpurea*, and *Medicago falcata* is shown as a N. C. R. for Cambridge! Many plants, such as *Saxifraga umbrosa* in North Devon, appear as natives instead of adventives—which at times may be seriously misleading.

Salmon's 'Flora of Surrey' is reviewed at some length by J. E. Lousley, and again by Dr. Druce, who complains of the omission of records from the Exchange Club Reports, and adds a long list of further localities. The additions consist almost entirely of aliens, with a certain number of more or less obscure varieties of native plants, sometimes doubtfully identified; and Salmon was evidently well advised in ignoring them*.

The Report also contains papers by various members of the Society, some entirely of a popular character. Among the more important is a "List of Plants from the Isle of Wight" by E. Drabble and J. W. Long, which is an interesting contribution to our knowledge of the flora; and an "Investigation into North-West European *Juncus alpinus* Forms" by Dr. Bertil Lindquist. This latter paper has been published in a more complete form elsewhere and will be separately noticed, but it may be noted here that Dr. Lindquist dismisses Druce's contention in the Club's last Report that the British plant of the group is *J. nodulosus* Wahlb. and figures a Teesdale specimen as the restricted *J. alpinus* of Villars. In this connection attention is drawn to the citation on p. 609 under "A new *Juncus* in Scotland," which has been materially altered and should be corrected.—H. W. P.

REVIEWS.

Flora Iberica. Briófitas (Pt. 2), *Musgos. Parte primera por* A. Casares-Gil. 8vo, pp. xxx, 434, with frontisp. and 149 text-figs. from original drawings by the Author. Museo Nacional de Ciencias Naturales: Madrid, 1932. Price 18 pesetas.

British botanists do not often visit Spain for its bryology. This is a pity; the moss flora of the Iberian Peninsula is of great interest, as the discovery, by Luisier, of the two extra-European genera, *Triquetrella* and *Brachymenium*, indicates. The present

* A similar criticism will apply to Dr. Druce's appreciative notice of the second edition of the 'Biographical Index of British and Irish Botanists.' A number of omissions (which might be indefinitely multiplied!) are cited. In their Preface the authors explain that reference under each item is made "to some botanical work or works justifying the inclusion of the name in the list" and also "to the chief sources of further information." To have elaborated the Index on the scale suggested in the review would have needed a volume many times the size.—A. B. R.

volume should do much to stimulate that interest. It is a continuation of the work begun by Casares-Gil (a portrait of whom forms the frontispiece to the part) by the publication of the volume on the Hepaticæ, in 1919, and it is a matter of congratulation that the lamented death of the author has not prevented the continuation of the work, under the editorship of Don A. Caballero Segares, who supplies a biography of Casares-Gil.

The present volume, containing the mosses from Andreæaceæ to Pottiaceæ, is primarily a description of all species known from the Iberian Peninsula, with clear and helpful half-tone illustrations in the text of all the species, which are also fully described, in Spanish. In addition to this, useful notes, often accompanied by a description, are given of nearly all the European species; these are printed in smaller type. (Why is the Portuguese *Pottia Sampaiana* Mach. treated—in the typography—as an alien?)

For Spanish and Portuguese bryologists, therefore, the work will fill the place not only of a handbook to the mosses of their own country, but to a great extent also of a European moss-flora.

A few misprints have been noticed, and the names of authors have been rather severely maltreated. Dixon is sometimes spelled Dickson, Limpricht appears throughout as Limprich, and Luisier should not, especially in a Spanish bryological work, so often be spelled Luissier.

The volume is a valuable contribution to European bryology.—H. N. D.

An Introduction to the Scientific Study of the Soil.. By NORMAN M. COMBER, D.Sc., A.R.C.S. Second Edition. Crown 8vo, pp. 208, 23 text-figs. Arnold: London, 1932. Price 7*s.* 6*d.*

THE first edition of Prof. Comber's book, published in 1927, was appreciatively reviewed in this Journal in 1928 (p. 51). The reviewer pointed out that, though addressed primarily to agricultural students—the author is Professor of Agricultural Chemistry in Leeds University,—the book may be strongly recommended to botanists and ecologists as a concise account of the modern conceptions of the soil. In the new edition the portion dealing with soil microbiology has been expanded, with the help of Dr. W. A. Millard, the section dealing with mechanical analysis has been rewritten, and an attempt has been made generally to bring the book up to date. Prof. Comber has a very concise style and conveys a great deal of information in the fifteen short chapters into which the text is divided. It is of interest to note how much the work at the Rothamsted Institute has contributed to the establishment of the study of the soil as a definite branch of Science. The last chapter, which supplies a classified and annotated list of relevant literature, directs the student in search of further information.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—On October 20 a number of Fellows and their guests dined together at the Trocadero, after which a Reception was held at the Society's rooms in Burlington House. The President, Prof. F. E. Weiss, F.R.S., received the guests in the Library, where a series of interesting exhibits had been arranged. From the Royal Botanic Gardens, Kew, came a collection of living South African Succulents, and, demonstrated by Miss M. L. Green, some excellent Swedish photographs illustrating Linnæus's home and garden and some of his personal belongings and also the Stockholm Botanic Garden. The Department of Botany, British Museum, showed a series of drawings in colour by Ellen Hawkins (died 1864) and Dr. H. Hamshaw Thomas some pteridospermous plants from the Triassic of South Africa. A feature of the evening was the presentation of a portrait of Julius von Sachs, formerly a Foreign Member, in commemoration of the centenary of his birth. Appreciations of his work were given by three of his former students—Prof. S. H. Vines (read by the President), Dr. D. H. Scott, and Prof. F. O. Bower. The portrait, the work of Sachs's daughter, was purchased by subscription from some of the Fellows.

At the first General Meeting of the session on October 27, the President referred to the Society's losses by death since the close of the last session. These included one of the most eminent of the Foreign Members, Prof. Karl Ritter von Goebel. Mr. Worsdell showed abnormal flowering specimens of *Papaver nudicaule*. The flower-stalk bore a pair of entire green leaves at varying distances below the flower. These the speaker regarded as displaced sepals. The fact that some of the petals were green, suggesting sepals, might be regarded as indicating that the calyx was in general, like the corolla, derived from the stamens.

Dr. D. H. Scott and Prof. H. S. Holden gave an account of the vegetative organs of the fern-like fossil *Scolecopteris Oliveri*. The authors of the communication did not favour the suggestion of the late Dr. Kidston that this and allied genera were pteridospermous.

At the General Meeting on Nov. 10, Dr. H. Hamshaw Thomas read a paper on "The Old Morphology and the New," of which the following is an abstract.

In recent years a great gulf has arisen between the classical concepts of plant morphology and the new ideas which have been suggested by a study of the modern pteridophytes and of the older palæozoic floras. A century of botanical investigation has not strengthened the foundations of the old morphology, but its modern exponents on the Continent have been led to regard much of what is termed morphology as irrelevant, and they reject all considerations of phylogeny, as well as the studies on the anatomy and cytology of plants. On the other hand, the foundations of the old system have been seriously shaken.

Goethe, in a passage which has been generally overlooked, recognized the validity of some of the considerations of the new morphology, the name applied to the concepts put forward by Lignier, Bower, Tansley, and others. According to this view the body of the higher plants is derived from a thallus with forking branches bearing terminal sporangia; large leaves were derived from branch systems which may or may not have continued to bear sporangia. Thus the reproductive structures of the seed plants are to be considered as modified branches or branch systems rather than as modified foliar structures. The application of these ideas to the flowering plants may lead to considerable changes in our ideas of primitive characters. It is suggested that the flowering plants may be derived from the palæozoic pteridosperms, and this leads to some new suggestions as to the morphology of modern floral structures. These suggestions are put forward with the object of showing that there may be new ways of interpreting floral structures, and of bringing the new morphology to the attention of botanists who are studying the flowering plants.

THE AUTUMN NUMBER OF 'COUNTRY-SIDE' maintains its interest as a magazine "devoted to Nature." Of special interest to botanists are J. F. Rayner's notes on our "Naturalised Plants." Some are of long-standing, as *Linaria Cymbalaria*, recorded by Dillenius in 1724 as an escape from the Chelsea Physic Garden, *Erigeron canadense* and *Lepidium Draba*; the "ubiquitous weed of cultivation," *Veronica Tournefortii*, was first noted in this country in 1929. The "Nature Records" include notes on first flowering of a few plants from ten English counties.

SIR HUGH LOW IN SARAWAK.—In the 'Orchid Review' for September and October, Mr. R. E. Arnold continues his account of Sir Hugh Low's pioneer work in Sarawak. The account gives a vivid picture of the condition of the country and of the natives in the "forties" of last century, of Mr. Brooke's untiring efforts to bring peace and prosperity to the country, and of Sir Hugh's efforts to improve native cultivation and to send home orchids and other plants of horticultural interest.

'THE JOURNAL OF THE WASHINGTON ACADEMY OF SCIENCES' (xxii. no. 15) contains a very full account by Charles Drechsler of the life-history and morphology of a new species of *Pythiogeton*, a genus of aquatic fungi allied to *Pythium*. The species, *P. autossytum*, was isolated from decaying leaf-sheaths of *Typha latifolia* collected near Port Clinton, Ohio, in October 1931.

WE note with much regret the death of Mr. JAMES WALTER WHITE, the veteran Bristol botanist. An appreciation of his work is promised for our next number.

U. nitens var. *stricta* Henry in Elwes & Henry, *Trees Gt. Brit.* vii. 1888, t. 397, 412, fig. 20 (1913), excl. syn. *U. campestris* β *stricta* Aiton (1789) (*U. angustifolia* Salisb. (1796); *U. sativa* Mill. (1768); *U. minor folio angusto scabro* Goodyer in Gerard (1636), quae planta obscura concertatoria est).

U. foliacea var. *stricta* Rehder in Bailey, *Stand. Cyclop. Hort.* vi. 3412 (1917); Rehder, *Manual Cult. Trees*, 189 (1927).

U. sativa var. *stricta* Rilstone in *Rept.* 1922 *B. E. C.* vi. 854 (1923).

"*U. stricta*. Cornish Elm. Leaves obovate, cuspidate, cuneate at base, evenly and nearly doubly crenate-serrate, strongly veined, coriaceous, very smooth and shining above, smooth beneath, with hairy axillæ. Branches bright brown, smooth, rigid, erect, very compact." (Lindley, *l. c.*, specim. authent. in herb. Cantab. !)

In describing *U. stricta* Lindley cites no previous literature, and *U. campestris* β *stricta* Aiton with "leaves harsh and rough on both sides" as described by Goodyer can hardly be considered synonymous. *U. stricta* is of south-western distribution in England (occurring also in Brittany) and is unknown as a wild tree in eastern England, where it is planted but rarely: we cannot accept Druce's identification of it with *U. minor* Mill. It is characterised by a pyramidal, rather fastigiate habit with the branches short and ascending and the normal leaves small, smooth, and concave (when living) at base. They are often larger than in *U. minor* Mill. sec. Henry which forms a tree of different habit.

Cult. Cambridge Botanic Garden, England. Flores, 2. iv. 1931; folia, 11. vi. 1931. *Leg.* et *det.* J. S. L. Gilmour & W. T. Stearn.

18. ×**Ulmus vegeta** (Loud.) Ley. Huntingdon Elm.

Ulmus vegeta Lindley in Donn, *Hort. Cantab.* ed. 2, 96 (1826), nomen.

U. (*montana*) *glabra* Mill. var. *vegeta* Loudon, *Arb. et Fruct. Brit.* iii. 1404 (1838).

×*U. Dippeliana* forma *vegeta* C. K. Schneider, *Handb. Laubholzk.* i. 219 (1904); Ascherson & Graebner, *Syn. Mitteleurop. Fl.* iv. 566 (1911).

U. vegeta Ley in *Journ. Bot.* 1910, 68; Henry in *Journ. Linn. Soc., Bot.* xxxix. 291, t. 20 (1910); Moss in *Gard. Chron.* ser. 3, li. 198, 235 (1912); Elwes & Henry, *Trees Gt. Britain*, vii. 1849, 1879, tt. 395, 412, fig. 16 (1913); Moss, *Camb. Brit. Fl.* ii. 91, t. 94 (1914); Bean, *Trees & Shrubs Brit. Isles*, ii. 621 (1914); A. B. Jackson in *New Flora & Silva*, ii. 227, t. lxxxv. (1930); Gilbert-Carter, *Catk.-Bear. Plants*, 50, t. xvi. (1930).

U. glabra Mill. var. *huntingdoniensis* Druce in *Journ. Northampt. Nat. Hist. Soc.* xvi. 291 (1911).

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