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NOTES ON THE LINNEAN TYPES OF AMERICAN LABIATÆ.

By Dr. Carl Epling
(University of California).

It is well known that the plants of the Linnean herbarium do not necessarily represent the historic types of the *Species Plantarum* *. The types of many species are unknown or are to be found elsewhere; many were based solely upon the published description and drawing of another author. As a result the identity of historic types is frequently a matter of speculation; their determination frequently impossible. I have therefore sought, in connection with monographic studies upon the American Labiatæ, to fix upon certain herbarium specimens which may serve as standards, if not always types, in the purely historic sense. While each case has been considered carefully upon its own merits, in the selection of these specimens I have endeavoured to be not wholly arbitrary but consistent in application of a certain method of procedure which may be of general application. Following this method (e. g., *Satureia viminea*), the plant actually described by Linné has been determined whenever possible. This true type failing or being obscure, the references cited for the species concerned have been studied and in a majority of cases the plants therein referred to have been consulted. The standard has then been chosen from amongst their number or from the Linnean herbarium according to the circumstances peculiar to each case.

The sources for the species of American Labiatæ other than the Linnean herbarium are chiefly seven: the plants of Plukenet's *Almagestum* (Mus. Brit.), the Morison herbarium (Oxford), the Dillenian

* In his *Index to the Linnean Herbarium* (Proc. Linn. Soc. 1911–12, Suppl.) Dr. B. D. Jackson has indicated the species that occur in the three enumerations extant in Linné's handwriting, namely 1753, 1755, and 1767. These are referred to in the following account as the first, second, and third enumeration, respectively.

herbarium (Oxford), the plants described by Royen (unknown to me), the Sloane herbarium (Mus. Brit.), the Clayton plants from the Gronovian herbarium (Mus. Brit.), and the plants of the *Hortus Cliffortianus* (Mus. Brit.). Of these, Linné is known to have studied only the two collections last mentioned, but it is known that he visited the Sloane, Plukenet, and Dillen herbaria during his stay in England. Whenever standards have been chosen in these herbaria in preference to the Linnean herbarium, the object sought has been solely to gain a more certain and stable basis for the nomenclature of the species concerned. This would otherwise remain in doubt where the historic type is wanting or obscure. As a matter of fact, that plant, which often in the modern sense of the word is the historic type, is often in all probability to be found either in the *Hortus Cliffortianus* or in the Gronovian herbarium. The absence of specific references to herbarium specimens on the part of Linné and the absence of his handwriting on all but a few sheets of these herbaria will always leave this question obscure. However, Britten * and Rendle † have already authoritatively discussed the relationship of the *Hortus Cliffortianus* and the Gronovian plants to the *Species Plantarum*.

In view of these facts, when a reference was made by Linné to the *Hortus Cliffortianus* and a plant corresponding to this reference was found, that plant has been in most cases accepted by me as the standard. While it is true that the year 1753 was adopted as the point of departure for nomenclature, nevertheless the diagnoses and descriptions of the *Hortus Cliffortianus* are generally recognized as constituting the initial publication of the corresponding species of the *Species Plantarum*. Comparison of the *Viridarium* with the *Hortus* will demonstrate that the latter is something more than the enumeration of plants growing in a garden, including as it does many species known to Linné only from dried material. It is really an incomplete "species plantarum" co-ordinate with the first edition of the *Genera Plantarum*.

Secondly, in the absence of a reference to the *Hortus Cliffortianus*, when a reference was made by Linné to the Gronovian herbarium and a plant corresponding to that reference was found, that plant has been in most cases accepted by me as the standard. There can be no doubt that Linné not only saw and studied the Clayton plants, and that for the most part they served as the basis for his actual knowledge of the species represented, but that he assisted and advised Gronovius in the publication of the *Flora Virginica*, the preparation of which was contemporaneous with Linné's residence in Holland. Furthermore, since the Clayton plants come from a somewhat circumscribed and definite area in Virginia, it is not difficult to correlate them with individuals of the present flora. They accordingly are to be preferred to the Kalm specimens of the Linnean herbarium.

Thirdly, for the same reason, where other considerations are equal, a plant known to be of spontaneous origin has been preferred to a

* Britten, Journ. Bot. 1898, p. 264.

† Rendle, Proc. Linnean Soc. London, 1923–24.

garden specimen. In the Labiatæ, at least, variation under cultivation is frequently so great as to obscure varietal or racial differences, and forms are commonly produced in gardens which are difficult to correlate satisfactorily with specimens growing spontaneously. It may be added that this method of approach was adopted after the above-mentioned herbaria had been studied, and, in view of the nature of the material found there, bade fair to give the most practicable results.

For the most part the plants of the subsidiary references in the *Species Plantarum* were found to be conspecific with each other and with the corresponding plant of the Linnean herbarium. The selection of a standard in such cases is chiefly of assistance in correlating the Linnean plant with individuals of the present flora. Occasionally, however, these plants may differ even generically, or the same species may appear under two genera, or two species may be confounded. In such cases the selection of a standard is imperative in order to secure stability of nomenclature. It is hoped that those herein adopted may meet that end.

Lycopus virginicus Sp. Pl. 21, 1753.

References: Lycopus foliis lanceolatis tenuissime serratis. Gron. virg. 8, 1739.

Linnean Herbarium: No specimen named by Linnæus.

Standard: Clayton ex Herb. Gronov. (Hb. Mus. Brit.).

Observations: Clayton's plant agrees well with the tips of the branches of *Fernald and Weatherly* 265 (Hb. Mus. Brit.).

Monarda fistulosa Sp. Pl. 22, 1753.

Ref.: M. capitulis terminalibus, caule obtus-angulo. Hort. ups. 12, 1748.

M. floribus capitatis, caule obtuso. Vir. Cliff. 3, 1737. Roy. lugdb. 313, 1740.

Monarda, Hort. Cliff. 11, 1737.

Origanum fistulosum canadense. Corn. canad. 13, t. 14, 1635.

L. H.: A specimen unannotated by Linné, hence doubtfully from Hortus Upsalensis, but present at first enumeration. It is conspecific with and similar to the plant in Hort. Cliff. A second specimen upon which Linné has written "*Mollissima.*"

Std.: *Monarda fistulosa*, larger specimen in Hort. Cliff.

Obs.: This is a villous plant as interpreted by Robinson *, and is conspecific with and similar to *Biltmore Herb.* 652 *b* (Hb. Mus. Brit.). As far as one may judge from the description and plate, Cornuti's plant was similar.

Monarda mollis Amoen. Acad. iii. 399, 1756.

Ref.: None, but a rather full description.

L. H.: A specimen filed under *M. fistulosa* upon which Linné has written "*Mollissima.*" Present in second enumeration.

Std.: The same, doubtless the historical type.

Obs.: The plant is as interpreted by Robinson *.

* Fernald, M. L., *Rhodora*, iii. 14, 1901.

Monarda didyma Sp. Pl. 22, 1753.

Ref.: Monarda caule acute angulato, capitulis terminalibus. Hort. Cliff. 495, 1737. Cold. noveb. 7, 1743.

Monarda floribus capitatis verticillatisque, caule acute angulato, foliis lanceolato serratis glabris. Büttn. cun. 266, 1750.

L. H.: A garden specimen so labelled by Linné present in first enumeration.

Std.: The same.

Obs.: There is apparently no specimen preserved in the Hort. Cliff. The species is as usually interpreted.

Monarda clinopodia Sp. Pl. 22, 1753.

Ref.: Monarda foliis ovato-lanceolatis, verticillis lateralibus dichotomis corymbosis, foliis inæqualiter serratis. Gron. virg. 9, 1739.

L. H.: A badly damaged plant present in the first enumeration.

Std.: The same.

Obs.: No Clayton plant was found in the general herbarium of the British Museum. The Linnean plant is conspecific with and similar to *J. K. Small, N. Fork Holston R.,. July* 30, 1892 (Hb. Mus. Brit.). A similar plant, evidently of garden origin, is found in the Linnean herbarium labelled "*M. clinopodifolia*" by Linné. This is presumably the plant referred to in Amoen. Acad. iii. 399, 1756, a nomen nudum. In his copy of the second edition of Gronovius's *Flora Virginica*, Linné has written in the margin opposite each species the equivalent binomials. This name is used there opposite the Gronovian description of *M. clinopodia*, and was evidently considered by Linné as a synonym of that species. It is not improbable that the original name *M. clinopodia* was a typographical error for *M. clinopodifolia*, particularly so since it was not capitalized.

Monarda punctata Sp. Pl. 22, 1753.

Ref.: Monarda floribus verticillatis, corollis punctatis. Hort. ups. 12, 1748.

Monarda floribus verticillatis. Hort. Cliff. 495, 1737. Gron. virg. 9, 1739. Roy. lugdb. 313, 1740.

Clinopodium virginianum angustifolium, quovis verticillo duodecim foliolis rubentibus cincto. Pluk. alm. iii. t. 24. f. 1, 1591.

L. H.: A plant so labelled by Linné has the aspect of a plant found wild. A second plant is obviously a garden specimen. On the sheet is written "flor. verticill. hort. cliff. 495," but this has been later struck out and "M. punctata" written.

Std.: Plant of Linnean Herbarium labelled "flor. verticill. hort. cliff. 495."

Obs.: No specimen of this species was found in Hort. Cliff. It seems not improbable that the garden specimen above referred to was the actual type of Hort. Cliff. It corresponds closely to the diagnosis and to the Clayton and Plukenet plants. It is conspecific with *Biltmore Herbarium* 653 *a* (Hb. Mus. Brit.), but is a coarser garden form. The Clayton plant is fragmentary.

Monarda ciliata Sp. Pl. 23, 1753. (*Blephilia ciliata* Raf.)

Ref.: Monarda spicâ interrupta, involucris longitudine verticillorum lanceolatis. Gron. virg. 9, 1739.

Clinopodium angustifolium non ramosum, flore cæruleo: labio trifido atropurpureis maculis ornato. Pluk. alm. 110, t. 164, f. 3. Moris. hist. iii. p. 374, sect. 11, t. 8. f. 6, 1699.

L. H.: No specimen annotated by Linné or present in the first enumeration.

Std.: *Clayton* 412 ex Hb. Gronov. in Herb. Mus. Brit.

Obs.: The plants illustrated by Plukenet and Morison are apparently conspecific with that of Clayton. The Morison plant is not preserved, and no corresponding plant was found in Plukenet's herb. Clayton's plant is conspecific with and similar to *Shuttleworth* 101 (Hb. Mus. Brit.).

Salvia mexicana Sp. Pl. 25, 1753.

Ref.: Salvia foliis ovatis utrinque acuminatis serratis. Hort. Cliff. 18, 1737. Roy. ludgb. 308, 1740.

Sclarea Mexicana altissima facie heliotropii, Dill. elth. 339, t. 254. f. 330, 1732.

L. H.: A branch bearing leaves only; present at first enumeration.

Std.: *Sclarea mexicana* in Herb. Dillen. (Oxford).

Obs.: Since no specimen is preserved in Hort. Cliff., Dillen's plant, which is excellently illustrated and well preserved, seems preferable as the standard.

Salvia hispanica Sp. Pl. 25, 1753.

Ref.: Horminum sylvestre, lavendulæ flore. Bauh. pin. 239 ?

Sclarea hispanica. Tabern. hist. 764, ic. 374, 1590.

Habitat in Italia: D. Rathgeb; in Hispania: Loefling.

L. H.: A specimen, the origin not indicated; first enumeration.

Std.: The same.

Obs.: The species is as usually interpreted; the figure of Tabernæmontanus is poor and may or may not represent this species.

Salvia dominica Sp. Pl. 25, 1753. (*S. graveolens* Vahl.)

L. H.: A specimen of unknown origin; first enumeration; wrongly attributed to Domingo by Linné it was later given the name *S. commutata* by Bentham, who still later referred this species to synonymy with *S. graveolens* Vahl, by which name it is known at present.

Salvia serotina Mantissa 25, 1767.

Ref.: Salvia foliis cordato-ovatis serratis rugosis, bracteis subverticillatis senis, calycibus tridentatis. Ard. Spec. i. p. 10, t. 2. 1759.

L. H.: A specimen from the Hort. Ups., according to Bentham, but marked as being from Italy; third enumeration. The probable historical type.

Obs.: Arduini pictures *Salvia micrantha* Vahl. Linné's diagnosis is not wholly consistent with Ardiuni's fairly good figure.

Salvia lyrata Sp. Pl. 23, 1753.

Ref.: Salvia corollarum labio superiore breviore; fauce patente. Gron. virg. 8, 1739.

Horminum virginianum erectum, urticæ foliis, flore minore. Moris. hist. iii. p. 395, s. 11, t. 13. f. 31, 1699.

L. H.: A specimen from Kalm; first enumeration.

Std.: Clayton ex Herb. Gronov. in Herb. Mus. Brit.

Obs.: Kalm's plant is conspecific with and similar to Clayton's. Both are thinly villous with distinctly lyrate leaves. (The Morison drawing referred to represents *Salvia urticifolia*. It was erroneously cited by Linné for fig. 27 on the same page which represents *S. lyrata*. In the second edition of the *Species Plantarum* a correction is made.) The Morisonian plant determined by Vines as *Salvia mexicana* is not that species, but *S. urticifolia*.

Salvia urticifolia Sp. Pl. 24, 1753.

Ref.: Salvia foliis ovato-oblongis duplicato-serratis calycibus tridentatis; lacinia summa tridentate. Gron. virg. 8, 1739.

Horminum virginianum erectum, urticæ foliis, flore minore. Moris. hist. iii. p. 395, s. 11, t. 13. f. 31, 1699.

L. H.: A plant present in first enumeration conspecific with and similar to Clayton's plant.

Std.: Clayton ex Herb. Gronov. in Herb. Mus. Brit.

Obs.: See under *S. lyrata*.

Collinsonia canadensis Sp. Pl. 28, 1753.

Ref.: Hort. Cliff. 14, t. 5. 1737. Cold. noveb. 8, 1743.

L. H.: A specimen from Kalm; first enumeration.

Std.: *Collinsonia canadensis* in Hort. Cliff.

Obs.: Kalm's specimen is conspecific with the plant of Hort. Cliff., and both are similar to Clayton's plant and to a plant collected by Burgess at London, Ontario, Aug. 29, 1884 (Hb. Mus. Brit.).

Teucrium canadense Sp. Pl. 564, 1753.

Ref.: Teucrium foliis lanceolatis serratis petiolatis, floribus solitariis. Gron. virg. 64, 1739.

Chamædrys canadensis, urticæ folio subtus incano. Tournef. inst. 205.

L. H.: A specimen present in first enumeration, without other data.

Std.: The same.

Obs.: The Clayton specimen is an abnormal depauperate specimen with solitary verticillate flowers, but probably conspecific with the Linnean plant.

Teucrium virginicum Sp. Pl. 564, 1753. (? *T. canadense* L.)

Ref.: Teucrium foliis ovatis inæqualiter serratis, racemis terminalibus. Gron. virg. 64, 1739.

Obs.: No specimens were found either in the Linnean herbarium or in the British Museum; probably *T. canadense*.

Satureja virginiana Sp. Pl. 567, 1753. (*Pycnanthemum linifolium* Pursh.)

Ref.: Satureja virginiana Herm. par 218, t. 218. 1698.

Pulegium erectum virginianum angustifolium, floribus in cymis dispositis. Moris. hist. iii. p. 371, s. 11, t. 7. f. 3, 1699.

Clinopodium foliis lanceolatis acuminatis, capitulis terminalibus. Hort. Cliff. 304, 1737. Gron. virg. 65, 1739. Roy. lugdb. 314, 1740.

Clinopodium, pulegii angusto rigidoque folio, virginianum flosculis in cymis dispositis. Pluk. alm. 110, t. 54. f. 2, 1699. Serpentaria virginiana. Bocc. mus. 2, p. 161, t. 115. 1797.

L. H.: A specimen conspecific with and agreeing very well with *House* 405, New Alexandra, Va. (Hb. Kew.); first enumeration This species was later described by Pursh as *Pycnanthemum lanceolatum*.

Std.: *Clinopodium foliis lanceolatis*, later named *Thymus virginicus* in Hort. Cliff.

Obs.: The plant of Hort. Cliff. is conspecific with and very similar to Clayton's plant; both are conspecific with and similar to *Harper* 103, Chicamauga, Ga. (Hb. Kew.). This species was later described by Pursh as *Pycnanthemum linifolium*. The plants described by Plukenet, Morison, and Gronovius are also conspecific with Harper's plant. Boccone's drawing illustrates the same species.

That of Hermann is indeterminable, and alone of the references cited represents a plant with leaves similar to those of the plant of the Linnean herbarium. Clearly, the species was first described by Linné in Hort. Cliff. under *Clinopodium*. Later he confused the species there described with another, described by Pursh as *Pycnanthemum lanceolatum*. The combination *Pycnanthemum virginianum* (L.) is accordingly synonymous with *Pycnanthemum linifolium* Pursh.

Satureja origanoides Sp. Pl. 568, 1753. (*Cunila mariana* L.)

Ref.: Thymus foliis ovatis acuminatis serratis, corymbis lateralibus terminalibus pedunculatis. Gron. virg. 64, 1739.

Calamintha mariana, mucronatis rigidioribus et crenatis foliis, flosculorum calyculis villis argenteis summo margine fimbriatis. Pluk. mant. 35, t. 344. f. 2, 1700.

Calamintha erecta virginiana, mucronato folio glabro. Moris. hist. iii. p. 413, s. 11, t. 19. f. 7, 1699.

L. H.: a plant from Kalm under *Cunila mariana*.

Std.: *Clayton* ex Herb. Gronov. in Herb. Mus. Brit.

Obs.: The Kalm and Clayton plants are conspecific. This species was later, in the second edition of the *Species Plantarum*, made the basis of the genus *Cunila*. The citations are similar, with the addition of a reference to *Satureia origanoides*, first edition, and to the genus *Hedyosmos* of Mitchell.

Satureja viminea Syst. ed 10, 1096, 1759.

L. H.: A specimen from Patrick Browne. A large, rather thin-leaved form similar to *Shafer* 8988; the calyx-teeth are very acute. Clearly the historical type.

Hyssopus nepetoides Sp. Pl. 569, 1753.

Ref.: Hyssopus caule acuto quadrangulo. Hort. Ups. 3, 1748. Nepota caule acute quadrangulo glabro. Vir. Cliff. 58, 1737. Roy. lugb. 316, 1740. Gron. virg. 66, 1739.

Brunella bracteis lanceolatis. Hort. Cliff. 316, 1737.

Betonica virginiana elatior, foliis scrophulariæ glabris, flore ochroleuco. Pluk. alm. 67, t. 150. f. 3, 1691. Moris. hist. iii. p. 365, s. 11, t. 4. f. 11, 1699.

L. H.: A specimen evidently of horticultural origin, conspecific with Clayton's plant, Plukenet's, and that of Hort. Cliff.

Std.: *Hyssopus nepetoides* in Hort. Cliff.

Obs.: This plant is conspecific with *Bush* 451 (Hb. Kew.), but the bracts are larger and more conspicuous.

Nepeta virginica Sp. Pl. 571, 1753. (*Pycnanthemum aristatum* Pursh.)

Ref.: Clinopodium foliis lanceolatis, capitulis terminalibus. Hort. Cliff. 305. Gron. virg. 65, 1739.

Clinopodium amaraci folio, floribus albis. Pluk. alm. 110, t. 85. f. 2, 1691.

Clinopodium, flore albo, ramosius, angustioribus foliis glabris, virginianum. Moris. hist. iii. p. 374, s. 11, t. 8. f. ult. 1699.

L. H.: A plant present in third enumeration.

Std.: *Clayton* 898 ex Gronov. in Herb. Mus. Brit.

Obs.: The description in the Hort. Cliff. refers to a specimen from Gronovius. None is preserved in the Hort. Cliff. nor, apparently, in the Linnean herbarium. The Clayton plant is conspecific with and similar to *Biltmore Herb.* 750 *b* in Herb. Mus. Brit. In Plukenet's figure the calyx-teeth are shown as acute. In his plant, which corresponds very closely to the drawing in habit, the calyx-teeth are aristate; the acute teeth of the drawing were evidently a blunder of the artist.

Mentha canadensis Sp. Pl. 577, 1753.

Ref.: Canada, Kalm.

L. H.: What is presumably Kalm's plant is conspecific with and similar to *MacDougal* 18, Macabee's ranch (Hb. Kew.).

Std.: The same; probably also the historical type.

Ballota suaveolens Syst. ed. 10, 1100, 1759; Pl. Jam. Pugill. 15, 1759. (*Hyptis suaveolens* Poit.)

Ref.: Plum. ic. t. 163, 1693. Sloan. Jam. t. 102. f. 2, 1709–25.

L. H.: A specimen from Patrick Browne; third enumeration; the historical type.

Obs.: It is the compact form illustrated by Plumier: *H. Plumieri* of Poiteau.

Clinopodium incanum Sp. Pl. 588, 1753. (*Pycnanthemum incanum* Pursh.)

Ref.: Clinopodium foliis lanceolatis serratis, verticillis pedunculatis. Roy. lugdb. 313, 1740.

Clinopodium, menthæ folio, incanum et odoratum. Dill. elth. 87, t. 74. f. 85, 1732.

Clinopodium majus virginianum non ramosum, verticillis majoribus, floribus brevioribus corneis. Moris. hist. iii. p. 374, s. 11, t. 8. f. 4, 1699.

Clinopodium Serpentaria dictum, latiori folio, capitulis grandioribus. Pluk. mant. 51, t. 344. f. 7, Raj. suppl. 298, 1229. Habitat in Europa boreali.

L. H.: A specimen labelled "H. W. Kalm"; first enumeration. It is conspecific with Clayton's plant (not cited) and probably with Plukenet's.

Std.: The same.

Obs.: The plants of Plukenet, Dillen, and Morison are conspecific with those of Linné and Gronovius. The latter is not cited. The Linnean plant is conspecific with and similar to Pursh's plant from "Sweet Springs" (Hb. Kew.).

Clinopodium rugosum Sp. Pl. 588, 1753. (*Hyptis rugosa* (L.); *H. radiata* Willd.)

Ref.: Clinopodium rugosum, capitulis scabiosæ. Dill. elth. 88, t. 75. f. 86, 1732.

Scabiosæ affinis, chrysanthemi facie, lamii foliis, americana. Pluk. alm. 335, t. 222. f. 1, 1699.

Sideritis spicata, scrophulariæ folio, flore albo, spicis brevibus habitioribus rotundis pediculis insidentibus. Sloan. jam. 65, hist. i. p. 174, t. 109. f. 2, 1709–25.

Mentha americana inodora, foliis subincanis. Raj. suppl. 284.

Mentha melissoides americana. Pluk. mant. 129, 1700.

Melissa altissima globularia. Plum. spec. 6.

L. H.: No specimen found.

Std.: *Clinopodium rugosum* in Herb. Dillen. (Oxford).

Obs.: Since this species was probably based solely upon descriptions and figures of previous authors, and since the Dillenian figure and specimen are excellent, and since the Dillenian name was adopted, there seems little question as to the identity of the plant Linné had in mind, particularly in view of the dubious figures of the other citations. The plants of Sloane and Plukenet are *Hyptis capitata* Jacq.

Melissa pulegioides Sp. Pl. 593, 1753. (*Hedeoma pulegioides* Pers.)

Ref.: Melissa floribus verticillatis glomeratis secundum longitudinem caulis, foliis tomentosis. Gron. virg. 167, 1739.

L. H.: A Kalm plant; a plant bearing on the back of the sheet the annotation "Fl. virgin. 66," very like one of the Gronovian plants.

Std.: *Clayton* 514 ex Herb. Gronov. in Herb. Mus. Brit.

Obs.: In the Gronovian herbarium were three plants: one collected on Staten Island, one grown from Virginian seed, one from Clayton. All are conspecific with each other and with the plants in the Linnean herbarium. The species is as usually interpreted.

Dracocephalum virginianum Sp. Pl. 594, 1753. (*Physostegia virginiana* Benth.)

Ref.: Dracocephalum foliis simplicibus, floribus spicatis. Hort. Cliff. 308, 1737. Roy. lugdb. 311, 1740.

Dracocephalum. Breyn. ic. 33, t. 27, 1739. Hir. act. 1712, p. 276, t. 11.

Dracocephalus angustifolius, folio glabro serrato. Moris. hist. iii. p. 407, s. 11, t. 4. f. 1, 1699.

Pseudodigitalis persicæ foliis. Bocc. Sec. 12, t. 6. f. 3.

Lysimachia galericulata spicata purpurea canadensis. Barr. ic. 1152, 1714.

L. H.: Two specimens, one evidently of garden origin, a second from Kalm, rather small-flowered, suggesting *Dracocephalum breviflorum* (Nutt.).

Std.: The garden specimen in Linnean Herbarium.

Obs.: No specimen was found in the Hort. Cliff. Since the garden specimen in Herb. Linn. more closely corresponds to the published drawings cited by Linné, and to the usual interpretation of this rather well-known horticultural plant, it was selected as the standard, rather than the Kalm plant.

Horminum virginicum Sp. Pl. 596, 1753. (*Salvia lyrata* L.)

Ref.: Melissa atrorubens, pugulæ folio. Dill. elth. 219, t. 175. f. 216, 1732.

Sideritis, bugulæ folio, mariana, floribus purpureis longo tubulo donatis. Pluk. mant. 171, 1700.

L. H.: A specimen of unknown origin, not present in first enumeration, now under *Salvia*; labelled by Linné "Horminum virginicum purpureum."

Std.: The same.

Obs.: Dillen's plant is conspecific with *Salvia obovata* Elliott and *Salvia lyrata* var. *obovata* Pursh. The plant of the Linnean Herbarium is similar, but the leaves are somewhat lyrate.

Ocimum americanum Amoen. Acad. iv. 276, 1759.

Ref.: America. Miller.

L. H.: A very depauperate specimen present in the second enumeration, corresponding only in a general way to the rather complete description. The actual type was doubtless a plant sent by Miller and since lost, for none was found in Miller's herbarium.

Std.: The plant in the Linnean herbarium, conspecific with *O. canum* Sims.

Trichostema dichotomum Sp. Pl. 598, 1753.

Ref.: Trichostema. Hort. Cliff. 493, 1737. Gron. virg. 64, 1739; Roy. Lugdb. 310, 1740.

Scutellaria cærulea, majoranæ folio, americana. Raj. suppl. 311, 1704.

Cassida mariana, majoranæ folio. Pet. sicc. 243.

L. H.: A specimen of unknown origin; first enumeration.

Std.: *Clayton* 177 ex Herb. Gronov. in Herb. Mus. Brit.

Obs.: No specimen is preserved in the Hort. Cliff. The original description was based upon a plant from Gronovius. The Clayton plant is a better specimen than that in the Linnean herbarium. Both are conspecific with *Nash* 2452, and Clayton's plant agrees well with that sheet in Herb. Mus. Brit.

Trichostema brachiatum Sp. Pl. 598, 1753. (*Isanthus brachiatus* B. S. P.)

Ref.: Teucrium virginianum, origani folio. Dill. elth. 380, t. 285. f. 369, 1732.

L. H.: A specimen of unknown origin; not present in first enumeration.

Std.: The same.

Obs.: The plant of the Linnean herbarium agrees well with *Small, Smyth Co., Va., Aug.* 8, 1892 (Hb. Kew.).

Scutellaria lateriflora Sp. Pl. 598, 1753.

Ref.: Scutellaria foliis cordato-lanceolatis serratis, pedunculis multifloris. Roy. lugdb. 311, 1740.

Scutellaria foliis ovato-lanceolatis petiolatis, racemis foliosis. Gron. virg. 67, 1739.

Scutellaria palustris repens virginiana major, flore minore. Moris. hist. iii. p. 416, 1699.

L. H.: A quite young garden specimen from Hortus Upsalensis present in first enumeration.

Std.: *Clayton* ex Herb. Gronov. in Herb. Mus. Brit.

Obs.: Clayton's plant is conspecific with that of the Linnean herbarium, and is similar to *Sheldon, Milaca, Mille Lacs Co., Minn., July* 1892 (Herb. Mus. Brit.). Morison's plant is *S. nervosa* Pursh.

Scutellaria integrifolia Sp. Pl. 599, 1753.

Ref.: Scutellaria foliis integerrimis. Gron. virg. 67, 1739.

Scutellaria cærulea virginiana, lamii aut potius teucrii folio, minor. Pluk. alm. 338, t. 313. f. 4, 1696.

Scutellaria, teucrii folio, marilandica. Raj. Suppl. 310, 1704.

L. H.: On the sheet labelled by Linné "Scutellaria integrifolia Kalm" are two species: a branch of *S. nervosa* Pursh and a branch conspecific with *Clayton* 205, which in turn agrees well with *Blake* 9510 (Herb. Mus. Brit.).

Std.: *Clayton* 205 ex Gronov. in Herb. Mus. Brit.

Obs.: It is evident that Linné drew his diagnosis "foliis sessilibus ovatis: inferioribus obsolete serratis; superioribus integerrimis" from the Kalm specimens, believing that the branch of *S. nervosa* represented a basal branch. Plukenet's plant is the type of *Scutellaria ovalifolia* Pers., and is very similar to *Blake* 9511 (Herb. Mus. Brit.) as well as *Clayton* 758 and *Bartram* (Herb. Mus. Brit.).

Scutellaria hyssopifolia Sp. Pl. 599, 1753.

Ref.: Scutellaria foliis lanceolatis. Gron. virg. 167, 1739.

Cassida mariana hyssopifolia. Pet. act. angl.

L. H.: A specimen from Kalm; first enumeration.

Std.: *Kalm* in Linnean herbarium.

Obs.: The Kalm plant is here chosen in preference to the Clayton plant since it is more complete, the latter being only a tip. Kalm's plant is conspecific with and similar to *Drummond*, New Orleans, or *Nuttall*, Philadelphia (Herb. Kew.).

Verbena prismatica Sp. Pl. 19, 1753. (*Stachytarpheta prismatica* Smith.)

Ref.: Verbena minima, chamædryos folio. Sloane jam. 64.

L. H.: The plant labelled by Linné *Verbena prismatica*, which corresponds to his description, was later designated *Stachytarpheta prismatica* by Smith. Sloane's plant, clearly illustrated, is *Salvia occidentalis* Swartz. Since Linné's description clearly refers to the specimen in his herbarium, the reference to Sloane's drawing may be considered an error. I regret to state that, influenced by the reference to Sloane's drawing, I believed it necessary to make a new combination synonymous with *S. occidentalis* Swartz, and labelled some herbarium material in this way, notably in the Berlin herbarium.

SOME BRITISH ALCHEMILLAS.

By C. E. Salmon, F.L.S.

With his customary kindness, Dr. F. Jaquet, of Fribourg, has determined—or confirmed the naming of—several gatherings of this fascinating genus made by friends or myself during recent years.

These results are tabulated below, and it will be seen that our British list is enriched to the extent of two new species, *Alchemilla heteropoda* Bus., discovered by Mrs. Corstorphine, and *A. acuminatidens* Bus., gathered by Miss I. M. Roper.

I have marked with an asterisk new county records, and aliens with a dagger.

A. curtiloba Bus. (see Journ. Bot. 1925, 222). This close ally of *A. pratensis* may now be reckoned as an inhabitant of **Elgin, v.c. 95*, where it was found at Longmorn by Miss K. D. Little in 1927.

A. Salmoniana Jaquet (Journ. Bot. 1926, 280). I am pleased to be able to add another county to that of Cumberland, from which the species was originally reported, viz. **Westmorland, v.c. 69.* Helvellyn! July 1921. *L. B. Hall.* It may prove to be, like *Myosotis brevifolia*, a plant with its headquarters in the Lake District.

A. tenuis Bus. (Journ. Bot. 1925, 225). Mr. J. E. Little kindly lent me the specimen from Box Wood, Stevenage (*Herts, v.c. 20*) gathered in 1911, to which reference has been made in Rep. B.E.C. 1926, 113. Upon close examination the plant did not appear to show the characters of the group *Heteropodæ*, and seemed better placed under *A. minor* Huds. Dr. Jaquet has confirmed this view.

It will, however, be satisfactory to Hertfordshire botanists to know that this species may yet be included as a native of their county, as Mr. L. B. Hall discovered it near Chipperfield in 1916.

A. heteropoda Bus. This extremely interesting member of the group *Heteropodæ* (the second found in our islands, the other being *A. tenuis*) has been added to the British list of Alchemillas by Mrs. M. Corstophine, who discovered it in August 1915 at Caenlochan, *Forfar, v.c. 90.*

It was originally described by Buser in Ber. Schweiz. Bot. Ges. iv. 73 (1894), of which the following is a translation:—*Alchemilla heteropoda* Buser:—Medium-sized plant, ugly and coarse, sombre and dirty dark-green, becoming dark reddish-brown in the sun towards maturity, shoots of different kinds, *i.e.* the first petioles and shoots are smooth, the later ones patently hairy; with glabrous, crowded, capitate flowers. *Rhizome* strong, very fibrous, rather near the surface. *Leaves* 9-lobed (in small plants the outermost pair a little reduced), rounded-reniform, the later ones with a broad notch, which is often right-angled, narrowed rapidly towards the stalk. *Lobes* of the spring leaves very thin, flattened, arcuate, ±truncate, $\frac{1}{6}$–$\frac{1}{5}$ radius, those of the mid-season subobovate, those of the summer leaves broadly triangular and acute, $\frac{1}{4}$–$\frac{1}{3}$ radius, spreading; all are serrate round the edge. *Serrations* 6–8, not very deep and rather broad, obviously unequal, those of the lower leaves semi-oval, with hair-points, those of the upper leaves acute and protruding. Leaves in the fresh state wavy, when dried having the undulations folded and creased, rather hard and firm, ±thick, in the fresh state with the upper surface dirty dark-green and somewhat shining, as if covered with a dirty membrane, in the dry state matt, greyish-brown; brighter below, not glaucous, the summer leaves sometimes somewhat whitish-green; with very transparent reticulate nervation, in the dried leaves obviously impressed above and slightly prominent below. Spring leaves, with the exception of the nerves, quite glabrous, the leaves following them hairy along the folds on the upper side and on the nerves below, the large midsummer leaves sparsely covered with long, laxly adpressed hairs on both sides, the hairs being dirty yellowish-white in the dry state. The first (2–3) *petioles* entirely glabrous or the uppermost with a few very sparse hairs, the curved or straight stalks of the midsummer leaves patently subvillous or villous. *Stipules* rather broad, forming a firm tuft, greenish or whitish, rarely slightly violet; forming oblong to oblong-triangular ears. Stem curved, upright or with a curved base, usually about half as long again as the longest petiole, more rarely 3–4 times longer than it, but on account of its curvature the stem does not exceed the tuft of leaves, or only very slightly; stem dull green, ugly and thick, the twigs forking almost at right-angles, thinly patently villose as far as the axil of the 2nd or 3rd branch, the lowest internodes thinly hairy. *Stem-leaves* relatively large, shallowly lobed, with broad sheathing stipules; stipules broadly, shortly, and few-toothed. *Inflorescence* moderately developed, usually beginning below the middle of the

stem, forming a poor corymb, one branch much more advanced than the other. *Cincinni* somewhat uncoiled, stalks squarrose, patent, and so, on account of their shortness, the flowers are not coiled up. *Flowers* in all parts short, broad, and thick; calyx-tubes at flowering-time broadly funnel-shaped, as broad as long, gradually broadening into the limb which is equally long, the lower ones towards maturity turbinate, or the upper truncate-spherical in fruit often ventricose, basin-shaped, with the nerves marked as darkish lines. *Sepals* broadly triangular to truncate-cordate, glabrous or with a few hairs on the back, after flowering-time elongated, covering the style. Outer calyx-segments rather broadened, lanceolate, elliptic to ovate. The somewhat thick pedicel is as long as, or slightly shorter than, the calyx-tube. Leaves 3–12·6 × 2·7–10·5 cm. Stem 9–35 cm. Petioles 3–34 cm. Flowers 2–3 mm. long, 3–4 mm. broad. Calyx-tube and limb 1–1·5 mm. Pedicels 2·5–1 mm. . . . This is the ugliest of all our Alchemillas. The colouring is dark and dirty, the leaves have an upper surface resembling the skin on dirty water; the inflorescence is ugly, the flowers thick and coarse. The plant seems as if it came from the coarse alpine localities where pigs were to be found. This should also explain its absence from collections because we have ample opportunity to put into the herbarium more beautiful and inviting forms. . . . The hairiness, especially that of the stems, is on the whole rather strong: such plants, by their greater striation, recall *obscura* and *crinita*. The heteropody is more pronounced in this plant than in most of the other species; the first petioles of the spring leaves are quite glabrous. Often under the normal hairy pedicel is inserted one which is glabrous, except for a few hairs.

A. ACUMINATIDENS Bus. This species, holding a position between *A. acutidens* and *A. alpestris*, I have long been seeking, and it was a great pleasure to find that an example gathered by Miss I. M. Roper by the Spey, at Aviemore, *Easterness*, *v.c. 96*, in 1927, and which I queried as this plant, was confirmed by Dr. Jaquet.

It was described by Buser in Bull. Herb. Boiss. ser. 2, ii. 624–6 (1902) as follows:—*A. acuminatidens* Bus., sp. n.—Quand l'*A. acutidens* Bus. est bien développé, c'est alors une des formes les plus faciles à saisir et à caractériser. Mais à côté de la forme typique, on reçoit assez souvent des spécimens moins précis, embarrassants par leur degré amoindri de différenciations. Ayant reçu dernièrement de M. Firmin Jaquet, mon précieux correspondant dans les Alpes fribourgeoises, un lot de pareilles plantes, dont le nombre et la parfaite identité garantissant la constance, je les ai soumises à une comparaison minutieuse avec le type du Jura et suis arrivé à la conviction que les deux formes sont à séparer spécifiquement. Au lieu de donner une description de la forme nouvelle qui, nécesairement, répéterait au long ce qui est commun aux deux, je préfère les mettre en opposition pour leurs seules différences.

A. acutidens Bus. (Bull. Herb. Boiss. ii. 1899, 102).—Feuilles fortement ondulées, à petits plis dans les angles des lobes sur le sec, à plis de vernation à peine perceptibles, d'un vert luisant, glabres ou soyeuses le long des plis et sur les dents en dessus, plus pâles en dessous et ±soyeuses le long des côtés, sur la partie antérieure des lobes et sur ceux avoisinant le pétiole. Nervation subopaque, légèrement saillante sur le dessus des feuilles estivales. Dents nombreuses (6–)7–9 de chaque côté, plus étroites et plus serrées, très égales, à ligne extérieure plus courbée, conniventes sur les feuilles inférieures, bien ciliées et pénicillées; dent terminale presque égale aux latérales. Tiges dures, résistantes, ne s'aplatissant pas par la dessiccation, grêles. Inflorescences laches et diffuses. Urcéoles (½ murs) turbinés, à base allongée. Styles presque de double longueur des filaments. Pédicelles alaires (2–5 mm.) égalant 2–2½ fois les urcéoles, pédicelles supérieurs des scorpioïdes égalant l'urcéole.

A. acuminatidens Bus., sp. n.—Feuilles pliées en carène sur le vif, à plis de vernation longtemps perceptibles en lignes semi-transparentes, planes sur le sec et ne se plissant pas dans les angles de lobes, vert bleuâtre et glabre en dessus, blanc verdâtre et faiblement soyeuses sur la partie antérieure des côtés en dessous, à nervation finement réticulée et assez bien transparente, non saillante. Dents 5–7 de chaque côté, inégales, aigueës, à ligne extérieure plus droite et dents ainsi plus "en scie" et écartées, faiblement ciliées; dent terminale petite. Tiges plus grosses, s'aplatissant et se plissant un peu (ainsi que les pétioles, les pédicelles et les côtés des feuilles) par l'effet de la dessiccation, ordinairement moins flexueuses. Inflorescences plus compactes à cause des pédicelles plus courts et du raccourcissement de tous les axes des rameaux supérieurs. Feuilles caulinaires à lobes plus courts; stipuliums plus petits; dentelure des deux correspondant à celle des feuilles. Urcéoles campanulés ou turbinés, à base abrupte. Styles ne dépassant pas les filaments. Pédicelles alaires égalant 1⅓–1½ fois les urcéoles, les supérieurs des scorpioïdes d'un ⅓ plus courts que l'urcéole.

Tiges 7–26 cm. Pétioles 3–17 cm. Feuilles 40–80 × 32–55 mm. Fleurs larges de 4–4½ mm. Urcéoles 1½, sepales 1⅔–1½ mm., pédicelles 1⅔–3 mm.

En général l'*A. acuminatidens* n'atteint pas ce degré d'élégance gracile qui distingue l'*acutidens*, la plante est plus ramassée, la dentelure plus inégale, plus grossière, les inflorescences plus condensée, les fleurs plus petites, plus raccourcies. La quantité de l'indument est de moitié plus faible et à peu près celle d'un *A. alpestris* Schmidt avec lequel l'*acuminatidens* a une certaine ressemblance superficielle. Des feuilles bien arrondies ou suborbiculaires me semblent se rencontrer plus rarement, les lobes être moins profonds que dans l'*acutidens*.

A. CORIACEA Bus. Mrs. Corstorphine very kindly sent me an example from near Legaston, *Forfarshire* (*v.c. 90*) gathered in 1915. After a careful examination I rather doubted the name, as the stem and petioles were not glabrous and the urceoles were not almost twice as long as the sepals, as in that species. I thought it robust *A. alpestris*. Dr. Jaquet's report was as follows:—"Le

coriacea est tout à fait glabre, des pieds à la tete. Ceci est une forme luxuriante (*vegeta*) de *A. alpestris* Schmt."

A. FIRMA Bus. (Journ. Bot. 1925, 228). Dr. Jaquet determines as this species an *Alchemilla* in my herbarium collected by H. T. Mennell about 1884 at Cauldron Snout, **Durham* (*v.c. 66*).

A. ARGENTEA G. Don (*A. conjuncta* Bab.).

**Yorkshire, mid-west, v.c. 64.* Ingleton! 1882. *J. Watkins. Herb. Mus. Brit.*

**Westmorland, v.c. 69.* Rydal Mount! *Rev. Stillingfleet. Ex herb. W. L. Notcutt. Herb. C. Bailey.*

Westmorland (*v.c. 69*) or *Cumberland* (*v.c. 70*). Ullswater! *J. Walton. Herb. A. W. Bennett* (labelled *A. alpina*). Unfortunately the county is not stated on the label, and the boundary of Westmorland and Cumberland runs through the centre of the lake!

Cumberland, v.c. 70. Gatesgarth! 1844. *Borrer. Herb. Mus. Brit.* This example is interesting. Given for "Gatesgarth Pass, Cumberland. *Messrs. Dovaston and Bowman.*" Bab. Man. 90 (1843), but omitted from ed. 2 (1847) and subsequent editions. Watson (Comp. Cyb. Brit. 470, 1870) states—"Mr. J. E. Bowman was cited as the authority for *conjuncta* having been found in Gatesgarth Pass or Dale, Cumberland; but he himself has expressly declared that the plant he brought thence was *alpina*, which remained unchanged in his garden; and Mr. Borrer unsuccessfully sought the *conjuncta* in the locality named, finding *alpina* there only." I can make no comment beyond the fact that Borrer's example appears quite satisfactory *argentea* and is labelled *A. conjuncta.*

Buttermere fells! 1850. Coll. *W. Dickinson*, sent by *R. Wood. Herb. C. Bailey.* This throws light on the Cumberland record in Journ. Bot. 1872, 308, and supplies the locality where I trust it may be re-found. I have another specimen from the same locality, sent me by Mr. Arthur Bennett (Hort. Croydon, 1879), with the information "gathered by Mr. Hodgson, a friend of mine. R. Wood."

**Perth, mid, v.c. 88.* A specimen labelled *A. alpina*, collected by Dr. Hughes in *Herb. F. Bossey* (now in the possession of the Holmesdale Nat. Hist. Club, Reigate), gathered on "Mael Gredha," has proved to be *A. argentea.*

Forfar, v.c. 90. Gathered at Clova, in 1856 by *A. Croall*! and in 1882 by *M. J. Whitehead*!

†*Caithness, v.c. 109.* Roadside near Thurso Cemetery. 1916. *C.E.S.* An introduction here, I believe.

An interesting account of *A. argentea* is given by Dr. G. C. Druce in Rep. B.E.C 1917, 20 and 1918, 282.

MESEMBRYANTHEMUM AND ALLIED GENERA.

By N. E. Brown, A.L.S.

(Continued from vol. lxvi. p. 327, 1928.)

CEPHALOPHYLLUM DIVERSIPHYLLUM N. E. Br. (*M. diversiphyllum* Haw. Obs. 228. *M. diversifolium* Haw. Misc. Nat. 38, Synop. 230, and Rev. 108, including varieties; Salm Dyck, Mes. § 15, f. 2, and 2 β. *M. loreum* L. Sp. Pl. ed. 2, 694 (1762), as to main description, but not of description in italics of purple-flowered plant, which is *C. diminutum*, and *M. loreum* vars. β & γ only, L. Sp. Pl. 487 (1753); Haw. Obs. 232, Misc. Nat. 38, Synop. 229, and Rev. 108, including var. *congestum*. *C. diversifolium* L. Bol. and *C. loreum* L. Bol. in S. Afr. Gard. 1928, 155, 156, and Mes. 121, as to Haworth's names only, not as to specimens so named nor as to the figure. *M. diversifolium* Haw. was founded upon Dillenius, Hort. Elth. t. 198, f. 252, and *M. loreum* Haw. (not of Linn.) upon f. 255, which I and some others regard as being the same species. It has been in cultivation over 200 years, and the Dillenian figure of it is excellent; see also Bradley, Hist. Succ. Pl. Dec. iv. 18, t. 40.)

C. DUBIUM L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. dubium* Haw. Misc. Nat. 39 (1803), Synop. 231, and Rev. 110; Salm Dyck, Mes. § 15, f. 4. Not *M. dubium* Haw. Obs. 471 (1795), which is *Odontospermum pygmæum* O. Hoffm. *M. procumbens* Haw. Rev. 111.)

C. EBRACTEATUM L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 120. (*M. ebracteatum* Pax in Schultze, *Aus Namaland und Kalahari*, 93, with fig. & 693, not of L. Bolus. *M. Rangei* Engl. in Bot. Jahrb. xliii. 190, f. 2.)

C. GRACILE L. Bol. in S. Afr. Gard. 1928, 155, f. 39, and Mes. 118, 119, f. 39, & 149.

C. INÆQUALE L. Bol. Mes. 149.

C. LOREUM N. E. Br. (*M. loreum* L. Sp. Pl. 486, excluding varieties, not of ed. 2, nor of Haworth, and *M. corniculatum* L. Sp. Pl. ed. 2, 697, both names founded upon Dillenius, Hort. Elth. f. 253, 254. *C. corniculatum* L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121.)

C. MARITIMUM L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. maritimum* L. Bol. in Ann. Bol. Herb. iv. 2; S. Afr. Gard. 1927, 134, f. 26, A 3; Journ. Bot. Soc. S. Afr. 1927, 11, t. 4, f. 1 F, and Mes. 8, f. 1 F, & 10, f. 2, A 3.)

C. NAMAQUANUM L. Bol. Mes. 149.

C. PARVIFLORUM L. Bol. in S. Afr. Gard. 1928, 156, f. 40, and Mes. 119, f. 40, & 150.

C. PITTENII L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 120, 149.

C. PLATYCALYX L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. platycalyx* L. Bol. in Ann. Bol. Herb. 3, 161.)

C. PRIMULINUM L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. primulinum* L. Bol. in Ann. Bol. Herb. iii. 160.)

C. PUNCTATUM N. E. Br. (*M. punctatum* Haw. Obs. 411, and Rev. 107.)

C. PURPUREOALBUM L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. purpureoalbum* Haw. in Phil. Mag. 1826, 328; Salm Dyck, Mes. § 15, f. 3.)

C. RAMOSUM N. E. Br. (*M. diversifolium* L. Bol. in Ann. S. Afr. Mus. ix. 144, partly, not of Haworth. It is not at all like *M. diversifolium* Haw., and will be described later.)

C. RIGIDUM L. Bol. in Journ. Bot. 1928, 198.

C. SPONGIOSUM L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. spongiosum* L. Bol. in Ann. Bol. Herb. iv. 74.)

C. SUBULATOIDES N. E. Br. (*M. subulatoides* Haw. Obs. 141. *M. acutum* Haw. Misc. Nat. 26, Synops. 207, and Rev. 107; Salm Dyck, Mes. § 13, f. 1; Berger, Mes. 222, f. 46, copied from Salm Dyck. *C. acutum* L. Bol. Fl. Pl. S. Afr. vii. t. 257, and Mes. 121.)

C. TRICOLORUM N. E. Br. in Phillips, Gen. S. Afr. Fl. Pl. 247. (*M. tricolorum* Haw. Obs. 233, Misc. Nat. 39, Synop. 232, and Rev. 111; Salm Dyck, Mes. § 15, f. 7; Nicholson, Dict. ii. 360, description only not as to fig. 565; Lubbock, *Seedlings*, ii. 15.

CEROCHLAMYS N. E. Br. in Journ. Bot. 1928, 171.

C. TRIGONA N. E. Br. *l. c.* 171

CHASMATOPHYLLUM Dint. & Schwant. in Zeitschr. f. Sukk. 1927, 15, 17.

C. BRAUNSII Schwant. in Zeitschr. f. Sukk. 1928, 279. This is probably synonymous with *C. Nelii* Schwant.

C. MANINUM L. Bol. in S. Afr. Gard. 1927, 399, f. 21 D (not C as quoted in the text), and Mes. 96, f. 21, and 133.

C. MUSCULINUM Dint. & Schwant. in Zeitschr. f. Sukk. 1927, 18; L. Bol. in S. Afr. Gard. 1927, 399, f. 21 E, and Mes. 96, f. 21, part of a fruit only. (*M. musculinum* Haw. in Phil. Mag. 1826, 327; Salm Dyck, Mes. § 5, f. 7; Berger, Mes. 271, f. 59 I. *M. Dinteræ* Dint. Neue Pfl. Deutsch-Sudwest. Afr. 39, f. 55. *M. recumbens* N. E. Br. in Gard. Chron. lxx. 303, f. 134 (1921). *Stomatium musculinum* Schwant.)

CHEIRIDOPSIS N. E. Br. in Gard. Chron. lxxviii. 433 (1925), and lxxix. 406, f. 210, and in Phillips, Gen. S. Afr. Fl. Pl. 244.

For descriptions and figures of most of the species belonging to this genus, see Gard. Chron., as above quoted. The following have been described since, but several are not figured, and slight variations of the same plant have been described as distinct species.

C. ALTITECTA Schwant. in Zeitschr. f. Sukk. 1928, 278.

C. AUREA L. Bol. in S. Afr. Gard. 1927, 280, f. 6, and 292 (the description is missing from some copies!), and Mes. 74, f. 6, and 130.

C. BRAUNSII Schwant. in Zeitschr. f. Sukk. 1928, 179.

C. BREACHIÆ L. Bol. in S. Afr. Gard. 1927, 326, 327, f. 11 A, and Mes. 80, f. 11 A, and 130.

C. BROWNII Schick & Tischer in Zeitschr. f. Sukk. 1928, 248.

C. DERENBERGIANA Schwant. in Moller's Deutsch. Gart. Zeit. 1927, 158.

C. FRAMESII L. Bol. in S. Afr. Gard. 1927, 326, and Mes. 131.

C. GIBBOSA Schick & Tischer in Zeitschr. f. Sukk. 1927, 154, with fig.

C. GRAESSNERI Tischer in Zeitschr. f. Sukk. 1928, 351. (*C. Schlechteri* Schwant. *l. c.* 276, not of Tischer.)

C. INSIGNIS Schwant. in Zeitschr. f. Sukk. 1928, 276, and Tischer, *l. c.* 350.

C. MINIMA Tischer in *Succulenta*, 1927, 145.

C. NELII Schwant. in Zeitschr. f. Sukk. 1928, 277. Probably *C. Braunsii* Schwant. is a synonym of this.

C. OLIVACEA Schwant. in Zeitschr. f. Sukk. 1928, 277. This is probably a synonym of *C. Schickiana* Tischer.

C. PERDECORA N. E. Br. (*C. robusta* L. Bol. in S. Afr. Gard. 1927, 280, 281, f. 9 A, not of N. E. Br.)

C. PILLANSII L. Bol. in S. Afr. Gard. 1927, 326, f. 10, and Mes. 79, f. 10, and 130.

C. SCHICKIANA Tischer in Zeitschr. f. Sukk. 1927, 121, with fig. Probably *C. insignis* Schwant. and *C. olivacea* Schwant. are synonyms of this, see Tischer, *l. c.* 350, 351.

C. SCHLECHTERI Tischer in *Succulenta*, 1927, 144, with fig., and in Zeitschr. f. Sukk. 1928, 351. (*C. Johannis-Winkleri* Schwant. in Zeitschr. f. Sukk. 277.)

C. SPECIOSA L. Bol. in S. Afr. Gard. 1927, 280, f. 5, and 292, and Mes. 73, 74, f. 5, and 129.

C. VERRUCOSA L. Bol. in S. Afr. Gard. 1927, 281, f. 9 B, and 292, & Mes. 76, 78, f. 9B, and 130. (*C. mirabilis* Schwant. in Zeitschr. f. Sukk. 1928, 275. *C. brevis* Schwant. *l. c.* 276. *C. pachyphylla* Schwant. *l. c.* 276; see also Tischer, *l. c.* 350, 351.)

(To be continued.)

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

BOTANICAL SOCIETY AND EXCHANGE CLUB OF THE BRITISH ISLES. REPORT FOR 1927 vol. viii. pts. 3 & 4, August 1928.—Part I., edited by Dr. G. C. Druce, contains many interesting notes and valuable papers upon British botany. Among the "Plant Notes, etc., for 1927" we notice *Cardamine impatiens* L. var. nov. *poteriifolia* Dr. (p. 301), *Alchemilla crinita* Bus. var. *britannica* Jaquet & Druce (p. 305), *Solidago Virgaurea* varr. nov. (vel formæ) *interrupta* and *dentatifolia* Dr. (p. 307), *Statice pubescens* Sm. var. nov. *Weyeri* Dr. (p. 309), *Scrophularia nodosa* L. var. *trachelioides* Dr. & Wade (p. 313), *Mentha spicata* var. *ciliata* Dr. (p. 315), *Chenopodium rubrum* L. var. nov. *kochiiforme* Murr. (p. 316), *Orchis purpurea* Huds. var. nov. *pseudo-militaris* Dr. (p. 317), and *Glyceria procumbens* Dum. var. nov. *erecta* Dr. (p. 322).

Notes on Publications, new Books, etc., occupy pp. 325–374 and Obituaries 375–383.

Among New County and other records (pp. 384–425) we find *Senecio erraticus* Bertol. (with plate), *Myosotis brevifolia* from N.W. Yorkshire, and *Stachys alpina* from Denbigh.

Lists of Plants from Co. Donegal (F. R. Browning), an account of the Flora of St. Kilda (W. B. Turrill), and an Alien Flora of the Metropolitan area (R. Melville & R. L. Smith) are given, and Dr. Druce contributes a long and interesting account of the British Plants in the Du Bois Herbarium at Oxford and another upon a visit to the Canary Islands.

There are also included articles by the Rev. T. Stephenson (Orchids), W. Watson (*Rubi*), K. Rönniger (*Thymus*), F. Jaquet (*Alchemilla*), and C. E. Britton (*Veronica*) and many others of much interest to those working at critical genera.

Part. IV. by the Distributor, Mr. F. Rilstone, contains notes upon the 4485 plants contributed by 28 members. These notes are, of course, mainly of value to members, but of general interest are those upon *Viola epipsila* (p. 565), *Galeopsis Tetrahit* (p. 584), *Polygonum maculatum* (p. 586), and *Carex leporina* var. *bracteata* (p. 590). C. E. S.

NOTES ON SPERGULA.—E. Price Evans (*Journal of Ecology*, xvi. p. 394, 1928), in the course of an account of Warburton Moss, gives some interesting notes on the relative abundance, on different types of soil, of the two recognized forms of *Spergula*—*S. sativa* and *S. arvensis*,—which occur as weeds of arable land in that district. He assumes that the presence of papillæ on the testa of the seed of *arvensis* is a character of specific value, giving that form a rank distinct from *sativa* with non-papillate seeds; no forms which could definitely be termed intermediate or hybrid were found. Over 5000 plants were examined in all, the methods adopted being, to pick at random individual plants all over an area where the soil was more or less uniform or to take handfuls of plants. The gatherings were examined with a pocket lens, as it was found to be impossible to distinguish the two forms in the field at a glance. The results were then tabulated and it was found that *S. sativa* was the dominant or characteristic form in the district. On light or medium loamy soils, slightly acid in reaction, both were often abundant and nearly equally distributed, but on peaty or on medium to heavy soils *S. sativa* predominated, while on very heavy land the plant was almost absent.—DORIS POWELL.

VARIATION OF THE BELGIAN SPECIES OF *OPHRYS*.—J. Houzeau de Lehaie (Bull. Soc. Roy. Bot. Belg. lx. 1928, pp. 99–100) records his observations on plants which have been in cultivation since 1925 and states that:—

(1) In the genus *Ophrys* each plant assumes a different shape; each flower of the same plant differs from the rest; each year there are as many new forms as there are flowers.

(2) All the specific somatic characters observed are shown to be variable. In *O. fuciflora* Reichb., for example, the variation, extending to twenty-six floral characters and ten vegetative, is practically illimitable.

(3) *O. apifera* L. varies less in Belgium than the other two species. In *O. muscifera* Huds. the variation is so extensive that it is almost illimitable. Up to the present it has not been possible to arrange the forms. *O. fuciflora* Reichb., on the contrary, conforms to certain rules; each individual varies fairly narrowly round a type.

(4) In *O. fuciflora* Reichb. several groups of individuals have been delimited according to the shape of the labellum alone. These groups have each a cycle of variations which have remained distinct from those of other groups for three years. The author then gives the characters of the labellum in these groups.

(5) The perianth is differently coloured, in certain cases forming distinct races.

(6) The lateral petals also vary in shape.

(7) Certain characteristics seem to be annual. Examples are given.—E. G. B.

OBITUARIES.

Charlotte Georgiana Trower.

Miss Charlotte Georgiana Trower, daughter of the late Captain Edward Spencer Trower, after much suffering, died at her life-long residence at Stansteadbury Park, on November 8th, 1928, aged 73.

Keenly interested in country life, she was for many years prominent in the hunting field, and keeper of a successful pedigree herd of Guernseys, and was President of the local V.A.D. and Red Cross. During the war she was a voluntary worker with the Ministry of Pensions, and did excellent service at the Ware Priory Hospital.

Always interested in sketching, about twenty-five years ago she began painting British wild flowers, in which art she became an adept. Shortly before Moyle Rogers's death she began what one hoped might be a set of paintings of the British *Rubi*. Unfortunately, his decease took place when she had finished about thirty, but these are in the very front rank of water-colour paintings; she took Bauer as a model, and they have much of his accuracy and beauty. Deservedly they gained the Grenfell Medal of the Royal Horticultural Society. It was our intention to produce a volume of the British *Rubi*—akin to that of Weihe and Nees's *Rubi Germanici*, but owing to the loss of our expert on brambles, the idea was dropped. Miss Trower was kind enough to give these paintings to me, as she afterwards did her large collection of localised British wild flowers, over 1500 in number, contained in 32 volumes. The plants for the great part had been gathered by her surviving sister, and some by myself. Two other Grenfell Medals were earned for these paintings, the Cyperaceæ being an especially fine set. At these she worked with meticulous care year by year. About twelve months ago she underwent a severe operation; this led to the loss of her right arm. Much suffering was endured with great bravery till the end came. She was buried in the churchyard adjoining her Park, and the large attendance showed the high estimation in which she was held. She was a delightful companion, and her home with her sister, who also had considerable artistic powers, was one which it was a delight to visit. The sisters had the power of making plants grow, and many and strange species flourished together happily in their old world garden and grounds.

The Trowers had a botanical strain in them, since the Gosselins, of Guernsey, were among their forebears.—G. Claridge Druce.

Dr. Julius Röll.

The death of Professor Dr. Julius Röll at Aue, Erzgebirge, on November 21, in his eighty-third year, removes one who contributed much to the cause of bryology on both sides of the Atlantic. In 1888–9 he travelled across the United States, and the bryological results of his journey were published in *Hedwigia* in 1893, with supplements in subsequent years. He travelled widely in Europe also, and published important papers on the moss-flora of the Odenwald, Thuringia, the Erzgebirge, Carpathians, etc. He was an expert sphagnologist, holding views at variance with those of C. Warnstorf. The contents of his herbarium are described on the back cover of *Hedwigia*, lvi. Heft. 1–2, 1915.—A. Gepp.

Rev. Dr. Sven Johan Enander (1847–1928).

We learn with regret that this veteran Swedish botanist died suddenly at Victoria, British Columbia, on December 16. Dr. Enander had been touring British North America in continuation of his studies of the Willows, a genus in which he had long been interested. In the course of his studies he had travelled widely in the North Temperate Zone, visiting England in 1905, Nova Zembla and the Kola Peninsula in 1911 and '12, Russia and Siberia in 1912, '13, and '14, Japan in 1913, North America in 1919, '20, and '21, and Greenland in 1921.

His *Studier öfver Salices i Linné's Herbarium*, published by the University of Uppsala in 1907 (it was communicated by invitation at the "promotion" of doctors in theology), contains an exhaustive description of the specimens in the Linnean herbarium, which he had studied when in London; also an account of a few specimens in the collection of Olave Celsius (1730) which Linnæus had examined, and a correlation of the species of the genus in Linnæus's various published works.

His *Salices Scandinaviæ Exsiccatæ* were issued in three fascicles of 150 numbers, from 1905–10; the set of specimens, together with the printed 'Schedulæ,' containing descriptions of the species, hybrids, &c., with critical notes, are a valuable contribution to Salicology.

Enander was born at Torsås, in Kalmar, Dec. 29, 1847; he studied theology at Uppsala, taking orders in 1883, and becoming subsequently pastor of Lillhärdal. He received the honorary Ph.D. from Lund in 1918, and in 1921 was Linnean Gold Medallist of the Royal Society of Stockholm.

We also record with regret the death of Dr. William G. Smith on Dec. 15th. Dr. Smith was one of the earlier workers on the ecological aspect of our flora, and we hope to publish an appreciation of his work in our next number.

We also regret to note the death of Sir William Thiselton-Dyer, K.C.M.G., formerly Director of the Royal Gardens, Kew, which took place on December 23, at his home at Witcombe, Gloucestershire, in his 86th year. Some account of his life and work will appear in our next number.

SHORT NOTES.

A British *Veronica* Hybrid.—On October 5th, 1928, I visited Tringford Reservoir, near Tring, Hertfordshire, on the edge of which was growing a great quantity of a smallish prostrate form of *Veronica Anagallis* L., together with a rather smaller quantity of *Veronica aquatica* Bernh. Both were flowering and producing good fruit. *Veronica Beccabunga* L. was also present. It may be worth noting that *V. Anagallis* and *V. aquatica* were in appearance perfectly distinct in this locality, differing in the following characters:—

V. Anagallis:—Flowers blue; pedicels very slender, considerably longer than the bracts and tending to leave the stem at an angle of about 45 degrees; well-developed capsules 3 mm. long by 3·5 mm. broad; leaves lanceolate, sharply narrowed to the base or petiolate, slightly toothed, generally green; an average well-developed leaf measures 2·7 × 1·2 cm.

V. aquatica:—Flowers smaller, pink; pedicels thicker, not, or scarcely, exceeding the bracts, and tending to leave the stem at a broader angle; well-developed capsules 3 mm. long and broad; leaves linear-lanceolate or almost strap-shaped, only slightly narrowed to the base, sessile, sharply toothed, generally reddish; an average well-developed leaf measures 2·9 × ·7 cm.

These differences are, of course, only meant to apply to the specimens collected by me at this particular locality and on this particular date. It may also be worth mentioning that the Tringford form of *V. aquatica* bears a varying number of glandular hairs on the inflorescence, but is not densely glandular, as this species sometimes is; and that it is from this same district that *V. Anagallis* var. *montioides* (Boiss.) has been recorded, but that the form of *V. Anagallis* described above is not Boissier's variety.

Growing among these two plants I found one patch of several specimens, and also two solitary examples, of what seems certainly to be a hybrid between the two. The leaves of these hybrids were perfectly intermediate in shape between those of *V. Anagallis* and *V. aquatica*, and measured in a well-developed specimen 2·1 × ·8 cm., being much narrowed to the base, though scarcely petiolate. The flowers inclined to the blue of *V. Anagallis*, but were a little smaller, and had a distinct tinge of red in them. The plants were extremely floriferous, some of the inflorescences bearing, or having borne, between thirty and forty flowers, whereas none of the specimens of *V. aquatica* which I gathered had more than about a dozen, and none of those of *V. Anagallis* more than about twenty. These hybrid plants were, however, entirely barren, not one of them bearing any capsules at all. Nor could I find any fertile *Veronica* by this reservoir which was not clearly referable either to *Anagallis* or to *aquatica*.

The inference seems clear, therefore, that *V. Anagallis* L. and *V. aquatica* Bernh. are distinct species, producing a sterile offspring when they cross.

Specimens of each of the three gatherings—the two parents and the hybrid—are being placed in the British Museum Herbarium at South Kensington.

Finally, I must record my thanks to Mr. A. J. Wilmott for the assistance he has given me over this matter as over many others.—I. A. Williams.

Andromeda polifolia L. near Goathland, North Yorkshire.—On June 9, 1924, Miss H. V. Medlicott of Partridge Hill, Goathland, discovered a small plant, in flower, growing in a boggy place on the moor near Saltersgate, which Capt. Medlicott named *Andromeda polifolia*. He sent this specimen in a letter to Mr. Edgar Sykes, at that time the schoolmaster here, who confirmed the identification.

On June 16, 1925, I accompanied Capt. Medlicott to the place where his daughter found *Andromeda*. We made a careful search, but could not discover any more. Since then several unsuccessful attempts have been made to find more growths. *Vaccinium Oxycoccos* L. is plentiful in this situation.

Unfortunately, Mr. Sykes, now of Scarborough, had misplaced Capt. Medlicott's letter containing the original specimen. However, I urged him to try and find it, and on March 26, 1928, I received both from Mr. Sykes. In order that there might be no doubt about the identity of this plant I sent it to Dr. W. A. Sledge, of Leeds, who had not the slightest hesitation in naming the specimen *Andromeda polifolia*. The discovery in this district of *Andromeda* is important. Baker in his *Flora of North Yorkshire* gives two stations only for this plant: one on Strensall Common in No. 1 district, the Ouse and Foss Area, and the other in or near Balderdale in No. 9 district, the West Tees Area. Certainly it would have been better had more specimens been found, but further search will be made, and in the meantime it is desirable that Miss Medlicott's interesting discovery should be recorded. This is only the second record for vice-county 62.—R. J. Flintoff, *Recorder, Yorkshire Naturalists' Union.*

The Economic Possibilities of Rice Grass (*Spartina Townsendii*).—Professor F. W. Oliver (*Journal of the Ministry of Agriculture*, xxv. p. 709 (1928)) outlines the history of the spread of this remarkable grass from its first recorded appearance in Southampton Water in 1870 up to the present day, when it not only occurs all along the coast from Poole Harbour to Rye, but also across the Channel, growing in practically every estuary between Cherbourg and the Seine, as well as in the River Conche near Etaples, the Slack near Wimereux, and at the mouth of the Elorn at Brest in Brittany. He lays stress on the characters which fit this plant so ably for the work of reclaiming the muddy foreshores, and predicts that it will be used in this capacity all over the world wherever the climate is not too extreme. Already cuttings have been exported to Ireland, Holland, Germany, and the Antipodes.

Another use to which *Spartina* has recently been put is as feed for stock. It was noticed in Poole Harbour that all farm animals ate it readily. It is convenient as a reserve food because it remains on its roots all the winter and so can be cut as required. This use is now being investigated by the East Anglian Institute of Agriculture at Chelmsford, which is encouraging local farmers to plant it in the Essex marshes. The Institute is also investigating the chemical composition of the plant and is making detailed feeding experiments.

Spartina was experimented with during the war as a raw material for paper-making. The dried grass was found to contain 40 per cent. of fibre, but there was one serious drawback, that of the great expense of bleaching the pulp by the current methods. Professor Oliver thinks

that its use for paper-making is unimportant in comparison with the primary ones indicated above.

Professor Oliver then describes the results of the experimental planting of *Spartina* in Holland. Dr. J. P. Lotsy, who was attracted by the idea of planting *Spartina* in connexion with the reclamation of muds and poldering operations which are always in progress in Holland, secured a trial batch of 50 *Spartina* cuttings which were planted in the tidal mud of the Sloe in May 1924. In subsequent years much larger consignments have been sent to Holland from Poole. This autumn Professor Oliver inspected a number of these plantings, and the photographs illustrating this paper give a good idea of the large scale on which the plantations have been made. Many of the tufts which were planted in 1925 are 6–7 ft. in diameter, and should begin to meadow (*i. e.*, make contact between the units) in 1929 and have meadowed completely by 1930. This means that it will have taken the Dutch five years to accomplish what nature unaided requires from 15 to 20 years to do. The units of the first trial batch of cuttings are now about 10 feet in diameter and they show clearly the way that the mud rises to the tufts. In several localities a rise of 18–30 inches has taken place in two or three years. These facts indicate that *Spartina* will have an important application in preparing the way for dyking, and Mr. Verhoeven, Maritime Engineer in charge of the reclamation works, on a conservative estimate expects, with its assistance, to accelerate poldering (*i. e.*, reclaiming land from sea or tidal river) by 10 years. This is the first time that it has been demonstrated that a preliminary treatment of bottomless muds by planting is feasible and likely to advance to a notable extent the date at which reclamation will become possible and the ground can be handed over to the farmer. —Doris Powell.

Scorzonera humilis L.—The interesting comparison of the Angiosperm floras of Kent and the Pas de Calais by Mr. R. D'O. Good (Journ. Bot. 1928, 253) contains a strange mis-statement. *Erucastrum Pollichii* (*E. gallicum* Dr., *Brassica gallica* (Willd.) Dr.), *Tetragonolobus siliquosus* (*Lotus siliquosus* L.), and *Scorzonera humilis* L. "have been found once or twice in this country, but always as transitory casuals." Most botanists would agree that two of these are alien to our flora. As a matter of fact, *Brassica gallica* was discovered by A. Irvine as long ago as 1863 (Fl. Surrey). It had the honour of being figured in this *Journal* (t. xxxi. p. 169, 1865), and Mr. Joshua Clarke was awarded a gold medal of the Royal Horticultural Society for its discovery in Suffolk in 1864; since then it has been found scores of times in Britain, and probably in each successive year; it is fairly constant about Newmarket, and I have given it an asterisk in both editions of my *List*.

Lotus siliquosus L. is quite naturalised in Berks, Oxon, Gloucester, and Hampshire. In Berkshire since 1913, in Hampshire when it was recorded as well established (B. E. C. Rept. 1875, 191); Ellman (*ibid.* 1924, 566) says it is permanently established near Bath, and Ridley (Journ. Bot. 1924) argued in favour of its being a native

species. Thus I give an asterisk to it in my *List*, as an established alien.

Scorzonera occupies a different position, although it is unjustifiably branded as "a transitory casual." So far from that being the case, nothing could be wider of the truth. It was discovered by Mr. Noel Sandwith (see B. E. C. Rept. 1915, 202) in great plenty. I went down to Dorsetshire with him to investigate the surroundings. There we found the plant in very great quantity, and occupying a considerable area of marshy pasture, bordered by heath-land, on which there were no signs of adventive species, its associates being *Carex stellulatà*, *C. flava* (agg.), *Hydrocotyle*, *Ranunculus Flammula*, *Alopecurus bulbosus*, etc. We were told that the pasture had once been under corn-culture, but subsequent and prolonged enquiry elicited the fact that only a small plot on the upper and drier end of the very large field had once had a crop of oats grown on it. After some difficulty, I traced the occupier of that time, and was told that the lower part (as was quite evident) had never been under tillage. The black oats he grew near his house, on a small portion only, at the upper and drier part of the field, were from an English not a continental source; the experiment not proving successful, that part reverted to pasture. Since that time, thirteen years ago, the locality has been visited yearly, and the plant has been seen there continuously. This year it was in abundant flower and fruit. Mr. L. B. Hall has also found it in another but similar habitat. One wonders where the myth of its being a fugitive alien arose. I was once told that the Rev. E. F. Linton scoffed at it, "he had once been in the field and did not see it"; therefore, I suppose he thought it could not be there. Out of flower it is not conspicuous, its leaves might be mistaken by a cursory observer for those of *Plantago lanceolata*, in flower it might be passed over as *Leontodon*. The same observer failed to observe *Carum verticillatum*, *Chenopodium urbicum*, which is abundant about the entrance to the field, and several other species, so that his search could not have been exhaustive. There can be no reasonable doubt that *Scorzonera* is native in Dorset; it occupies the same kind of habitat and with much the same surrounding vegetation near Le Touquet. Its geographical distribution is all in favour of its being a native, and it will probably be found in other localities. That it is native is the opinion of those botanists who have seen it *in situ*, and it is therefore to be regretted that such unqualified and incorrect statements should be made, especially when treating of the comparative constituents of a flora, and thus vitiating the deductions the writer of the paper draws that *Scorzonera* is "fighting an unsuccessful battle against prevailing conditions of various kinds." The battle-ground of *Scorzonera* is the same on both sides of the Channel, as are the antagonists.—G. Claridge Druce.

Betula pubescens Ehrh. in Shetland.—While on a trip in Shetland in June, I discovered one small plant of birch, which appears not to have been definitely recorded from Shetland before. It was a small shrub two feet high, growing at the water's edge upon a small

island in one of the many little un-named lochs immediately at the north foot of Ronas Hill in North Roe.

The position is significant, being out of reach of sheep and, in fact, only to be waded to with difficulty. Birch wood, some with the white bark still attached, is common in the peat in Shetland, especially in Yell, but the living tree seemed quite unknown.

J. Edmonston in Ann. Nat. Hist. 1841, 294, mentions "*Betula alba*, shady banks, not common," and in the same publication for 1907, 233, quotes his father, L. Edmonston, as saying: "no indigenous trees are to be seen, if we except a few dwarf bushes of birch, willow, and mountain ash." He also draws attention to the name Birka Water, which was close to our little un-named loch, and adds: "whether the birch still lingers in Shetland is at present uncertain."

Betula pubescens is recorded from but rare in Orkney, absent from the Faroës, and probably present in Iceland and Greenland, as the hybrid *pubescens* × *nana* (*intermedia* Thom.) is found in both places. Obviously, sheep are responsible for the gradual disappearance of this last Shetland tree, which now survives only on these small islands in the lochs, perhaps with some other rarities.—W. R. Price.

New Records for Sphagna in Scotland.—Through the courtesy of Mr. E. C. Wallace, I have had the opportunity of working out a small collection of mosses, mostly Sphagna, collected in Arran by Mr. R. Mackechnie. Among them are the following new additions to the flora of Arran, v.c. 100:—*Sphagnum Girgensohnii* var. *robustum* Warnst., *S. Warnstorfii* Russ., *S. quinquefarium* Warnst., *S. teres* var. *subteres* Lindb., *Bryum filiforme* Dicks.

The specimens are in the British Museum Herbarium.—W. E. Sherrin.

REVIEWS.

Fundamentals of Biology. By Arthur W. Haupt, Ph.D., Assistant Professor of Botany in the University of California at Los Angeles. 8vo, pp. 358, text-figs. 256. McGraw-Hill Publishing Company, London, 1928. Price 15*s*.

This book is "an outgrowth of a course of lectures which the author has delivered during the past four years to large college courses composed mainly of freshmen. It aims to present, in a somewhat condensed form, a broad view of the vast biological field, with emphasis upon the fundamental principles common to all living things," especially to those students who do not continue their studies beyond the elementary course. It would be interesting to probe the mind of the student who has been through this course. Without doubt a skilful lecturer could develop the chapters into a series of interesting semipopular lectures and leave his hearers with a general idea of some of the principals of biology, but the book as it stands is, in our opinion, far too sketchy and superficial to be helpful to the unassisted reader. Of the twenty-one chapters, twelve deal with the morphology and physiology of plants and animals, "some little attention" being given also to their classification, while in the remaining nine "an attempt is made to cover, in an elementary way, some

of the more general phases of genetics, ecology, and organic evolution." Bearing in mind that a considerable proportion of the book is occupied with illustrations and that the text is very clearly and spaciously printed, it must be evident that the author has attempted to include a great deal of matter in a very small compass, and has no opportunity for developing any part of his subject. A few examples will illustrate the difficulties which will confront a student. In a brief explanation of Taxonomy as one of the phases of biology we are told that "plants and animals are named according to a system of binomial nomenclature" devised by Linnæus, and a few examples of scientific names are given, but there is no explanation of the binominal, as indicating the name of the genus, the larger group, and that of the subsidiary grade, the species; *genus* is not mentioned. Further, "organisms are classified according to their natural relationships into groups called families, orders, &c.," with no further attempt at explanation. How far will this take the student? Chapter V. "The Great Plant-Groups," contains twelve pages, barely three of which are text, the remainder being occupied with illustrations with little or no explanation of members of the different great groups. The stem-structure of the seed-plant is described under two types, "exogenous" and "endogenous," illustrated by figures of cross-sections, which give a very limited idea of the structure, the description of which is dismissed in a few words.

Such criticism might be extended. The author has attempted a task which would seem impossible in the space at his disposal. Some of the chapters in the second half of the book are interesting reading, and assisted by the wealth of illustrations will be suggestive to teachers seeking matter for lectures on specific subjects. But such would probably prefer to consult the various text-books, from which a large number of the illustrations have been borrowed (with due acknowledgment).—A. B. R.

Lichens from Novaya Zemlya (*excl. of Acarospora and Lecanora*). *Report of the Scientific Results of the Norwegian Expedition to Novaya Zemlya*, 1921. N. 43. By Bernt Lynge. 8vo, pp. 299, 13 pls. Norske Vidensk.-Akad. Oslo, 1928.

The Norwegian Scientific Expedition included among its members the renowned lichenologist, Dr. Bernt Lynge; there was, therefore, good reason for expecting an unusually complete account of Northern Lichens. Lynge collected himself 7000 specimens, and the examination of these—mostly by the microscope—has been long and arduous. In the report now issued, 431 different species from his own collection have been listed. The two genera *Acarospora* and *Lecanora* were sent away for determination, the former to A. H. Magnusson, of Gothenburg, who has listed 10 species, included in the above enumeration. The large genus *Lecanora* was consigned to A. Zahlbruckner, Vienna, whose report is not yet to hand, but he has notified the finding of 52 species; the stones on which they grew probably harboured other lichens, and a supplementary paper may be expected.

The introduction takes due note of the work of previous collectors in Nova Zembla, with a sketch of the country and the climatic con-

ditions. The island, which lies wholly in the Arctic, is rather long and narrow, and has been botanically considered by Lynge under six localities—from (I.) the South Fiords, beginning at Goose Bay, to (VI.) the Farthest North round about Arkangel Bay. It is a barren land of high mountains and glaciers; the larger number of specimens were secured from the lowlands round the coasts and bays, and on the talus slopes. It was found impossible to examine the higher hills and precipices, the author being, as he states, no alpinist, though he declares regretfully that these inaccessible regions might have yielded many fine plants. One place (II.), at the Kara Sea entrance to Matotchkin Shar, is described by him as "a blessed locality for lichenologists." It is astonishing that so many specimens were gathered, as everywhere the handicap was scarcity of time. Lynge makes no claim to an exhaustive record. Lichens were among the most abundant plants that grew in Nova Zembla; the vascular plants found on the Expedition numbered 155 as against 413 lichens. It was also noted that the former decreased in number towards the north of the island more rapidly than did the lichens: the latter are evidently able to endure Arctic conditions better than any other vegetation, and propagation of lichens is also more easily achieved as spores are continuously being produced, and, in addition, any small part of the lichen thallus can give rise to new plants. Lynge has given notes on the systematy of the species and on locality; the habitat has in every case been carefully defined; the influence of the exposure is emphasised, as also the effect of the nitrogen contributed by the many sea-birds that nest on the island: hence the considerable numbers of nitrophilous species. Microscopic details have not been neglected: in several instances it has been necessary to extend the range of spore sizes beyond the recognised diagnosis, as, for instance, in *Candelariella cerinella*, in which the hitherto accepted length of the spores is 10–17 μ; along with these normal spores, some were found on the same plant measuring 19–24 μ. Other instances could be cited; all are of great assistance to workers. Many new species were found and are described clearly and succinctly. A few have been eliminated as wrong determinations, among these *Xanthoria parietina*, said to be non-Arctic. The form of *Xanthoria* growing in these regions is referred to *X. Candelaria* (*X. lychnea*), "a highly ornithocoprophilous species," and with a distribution from the Arctic to the Antarctic. The genus *Buellia*, so abundant in the far South, is represented by fifteen species, four new to science. The genus is evidently well adapted to severe cold. In a recent publication, Malme replaced the genus *Caloplaca* by an earlier designation, *Callopisma*. Lynge accepts his ruling, but the work was too far advanced to allow the change in nomenclature. In this country we have avoided these upheavals by retaining De Candolle's *Placodium*.

A debt of gratitude is due from us to Dr. Lynge for giving us his interesting and valuable record in English. Occasional mistakes creep in, such as "Arctis" for Arctic, but there is never any doubt as to the meaning. Botanists of all lands will welcome this contribution to the Arctic flora, and the author is to be congratulated on the successful completion of his task. The Plates give a photographic representation of new species or special microscopic details.—A. L. S.

An Introduction to the Chemistry of Plant Products. Volume I. By PAUL HAAS, D.Sc., Ph.D., and T. G. HILL, D.Sc., A.R.C.S. Fourth Edition. Pp. xvi + 530. Longmans: London, 1928. Price 18*s*. net.

THIS book in its previous editions has become too well known to need any introduction to the student of Botany, Plant Physiology, or Biochemistry. We note with satisfaction that the new edition is larger, the number of pages being now 530 instead of 414. Nearly all the chapters have been expanded and the subject-matter brought up to date, thus we note a reference to the production of vitamin D by the irradiation of egosterol, showing that the modern outlook has not been neglected.

It is, of course, possible to detect omissions in any book, however excellent, these omissions in many cases being rendered necessary by the need for keeping the book within reasonable limits of size. The essential oils receive very brief attention and no references are given; the terpenes do not appear to be mentioned. There are also one or two omissions in connection with recent progress in biochemical methods, such, for example, as the use of methylene blue as an indicator in sugar estimations by the use of "Fehling's Solution."

Such faults as the book possesses are very minor faults, while its merits are many and great, and it should certainly be in the possession of all whose interests lie in the direction of biochemistry.—B. D. BOLAS.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on November 29, 1928, the Director of the Royal Botanic Gardens, Kew, showed a small collection of minute succulent plants, sent from South Africa by Mr. J. Hutchinson. These included species of *Conophytum*, *Anacampseros*, and *Crassula*, originally found by Prof. Compton near the top of Vanrhyns Pass in a small hard pan of rock; a specimen of a new species of *Lithops* growing in shales, and a specimen of *Mesembryanthemum* growing amongst blocks of white rock, which it closely resembles.

The specimens had been potted at Kew with stones and shale sent over with the specimens from South Africa, and the natural conditions had been so well reproduced that it was difficult to detect the plants among the stones.

Mr. T. A. Sprague gave an account, illustrated with lantern-slides, of the results of his study, in conjunction with Mr. E. Nelmes, of the Herbal of Leonhard Fuchs.

The paper on which the account was based gives identifications of the 511 plants figured, prefaced by a general account of the Herbal. This is divided into chapters corresponding with those of Dioscorides, and arranged according to the Greek alphabet, the chief authorities cited being Dioscorides, Galen, and Pliny. The classification is mainly (1) pharmaceutical and economic, but sometimes (2) philological: thus (1) *Campanula Rapunculus* L. is classed with the Swede and the Beet, because it has an edible root, and is widely

separated in consequence from *C. Trachelium* L., which was used as a remedy for ulcers; and (2) *Momordica Balsamina* L. and *Impatiens Balsamina* L. are placed in the same chapter (genus) because the former was called *Balsamina* and the latter *Balsaminum*.

The nomenclature adopted on the plates is puzzling, and cannot be understood without reference to the text. It may be unitary, binary, ternary or rarely quaternary, and uninominal, binominal, trinominal or quadrinominal. But the nature of the nomenclature and its form do not necessarily correspond. Thus a trinominal designation, for example, may be either unitary, e. g. *Ephemerum non lotale* (a monotypic genus), or binary, e. g. *Trifolium pratense purpureum* (a species of the genus *Trifolium pratense*), or ternary, e. g. *Bellis minor hortensis* (a subspecies or variety of the species *Bellis minor*). *Helleborus niger adulterinus sylvestris* is really a binary combination, the genus being *Helleborus niger adulterinus*.

Miss E. L. Stephens exhibited, with explanatory remarks, a large number of fine and interesting lantern-slides, coloured and uncoloured, illustrating the scenery, physiographical features, vegetation, and individual plants and animals characteristic of the Cape Peninsula.

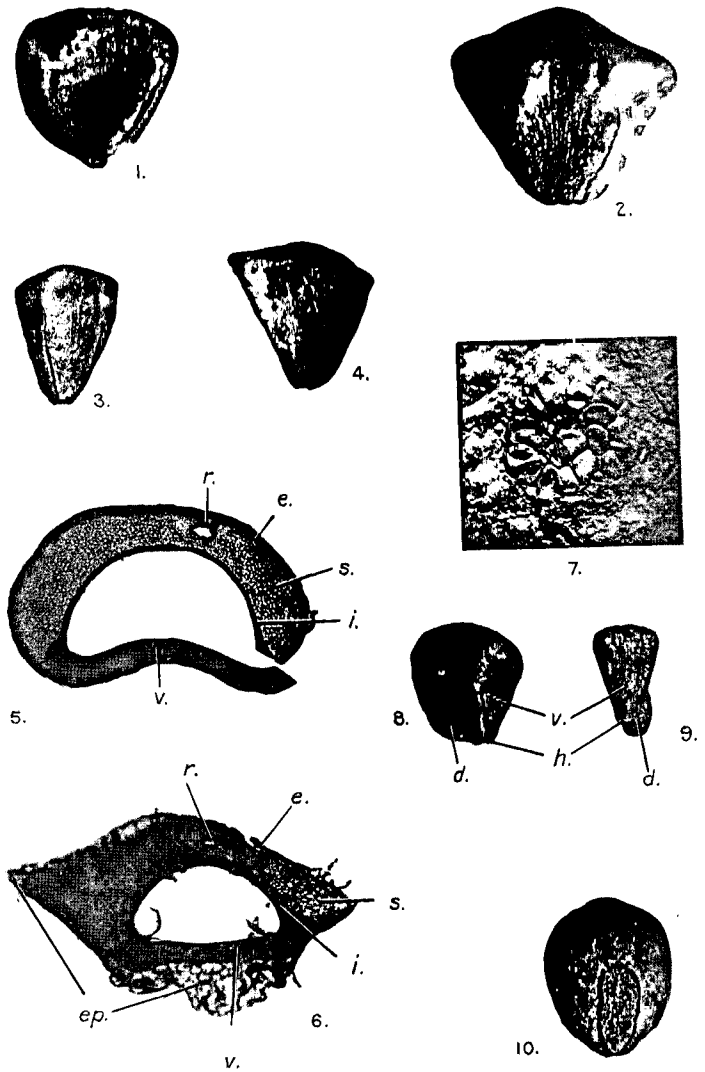
At the Meeting on December 13 twenty-one Fellows were elected, and the President announced that the number of Fellows was now within nine of the prescribed limit of 800.

Dr. A. W. Hill gave some account of Australian and New Zealand vegetation, seen by him during his recent visit, by means of a beautiful series of photographic lantern-slides. Among the subjects illustrated were the great desert forming the barrier between West Australia and the rest of the continent, the Australian Eucalypts, and the luxuriant mesophytic forest-vegetation and high alpine vegetation of New Zealand.

British Trees.—The most recent series of picture post-cards issued at the Natural History Museum is one of British-grown trees. The series includes, in addition to native species, various well-known and common trees which are not indigenous, such as the Sweet and Horse Chestnuts. The cards are in sets of four, each set dealing with one tree, and including two monochrome reproductions of the tree in the summer and winter state respectively, and two in colour illustrating foliage, flower, fruit, and the winter-twig. A four-page leaflet with each set gives some account of the tree, with notes on geographical distribution and other points of interest. The following are already on sale (price Sixpence per set):—Alder, Wild Apple, Ash, Beech, Sweet Chestnut, Horse Chestnut, Sycamore; and other sets are in preparation.

Dr. Leonard Cockayne.—At the Anniversary Meeting of the Royal Society on November 30, the Darwin Medal was awarded to Dr. Leonard Cockayne, F.R.S. Dr. Cockayne, who has devoted many years to the study of the vegetation of New Zealand, was described as "one of the foremost living students of plant-association," whose "taxonomic studies rendered necessary by his ecological results have led to those remarkable discoveries of natural hybrids in New Zealand that have won for him a world-wide reputation."

Journ. Bot. Plate 589.



Photos 1-7, P.A.N; 8, E.M.R; 9,10, M.E.J. Chandler.

1-9 DECODON; 10 DICLIDOCARYA MENZELII.

THE SYSTEMATIC POSITION OF THE FOSSIL GENUS *DICLIDOCARYA* E. M. REID.

BY P. A. NIKITIN.

(With a Note by Mrs. E. M. REID having especial reference to *D. gibbosa* E. M. Reid and *D. Menzelii* E. M. Reid.)

(PLATE 589.)

SEEDS described under the form-name *Diclidocarya* are characteristic fossils of the Pliocene and Miocene. The family to which they belong has hitherto been unknown.

They were first figured, but not described, in 1907, from the Upper Pliocene of Tegelen (2, fig. 124), by Clement Reid and Mrs. Reid, the founders of the scientific study of fossil seeds. Later they were found successively in the Upper (?) Pliocene of Raevels in Belgium (3, p. 589); in the Middle Pliocene of Reuver (4, p. 112, pl. xi. fig. 18); in the Mio-Pliocene of the Pont-de-Gail (Cantal) (5, p. 80, pl. iv. figs. 23–25; 6, p. 352, pl. xi. fig. 29), from which deposit a second species was described; in the Pliocene of Central Russia; and, finally, in the Miocene Brown-coal of Kauscha in the Senftenberg, from which a third species was described (7, p. 1, pl. 580, figs. 1–7).

The first suggestion made by the Reids as to the systematic position of the above-mentioned fossils was that they might be related to *Stocksia*, one of the Sapindaceæ. The suggestion, which was put forward with much hesitation, was based on the presence of a very characteristic germination valve which serves for the emergence of the embryo.

In 1920 Mrs. E. M. Reid re-examined the fossils and was convinced of the impossibility of referring them to Sapindaceæ. She provisionally described them as "Famille: *Diclidocarya* n. g." until such time as their taxonomic position could be found.

At the present time three species of *Diclidocarya* have been figured and described by Mrs. Reid. They are *D. globosa*, frequent and abundant in the Pliocene of Tegelen, Raevels, Reuver, and Voronezh, the Mio-Pliocene of Pont-de-Gail, and the Miocene of the Senftenberg; *D. gibbosa* known only from the Mio-Pliocene of Pont-de-Gail; and *D. Menzelii* known only from the Senftenberg.

The conclusions to which Mrs. Reid has been led are the following:—

1. The fossils are probably seeds (6, p. 2).

2. The seeds almost certainly belong to a living genus because they still abound in the Upper Pliocene (4, p. 81).

3. It is highly probable that they belong to an aquatic genus because they occur in such abundance and in association with the remains of specifically aquatic plants such as *Naias*, *Potamogeton*, and Nymphæaceæ, also similarly abundant.

The seeds which I have found in three deposits of Middle Pliocene age in the province of Voronezh (Central Russia) were determined by Mrs. Reid as *Diclidocarya globosa* (perhaps two varieties). The

comparison of the Voronezh specimens with specimens, figures, and descriptions of those from Western Europe indicates the correctness of this determination.

The deposit of lignite, two metres thick, in the village of Krivoborye (40 km. north of the town of Voronezh), in which *Diclidocarya* is especially abundant, was examined by me stratum by stratum for the contained fossil plants and mineral ash.

The examination proved that the strata represented successive deposits of lakes, marshes, and woodlands. An abundance of well-ripened seeds of *Diclidocarya* is met with in the lower part of the lens of lignite. Higher up they are less in quantity and have an admixture of undeveloped seeds. In the upper strata *Diclidocarya* is represented occasionally by undeveloped seeds which have a narrow triangular shape and thin shrivelled dull testa.

I could not observe any definite distribution corresponding to the succession of lake, marsh, and woodland deposits. *Diclidocarya* occurred, however, in the least quantity in definitely lacustrine strata where aquatic plants such as *Potamogeton*, *Naias*, and *Aldrovanda* were prevalent, and was abundant where *Salix*, *Epipremnum*, and *Hypericum* were also abundant.

This suggested that the fossils belonged to subaquatic, not aquatic plants.

Description of the Fossil Fruits.—The walls of the fruit are not preserved in the fossil state, but sometimes it happens that 20–30 (or fewer) seeds have remained grouped as in the living fruit (Pl. 589, fig. 7). The dimensions of such a group are from 5·5 to 6 mm.

Seeds (Pl. 589, figs. 1, 3).—These are small inverted triangular-pyramidal in shape, with rounded edges and often with rounded sides. The three facets are more accentuated in the undeveloped than in the developed seeds. In the latter the roundness of sides and edges often makes the seeds hemispherical. The top of the seed is broad and slopes to the back. The base is pointed. The dorsal side is angular, or round and smooth. The median angle of the dorsal side marks the raphe. On the ventral side there is a triangular oval valve which is either concave or flat; it is confluent with the walls of the seed at its base, which is situated near the top of the seed, and its pointed end reaches the base. The outside surface of the valve is ornamented by 8–10 small narrow longitudinal grooves full of pits; the midmost grooves reach the top of the seed. There is a micropyle between the pointed end of the valve and the base of the seed. A round hole is to be seen near the micropyle on the ventral side of the base; it is the beginning of the canal which carries the vascular bundle of the raphe.

The ripe seeds are light brown in colour and glossy. The testa (Pl. 589, fig. 5) is formed of two integuments. The external consists of two layers: the epidermal, and the ligneous layer which lies deeper. Of the epidermal layer, individual bright black cells only are preserved in the fossil state. The ligneous layer of the external integument is represented, on the ventral side, by a single layer, 4–6 cells deep, of angular cells with very thick walls. Passing from the base of the valve along the ventral side over to the dorsal side, this thick layer splits into two layers; the space between being filled up by an inter-

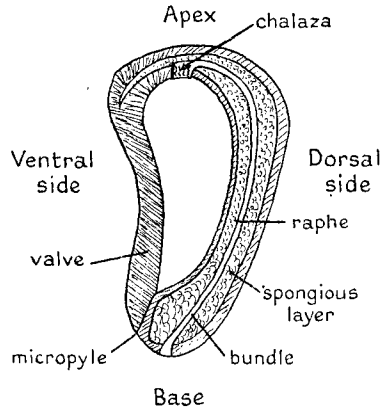
calated spongy layer of rounded thin-walled air-cells. The raphe canal runs from the base to the chalaza within this spongy layer.

The chalaza is filled with spongy cells. Where the free edges of the valve meet the body of the seed, may be observed a light stratum of two or three rows of fusiform or oblong cells, by which the separation of the valve from the body of the seed takes place under the pressure exerted by the swelling embryo. After the valve has opened, this row has the appearance of a palisade-layer.

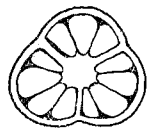
The internal integument is preserved as a small shrivelled brown membranous sac in the cavity of the fossil seed. The seed is 1–1·5 mm. long and ·9–1·3 mm. broad.

Except for its somewhat smaller size, more angular form, and slight difference in the testa, characters which will be discussed later, the fossil seeds of *Diclidocarya globosa* E. M. Reid differ in the

Text-fig. 1.



Text-fig. 2.



Decodon verticillatus Ell.

Fig. 1.—Longitudinal section of living seed. × 27. Original.
Fig. 2.—Transverse section of living fruit, showing the disposition of the seeds within the capsule. × 3. After Koehne.

leading features neither morphologically nor anatomically from the recent seeds of *Decodon verticillatus* Ell. of the family Lythraceæ (Pl. 589, figs. 2, 4, 6; text-fig. 1). The external epidermal layer of the recent seeds is a swollen layer. It is especially strongly developed in the valve and quite conceals it. Such a possibility was suggested by C. and E. M. Reid to account for the difficulty in tracing the living ally. It is observed that frequently the fossil seeds have the external hard part of the woody dorsal layer *thicker* than the internal, while the external layer of the recent seeds is *thinner* than the internal. The outline of the lateral margins of the living seeds is either *concave* or straight; that of the fossils is either *convex* or straight (Pl. 589, figs. 1–4). The length of the recent seed is 1·1–1·7 mm., the breadth 1·6 mm. The fruit of the recent plant is a dry 3- (or 4-) celled capsule with 20–30 seeds. The diameter of the capsule is 5–6 mm. (text-fig. 2).

The differences in form, size, and testa, referred to above, are persistent both in the fossil and recent seeds. My original supposition that these differences might possibly be due to there being two living varieties (of which I may have seen but one) was proved not to correspond with facts (see note by Mrs. Reid). It appears therefore that though closely related and possibly ancestral to the living species, *Diclidocarya globosa* differs from it in certain features which are probably specific. Hence while it retains its specific name, it must be referred to the living genus *Decodon* as *D. globosus*.

Decodon verticillatus belongs to a monotypic genus, but is represented at the present day by two varieties. It is found only in North America: in Canada and the Eastern and Northern United States within the borders of Quebec–Ontario–Wisconsin–Missouri–Mississippi–Florida (7, p. 243).

I am obliged to Mrs. Reid for her valuable help and criticism in this work and I thank her very warmly.

Note by Mrs. E. M. Reid.

Mr. Nikitin's paper shows by what observations he was led to deduce that the fossil seeds named by me *Diclidocarya globosa* (4, p. 80) must belong to a sub-aquatic, not an aquatic plant, and further how this clever deduction, coupled with observations of the grouping of the seeds *in situ* and the character of the seeds themselves, led to his discovery that they were closely related to the fruits and seeds of the living species *Decodon verticillatus* Elliott. The news of this solution of a long-standing puzzle has given me the liveliest satisfaction. It is of interest in that it forms another indisputable link connecting the flora of North America with the Tertiary Flora of Western Europe, and that it carries this linkage into the heart of Russia. It is of especial interest to me, because it confirms a suggestion made by me in 1920 (4, p. 80) as to the probable character and habit of the plant to which the seeds belonged.

Mr. Nikitin placed his manuscript in my hands, and agreed to its publication in England, a desirable course, as all the previous work on the subject has emanated from England; I have made a transcript of his paper so as to revise the English, but in so doing, hope I have kept his exact meaning. He has himself revised my revised transcript.

I received the manuscript whilst I was working at Kew, and at once examined the seeds of *Decodon verticillatus*. There can be no doubt of the accuracy of Mr. Nikitin's determination of *Diclidocarya globosa* as a species of *Decodon* closely related to *D. verticillatus*, but not identical with it. He originally suggested that a slight difference in the relative thickness of the outer and inner layers of the ligneous coat in the fossil and recent seeds and differences in form might correspond to similar differences in the two varieties of the living species. I was, fortunately, able to consult Dr. H. A. Gleason, of the New York Botanic Garden (who was then working at Kew), upon the subject. He not only gave as his opinion that the so-called varieties are not true, but depend on local edaphic conditions, but most kindly obtained for me the opinions of Mr. Percy Wilson, of the New York Botanic Garden, and of Mr. Ivan Johnston, of the Gray Herbarium, Harvard University, that there is no difference discernible between the fruits and seeds of the two varieties.

It seems, therefore, that the differences to which Mr. Nikitin draws attention must be regarded, like the difference in size and form, as specific.

The species *Decodon gibbosus* E. M. Reid (*Diclidocarya gibbosa* E. M. Reid), from Pont-de-Gail, is more unlike the living species *Decodon verticillatus* Ell. than is *D. globosus*. *D. verticillatus* is broadly triangular in section, the ventral face being the broadest, as in *D. globosus*; *D. gibbosus*, on the contrary, is narrowly triangular in section, the ventral face being the narrowest. It is further to be noted that, whereas *D. globosus* is known to range from the Miocene to the Upper Pliocene and has been found in many districts in Central and Western Europe, *D. gibbosus* is known only from the Mio-Pliocene of Point-de-Gail (Cantal).

Diclidocarya Menzelii E. M. Reid, from the Senftenberg Miocene, which I had placed in the same form-genus, although agreeing in general structure with *Decodon*, shows a striking difference in the disposition of the spongy cells as well as a slight difference in the form of the valve, which, instead of being continuous at the base with the body of the seed, as in *Decodon verticillatus*, *D. globosa*, and *D. gibbosa*, is separate from it. This raised a doubt in my mind whether *Diclidocarya Menzelii* ought rightly to be referred to the genus *Decodon*, or might not perchance belong to some allied genus. I therefore re-examined the Lythraceæ from this point of view, studying the living species in the Kew Herbarium, and referring to Koehne's monograph on the family (1). There is no other living genus to which it could be referred. None have the peculiar valve seen in *Decodon* and, in a moderated form, in *Diclidocarya Menzelii*. Also, none combine the same size, form, and character of testa. It cannot therefore be referred to any other living genus. The question remains as to whether it should be regarded as belonging to an extinct genus. In view of our extended knowledge of the genus *Decodon* with its now known three species, one living and two extinct, it is possible to state that in this genus the valve is never discontinuous all round, but only at the sides, being continuous with the rest of the testa at the top of the fruit. Also the spongy cells are always disposed dorsally as well as laterally. In *D. Menzelii* they are lateral only. Such differences in the light of more intimate knowledge must be regarded as generic. Therefore, whilst *D. globosa* and *D. gibbosa* now pass into the living genus *Decodon*, the fossil name *Diclidocarya* may be retained for the extinct, but closely allied, genus represented by *D. Menzelii*.

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Explanation of Plate 589.

Fig. 1. *Decodon globosus*. Well-developed seed, ventral face. × 15. Pliocene. Village of Krivoborye.
Fig. 2. *D. verticillatus*. Well-developed seed, ventral face, without epidermal layer. × 15. Recent. Brooklyn Botanic Garden.
Fig. 3. *D. globosus*. Undeveloped seed, ventral face. × 15. Pliocene. Krivoborye.
Fig. 4. *D. verticillatus*. Undeveloped seed, ventral face with epidermal layer. × 15. Recent. Brooklyn Botanic Garden.
Fig. 5. *D. globosus*. Transverse section of seed, showing three sub-layers on the dorsal side of the testa: the external ligneous sub-layer is thicker than the internal. There is a cross-section of the raphe canal within the middle spongy sub-layer. One border of the valve has separated accidentally from the body of the seed. × 30. Pliocene. Krivoborye.
Fig. 6. *D. verticillatus*. Transverse section of seed with epidermal layer, showing external ligneous sub-layer thinner than the internal. × 30. Recent. Brooklyn Botanic Garden.
Fig. 7. *D. globosus*. Group of seeds. × 3. Pliocene. Krivoborye.
Fig. 8. *D. gibbosus*. Well-developed seed, showing narrow ventral face and deep lateral face. × 12. Mio-Pliocene. Pont-du-Gail (France).
Fig. 9. *D. gibbosus*. Ventral face. × 12. Mio-Pliocene. Pont-du-Gail (France).
Fig. 10. *Diclidocarya Menzelii*. Well-developed seed, ventral face. × 12. Miocene. Senftenberg (Germany).

r., raphe-canal; *e.*, external ligneous layer; *i.*, internal ligneous layer; *s.*, spongy layer; *ep.*, epidermal layer; *v.*, valve; *h.*, hilum and micropyle; *d.*, dorsal protuberance.

ON SOME VARIETIES OF *ROSA TOMENTOSA* (SCABRIUSCULÆ).

By Lt.-Col. A. H. Wolley-Dod.

I have endeavoured, without any great measure of success, to clear up the doubt which has surrounded the name of *R. britannica* Déségl. MS. and its allies *R. Jundzilliana* Baker, non Bess., and *R. tomentosa* v. *sylvestris* Woods. In order to get all the light I can throw on the question, I have examined all the specimens at Kew and at the British Museum (both in the British and Déséglise's herbaria), and those in Herb. Bailey, kindly lent me for the purpose by the Curator of the Botanical Department of Manchester University.

Taking *R. Jundzilliana* Baker first; there are five distinct gatherings, covering three different varieties to which this name has been applied in the specimens seen, four of them by Baker himself, these all in July 1864, but only one of them has the day of the month on the label, so that it is not easy to trace the sequence of events which led up to the adoption and subsequent dropping of the name. The labels of the five specimens are as follows:—

1. At Kew. "*Rosa Jundzilliana* (Bess.). By the bridge over Greasby Brook, road between Moreton and Hoylake, Cheshire, July 1864." The label was written by Webb, who collected the specimen, but there is no doubt that he got the name from Baker, who wrote on the sheet "Original of *R. britannica* of Déséglise, now identified by him with *fœtida* Bast." The note is not dated.

2. In Herb. Bailey. "*Rosa Jundzilliana* Bess. *R. tomentosa* var. *sylvestris* Woods. *R. sylvestris* Lindl. Synops. Hedge at Boltby, Yorks, July 21, 1864. Herb. Ros. Brit. No. 11." Label written by Baker. Duplicates in Herb. Mus. Brit., Herb. Rogers, and Herb. Déséglise (in *R. fœtida* cover).

3. In Herb. Rogers. "*R. Jundzilliana* Besser. Studley Woods, W. Yorks, July 1864." Label written by Baker.

4. In Herb. Déségl. "*R. Jundzilliana* Bess. Thicket in Studley Woods, W. Yorks, July 1864." No. 88 of Herb. Baker, who wrote on the sheet: "Please compare this with your plant and tell me if you think I am right in using the name. The *R. sylvestris* of Lindley's 'Synopsis' (*tomentosa* var. *sylvestris* of Woods) does not, I think, differ materially." The note is not dated, nor is there any reply from Déséglise, who placed it in his cover of *R. fœtida*, since he does not keep up var. *sylvestris*. "Your plant," no doubt, means *R. Jundzilliana* Bess.

5. In Herb. Bailey. "*R. villosa* L. subsp. *tomentosa* Sm. var. *sylvestris* Woods, syn. *Rosa Jundzilliana* Baker, *R. britannica* Déségl. Beach Bank, Menai Bridge, Carnarvon, July 27, 1871." Label written by Harbord Lewis.

The remarks by Baker on No. 1 are of the greatest importance, and might be taken as conclusive evidence, but there is no duplicate of it in Herb. Déséglise. I know of no instance in the whole genus in which a specimen seen by Déséglise is not to be found in his herbarium, and is not mentioned specifically in Cat. Rais. Déséglise certainly saw Nos. 2 and 4, and the defect of No. 1 gives me very strongly the opinion that his opinions were based upon the two former and not upon Cheshire specimens. The "Burton, Cheshire" specimen from Webb, mentioned in the note under *R. fœtida* on p. 304 of Cat. Rais., is misleading. The station is Newton, not Burton, and the specimen, so far as evidence on the sheet is concerned, was never referred to *Jundzilliana*, though there is good reason to suppose that it came from the same station as No. 1. It was collected in 1872.

I have therefore concluded, though not without a strong element of doubt, that it was to Baker's No. 11 from Studley (No. 2 of above list) that Déséglise proposed the name of *R. britannica*, and that the note on No. 1 should have been written by Baker on No. 2.

In Fl. Chesh. 122, Webb writes: "The plant found by Mr. Fisher and myself about 1863, and described under the name *R. Jundzilliana* of Baker, *Roses*, 21, and in E. B. ed. 3, grew by the high-road between Moreton and the Oar (*sic*, ? Carr) Houses on the way to Hoylake, also by a bridge over the Birket; the bush was destroyed when the road was widened. A portion transplanted to a hedge near Claughton Village still exists, although the main stems have been carried away for "standards." I think it worth while giving these particulars, as I do not consider the Newton Heath plant or any of the other "*sylvestris*" I have seen to be the same as the "original plant." Webb is wrong in his opinion. The Newton Heath plant is identical with No. 1, but may not have come from the same bush.

In a note following the description of *R. Jundzilliana* Bess. in *The Naturalist*, 1864, 21, Baker says: "Gathered by Mr. F. M. Webb and Mr. H. J. Fisher in a hedge near Moreton, Cheshire, only one bush actually known. The Cheshire plant agrees well with my specimens of the French plant from M. Déséglise. . . ." He then proceeds to give certain differences from *R. tomentosa* and *R. Borreri*, the two he thought it came nearest to. This note was published July 1st, 1864, so must have been written earlier. It will also be noticed that Webb writes of finding the rose "about 1863." Without these dates it might be difficult to understand why Baker said only one bush was actually known, since he knew of all five specimens, from four different stations, in July 1864, when the remark was published, and therefore presumably too late to correct it.

I have seen no specimens of this aggregation of varieties collected between 1864 and 1871, but it would appear that the name *Jundzilliana* was dropped in the former year, and *R. britannica* substituted for it, and from then confusion as to its application began. Not only were Cheshire specimens differing from the Moreton variety so labelled, but others from other districts, notably the Menai Straits rose and that from Studley. I will deal with these presently.

The name *R. britannica*, though first published by Baker as a synonym of var. *sylvestris* in the *Monograph* (1869), does not appear to have been used in Britain till 1871, viz.—"*R. tomentosa* var. *R. sylvestris* Lindl., *R. britannica* Déségl. MS.—Bank of Menai Strait, Bangor, Carnarvon, leg. Harbord Lewis, July 25, 1871," in Herb. Bailey, duplicate in Herb. Rogers. It was again used for the specimen cited by Déséglise from "Burton," the label of which in his own herbarium reads: "By the bridge at Newton Heath on the road Grange to Frankby, Cheshire, leg. F. M. Webb, Aug. 30, 1872." It appears again on various specimens which it is unnecessary to detail.

In Journ. Bot. 1907, 209, Ley makes *R. britannica* a variety of *R. cuspidatoides*, but his description of the latter species would

cover several varieties of *R. tomentosa*. His note on "var. *britannica*" is quite correct as far as it goes, but he allowed considerable latitude in his interpretation of it, and has so labelled specimens from various counties which do not in the least resemble the Moreton Rose. His own description of var. *fœtida*, also under *R. cuspidatoides*, shows that he did not understand the special form from Moreton. I think, therefore, that his name may be disregarded as a *nomen confusum*.

In Journ. Bot. 1920, Suppl. 16, I revived the name of *britannica* with a short description to cover both the Moreton and the Menai Straits varieties. The description, as it stands, would do very well for the former, but not for the latter, to be described below. I therefore admit confusion in my own mind and think my name should also be dropped.

Finally, Boulenger, in *Roses d'Europe*, i. 339, uses the name *R. tomentosa* v. *britannica* (Déségl.) W.-Dod, citing *Jundzilliana* Baker non Bess., *R. fœtida* Bast., and other names as synonymous. But his description, which he says is drawn up from living specimens, and which is apparently a reproduction of his own of *R. britannica* in Journ. Bot. 1920, 185 (five months after my own publication) shows that it was based upon Surrey specimens, the Cheshire one having been extinct for many years. It would not be a bad description of the Moreton rose, but is not accurate, nor does it bring out the special features of that variety. On the other hand, it is so obviously a description of my var. *Brittoni*, essentially a Surrey and W. Kent variety, that it is surely drawn from "living specimens" of that. There is certainly a close connection between var. *Brittoni* mihi and the Menai Straits rose, which latter has been confounded by most botanists, including myself, with the Moreton "*Jundzilliana*," but from which it is clearly distinct.

I propose, therefore, to discard the name of *britannica* altogether as a *nomen confusum* and to describe two new forms as follows. I hesitate to give either full varietal rank:—

R. tomentosa Sm. var. *scabriuscula* Sm. form. nov. *Leesii*. *Prickles* few or none, rather slender, straight or declining from short bases; *leaflets* large, regularly elliptical, dark green, glabrous above, thinly pubescent on midribs and primary nerves beneath, subfoliar glands few; *petioles* glabrous or nearly so, densely glandular and with numerous very small but stout prickles; *peduncles* long, densely and rather strongly glandular-aciculate, usually about three in a cluster; *sepals* dark-coloured, intensely glandular, spreading or even suberect, longer persistent than in var. *scabriuscula*: *fruit* variable, from subglobose to ellipsoid, usually roundish ovoid, with scattered glandular and eglandular acicles; styles glabrous.

The description does not greatly differentiate it from var. *fœtida* f. *moretonensis* on the one hand and from var. *Brittoni* on the other, but I consider it to be distinct from both. I name it after its first discoverer.

Hab. Banks of Menai Straits, near Bangor, Carnarvon. A specimen from Penmaenmawr, in the same county, distributed by me as No. 1447 in 1906, is very near this, but differs in its reflexed sepals and more fully biserrate, narrower, and less glandular leaflets.

R. tomentosa Sm. var. ~~*fœtida* Bast~~. form. nov. *moretonensis*. *Prickles* on the flowering-shoots rather slender, curved or straight, and declining from a rather short base, those on the barren shoots very strong and large; *leaflets* large or rather large, oval, acute, not acuminate, with rounded base, those on the stronger barren shoots very large and broad, all strongly gland-biserrate, pubescent both sides, rather more densely beneath, but harsh, not soft, with rather numerous though small subfoliar glands; *petioles* pubescent, rather densely glandular and prickly; *stipules* very strongly gland-ciliate, but nearly naked on backs; *peduncles* usually in clusters of three to nine, rather long, longer than the fruit, densely clothed with stipitate glandular or eglandular acicles which are not very long; *fruit* oblong-ovoid, clothed as on the peduncles but less densely so; *sepals* very dark, spreading horizontally on fully-formed fruit in July, densely glandular and considerably pinnate; *styles* short, glabrous or subglabrous.

It resembles var. *Brittoni*, but is much more compact with closer-set darker green leaflets, and is much more prickly and darker coloured. Its peduncles, though longish, are not so long, and the leaf-serration differs. Its general appearance is very different, but the characters are not easy to describe.

Hab. Moreton, Hoylake, Newton Heath, Woodchurch, and Claughton, all in Cheshire, but the first three stations may be identical. It has not been collected for many years and is certainly extinct at Moreton, but may exist at Claughton or Woodchurch.

The Studley and Boltby Roses, which have been labelled *R. britannica* and *R. Jundzilliana*, I believe to be pure var. *sylvestris* Woods, as did Baker.

SENECIO ERRATICUS Bertolini IN BRITAIN.

By Eric Drabble.

In August 1925, a large *Senecio* was found near Brockenhurst in the New Forest, which was so obviously different from *S. aquaticus* that I thought it might be *S. erraticus* Bert., especially as a plant gathered by Mr. C. Trapnell in 1923 had been so named. In September 1928 similar plants were found at Freshwater, Isle of Wight. After careful comparison with published descriptions, my opinion was confirmed. These plants were so unlike *aquaticus* that there seemed to be little likelihood that they were what Dr. Druce has called *S. aquaticus* var. *intermedius*. Dr. Druce kindly examined a specimen and stated that it was not his var. *intermedius*, giving his opinion that it was *erraticus*.

The differences between *aquaticus* and *erraticus* are well brought out by Rouy (Flor. France, viii. 336):—

S. aquaticus Huds. "Feuilles inférieures ovales ou lancéolées, inégalement dentées ou lyrées, à segment terminal très grande, subcordé ou largement tronqué, subtriangulaire, se rétrécissant de la base au sommet; feuilles caulinaires à segments latéraux obliques, oblongs ou linéaires, entiers ou à peine dentés; pédoncules courts, assez épais, étalés ou ascendants; calathides de $\frac{1}{3}$ env. plus grandes que dans le *S. erraticus*."

S. erraticus Bertol. "Feuilles inférieures profondément lyrées, à segment terminal très grande, cordé, tronqué ou à peine atténué à la base, arrondi au sommet, ovale ou oblong; feuilles caulinaires à segments latéraux étalés à angle droit, oblongs, dentés, pédoncules divariqués, grêles; calathides petites."

Coste (Fl. Fr. ii. 30) also gives the differences clearly. *S. aquaticus* is described as having the "rameaux du corymbe étalés-dressés; lobes latéraux de feuilles caulinaires oblique," while *S. erraticus* is stated to have the "rameaux du corymbe étalés divariqués; lobes latéraux des feuilles caulinaires écartés de l'axe à angle droit."

Brébisson (Fl. Normandie) rightly calls attention to the larger number of slender, open and divaricate branches in *erraticus*. Indeed, this is a leading feature of *erraticus*, and is well shown in the photograph of Dr. Druce's New Forest plant in Rep. B. E. C. 1927, where, however, the form of the leaves cannot be clearly seen.

Reichenbach, Icones Fl. Germ. et Helv. CMLXIV. i., illustrates a small portion of true *S. erraticus*, while Icon. CMLXV. ii. (as *S. barbaræifolius* Krock.) is *S. aquaticus* var. *pennatifidus* G. & G. This figure is quoted by Rouy, Fl. Fr. viii. 377, as *S. barbaræifolius* Reichb., since Krocker only refers to *S. Barbaræ foliis*, which, as Rouy rightly says, does not constitute a binary name. *S. barbaræifolius* Wimm. et Grab. Fl. Siles. iii. 151 (*non* Reichb.) is *S. erraticus* Bertol.

The undermentioned sheets in Herb. Mus. Brit. are *S. erraticus*:—

Billot, Fl. Gall. et Germ. 1894, Vendée, Août 1855.

Herb. Heldreich, ad ripas Libadiam, Aug. 1848.

F. Petrak, Fl. Bohem. et Morav. exsicc. no. 397 (as *S. barbariæfoliis* Krocker).

Fl. Lusitan. exsicc. 272; Espinho. Leg. A. Moller, Sept. 1886 (as *aquaticus*).

A short description of the Freshwater and Brockenhurst plants may be useful:—

Plant *tall* (up to 13 dm. when growing in shade), *profusely and divaricately branched*. *Leaves* very deeply pinnatifid, *the lateral segments spreading at approximately a right angle*. Lower leaves with large ovate obtuse basally truncate or sub-cordate terminal segment and few short slender lateral segments borne on a long scarcely winged midrib. Intermediate leaves large (up to $2{\cdot}3 \times 1{\cdot}25$ dm., usually about half this size), with about four oblong or spatulate entire or irregularly toothed lateral segments, terminal lobe large ovate and truncate-based. Upper leaves less divided and with narrower oblong toothed terminal segment. *Flowering branches very numerous, widely divaricate slender long* (up to 4·5 dm.), forming a very loose open cymose corymb. Capitula smaller than those of typical *aquaticus*. Fruits in my specimens mostly slightly hairy on the ribs, a few glabrous when ripe.

The characters which readily and at once distinguish this plant

from *S. aquaticus* var. *pennatifidus* G. & G. are its great height, the very long slender widely-spreading flowering branches, the generally smaller capitula, the shape of the terminal lobe of the leaf, and the lateral segments spreading at approximately right angles.

It is unnecessary to recapitulate the history of the plant (and the name) in this country, as Dr. Druce has done so recently (see Rep. B. E. C. 1917, pp. 35–36; 1919, pp. 771–2; 1923, pp. 39–40; 1925, pp. 996–7; 1927, p. 308).

With regard to the relationships of *erraticus* a few words may be written. It is clearly related to *aquaticus*, but is at once distinguishable even from extreme forms of *pennatifidus* by the characters mentioned above. Whether it should be given specific rank can only be a matter of opinion in the present disturbed and uncertain state of the species problem. The late Dr. Thellung thought it impossible to draw a sharp line between *aquaticus* and *erraticus*, but with this view I cannot agree. The plant is quite distinct from any form of *aquaticus* with which I am acquainted and, in my opinion, it should not be placed as a variety of that species by the side of *pennatifidus*. Dr. Druce (Rep. B. E. C. 1927, p. 308) has given the name var. *intermedius* to the larger plants of the "*pennatifidus*" type. Babington at one time thought that certain large plants of *aquaticus* were *S. erraticus*, but he later altered his opinion and described them as var. *major* in his *Manual* (1847). I possess a specimen labelled "*Senecio aquaticus* Huds. *β. major* Bab. Wood near Fillongely (*sic*), July 1854, T. K." This seems to be Babington's plant and it is certainly not *erraticus*. It would seem to be identical with var. *intermedius* Druce.

The only authenticated records of *S. erraticus* in this country appear to be the following:—Hampshire—Lyndhurst (*C. Trapnell*), Holmesby (*G. C. Druce*), Brockenhurst (*E. & H. Drabble*); Isle of Wight—Freshwater (*E. & H. Drabble*); Berkshire—Southcote, "not quite typical" (*G. C. Druce*).

NOTES ON SOME SPECIES OF *COMBRETUM* FROM TANGANYIKA TERRITORY.

By A. W. Exell, M.A., F.L.S.

Among a valuable collection recently made by Mr. B. D. Burtt, Botanist (Tsetse Research), Game Department, Tanganyika Territory, are a number of species of *Combretum*, some of which were formerly known only from scanty material. The ecological notes made by the collector are here given in full, as they form an important addition to our knowledge of the climatic and edaphic conditions determining the distribution of the species concerned. The specimens referred to are in the British Museum Herbarium.

I have added, at the end, a description of a new species collected by the British Museum East Africa Expedition, at Tendaguru.

C. Trothæ Engl. & Diels. Dodoma District: at Kazikazi, Nos. 530, 545; between Kondoa and Dodoma, alt. about 4500 ft., Nos. 1392, 1432, 1528, 1529. Singida District: at about 4000 ft., No. 1607. Warangi name "Kipulu," Wanyaturu name "Mnagana" or "Mnyaganya," Wasukuma name "Mdanhambeba."

The fruits, hitherto unknown, are small, about 15 mm. long by 12 mm. across, with rather thin wings standing out at right angles and measuring up to 6 mm. across. Small distinct yellowish scales are present on the wings and more densely on the body of the fruit, which is otherwise glabrous.

Note.—"This species occurs locally in Tanganyika, being confined, as far as my experience goes, to the Great 'Itigi' Thicket Belt, which commences approximately at Dodoma, on the Central Railway, and extends up the line as far as Chaya Station. The belt extends south of the railway for some 30 miles south of Manyone Station; but I am not sure of the exact southern boundary of this thicket area. Northwards the thicket extends in an almost unbroken belt which peters out between Singida Town and the Wembare Steppe. The Great Thicket attains its greatest width in the neighbourhood of Itigi Station. *C. Trothæ* is found generally throughout the thicket, but occurs in almost pure stands in the area north of Kazikazi, where it is dominant in small areas. It is a very much coppiced shrub, about 10 ft. high." [B. D. B.]

C. splendens Engl. Kondoa Irangi District: Bereku, at about 5000 ft., No. 673; near Kingassi, at about 5000 ft., No. 1604. Warangi name "Mlima."

Note.—"This *Combretum* is characteristic of the micaceous sandy soils, of a reddish colour, which support the very extensive *Berlinia globiflora* Harms—savannahs, known by the native term 'miombo' bush. These 'miombo' savannahs cover a very large area of the central plateau region from approximately 1500 to 4500 ft. *C. splendens* is especially common on the savannah slopes of the many escarpments—viz.: the Irangi Scarp, the Simbo Hills, the Chenene Hills, the Bereku Ridge, and parts of the Great Rift Wall.

"This species is usually a small tree up to 20 ft. high, but where the tree has been cut down it grows up as a loose-coppiced shrub. On the Irambe Plateau, near Mkalama, the natives pollard the trees, using the young branches which result from the pollarding as fuel or building material. The flowers appear during the little rains (Nov.–Dec.) and the leaves mature after the flowers have been pollinated. The bark of the old trees is very rough, giving a reticulated appearance." [B. D. B.]

C. grandifolium F. Hoffm. Singida District: at Kazikazi, at about 4500 ft., Nos. 573, 1606. Kinyamwezi name "Mkukula."

Note.—"This is a very large species growing up to 40 ft. high. The one locality I know of is near Kazikazi Station on the Central Railway. The tree is growing in reddish sandy micaceous soil, and has several young trees near it, up to 15 ft. high." [B. D. B.]

C. APICULATUM Sond. subsp. nov. **boreale**, *foliis* majoribus oblique late lanceolatis basi plerumque leviter cordatis.

Kondoa Irangi District: at about 4500 ft., No. 856; near Salia Lake, at about 4500 ft., No. 1120; near Kondaga, at about 4500 ft., No. 1224 (holotype); near Salia, at about 4300 ft., No. 1602; at Salanga, at about 5000 ft., No. 1603. Wanyanwezi name "Sibula."

These specimens from Tanganyika Territory differ from typical *C. apiculatum* in having much larger leaves, up to 14×5·5 cm., while those of the typical subspecies seldom exceed 8 cm. in length. It seems best to treat them, for the present, as two geographical subspecies whose ranges meet in Rhodesia. *F. A. Rogers* 5569, from Victoria Falls, Rhodesia, belongs to subsp. *boreale*.

Note.—"A shrub, or small tree, up to 15 ft. high, on reddish sandy micaceous soils, occurring in a belt, or zone, between the *Berlinia*-savannah and the grey-sandy soils ('semi-mbuga') of the semi-seasonal swamps. It is especially noticeable in the Singida-Mkalama areas which slope down to the Wembare Steppe. The wood is used by the natives for building." [B. D. B.]

C. FISCHERI Engl. Kondoa Irangi District: along the Bubu River, near Salia, at about 4300 ft., No. 694; very local near Salia, in association with *Markhamia lanata* K. Schum. etc., No. 715. Singida District: near Matelele, at about 4000 ft., Nos. 725, 742, 1601. Wanyaturu name "Moriandata," Wanyanwezi name "Mulandala," Sandawa name "Drima." Swahili name "Msana."

Note.—"A species occurring in a grey sandy-clay soil bordering seasonal swamps which are called 'mbuga' by the natives. I refer to this type of soil formation as 'semi-mbuga' type, as it contains a floral formula of very characteristic type; such plants as *Acacia spirocarpa* Hochst., *A. pallens* Rolfe, *Grewia bicolor* Juss., and *Commiphora* spp., being usual in this habitat. *O. Fischeri* is a small tree, 15 to 20 ft. high, flowering before the leaves have matured." [B. D. B.]

C. ZEYHERI Sond. (*C. oblongum* F. Hoffm.) Manyone District: between Msalalo and Ngambo, No. 553. Singida District: very common in *Brachystegia*-association and cleared areas, Mihama, No. 569; near the Wembare Steppe, among *Borassus* Palms, along the bank of the Iwumbu River, at about 4000 ft., No. 736, 1610.

I can find no good distinction between *C. Zeyheri* and *C. oblongum*, and cannot at present even make distinct varieties or subspecies of them.

Note.—"Occurs in a very similar habitat to *C. apiculatum*." [B. D. B.]

C. PARVIFOLIUM Engl. Singida District: near Manyugi, at about 4500 ft., No. 1381; from near Matelele to Iwumbu, at about 4000 ft., No. 1608. Wanyamwezi name "Mlowasi."

The fruits, not hitherto described, are up to 2·3×1·8 cm., with four rather thin wings, projecting at right angles and measuring up to about 9 mm. in width. The body of the fruit is densely covered with dark red scales which become sparse on the wings.

Note.—"A common species in the grey sandy-clay-soil area ('semi-mbuga'): I have never seen it in any other soils. It is a coppiced shrub growing to 10 ft. high, with a very erect appearance, the stems being very tough and appearing white in the strong rays of the sun. The side branches are never very long and are usually of uniform size, giving the shrub a very singular aspect. The species is common in the Wembare region and south of the Central Railway, near Itigi." [B. D. B.]

C. OBOVATUM F. Hoffm. Singida District: shrubby bush, in dark soil area, probably the same species as the great climber of the riverine forest, near Matelele, at about 3700 ft., No. 737; great climbing plant of the Matelele riverine forest, at about 3700 ft., No. 1400; climbing liane of the Mwaru River, also very common along the Iwumbu and Ugwandi Rivers, at about 3700 ft., No. 1521; great climbing liane of riverine forest, at about 4000 ft., No. 1522. Swahili name "Mgwobeko."

The fruits, hitherto undescribed, are about 3×3 cm., with five semi-rigid wings measuring up to about 1·2 cm. in width. The body of the fruit is covered with a short, fairly thick, greyish pubescence, the wings being sparsely puberulous to glabrescent.

Note.—"A species occurring in the 'riverine forest' along seasonal rivers, such as the Iwumbu River, which flows into the Wembare Steppe. I have also seen it near a small water-course in the Chenene Hills, between Kondoa Irangi and Dodoma. It is a climbing plant, becoming a thick liane of over 8 inches in diameter near the base. It climbs to the tops of *Tamarindus indicus* L. and *Piptadenia* sp., trees over 60 ft. in height. The leaf-like bracts near the flower-heads are of a bleached whitish colour, presumably to guide insects to the rather inconspicuous flower-heads." [B. D. B.]

C. LONGISPICATUM (Engl.) Engl. & Diels. Singida District: a climbing plant, in waste places, with flowers tinged with crimson and yellow, No. 547. Kondoa Irangi District: Simbo Hills, at about 4500 ft., No. 861; very common in *Berlinia*-savannah, at Simbo, at about 4500 ft., No. 1030. Swahili name "Goweko."

The leaves of this species, hitherto unknown, are ovate, up to 13×7 cm., abruptly and sharply acuminate at the apex, and rounded at the base. When very young they are covered with a beautiful dense silvery-sericeous tomentum which persists to maturity as a soft indumentum on both surfaces of the leaf. Thorns up to 1·2 cm. long, covered with a greyish tomentum, occur on the older wood. These are apparently formed from the persistent bases of the petioles.

Note.—"This is a common species in the dry area of the Territory, from the coast to approximately 3000 ft., where the soil is of a reddish sandy nature—*i. e.*, the areas dominated by *Berlinia obliqua* Harms; also on the margins of the Great Itigi Thicket, and on the slopes of granite kopjes and rocky hills. The flowers usually appear

before the leaves. This species is a climbing plant growing over small shrubs of about 10 ft. high." [B. D. B.]

C. TRICHOPETALUM Engl. Singida District: a climbing plant reaching 25 ft. high, in *Brachystegia* woods, flowers white, tinged with pink, very attractive to butterflies, No. 542; a woody shrub 7 ft. high, flowers sweet-scented, white tinged with cherry-pink, in open savannah of *Combretum-Mbudica* type, on old "shamba." Native name "Gwobeko" or "Ngobeko."

No. 1605, from the Kondoa Irangi Plateau, is very near to *C. trichopetalum* and may eventually be identifiable with it. It has longer inflorescences and prominent spines on the older wood. Spines have never been recorded for *C. trichopetalum*, perhaps because they are commonly absent from herbarium specimens which merely consist of flowering twigs.

Combretum Migeodii, sp. nov. *Frutex* scandens?, ramulis primo minute puberulis mox glabrescentibus, cortice albo. *Folia* opposita petiolata, petiolo minute pubescente, obovata vel anguste obovata, apice obtusa vel breviter acuminata, basi plus minusve cuneata, omnino dense minutissime lepidota, lepidibus vix conspicuis, cetera glabra, costis lateralibus utrinque 5–6 infra prominentibus, reticulo infra prominente. *Flores* pentameri sessiles in spicas unilaterales solitarias axillares dispositi. *Receptaculum* inferius pubescens, superius quam inferiore longiore campanulatum infra medium paullo constrictum sparse puberulum glabrescens. *Discus* campanulatus margine pilosus. *Calycis segmenta* late triangularia margine pubescentia. *Petala* oblongo-lanceolata pilosa. *Stamina* biserialia longe exserta. *Stylus* brevis haud exsertus. *Fructus* mihi ignotus.

Hab. TANGANYIKA TERRITORY: Tendaguru, *Migeod* 269 (in Herb. Mus. Brit.).

Shrub; flowers pink, with faint unpleasant smell; fruits pink.

Leaves 9–13 × 4·5–6 cm.; *petioles* 4–6 mm. long; *spikes* about 8 cm. long; *lower receptacle* 5–6 mm. long; *upper receptacle* 15 × 8 mm., measuring to the tips of the calyx-lobes; *stamens*, longer ones 20 mm. long, shorter ones 17 mm. long; *style* 6 mm. long.

This species, which appears from the dried specimen to be extremely beautiful, belongs to Sect. *Trichopetalæ* Engl. & Diels. The axillary unilateral spikes borne in the axils of the leaves of the previous season relate it to *C. longispicatum* Engl. & Diels, from which it can be immediately distinguished by the almost glabrous leaves with a strong reticulation below, while those of *C. longispicatum* are sericeous-tomentose.

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

NEW SPECIES OF PAPUAN PLANTS.

BY S. MOORE.

IN the *Journal* for 1927 (pp. 241, 265) were described some new Rubiaceæ collected by Mr. L. J. Brass in New Guinea for the Arnold Arboretum. Among some additional specimens recently sent by Mr. C. T. White were found the following novelties:—

RUBIACEÆ.

Psychotria lolokiensis, sp. nov. *Arbor* parva exclusa inflorescentia glabra; *ramis* ultimis compressiusculis 3 mm. lat.; *foliis* petiolatis oblongo-obovatis apice rotundatis basi obtusis tenuiter coriaceis nitidis costis lateralibus utrinque 10 pag. utraque sat visibilibus etsi tenuibus; *stipulis* oblongo-ovatis obtusis cito deciduis; *panicula* terminali sat laxa pedunculata ramis lateralibus 5 bis dichotomis ultimis minute pubescentibus cymas confertas paucifloras fulcientibus; *bracteis* parvulis suborbicularibus glabris; *floribus* mediocribus sessilibus vel subsessilibus; *calyce* truncato vel obscure denticulato quam corolla breviore; *corollæ* tubo lato intus in faucibus villoso lobis 5 oblongis obtusis tubo paullulum longioribus; *staminibus* faucibus corollæ insertis; *disco* maxime prominente; *ovario* parvulo; *stylo* glabro breviter exserto.

Hab. Rain forest, Loloki River; *Brass*, 898.

"Thick-foliaged tree 15–20 ft." Leaves 8–10 × 4–5·5 cm. (highest 5 × 3 cm.), drying grey- or brown-green, paler below; petioles channelled above, 1·5 cm. long. Panicles 10 × 6 cm.; peduncle 5 cm. long; lateral branches about 2·5 cm. and ultimate branches ±1 cm. long; panicle and flowers white. Bracts 2 mm. long. Calyx 2·25 mm. long. Corolla-tube 4 × 2·5 mm.; lobes 5 mm. long. Stamens included; anthers apiculate, 2 mm. long. Style 6 mm. long. Fruit not seen.

This can be recognised among Papuan species by comparatively small, shining, glabrous leaves rotundate at the top and with ten pairs of nerves combined with the rather large flowers.

LOGANIACEÆ.

Fagræa pluvialis, sp. nov. *Arbor* parva glabra; *ramis* ultimis 5 mm. diam. cortice laxo dilute badio cinctis; foliis oblongo-obovatis basi obtusis subrotundatisve crassiusculo-coriaceis nitidulis costa centrali pag. inf. valde prominente costis lateralibus paucis (circa 10?) pag. utraque subevanidis, petiolis sat validis basi lamina stipuliformi ovata rotundata rigida onustis; *floribus* majusculis pedicellatis in cymam pedunculatam bis dichotomam paucifloram foliis circiter æquilongam ordinatis; *calyce* turbinato medium usque in lobos ovatos rotundatos sursum coloratos coriaceos diviso; *corollæ* tubo calycem longe excedente cylindrico sub limbo statim ampliato lobis ovato-oblongis

rotundatis tubo multo brevioribus; *antheris* inclusis; *ovario* oblongo; *stylo* crassiusculo basi leviter dilatato brevissime exserto; *stigmate* capitato.

Hab. Rain forest, Ihu, Vailala River; *Brass*, 944.

"Small, weak, branched tree 15 ft. high." Leaves (upper portion not seen) about 12 × 6·5 cm., drying brown, paler below; petioles shallowly channelled, 2·5 cm. long, the basal lamina 6 mm. long. Flowers white, sweet-scented. Peduncle about 4 cm. long; secondary peduncles a little shorter, ascending. Pedicels 2 cm. long. Calyx-tube 12 mm., lobes 13 mm. long, coloured terminal part of latter 5 mm. long. Corolla-tube 6 cm. long, 5 mm. broad, under the limb 10 mm. broad; lobes 22 × 12 mm. Ovary 10 × 3 mm. Fruit not seen.

In some respects imperfect, the specimen is good enough to yield a workable diagnosis. The affinity seems to be with *F. macrodendron* Gilg & Benedict. It is also near the recently-described *F. novæ-guineæ* Cammerl.

Couthovia Brassii, sp. nov. *Arbuscula* glabra; *ramulis* ultimis compressis 3–4 mm. crass.; *foliis* sat longe petiolatis late ovatis apice rotundatis vel brevissime latissimeque cuspidatis basi rotundatis pergamaceis costis lateralibus sat perspicuis utrinque 5–7 percursis; *stipulis* interpetiolaribus petiolis plane brevioribus ovatis obtusis coriaceis mox fere basin usque fissis; *floribus* sessilibus corymbum cymosum multiflorum breviter pedunculatum foliis breviorem digestis; *cymis* ad apicem ramulorum tertii ordinis dense aggregatis; *bracteis* parvulis ovatis obtusis; *calyce* quam corollæ tubus breviore breviter lateque lobato; *corollæ* tubo lobis triangularibus obtusiusculis paullo longiore intus ori villoso necnon inter staminum insertionem piloso-pulvinato; *antheris* basi breviter barbellatis; *ovario* late ovoideo sulcato in stylum abrupte desinente; *stigmate* capitato; *fructibus* anguste ovoideis utrinque attenuatis carnosis albidis.

Hab. Karema, Gulf Division, on low marshy ground; *Brass*, 1221.

"Small tree 15 ft." Leaves 12–16 × 8·5–10 cm., drying greyish green, opaque on both faces; petioles broad, 1–2 cm. long. Stipules 8 mm. long. Inflorescence 6 × 10 cm.; peduncle about 1 cm. long; primary branches 4 cm., secondary 2 cm., tertiary about 1 cm. long. Calyx 1 mm. long. Corolla-tube 2·5 mm., and lobes 1·5 mm. long. Anthers rather more than 1 mm. long, apiculate. Ovary and style 1 mm. long.

This is evidently allied to *C. pachypoda* Gilg & Benedict (well figured in Engl. Bot. Jahrb. liv. 179), which it greatly resembles in floral structure; but the larger and broader basally rounded leaves with much longer stalks and the apparently narrower stipules are points of difference easily recognised.

GESNERACEÆ.

Cyrtandra (§ *Dissimiles* ?) **externata**, sp. nov. *Frutex* 4 m. alt.; *caule* simplici subtereti transversim rugoso 5 mm. crass.; *foliis* (specie ?) oppositis magnis subsessilibus spathulato-obovatis dimidio inf. angustatis dimidio sup. margine denticulatis apicem versus dentatis dimidio inf. integris chartaceis costis pag. utravis puberulis costis lat. utrinque circa 22 uti costa media subtus eminentibus; *floribus* magnis pedicellatis in fasciculos paucifloros digestis; *bracteis* 2 calyce multo brevioribus inter se liberis ovato-lanceolatis acutis glabris; *calycis* glabri segmentis oblongis obtusis 2 anticis basin usque liberis posticis 3 in unum latum 3-fidum connatis; *corolla* calyci æquilonga ore obliqua labio postico breviter 2-lobo antico usque $\frac{1}{5}$ in lobos late ovatos diviso; *staminibus* juxta medium tubum corollæ insertis; *staminodiis* haud visis; *disco* prominente; *ovario* glabro in stylum longum complanatum apice papillosum desinente; *stigmate* peltato.

Hab. Hohora, Vailala River, rain-forest plains; *Brass*, 1043.

Leaves (said by the collector to be opposite, but one of the pair is not to be seen and perhaps may be represented by a raised line) 44 cm. long, in upper part 13 cm. wide, in the lower 3 cm., and about 2 cm. at base; midrib broad, especially near the somewhat scurfy base; petiole broad, somewhat scurfy, about 1 cm. long. Flowers three together on 1 cm. long glabrous pedicels. Bracts 3 cm. long. Calyx 4·5 cm. long; lobed portion 17 mm. wide with lobes about 8 mm. long; free segments 7 mm. wide. Corolla "greenish yellow, streaked and mottled with red"; anticous lip broadly obovate, lobes ovate, about 8 mm. long; posticous lip not seen entire in the expanded state. Filaments (in bud) 5 mm. Anthers 4 mm. long. Disk denticulate, 2 mm. deep. Ovary 4 mm., style 3 mm. long. Berry not seen.

Judging from Clarke's imperfect description (Monog. Cyrtand. 254) of unsatisfactory material, this must be near *C. Albertisii* Clarke. The leaves of both must be very like, but those of the latter are said to be smaller and have fewer lateral nerves villous on the underside, the flowers are sessile, and the much smaller calyx is split down one side only. Other differences will probably appear when better material comes to hand. *C. Wentiana* Laut. has much superficial resemblance; but its strongly-toothed leaves are differently shaped, the bracts are longer and tomentose, and the calyx is tubular besides other differences.

New Species of Acanthaceæ from Rhodesia.

By S. Moore.

In the *Journal* for 1926 (pp. 301–307) a small collection, made in Rhodesia by Dr. R. F. Rand, came under notice. To the new species there described the following must be added:—

Lepidagathis (§ *Neuracanthopsis*) **persimilis**, sp. nov. *Herba* spithamea; *caule* sursum perpauciramoso puberulo; *foliis* petiolatis oblongis vel anguste oblongo-ovatis obtusis basi obtusis supra glabris subtus in nervis puberulis; *cymis* sessilibus axillaribus vel terminalibus paucifloris glabris; *foliis floralibus* paucis ovatis acutis inter se

leviter inæqualibus; *calycis* segmentis folia floralia facile superantibus segmento postico anguste ovato-oblongo acuto longitrorsum obscure nervoso segmentis anticis postico æquilongis oblongis breviter acuminatis lateralibus ceteris paullo longioribus lineari-lanceolatis apice breviter aristatis segmentis omnibus scariosis fusco-brunneis; *corollæ* tubo juxta medium leviter attenuato dimidio sup. dilatato labii antici lobo intermedio suborbiculari lobis lateralibus ovatis obtusissimis labio postico antico breviore suborbiculari apice retuso; *antheris* posticis 1-locularibus; *ovulis* pro loculo 2.

Hab. South Rhodesia, Miami, April 1926; *R. F. Rand*, 77.

Leaves mostly 3–4 × 1–1·5 cm.; lateral nerves very few, prominent; cystoliths fairly conspicuous; petioles 3 mm. long. Cymes (with flower expanded) about 1·5 cm. long. Floral leaves 5–6 mm. long. Posticous calyx-segment 9 × 3·5 mm.; anticous segments 9 mm. long, barely 3 mm. wide; lateral 11 × 1·5 mm. Corolla pale purple; tube 11 mm. long, at bottom 3 mm. wide soon narrowed to 2 mm.; in the upper half 5 mm. wide; lower lip 7 mm. long, upper 5 × 5 mm. Filaments of anticous stamens 4 mm., of posticous 3 mm. long. Ovary barely 2 mm. long. Style glabrous, 11·5 mm. long.

Very like and, until examination of the inflorescence, might easily be mistaken for *L. Gossweileri* S. Moore, from Angola, which has, *inter alia*, differently shaped, larger and strongly-nerved floral leaves, ovate obtuse anterior and posterior calyx-lobes, and corolla-tube enlarged only just at the mouth instead of halfway up.

OBITUARIES.

Daniel Alexander Boyd
(1855–1928).

Daniel Alexander Boyd was born at West Kilbride, Ayrshire, in January 1855, where he lived until 1912, when he moved to Saltcoats, dying there on October 8th last. He was a son of the manse, and was trained as a writer but never practised, devoting himself to the study of archæology and natural history. He had an excellent all-round aquaintance with natural history, but was best known for his field-knowledge of microfungi. He added very many species to the British flora and discovered several new to science. These he did not himself describe, but sent principally to Miss Lorrain Smith, though he was ready to oblige anyone working at special groups. For himself he was contented to write general accounts of the microfungi of his beloved Clyde area, the last article being contained in the British Association *Handbook* of the Glasgow Meeting, where the statement concerning *Ovularia* and *Ramularia*—"The number described by Massee [*British Fungus Flora*] extended to thirty, the total has now been increased to not less than fifty-three species" for the Clyde area alone—indicates the intensive work he had accomplished. Probably no area of the British Isles has been so well worked.

I had hoped to meet him at the Scottish Cryptogamic Society's Foray at Troon after the Glasgow meeting, but he was too ill to

appear or even to be visited. I had met him at Forres in 1912, when he had astonished us all by the facility he showed in finding microfungi. In my opinion he was our best field-man in this line, and a letter from him, always in a neat small hand, was sure to contain peculiar information. About six years ago he had a serious illness which interfered greatly with his activities, but recently he had again become busy, and it was hoped that he would write up some of his field-observations. He was quiet, courteous, and unassuming, and was beloved by all who knew him. His name is preserved in the genus *Boydia* A. L. Sm. and in several specific names.—J. Ramsbottom.

William Gardner Smith
(1866–1928).

William Gardner Smith was born at Dundee on March 20th, 1866, and died at Edinburgh on Dec. 8th last. He graduated in science at St. Andrews, and, after teaching for a short time, lectured on Agriculture for the Forfarshire County Council, and afterwards demonstrated in Botany at Edinburgh University. He went to Munich and worked under Tubeuf* for his Ph.D. His thesis, *Untersuchung der Morphologie und Anatomie der durch Exoasceen verursachten Spross- und Blatt-Deformationen*, was a very able piece of mycological research, and had the unusual compliment paid to it of being translated into Italian. Smith followed the example of many botanists of his period and translated his German Professor's book. The English edition appeared under the title *Diseases of Plants induced by Cryptogamic Parasites*; the book was something more than a translation, and is still much used. The preface is dated 1896, from the Royal Botanic Garden, Edinburgh, where Smith returned for a short period as a junior lecturer in Botany. He was then appointed lecturer in Botany in the Department of Biology at the Yorkshire College, Leeds, under the late Prof. L. C. Miall. It was whilst at Leeds that Smith became interested in ecological plant-geography—although he always retained his interest in microfungi. Smith's brother, the late Robert Smith, had studied under Professor Flahault, of Montpellier, and had imbibed the spirit and the methods of this acute plant-geographer. On returning to Scotland he published his *Geographical Distribution of Vegetation in Scotland: I. Edinburgh*, and *II. Perthshire District*. Robert Smith himself died in 1898, and his mantle fell on his brother.

W. G. Smith then published *Geographical Distribution of Vegetation in Yorkshire, I. Leeds and Halifax District*, in collaboration with C. E. Moss, and *II. Harrogate and Skipton District*, in collaboration with W. M. Rankin. Moss and Rankin were both students of Smith at Leeds.

The Central Committee for the Survey and Study of British Vegetation was founded in Smith's house at Leeds in 1904, and Smith was the secretary of this Committee throughout its whole existence. When in 1912 the committee was translated into the British Ecolo-

* Recently deceased.

gical Society, Smith was made the first honorary life-member of the Society in recognition of his work on the Vegetation Committee. He was President of the Society for 1917 and 1918.

In 1908 he was appointed chief of the Edinburgh and East of Scotland College of Agriculture, and in 1927 was made advisory officer in Agricultural Botany to the Board of Agriculture for Scotland. During this period his studies were chiefly on hill-pastures and the utilization of heathland. His last published paper, "Notes on the Effect of cutting Bracken," contains data accumulated up to July 1928.

For practically the whole of his career Smith was engaged in teaching, but continued to produce a steady stream of papers. He was much influenced by Danish work—he visited Denmark with the Association Internationale des Botanistes in 1913—and, indeed, introduced the knowledge of Raunkier's growth-forms to British workers. He was one of our best all-round botanists and an indefatigable field-worker. He was an exceedingly pleasant companion on excursions and had a good sense of humour. Ever ready to help younger men, he was a little impatient of a certain attitude towards others which is usually requisite for academic advancement.

It is to be regretted that he was not more closely connected with the teaching of university botany during the last twenty years—a period during which the necessity for such an outlook as his has only gradually become apparent.—C. E. Moss; J. Ramsbottom.

Sir William Turner Thiselton-Dyer (1843–1928).

The death of Sir William Turner Thiselton-Dyer * in his eighty-eighth year, on December 23, removed a dominant figure in the botanical world of the later decades of the last century and the earlier years of the present. Born in Westminster in 1843 (July 28), he was educated with a view to succeeding his father in his medical practice, but at the age of twenty left King's College, London, and entered Christ Church, Oxford, as a Junior Student. In 1867 he obtained a second class in the final school of Mathematics and a first class in the final school of Natural Science. In 1868 he was appointed to the Chair of Natural History at the Royal Agricultural College at Cirencester, where he collaborated in the production of an edition of a text-book, *How Crops Grow*.

An active interest in British botany found expression in the *Flora of Middlesex* (1869), in which he assisted Henry Trimen, a friend of his medical-student days, who had just joined the Department of Botany of the British Museum. It is interesting to note that at the time of this appointment "two young men of promise were anxious to obtain botanical work, and it was after much deliberation that Dr. Trimen rather than Mr. Dyer was chosen for the post" (Journ. Bot. 1895, 183). In his obituary notice of Henry Trimen (*ibid.* 1896, 489), Mr. Britten also refers to his introduction to Mr. Trimen and Mr. Dyer in 1864 at a meeting of the Society of Amateur Botanists, of which Trimen and Dyer were the leading spirits.

* The hyphen was assumed about 1891.

The *Flora* was in form and arrangement a distinct advance on previous works of this character, being a development of the model initiated by Babington. In 1870 Dyer went to Dublin as Professor of Botany at the Royal College of Science, but after two years returned to London, where he joined the Royal Horticultural Society, which then occupied the old Exhibition Grounds at South Kensington, as its Professor of Botany. His talks on "plants of interest in the show" were an educational and much appreciated feature of the meetings of the Society at that time. Meanwhile, Huxley was developing the Normal School of Science at the new building in the Exhibition Road, and Dyer was invited in 1873 to conduct a course of instruction in botany. In the Preface to the *Course of Practical Instruction in Botany*, by Bower and Vines (1884)—the outcome of this introduction of modern laboratory methods into the teaching of botany in this country,—Dyer gave an account of the origin of the work which he undertook with the assistance of Prof. Lawson. He writes: "We had the use of Professor Huxley's convenient and well-appointed laboratory, and we determined to attempt a course of instruction which should embrace the leading morphological facts of every important type in the vegetable kingdom . . . .; in fact, to adopt exactly the same plan of work as Professor Huxley in his own teaching had found convenient for the animal side of morphology." A further contribution to the inauguration of the new era in botanical teaching was the translation of Sachs's classic *Text-book of Botany* (1875), in which he was associated with A. W. Bennett. In 1875 Dyer gave up active teaching work and became Assistant Director of the Royal Gardens, Kew, under Sir Joseph Hooker, whose eldest daughter he married two years later. But his influence in the teaching world continued, and his support was eagerly sought by aspirants for University and other appointments in botany. For thirty years he devoted himself to the administrative work of the Royal Gardens, succeeding Hooker as Director on the retirement of the latter in 1885. A great organiser and administrator, he developed the various departments of work initiated by the Hookers, father and son. The Imperial side of Kew was a special obsession; he worked to make the Royal Gardens the centre of information in matters of economic botany for the overseas parts of the Empire, and a medium for the interchange of plants and seeds. An example was the foundation of the East Indian rubber trade by the introduction to Singapore from Kew of plants germinated from South American seeds. His reference to "the burden of Empire" which "we feel so heavily at Kew" was not in the nature of a complaint, but rather an expression of the recognition of his efforts.

Among special results of his activity at Kew may be mentioned the extension of the Herbarium, the building of the Jodrell laboratory for botanical research, the formation of a Forestry Museum, and th initiation in 1887 of the *Kew Bulletin of Miscellaneous Information*, a periodical publication for the record of work done at Kew and of items of interest in connection with the numerous associated overseas botanical establishments.

Two important Floras, the *Flora Capensis* and the *Flora of Tropical Africa*, the publication of which had been in abeyance, were resumed and carried towards completion under his editorship. A fuller appreciation of Dyer's work at Kew will doubtless be given elsewhere.

In the extra-mural activities incidental to a man of his position and calibre, Dyer took a full share. For many years he was at the centre of most movements in biological science, and his services were recognised by honours from universities and scientific societies at home and abroad. He was elected F.R.S. in 1880, and was a Vice-President 1896–7; he resigned his fellowship in 1917. He joined the Linnean Society in 1872 and remained a Fellow until his death. In 1880 he was nominated for the Botanical Secretaryship, but the late Dr. Daydon Jackson was elected.

Dyer served for two periods on the Council of the British Association and presided over the section of Biology (D) in 1888, and was the first president of the new Botany Section (K) at Ipswich in 1895. At the Cambridge meeting some years later he was one of the recipients of an Honorary Doctorate from the University. He also received numerous other honours, including the K.C.M.G. in 1899.

The burden of official and other duties left no leisure for protracted scientific research, but his frequent communications on matters of general scientific or botanical interest to *Nature*, the *Annals of Botany* (in the editorship of which he shared for a time), and other journals, gave evidence of wide knowledge and a close touch with things, and were marked by a clearness of exposition. His biographical notices make excellent reading; we recall, for instance, his "Eulogium on George Bentham" at the Centenary Anniversary of the Linnean Society in 1888, and his appreciation of John Ball in this *Journal* in 1895.

After his retirement from Kew in 1905 he continued for a few years his advisory work to the Colonial Office, but practically retired from active association with botanical work, removing to Whitcombe, in Gloucestershire, where he spent the remaining years of his life. Here he found leisure for the development of his interest in the botany of the classics. Sir Arthur Hort acknowledges his help in the identification of the plants in his edition and English translation of Theophrastus's *Enquiry into Plants*, 1916; and a writer in the *Times* of Dec. 31 last refers to the invaluable services which Dyer rendered to Greek lexicography by his identifications of ancient plant-names. He also supplied the section on "Flora" to the *Companions to Latin and Greek Studies*, issued by the Cambridge Press, and edited by Sir J. E. Sandys and L. Whibley respectively.

The younger generation of botanists would find it difficult to appreciate the respect and deference accorded to an individual such as were given to the subject of this notice, and which did not tend to the amelioration of a naturally autocratic disposition. As might be expected, resentment was on occasion provoked, especially on the part of senior men. But, though my earlier years at the Museum coincided with a period of personal tension between the respective heads of the Department of Botany and the Royal Gardens, my own relations with the Director were always pleasant ones, in spite of the fact that my official introduction to Sir William was marked by a *faux pas*. Wishing to consult some specimens of tropical African Pandanaceæ, I wrote to the Keeper of the Herbarium, Mr. J. G. Baker, for permission. A reply came from the office asking me to call on the Director, whom I found, after a mild reference to my breach of etiquette, most encouraging and helpful. At later periods I was invited to contribute to the *Index Floræ Sinensis* and the *Flora of Tropical Africa*, and my associations with Sir William in both these pieces of work, in the course of which I frequently spent the Saturday afternoon at Kew, were uniformly happy. And many others will remember, with gratitude, guidance and helpful counsel generously offered. To these and to many of his former colleagues and associates, the passing of a once pre-eminent personality will bring a pang of regret.—A. B. R.

Mrs. Henderina Victoria Scott.

The many friends of Dr. and Mrs. D. H. Scott were deeply grieved to hear of Mrs. Scott's very sudden death on January 18th at her home at East Oakley, Hants, and our sympathies are extended to Dr. Scott in his sad bereavement. Mrs. Scott, who shared her husband's love for botany, was frequently with him at botanical and other scientific meetings, such as those of the Linnean Society, the British Association, and the South-Eastern Union of Scientific Societies, and her interest and kindly presence will be greatly missed. Many botanists have pleasant memories of hospitality at East Oakley and of the delightful garden and grounds in which Mrs. Scott took so much interest.

Mrs. Scott was one of the earliest Lady-Fellows of the Linnean Society—she was elected in 1905, and had been an active contributor to its work. An exhibition of animated photographs of plants taken by the kammatograph, showing opening buds, pollination, circumnutation of a shoot, and other manifestations of plant-activity may be recalled. An interesting study of the movements of flowers of *Sparmannia africana* by means of the kinematograph appeared in the *Annals of Botany* (1903), and Mrs. Scott also contributed several papers to the same journal and to the *New Phytologist* on *Traquairia* and other fossils, and collaborated with the late Ethel Sargant in a study of the development of *Arum maculatum* from the seed (Ann. Bot. 1898). A number of illustrations in Dr. Scott's *Introduction to Structural Botany*, one of the best known of elementary text-books, and in his *Studies in Fossil Botany* were drawn by Mrs. Scott.—A. B. R.

An appreciation of the work of Prof. John Merle Coulter, for many years head of the Department of Botany, Chicago University, who died on December 23, 1928, is deferred until our next issue.

SHORT NOTES.

THE BIOLOGICAL EQUIPMENT OF SPECIES IN RELATION TO COMPETITION.—Dr. Salisbury, in his presidential address to the Ecological Society, considered how far it is possible to analyse the factors of competition and to replace vague generalisations by observation and measurement. That the factors determining the dominance of particular species may in some cases be due to causes incapable of measurement with our present knowledge and technique was illustrated by reference to epidemics among the higher plants and the close parallel which these offer to the epidemiology of Bacteria, even to the peculiar recrudescence demonstrated by Greenwood and Topley.

The much wider range of conditions tolerated by certain species in cultures, free from competition, as compared with the same species in the wild state, furnished striking evidence of the importance of competition. Examples were cited showing that the habitat conditions which determine the occurrence of species in nature may act either by "*selective stimulation*" or "*selective depression.*"

The prominent rôle played by potential height was shown by reference to various arboreal species, by the competitive struggle between *Ulex europæus* and *Pteridium aquilinum* on the heaths of Hertfordshire, and by the importance attained by species of naturally low growth in communities of artificially restricted stature such as pastures and lawns. The height factor must, however, be considered in relation to translucency of the foliage canopy and also the relative phenology of the species concerned, respecting all of which the data available are lamentably meagre.

Various examples demonstrating the intensity of root-competition were furnished, and it was shown that the root-systems, of some species at least, differ considerably both in form and branching when grown in competition, whereby the struggle for water is accentuated. The competition for water was shown to be further complicated by the fact that some species produce at the surface humus highly retentive of water, in such amounts as to bring about suppression by drought of their deeper-rooted competitors.

The rôle of means of propagation was next considered, and Dr. Salisbury provided data illustrating the importance of such features as the seed-output and the rate of vegetative increase, as measured by the "annual increment." With reference to the latter, the influence of soil-texture was shown to be considerable, whilst the seed-output had to be evaluated in conjunction with the normal percentage germination. It was shown also that the mode of germination might have considerable biological significance, and three types were distinguished, namely, "the simultaneous," "the continuous," and "the discontinuous."

The relatively greater importance of vegetative means of propagation in closed communities and late stages of succession was emphasized.

Stress was laid on the fact that these and other features considered, which are demonstrably of the first importance in estimating

the causes of frequency and dominance and all of which are capable of accurate presentation, are nevertheless aspects concerning which our knowledge is as yet extremely scanty.

RUSSIAN BOTANICAL CONGRESS, 1928.—In the Berichte d. Deutsch. Botan. Ges. 1928, Generalversamml.-Hft. 124, H. Gams, who states that he was the only Central European participant in the recent Russian Botanical Congress in St. Petersburg in January 1928, gives some account of the proceedings and incidentally an appreciation of the amount of plant-geographical work that is being done in Russia. 925 members attended the Congress, which occupied nine days and included about 400 discussions, distributed in general sittings in eight sections. The writer comments on the thoroughness of the organisation and the quantity and quality of the work represented. Plant-physiology was most strongly represented; the other sections, according to number of communications and participants, ranged in the following order:—(2) Phytosociology and Ecology, (3) Applied Botany (including a fundamental communication by Wavilow on the regional variability of cultivated plants), (4) Systematics and Geography of the higher plants, (5) Morphology, Anatomy, Cytology, and Genetics, and (6)–(8) the three Cryptogamic sections.

The writer comments in very eulogistic terms on the extent of the plant-geographic and floristic work which has already been done, or is in preparation, for the various provinces of European Russia and also for Siberia and Kamtschatka, which compares very favourably with that available for Central Europe. He also insists on the importance of a knowledge of the Russian language and literature for students of plant-geography.

CAREX TOMENTOSA L. IN MIDDLESEX.—On May 26, 1928, I found *Carex tomentosa* growing in some quantity in a meadow not very far from its Surrey locality, but on the Middlesex side of the Thames. I do not know that this sedge has previously been recorded in Middlesex. A specimen has been deposited in the British Museum Herbarium.—I. A. WILLIAMS.

REVIEWS.

Botany for Students of Medicine and Pharmacy. By F. E. FRITSCH, D.Sc., and E. J. SALISBURY, D.Sc. Second edition (revised). Pp. xiv, 357. G. Bell & Sons, Ltd.: London, 1928. Price 10*s.* 6*d.*

THE kindred arts of medicine and pharmacy are complementary to each other. Though both direct their efforts towards the maintenance of the public health, they approach their objective from very different points of view. Medicine focusses attention upon the patient, while pharmacy is mainly concerned with drugs and medicines. The physician is chiefly interested in physiological

relationships, while the chemist and druggist or pharmaceutical chemist studies morphological details and analytical distinctions. It is therefore evident that any handbook intended for use by both classes of students must be planned upon very liberal lines, and in designing a textbook of botany for such a purpose there should be an adequate treatment of all parts of the subject. Thus general external morphology and elementary taxonomy, which are fundamental for the pharmacist, should receive equal attention with other sections of the work which are more especially those which a medical student must study. It is from this point of view that one is inclined to criticise the otherwise very excellent work of Drs. Fritsch and Salisbury, which is now reissued in the form of a second and revised edition. The Introduction by Professor Boycott points out the value of botany for the training of physicians, but omits any reference to the relation of botany to pharmacy. In the Preface also it is hardly correct to say that "the syllabus of the Pharmaceutical Society's Preliminary Scientific Examination is, we believe, adequately covered." Elementary anatomy and physiology are well represented in a form suitable for both medical and pharmaceutical students, but the treatment of morphology is too meagre for students of pharmacy. *Pinus* is only sketchily described, while *Taxus* and *Cycas* are omitted altogether. Eleven families—Salicaceæ is omitted—of flowering plants are described in eight pages, a condensation which is partly due to the very desirable adoption of a number of useful abbreviations. Interest might have been added to this study by reference to such morphological details of fruits, leaves, etc., as are characteristic of the families. Medicinal plants might be well used in illustrations, but one fails to grasp the significance of a statement such as "the root of *Glycyrrhiza* is obtained from the plant of that name." Apart from its ill-adaptation to the needs of pharmacy, the book is an admirable production and provides just such information as is likely to be most useful to the medical student; the student of pharmacy, however, must obtain supplementary instruction from other sources.—T. E. Wallis.

An Introduction to the Study of Plants. By F. E. Fritsch, D.Sc., and E. J. Salisbury, D.Sc. Third Edition (revised). 8vo, pp. x, 399, 8 pls., 233 text-figs. G. Bell & Sons: London, 1928. Price 7*s.* 6*d.*

The appearance of a third edition of this well-known elementary text-book is an indication of the popularity which it deservedly enjoys. First published in 1914, it was one of the earliest attempts to provide an introduction to the study of plants from a modern standpoint, and in this purpose it has admirably succeeded. Throughout the book the nature and reactions of the plant as a living organism are insisted upon—form is studied in relation to function, and functions are elucidated by simple experiments requiring only such apparatus

as should be readily available or easily constructed in a school laboratory.

In its main contents the book does not differ from that of other similar elementary texts. The morphology and physiology of the flowering plant are its main theses. It is, however, in the treatment of the subject that this, in common with other modern text-books, differs so markedly from the text-books of even twenty years ago. There is no chapter, for example, with the familiar title of "The Stem and its Modifications." The stem is studied in relation to its functions, and the varying habits and environments of plants, as the titles of its chapters indicate, *e.g.*:—VII. "The Architecture of the Shoot"; VIII. "Buds, The Mechanical Structure of the Shoot"; XII. "Food Storage and Vegetative Reproduction."

Not the least important part of the book is the section on Ecology. The floras of Woodland, Heath and Moor, Sea Shores, etc., are described, and the various factors which are concerned in the determination of the composition of the vegetation are discussed.

There are some, no doubt, who may regret the decline of the purely descriptive botany which made up so much of the practical work of an earlier generation of students. It is an excellent discipline, and few who survived it regret the time and labour entailed. It must, however, be remembered that few of the thousands of young people who every year begin in the schools the study of plants will have an opportunity to continue this work in the Universities. For the majority their school-work in botany is the only formal training they will ever enjoy in a biological subject. If only for this reason, it is important that their instruction should emphasise the physiological and biological aspects of plant life.

The present edition is substantially the same as the first, no drastic alteration has been required, but throughout the book the text has been modified, wherever necessary, to bring it into conformity with recent advances in the subject. The section dealing with respiration has been recast and an additional experiment included. The chapters on Ecology have been brought up to date, and paragraphs added on mountain floras and on hedge-rows. The book is well written and in such a style as to make it readily intelligible to beginners. Used, as the authors intend it to be employed, as an adjunct to class-teaching and with adequate illustration from living materials, it will help the teacher to lay a sound foundation in the study of plants and stimulate a desire for further and wider knowledge.—R. J. Tabor.

Handbuch der Bodenlehre. Band I. *Die Naturwissenschaftlichen Grundlagen der Lehre von der Entstehung des Bodens.* 8vo, pp. viii, 335, 29 figs. Springer: Berlin, 1929. Price R.M. 29.60.

This is the first volume of a ten-volume handbook, completion of which is promised in 1930, under the editorship of Professor Blanck, of the Agricultural Institute, Göttingen; it is appropriate, therefore,

to deal in the first instance with the general plan of the work. Of the ten volumes, the first seven are to be devoted to the scientific aspects of soil study, in all its bearings, and the last three to agricultural science in the field, for which there is no exact word in English; the American word "agronomy" is perhaps the nearest. This division is significant, for it marks the westward progress of the Russian claim that soil science has as much right to be a separate branch of natural philosophy as have physics, chemistry, or botany. Generally speaking, it is correct to say that until a few years ago, the study of the soil was regarded as a means to an end—the improvement of agriculture; it was an applied, not a pure science. This was certainly the case in Great Britain and North America. The merit of the Russian view-point, that in its essentials is now adopted by most countries, is that it makes for sounder and surer progress. The investigators' attitude to the problems is dictated mainly by scientific curiosity, rather than by the necessity to solve by some rough and ready means an urgent practical problem in the shortest time. This is the view adopted in the present work. The subject is approached in the comprehensive manner characteristic of German text-books. The first volume is primarily devoted to the geological aspect of the origin of soils—in fact, it is not until the sixth and seventh volumes that the physical, chemical, and biological properties of the soil are discussed in detail. The main sections deal with the genesis of soils; (*a*) mineral material, (*b*) organic material; and the factors concerned in soil-formation (*a*) physical, (*b*) chemical, including colloidal factors, (*c*) geological actions such as water, ice, and wind. Mention should also be made of a long historical review by Dr. Giesecke on the development of soil science up to the beginning of the 20th century.

Practically all the well-known German soil scientists are contributing to the various volumes, and to those interested in the German outlook and research on soils, the publication can certainly be recommended. As far as the reviewer is aware, there is at present no similar work contemplated in any other country.—B. A. Keen.

Ortho-Artcraft, by Theo. B. Hyslop, C.M., M.D. (Amateur Artist Publishing Co.; price 2*s.* 6*d.*), is a paper-covered booklet describing the technique for obtaining effective nature prints from leaves, sea-weeds, feathers, and other flat natural objects, and suggestions as to their use for design and decoration. It is a precise elaboration of the method which most of us have practised at some time—smearing a flat object with pigment and then pressing it upon the surface on which it is desired to obtain the picture. The author also describes a method of painting a picture on glass and then transferring it to paper. There are numerous illustrations showing results, good and indifferent, for the guidance of the learner.

BOOK-NOTES, NEWS, ETC.

Linnean Society of London.—At the General Meeting on January 3, Prof. C. E. Moss gave an account of specimens of a new genus of Hydrocharitaceæ, recently discovered on the River Zambesi, but which are identical with specimens hitherto assigned to the genus *Boottia*. The new genus differs fundamentally from *Boottia* in the fact that the three placentas scarcely project at all into the ovary-cavity. It is most nearly allied to *Blyxa*, but differs in having broad petals and more numerous (12) stamens in the male flower, and in the presence of staminodes in the female flower. It is remarkable by its elongate and ligulate leaves, its long cylindrical peduncles, and its cylindric monophyllous spathes, all covered with soft conical projections.

At the General Meeting of January 17, Dr. A. B. Rendle showed, on behalf of Miss Maud Egremont, a series of coloured drawings in pastel of West Australian flowers and vegetation. The drawings, most of which were made in the Perth-Darlington district, gave a very vivid representation of some of the constituents of the remarkable flora of West Australia and of some general aspects of the vegetation.

Dr. Rendle also gave an account of a remarkable subterranean orchid from West Australia, recently described by Dr. R. S. Rogers, F.L.S., before the Royal Society of Western Australia. The first specimen was turned up by the plough of an observant farmer in West Australia, and was sent to the W.A. Agricultural Department; a notice in the press produced specimens from two other localities. Dr. Rogers had kindly sent photographs (from which lantern-slides had been prepared) and a short account of the plant.

The plant consists of an underground rootless rhizome, which is "in symbiotic relationship with a fungus which closely invests the decayed roots of *Melaleuca uncinata* R. Br." It lives about a foot below the surface of the ground. The figures show short rhizomes with a terminal bud and slender lateral branches covered with scale-leaves. The flowers are borne in a dense head surrounded by an involucre of bracts terminating a slender scape, which grows from the rhizome apparently towards the surface of the soil. The inflorescence, which suggests the capitulum of a Composite, reaches about three inches across. The relatively large bracts surround numerous small flowers. The plant "when fresh is colourless," but "the capitulum acquires purplish-coloured tints on exposure to light." Dr. Rogers writes:—"The affinities of the plant are with the Gastrodiinæ, especially as regards its vegetative parts, but I feel that its inflorescence and certain other characters are too extraordinary to include it in that sub-tribe without unduly extending its limits. I have therefore thought it better to accommodate it in a new sub-tribe, which should be placed next to Gastrodiinæ."

Dr. Rendle also showed an illustration of the nearly allied genus *Gastrodia*, an Eastern Asiatic and Australasian "saprophytic" genus which throws up a raceme of flowers from an underground tuber.

He also referred to the remarkable association of the Asiatic species, *G. elata*, which, as recently shown by the Japanese botanist Kusano, only reaches full development and produces an inflorescence when the tuber is invaded by the rhizomorph of the basidiomycetous fungus *Armillarea mellea*.

Mr. Ramsbottom emphasized the interest of the symbiotic association between this deadliest of parasitic fungi and the tuber of *Gastrodia*.

THE BRITISH BRYOLOGICAL SOCIETY.—A winter meeting of this Society was called by the President, the Rev. C. H. Binstead, M.A., F.L.S., and was held on January 4, 1929, by kind permission of the Linnean Society, at their Rooms at Burlington House. Members and friends assembled to the gratifying number of twenty-seven. They thoroughly enjoyed the reunion and disposed of some business questions. Mr. Marquand read some interesting notes on plant-collecting in Tirol and Carinthia. Mr. Dixon had kindly brought specimens of a number of very rare and interesting mosses, including one from 18,000 feet on Mount Everest, and gave explanatory descriptions, some being new species. Bryophytes were shown on microscopical slides, including a new American *Sphærocarpus* detected by Miss Wigglesworth, of the Manchester Museum. It is hoped that such a Meeting may become a yearly event.—ELEONORA ARMITAGE.

DR. F. J. SEAVER, Curator of Fungi in the New York Botanic Garden, and well known for his studies on Discomycetes, has published a volume entitled *The North American Cup-Fungi* (Operculates). The work contains 284 pages and 46 plates, two of which are in colour. Thus more than 100 species are illustrated out of the 280 described. Seventeen new species are described and a new genus, *Durandiomyces*, is erected for *Gyromitra gigas* Phill. (*G. Phillipsii* Mass.). The work seems to be very carefully done, and the illustrations call for a special word of praise though they have necessitated the use of a rather heavily loaded paper. As a large number of Discomycetes are apparently cosmopolitan the monograph will be useful to European workers. Unfortunately, the American code of nomenclature has been followed, and consequently there are many name-changes, and in the effort to achieve finality we have another series of generic and specific names for these attractive fungi. The volume is published by the author and costs 5 dollars 50 cents post-free.—J. R.

INTERNATIONAL BOTANICAL CONGRESS, 1930.—We would remind readers of the *Journal* that motions on the subject of Nomenclature for consideration by the Congress should be in the hands of the Rapporteur Général, Dr. J. Briquet, Conservatoire Botanique, Geneva, before March 31 next.

Motions must be presented in the form of additional articles (or amendments) to the *Rules* of 1905, 1910, drawn up in the form adopted in the *International Code*, and must be drafted as briefly as possible in Latin, English, French, German, or Italian. At least 100 printed copies must be presented.

A NEW SPECIES OF *BROMUS*.

BY I. A. WILLIAMS, F.L.S.

WHILE staying near Brampton, Cumberland, early in July 1928, I found in three places (a hay-field, the side of a main road, and the edge of a farm-track) a *Bromus* which I recognised as being the same as a plant I had gathered, in the preceding month, in a dry sandy ditch by the side of a road crossing Horsell Common, Woking, Surrey. In the next few weeks, I also found the same grass near Thursley, Surrey, and in Hampshire, near Frensham Pond. Examination of the Herbaria at the British Museum and at Kew revealed more specimens of the plant, all of them British, and generally labelled either as a variety of *Bromus hordeacus* (i. e., *mollis*) L. or as *Bromus brachystachys* Hornung.

The oldest specimen was that in the Borrer Herbarium at Kew. It was collected in June 1836 in corn-land at Dowdeswell, near Chetenham (*sic*, for Cheltenham), and was labelled by Borrer as an (unnamed) variety of *Bromus mollis*. In H. C. Watson's Herbarium, also at Kew, are gatherings from Surrey, one from "on the chalk down near Wanborough," 1867, and another from the "Hog's Back, near Guildford," 1871. Possibly these two localities were the same. To his plants Watson gave the name *Bromus mollis* var. *subglaber*, which he published in the sixth edition of the *London Catalogue*, 1867. But I have been unable to discover that he described his variety anywhere, and not all plants to which he gave the name were the same, some being, indeed, sub-glabrous states of *mollis*, and others (including his earliest gathering, that of 1867) being similar states of the plant which I am now venturing to describe as a new species. It is neither *B. hordeaceus* (*mollis*) L. nor *B. brachystachys* Horn., a plant which may possibly have to be struck out of the British list, even as a casual.

As there are many British records of this plant, spread over nearly a century, and (so far as material at Kew and the British Museum goes) no foreign ones, I am calling this grass *Bromus britannicus*. It is at least British by discovery, though it may eventually prove to occur also out of the British Islands; it appears to be frequent and native with us, or as native as any plant of roadsides, hayfields, and arable land can be said to be; and the specific name *britannicus* is not likely already to have been given to any species of *Bromus*.

Bromus britannicus, sp. nov. Planta annua (?), 25–75 cm. alta, formam debilem *B. hordeacei* L. simulans. *Caules foliaque* plus minusve hirsuti. *Flores*, juvenilibus exceptis, laxe imbricati, itaque rhachim sæpius ostendentes. *Spiculæ* villosæ vel glabrescentes (an interdum glabræ?) parvæ (circa 10–11 mm. longæ). *Palea inferior* c. 6 mm. longa bidentata, dentibus anguste triangularibus aliquantum divergentibus. *Palea superior* caryopside plane brevior, costæ marginalis tertia superiore parte calva inferne ciliata. *Caryopsis* maturans paleam inferiorem subæquans ut pilæ apicales inter paleæ inferioris dentes tandem videntur nisi omnino exsertæ sunt.

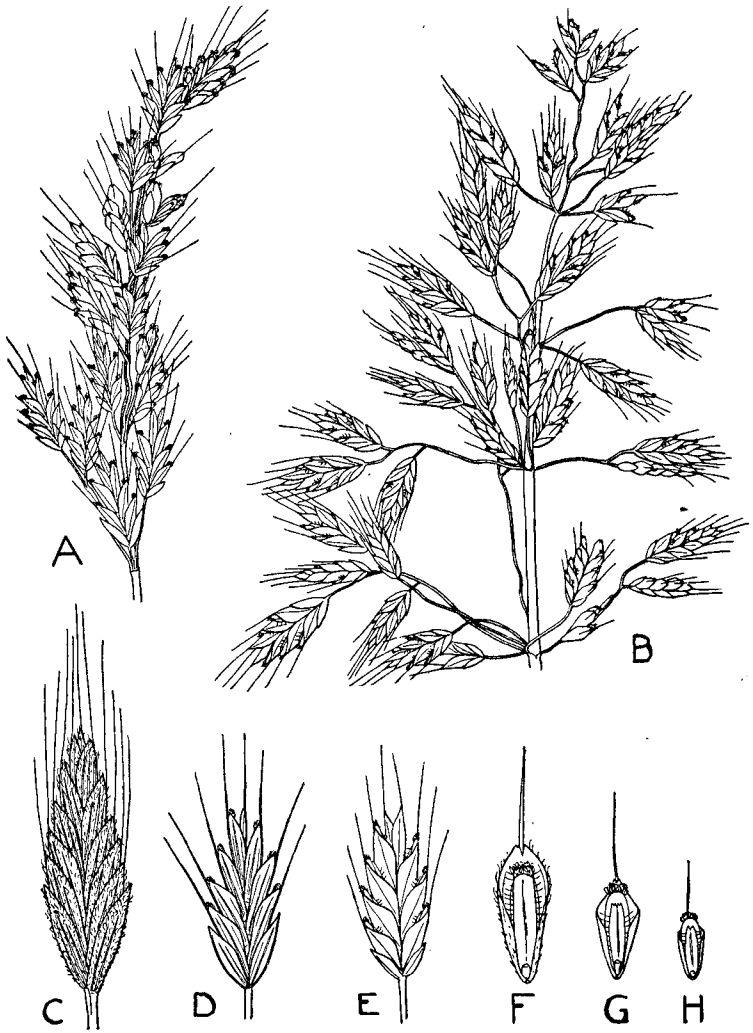
B. hordeaceus L. emend. (*B. mollis* L.), spiculis floribusque valde majoribus (palea inferiore 9–10 mm. longa), caryopside in paleis omnino inclusa ceterisque notis differt.

B. brachystachys Hornung habitu formæ gracili *B. arvensis* nec formæ debili *B. hordeacei* simile, panicula ampla ramulis longis tandem patulis laxa, palea inferiore modo 4 mm. longa, ciliis paleæ superioris apicem versus supra paleæ inferioris marginem prominentibus differt.

Annual (?). In general appearance like a slender form of *Bromus hordeaceus* L. Height 25–75 cm. Stems one or several. Stem and leaves more or less hairy. *Panicle usually contracted, 4–8 cm. long, the branches being mostly about as long as the generally solitary spikelets*; sometimes the lower branches are about 2 cm. long, and bear more than one spikelet. *Spikelets* hairy or glabrescent (? sometimes glabrous), *small*, usually about 10 or 11 mm. long, excluding the awns about 4 or 5 mm. broad, and broadest about the middle after the flower has opened; occasionally about 1·4 × ·5 cm.; 6–9-flowered. Upper glume reaching about halfway to the top of the sixth flower (*i. e.*, the third on the same side). Glumes and lower pales green, with a white membranaceous border. Lower pales markedly angular well above the middle, and divided into two very sharp, narrow, somewhat diverging points, the awn springing from the base of the sinus between them. Lower pales about 6 mm. long, their awns about the same length. *Upper pale much shorter than the caryopsis and ciliate up about two-thirds of its length only. Caryopsis, as it comes to maturity, reaching quite, or almost, to the top of the lower pale, the tuft of whitish hairs at the top of the caryopsis being eventually easily visible either in the sinus between the points of the lower pale or projecting beyond them. Flowers* very narrow at their bases, and *not closely imbricated, except when young*, so that the rhachis of the mature spikelet is often visible, and it is even sometimes possible to see right through the spikelet between the lower part of the flower and the rhachis.

In *Bromus hordeaceus* (*mollis*) L., the lower pale is about 9 mm. or 1 cm. long, and its points are less slender and less easily observed. Also the caryopsis is only about $\frac{5}{8}$ or $\frac{3}{4}$ of the length of the lower pale, and the upper pale is considerably (about 1 mm.) longer than the caryopsis, and ciliate nearly to the top. The spikelets of *B. hordeaceus* are normally 50 per cent. to 100 per cent. longer than those of *Bromus britannicus*. Duval-Jouve gave the varietal name *microstachys* to small-spikeleted forms of several species of *Bromus*, including *B. hordeaceus*, and some gatherings of *B. britannicus* have been named *B. mollis* var. *microstachys*. What Duval-Jouve's own specimens of his variety were I do not know; but there seem to be small-spikeleted forms of *hordeaceus*, to which the name should presumably be applied, and which are not to be confused with *B. britannicus*. Various other varietal names, such as *glabratus* Doell. and *glabrescens* Coss. & Germ., as well as Watson's *subglaber*, referred to above, have been applied to more or less glabrous forms of *britannicus*.

From *Bromus brachystachys* Horn., with which specimens of *B. britannicus* have sometimes been misidentified, it differs very much in habit (*B. brachystachys* having a longer (12–17 cm.) panicle, composed of long (*e.g.*, 9 cm.) compound, finally spreading



A, B. Panicles of *Bromus britannicus*, sp. nov., and *B. brachystachys* Horn. Nat. size.
C, D, E. Spikelets of *B. hordeaceus*, *B. britannicus*, and *B. brachystachys*. × 2.
F, G, H. Florets of same. × 2.

branches) and in the upper pale, which in Hornung's plant is ciliate almost to the top and reaches to, or projects beyond, the shoulders of the lower pale when the flower is fully open. The resemblance between the two species (which has led to this confusion) lies in the projecting caryopsis and the small size of the spikelets. *B. brachystachys*, however, has shorter lower pales (4 mm.) and spikelets rather shorter and broader in proportion to their length (about 9–10 × 5 mm.). Its lower pales are rather broader in proportion, the angles on their sides are more rounded, and their points less distinct. Hornung described this plant as strictly biennial; much of the British material has every appearance of being annual. But the habits of *brachystachys* and *britannicus* are so different that there can be little confusion between them once this difference is realised. It may be summed up by saying that superficially *brachystachys* resembles a slender *B. arvensis* (from which plant, and not from *hordeaceus*, Hornung was at pains to separate his grass), whereas *B. britannicus* is in appearance a slender *hordeaceus*.

There are specimens of *Bromus brachystachys*, from its original locality at Aschersleben in Germany, at Kew, and in the British Museum; and Mr. C. E. Salmon also has one which he was kind enough to lend me.

It is also, perhaps, worth remarking that the not closely imbricated flowers of the mature spikelets of *B. britannicus* have led to its being occasionally misidentified with *B. secalinus*.

The following is a list, arranged by vice-counties, of the gatherings of *Bromus britannicus* which I have seen. The herbaria in which these specimens are to be found are indicated by capital letters, of which B.M. indicates the Natural History Museum, South Kensington; K. Kew; S. the herbarium of Mr. C. E. Salmon; and W. my own. Records in square brackets refer to plants which are apparently *B. britannicus*, but have been gathered too young for absolute certainty. Collectors should note, in this connection, that specimens of this and its closely allied species should be fairly ripe for satisfactory determination :—

[V.c. 2, East Cornwall. Par Harbour. L. T. (?) Medlin, 1926, K.]

[V.c. 6, North Somerset. Field border, Tickenham Hill. Miss I. M. Roper, 1915, B.M.]

[V.c. 8, South Wiltshire. Broken ground on an uncultivated down east of Warminster. E. S. Marshall, 1903, B.M.]

V.c. 12, North Hampshire. Edge of barley field, near Frensham Pond. I. A. Williams, 1928, W.

[V.c. 14, East Sussex. Rottingdean. T. Hilton, 1907, K. Other specimens also immature from this locality in B.M. and S.]

V.c. 16, West Kent. In a field of Italian Rye-grass, near Eynsford. E. S. Marshall, 1893, B.M.

V.c. 17, Surrey. Cornfield, Betchworth. J. L. Warren, 1867, B.M. Chalk downs, Wanborough. H. C. Watson, 1867, B.M. and K. Hog's Back, near Guildford. H. C. Watson, 1871, K. [Field near Weybridge. H. & J. Groves, 1876, B.M.] West Barnes Lane, Merton. C. E. Britton, 1908, B.M. Roadside, Horsell Common, Woking. I. A. Williams, 1928, W. Roadside, near Thursley. I. A. Williams, 1928, W.

V.c. 21. Middlesex. Finsbury Park. Alfred French, 1875, B.M. Yiewsley. J. E. Cooper, 1910, K.

V.c. 28. West Norfolk. Flitcham. C. E. Hubbard, 1926, K.

V.c. 33. East Gloucestershire. In cornland, Dowdeswell, near Che[l]tenham. W. Borrer, 1836, K.

V.c. 58. Cheshire. Waste ground, Hatchmere. R. E. Adamson, 1921, B.M.

[V.c. 62. North-east Yorkshire. Near Thirsk. J. A. Baker, 1864, B.M.]

[V.c. 64. Mid-west Yorkshire. Wall by old hen-run, orchard at Meanwood Lodge [Leeds]. F. A. Lees, 1914, B.M.]

V.c. 70. Cumberland. In a hayfield near Brampton (type-locality), and in two other places in this neighbourhood. I. A. Williams, 1928, W. The holotype specimen in B.M.

V.c. 90. Forfar. Sown grass field, Glen Clova. E. S. Marshall, 1904, B.M.

V.c. 94. Banff. Clover field (1150 feet), Tomintoul. E. S. Marshall. Ref. No. 2881, 1905, S.

[V.c. 111. Orkney. Weed of cultivation, Deerness, Mainland. Magnus Spence. 1896, B.M.]

A grass gathered at Donaghadee, Co. Down, by C. D. Chase, in 1925 (specimen at Kew), is the only possible record I have seen for Ireland, but the plant is too young for certain determination.

Some of the above have been named *B. brachystachys* by various botanists, but I have seen no British specimen, so far, that is really Hornung's plant.

My best thanks for the assistance so ungrudgingly given me are due to Messrs. C. E. Hubbard and W. B. Turrill, of Kew; and to Mr. A. J. Wilmott, of the British Museum. Without Mr. Wilmott's encouragement, indeed, this paper would never have been written.

KEY TO THE BRITISH PANSIES.

By Eric Drabble.

The following Key has been drawn up in response to requests from many collectors. The writer has complied with great reluctance, as the pansies are difficult to characterize on paper. This, however, is not at all due to any indefinite limits between the various forms. Indeed, they seem to fall into much more sharply delimited groups than do the *Chenopodia*, *Atriplices*, *Salicorniæ*, *Ranunculi* and *Euphrasiæ*, to mention a few genera to which the writer has given some attention. Indeed, it is the examination and attempted use of published keys to these genera that has emboldened him to draw up a Key to the pansies.

With the pansies, as with many other genera, the difficulty lies in the nature of the distinguishing characters. The form of the leaves and stipules and the size and breadth of the sepals are often decisive features, and when the plants in question lie before any practised observer the differences are recognized at once. But when the beginner is confronted with printed descriptions without any standard of reference, it is hopeless for him to expect to form clear and correct mental images of the plants. Moreover, mere measurements are here generally of but little use, as the sizes are relative. There is much variation in size in nearly all the pansies, but the enlargement or diminution as a rule affects the plant in every part, leaving the relative proportions the same.

There are several matters to which careful attention must be given :—

(i.) Only *entire* plants must be used.

(ii.) At first only well-grown plants should be examined, and, if possible, several plants from the same gathering should lie before the collector when he uses the Key. Later, when familiarity with typical normally developed plants has been acquired, the more aberrant states will be readily recognized.

(iii.) All our British pansies are more or less hairy ; when in the Key a plant is stated to be hairy, a very definite and noticeable hairy coating is implied. Thus in *segetalis*, *ruralis*, *Lloydii*, *Lejeunei*, the hairiness is comparatively slight ; in *anglica* and *variata* it is very evident, and in *cantiana*, *vectensis*, and (usually) *agrestis*, it is dense and almost hispid.

(iv.) In considering the shape of the leaves and stipules, those of the middle region of the plant should be examined. In the uppermost leaves the laminæ tend in nearly all the pansies to be more acute and the form of the stipules less characteristic.

(v.) Many pansies, perhaps all, may flower at an early stage when only a few leaves have been formed and before any vegetative branching has occurred. Such plants are apt to be very puzzling, but generally more fully developed specimens may be found in the neighbourhood. These small imperfectly developed plants of the various members of the *arvensis* group must be carefully distinguished from *V. derelicta*, which is permanently of this type. Branching is sometimes but little evident in such a normally cæspitose plant as *V. variata*, especially in the north of Scotland ; but here again it is usually possible to find branched examples, and the leaf and stipular characters, when once these have become familiar in typical examples, should prevent confusion.

Further, perennials, especially *lepida*, when flowering in the first year before the formation of the twiggy bases of the branches, are liable to be mistaken for members of the *tricolor* group, particularly *V. Lejeunei*.

(vi.) Some suffusion of the petals with violet or blue is found occasionally, though rarely, in the pale-flowered plants, such as the *arvensis*-pansies and *V. contempta*.

In the first instance the Key should be used as a guide to an approximate determination and references to the fuller descriptions already given in this *Journal* should be made. It is very greatly hoped that specimens thus approximately determined will not be recorded or distributed without further confirmation. The writer will always be willing to examine and report on carefully selected and prepared *whole* plants, provided that sufficient material be sent to enable him to retain a representative specimen for reference.

* Flowers small, petals not longer than the sepals.

Maritime annuals, c. 1–3 in. in height with minute flowers, petals usually shorter than the very small sepals. Channel and Scilly Islands ..... NANA Group.

Inland annuals of cultivated ground, petals shorter than or equalling the rather large sepals..... ARVENSIS Group.

** Flowers large, petals longer than the sepals.

Annuals..... TRICOLOR Group.

Perennials, stems generally upright, branching from the base, lower parts twiggy lying on or just below the surface of the ground. Lower stipules digitate..... SAXATILIS Group.

Perennials with extensive underground development of slender herbaceous or twiggy branches, flowering shoots generally emerging separately from the earth. Lower stipules digitate ..... LUTEA-CURTISII Group.

NANA Group.

Plant very small, 2–3 in. in height, unbranched or but little branched..... *V. nana.*

Plants of low growth but considerably branched, branches up to 4 inches or more in length and spreading ..... *V. nana* f. *major.*

ARVENSIS Group.

* Plants upright.

Very small (4–6 in.), usually unbranched, peduncles ascending. Local ..... *V. derelicta.*

Usually small (c. 6 in.) with little or no branching, peduncles very widely divaricate. (When growing amongst corn the stem may be much elongated, but the usually unbranched slender stem with long internodes and the widely divaricate peduncles are characteristic.) ? Local..... *V. arvatica.*

[Small (3–5 in.), very hairy ..... Confer *V. vectensis.*]

Tall (12–20 in.), main stem dominant, lateral branches usually shorter than the main stem, often very short, spreading a little at the base and then upright ; leaves narrowly lanceolate, mid-lobe of stipule with slender stalk, lateral lobes linear. Common ..... *V. segetalis.*

Do., but leaves broader and very obtuse, mid-lobe of stipule broader, more foliaceous. Locally common. f. *obtusifolia.*

Plant 6–10 in. in height, branches upright or sharply ascending from the base, subequal to main stem, leaves ovate-lanceolate. Locally common ..... *V. Deseglisei.*

Do., but plant usually shorter and with linear leaves and mid-stipular lobes. Local ..... f. *subtilis.*

** Branches prostrate or widely spreading and decumbent from the base.

Lateral branches very long (8–12 in. or more) and prostrate; leaves lanceolate-acute, mid-lobe of stipule usually toothed, acute at apex, whole plant densely covered with short hairs which give it a dull rather ashy appearance. Very common. *V. agrestis.*

Branches 6 in. or more. Leaves large, broadly ovate or oval, clear green, mid-lobe of stipule very broad-based, rounded, obtuse, lateral lobes spreading at nearly right angles, rather broad, parallel-sided, ±obtuse. Very common ..... *V. ruralis.*

Plant smaller than *ruralis*, leaves small, rather densely hairy, pale green, stipules similar to those of *ruralis*, but much smaller. ? Rather rare ..... *V. anglica.*

Plant dark clear green, nearly glabrous, leaves very broadly ovate or oval with long slender petioles, stalk of mid-lobe of stipule elongated, slender, sepals large, petals whitish, very pale, generally shorter than the sepals. Rare ..... *V. latifolia.*

Tricolor Group.

* Plants not cæspitose, branches for the most part upright.

Plant tall (10–12 in.), leaves acute, stipules pinnately lobed, mid-lobe narrow acute, flowers pale creamy yellow. ? Rather rare ..... *V. contempta.*

Plant tall (8–12 in.), very leafy, leaves large, usually oblong-lanceolate, obtuse or subacute, mid-lobe of stipule ±crenate, sepals broad, upper or all the petals purple or violet (occ. all yellow). Locally abundant ..... *V. Lloydii.*

Do., but with very large flowers; internodes generally longer than the leaves. Uncommon..... f. *insignis.*

Plant short (4–5 in.), unbranched or with few very short basal branches, leaves oblong-lanceolate, coarsely crenate obtuse, mid-lobe of stipule narrowly oblong or spathulate entire, lateral lobes short, flowers few, very large, violet, on long peduncles. Orkney and Shetland Is., Caithness, and Sutherland..... *V. orcadensis.*

Plant tall (10–12 in.), leaves lanceolate or ovate-lanceolate, acute, smaller than in *Lloydii*, the plant thus appearing less leafy; sepals narrow, petals violet or particoloured. Locally common ..... *V. Lejeunei.*

Plant small (3–4 in.), little branched or unbranched, leaves very hairy, petals yellow or upper petals tinged with pale violet. Rare. (Certain less hairy plants with smaller flowers from Berkshire seem to be inseparable from *vectensis*.) ..... *V. vectensis.*

** Plant ±cæspitose or at least with branches widely prostrate at base.

Plant widely spreading (8–12 in.), leaves and mid-lobes of stipules narrow, acute; flowers pale creamy yellow. Rare..... *V. contempta* var. *patula.*

Branches 3–5 in.; leaves of middle of stem broadly ovate obtuse, stipules very small, mid-lobe not much larger than the lateral lobes, especially on the lower leaves; plant usually with very small flowerless branches at the base bearing round leaves; petals pale yellow or the upper petals violet. Very local ..... *V. monticola.*

Branches 6–8 in.; leaves and mid-lobes of stipules ±rounded or obtuse, distinctly hairy, flowers particoloured or violet. Locally abundant ..... *V. variata.*

Do., but stouter, leaves larger and less hairy, sepals broader, petals sulphur-yellow; plant with general habit of *ruralis*. Locally abundant..... *V. variata* var. *sulphurea.*

Similar to *sulphurea*, but more slender, with smaller leaves and stipules, narrow sepals, and smaller sepaline appendages. Very rare .... *V. alpestris.*

Plant small, branches 4–5 in.; leaves and stipules very small, densely covered with short hairs; mid-lobe of stipule ±rounded and obtuse; flowers brilliantly particoloured on very slender peduncles. Very rare ..... *V. cantiana.*

Saxatilis Group.

All our British plants come under *V. lepida* Jord. Typical *lepida* has many tall (10–12 in. or more) upright stems with narrow leaves (sometimes considerably broadened) with digitate stipules and entire (or in the lower leaves ±crenate-dentate) mid-lobe. *V. carpatica* Kerner is a luxuriant state with large leaves, while *V. meduanensis* Jord. is probably, at least in part, merely *lepida* flowering in its first year.

Lutea-Curtisii Group.

* Plants of calcareous uplands, usually only slightly hairy.

Aerial branches short, few-flowered, flowers yellow. Locally abundant ..... *V. lutea* Huds., *sens. str.*

Do., flowers purple. Locally abundant with *lutea* ... f. *amœna.*

Plant low-growing, with prostrate rooting sympodial branches and more hairy leaves. Very rare ..... f. *Murrayi.*

Branches long straggling (10 in. or more), flowers very large, purple (occasionally yellow), lower petal strongly unguiculate. Very rare ..... f. *sudetica.*

Aerial stems many, tall (10–12 in. or more), leaves broad, lower petal less unguiculate, flowers bright parti-coloured or yellow. Very local ..... f. *polychroma.*

Aerial stems many (6–10 in. or more), leaves narrow, flowers usually smaller than in typical *lutea*. Very local ..... f. *calaminaria.*

** Plants of sand-dunes by the sea, usually very hairy.

Underground branches more woody than in *lutea*, flowers yellow, usually smaller than in *lutea*, but varying greatly in size. Locally abundant ..... *Curtisii* f. *Forsteri.*

Do., but usually less hairy than in *Forsterii*, and with parti-coloured or purple flowers. Locally abundant ..... f. *Pesneaui.*

A short description of *V. contempta* var. *patula*, referred to in the Key, but not hitherto described, here follows:—

Viola contempta Jordan var. **patula**, var. nov. *Viola* annua, *V. contemptæ* similis, sed ab illa ramis patulis differt.

Annual, branches widely spreading from the base, more or less prostrate, with short hairy coating; *leaves* lanceolate to linear-lanceolate, acute, crenate, more or less hairy, strongly ciliate; *stipules* with linear-lanceolate or linear-oblong acute entire or crenate-dentate mid-lobe and linear acute lateral lobes arising chiefly near the base, distinctly hairy and ciliate; *petals* longer than the sepals, pale yellow, the upper occasionally with slight violet suffusion. The plant resembles *V. contempta*, but is at once distinguished by its widely-spreading more or less prostrate habit. It is not covered by Jordan's description of *V. contempta* (*Pugillus*, 24, 1852).

Hab. In arable land. Surrey—Shere; Sussex—near Crowborough; Buckinghamshire — Chesham; Hertfordshire — Purwell Field, near Hitchin (*J. E. Little*).

LICHENOLOGICAL NOTES.—IV.

By W. Watson, D.Sc.

As in former notes, species and varieties not previously recorded for the British Isles are indicated by asterisks, and botanical vice-counties are indicated by their numbers. Many of the records of localities are due to the work of Messrs. D. A. Jones, of Harlech, and H. H. Knight, of Cheltenham, and such records are indicated by D. A. J. and H. H. K., respectively.

Stenocybe bryophila Wats. In Bull. Soc. Mycol. France, 1926, 207, Abbé L.-J. Grelet describes a new variety of *Stenocybe major* as var. *Macvicaris*. It was found on the liverwort *Plagiochila punctata*, collected by S. M. Macvicar at West Inverness, v.c. 97, in 1903. The description was considered by Miss Lorrain Smith to correspond with that of the plant published under the name of *S. bryophila* in this *Journal* (1925, 130), and she kindly drew my attention to the matter. On communicating to the Abbé Grelet a copy of the description of *S. bryophila*, he agreed that his new variety of *S. major* corresponded, and that the former name had priority. He also kindly sent me a portion of his type-specimen, and there is no doubt as to the identity of the two plants. The Abbé describes the plant as a fungus and considers it to be "une forme intermédiare quant aux dimensions des spores" between *S. major* Nyl. and *S. septata* Rehm., but "avec un habitat différent." Apparently he considers that *S. septata* (*Calicium septatum* Leight.) should also be placed as a variety of *S. major*. This interpretation of the status of these plants is not generally accepted by lichenologists. *Plagiochila* is one of the genera of hepatics on which *S. bryophila* has previously been found. It was on *P. punctata* at Ceunant Mawr

(D. A. J.) and partly on *P. tridenticulata* at Cwm-y-glo. The habitat is always on hepatics except in the possible case mentioned in the original description (this *Journal*, 1925, 130), when it seemed to be attached to *Sphærophorus* (inadvertently given as *Stereocaulon* previously) *compressus*.

S. byssacea (Fr.) Nyl. On branches of alders overhanging water, near Launceston on Devon side, v.c. 3; Langford Heathfield, v.c. 5; near Brecon, v.c. 42 (D. A. J.).

S. septata (Leight.) Rehm. On holly, New Forest, v.c. 11 (D. A. J. and H. H. K.).

Parmelia saxatilis var. panniformis Schaer. Harmand (*Lichenes de France*) gives several forms which are found in our islands. Form **cinereo-albida* Harm. is not uncommon, and I have definite records of it from Princetown (3), Oareford (5), Bristol (34), Brecon (42), Astro Valley and Dolgelley (48). It may be considered as typical *P. saxatilis* var. *panniformis*, and is not necessarily the same plant given as form *panniformis* by Crombie (Mon. Br. Lich. 241) and referred to by Lorrain Smith (Mon. Br. Lich. 133), since Crombie's plant was sometimes so isidiiferous that it is referred to as a state of *furfuracea*, whereas typical *panniformis* has a fairly smooth thallus. Form **cæsio-pruinosa* Harm. has a bluish tint and is a much rarer plant. It occurs on rocks near Bristol (34) and near Hepste Falls (42). There is a tendency for the blue colour to disappear in the herbarium. This form does not correspond with *P. omphalodes* form *cæsio-pruinosa* Nyl. ex Stiz. (Cromb. Mon. p. 244; Lorrain Smith, Mon. i. p. 144), as this is put under the type of *P. omphalodes* and is not given as being panniform or with narrower laciniæ. Form *brunnea* Harm. may be considered as the typical form of what is usually regarded as *P. omphalodes* var. *panniformis*, and is a fairly frequent plant in mountainous districts. Form **nigrescens* Harm. is a dark form and is better placed under *P. omphalodes* var. *panniformis*. Harmand does not recognise the specific status of *P. omphalodes*, merely giving it as a variety of *P. saxatilis*. *P. omphalodes* var. *panniformis* form *nigrescens* (Harm.), comb. nov., not only has a darker colour, but the reticulations are usually indistinct and often almost absent. It seems to be a plant of mountainous districts and occurs on rocks, Brecon Beacons (42), Harlech (48, D. A. J.), and Cwm-y-glo (49).

P. exasperata (Ach.) Carroll is given as general and common in the S. and W. (Smith, Mon. Br. Lich. i. 142), but it is rare in Somerset. It occurs on trees at Dunster (5) and at Minehead Warren. In the same district Mr. Knight and I noticed it on shingle boulders. So far as I am aware, it has not previously been recorded from rocks in the British Isles.

P. sorediata (Ach.) Th. Fr. A specimen collected near Peebles, v.c. 78, by T. Hebden in 1891, was determined by Nylander.

P. FULIGINOSA form *ATERRIMA Wedd. is a very dark form found on rocks, especially near the sea :—Lustleigh (3), Withypool and Porlock (5), near Bristol (6), Fifield (7), and Dolgelly (48).

Var. GLABRATULA (Lamy) Oliv.; Longleat (6).

P. CAPERATA form SOREDIOSA Malbr. is the sorediate form which is not so common as the type, but is well distributed throughout the British Isles.

Var. *SAXICOLA Müll., on shingle, Porlock, v.c. 5. This is not merely a saxicolous state, since many saxicolous specimens of *P. caperata* cannot be referred to it. According to Flagey (*fide* Harm. Lich. de Fr. p. 574) it somewhat resembles *P. conspersa*, but is easily distinguished from it by the less laciniate lobes, less concave apothecia with their margins less crenated, and especially by the rarity of spermogonia.

P. SINUOSA (Sm.) Ach. On rock, Loch Gal, Kerry (T. Hebden).

P. DISSECTA Nyl. On tree, Tyn-y-Groes, v.c. 48.

P. MULTIFIDA (Dicks.) A. L. Sm. On rocks, Cwm Mawr, v.c. 48 (D. A. J.).

P. ACETABULUM (Neck.) Dub. Martinsell hill, v.c. 7 (H. H. K.).

P. DUBIA (Wulf.) Schaer. Saxicolous plants, which are rare, occur on shingle and on a sea-wall at Blue Anchor (5). A number of small species have been segregated from the main stock. *P. ulophylla* Ach., *P. reddenda* Stirt., *P. rudecta* Ach., *P. negata* Nyl., *P. stictica* Nyl., *P. cristifera* Tayl., and *P. frondifera* Merrill, all seem to belong to the stirps of *P. dubia*. Some of these occur in our islands. *P. dubia* var. **ulophylla* (Ach.) Harm., on a Lombardy poplar, Oake near Taunton, v.c. 5, has more-or-less recurved sorediate lobes somewhat similar to those of *P. physodes* form *labrosa*. *P. rudecta* Ach. Syn. Lich. 197 (1814); Nyl. Syn. Lich. 369 (1860); "thallus leviter scrobiculato-rugosus, ciliis et sorediis destitus, *maculis albis prominulis dense instructus*, margine excepto dense (usque confluente) isidiiformiter vel squamuliformiter microphyllinus vel glomuliferus." The cortex gives a yellowish coloration with K and the medulla a reddish one with C. Many British plants, which have been considered as states of *P. dubia*, are albo-punctate and become more or less isidioid, but to a less extent than in typical specimens of *P. rudecta*. The reaction of the medulla is similar to that of *P. dubia*. Corticicolous specimens from two localities near Harlech, v.c. 48 (*leg.* D. A. J.), correspond almost exactly with a Nylanderian specimen in the British Museum Herbarium (*ex herb.* Nylander, 1874, from S. Carolina, Ravenal, 1852), but the reaction of the medulla to calcium hypochlorite is negative. These belong to **P. negata* Nyl., which chiefly "differt a *rudecta* thallo firmiore, medulla CaCl—," Nyl. Lich. Pyr. Or. in *Flora*, 1872, 547. It has also been noted from the New Forest at Bramshaw, v.c. 11. A specimen of *P. dubia* in my

herbarium, collected by G. Livens, contained the typical form and also another which was apparently considered distinct. In this the thallus was albo-punctate rather than albo-sorediate with the points becoming larger and irregular, whilst neither the points nor the medulla gave any coloration with C. *P. reddenda* Stirt., is "precisely similar externally both in colour and albo-soredioid points to *P. Borreri* Turn., but the medulla K—C—" (Leight. Lich. Flora, ed. 3). Crombie considered that it was an accidental state in which the medulla (not the soredia) gave no reaction with calcium hypochlorite. The specimen in the British Museum Herbarium was collected by J. M. Andrew from New Galloway. The soralia are quite distinct and, though isidioid granules are sparsely present, the plant seems quite distinct from *P. negata*. Glyn, near Capel Curig, is another locality given for the plant by Leighton.

Several specimens, which have been named *P. reddenda*, at some time, by myself and other lichenologists, are referable to *P. negata* Nyl. A specimen from the Taunton district referred many years ago to *P. reddenda* has been mislaid, but it was probably correct. On comparing a series of plants from the same locality, especially in the field, belonging to the stirps of *P. dubia*, it is difficult to resist the conclusion that they are all forms of one plant. Specimens are frequently met with in which the white spots characteristic of *P. rudecta* or *P. negata*, partly merge into soralia similar to those of *P. dubia*, and partly become more or less confluent groups of isidia or small squamules. The more or less recurved sorediate lobes justify the separation of *ulophylla* as a variety, whilst *negata* may have the same status because of its negative reaction to C. *P. stictica* Nyl., *P. cristifera* Tayl., and *P. frondifera* Merr. have not been recorded from our islands.

PARMELIOPSIS AMBIGUA (Wulf.) Nyl. On pales near Droitwich (D. A. J. and H. H. K.), v.c. 37. On birch in v.c. 50 and on firs in v.c. 51, Nant-y-Ffrith (D. A. J.). Malham, v.c. 64 (T. Hebden).

P. HYPEROPTA (Ach.) Arn. On birch, Cwm Bychan, v.c. 48 (D. A. J.). Bettwys-y-Coed, v.c. 49 (H. H. K. in Trans. Br. Mycol. Soc. 1924).

BIATORA MICROCOCCA Krb. On oak, Oaksey, v.c. 7 (H. H. K.).

B. TURGIDULA (Fr.) Nyl. On pine, Aviemore, v.c. 96 (H. H. K.).

B. ERYSIBOIDES (Nyl.) Th. Fr. Near Harlech, v.c. 48 (D. A. J.).

B. PRASINA (Fr.) Syd. This is usually corticolous, but a plant from the bare soil of a hedgebank near Stogumber (5) agrees, except that the apothecia are often paler at first. They eventually become livid brown to blackish. As usual many spores are simple.

B. VIRIDESCENS (Schrad.) Mann. On gate-top, Portmadoc, v.c. 49 (*leg.* D. A. J.).

B. RUFOFUSCA Anzi. On the trunks of beeches near Lydeard hill (900 ft.), Quantocks, v.c. 5. I am indebted to Mr. Paulson for

independent corroboration of the determination of this plant. He remarks (*in litt.*) that "the specimen on beech sent by Larbalestier from Kylemore, Connemara, is remarkably like the Quantocks one. The specimens marked Anzi Cat. Lich. Sondr. 76 (1860), in the Kew Herbarium, are on decayed vegetation and do not look like the Kylemore specimen." The Quantock plant has remarkably rigid and cylindrical paraphyses which are discrete rather than concrete. The spores are 7–8 μ broad, and are therefore wider than is usually given for *B. rufofusca*. The slight differences do not seem sufficient to form a new species.

BIATORA VERNALIS (L.) Fr. form MINOR (Nyl.) Arn. On trees, Torrent Walk, Dolgelley, v.c. 48.

B. SYMMICTELLA (Nyl.) Lind. On pine, Cwm Bychan, v.c. 48. Previously recorded only from Braemar (92).

B. SANGUINEOATRA (Wulf.) Tuck. On *Frullania Tamarisci*, Crickley Hill, Cheltenham (H. H. K.), v.c. 33.

LECIDEA PROMINULA Borr. On wall, Cheddon Fitzpaine, v.c. 5. On wall near Harlech, v.c. 48 (D. A. J.).

L. KOCHIANA Hepp. is a frequent plant in vice-counties 48 and 49. It has also been noted at Brecon (42), Aberystwyth (46), Buckden (64), Hawkshead (69).

Var. LYGEA Leight. has been noted on the stones of the cairn on Dunkery Beacon (1760 ft.), Exmoor, in v.c. 5. In v.c. 48 and 49 it seems to be commoner than the type.

L. PETROSA Arn. On limestone pavement, Cray and Buckden, v.c. 64. Vainio considers this to be a variety of *L. albosuffusa*.

L. MERSATA Stirt. On stones, sometimes submerged, on shore of Loch Tulla, v.c. 98.

L. CINERASCENS (With.) A. L. Sm. Oareford (5), Craig-cerig-Gleisiad and Hepste Falls near Brecon (42), Buckden (64).

L. NIGROGRISEA Nyl. The "only locality" in the *Monograph of British Lichens* is on a mica-schist wall in Perthshire. Plants agreeing with the description are found on calcareous stones in fields, Thurlbear (5) and Somerton (6).

L. FURVELLA Nyl. has only been recorded from the Grampians, but plants from arenaceous rocks, Cocker Combe, Quantocks (5), and Precipice Walk, Dolgelley (48), seem referable to it.

L. EXPANSA Nyl. On shingle, Chesil Beach (9) and Blakeney Pt. (27 and 28). On rocks, Llanwrtyd (H. H. K.) and Brecon (42).

BACIDIA SCOPULICOLA (Nyl.) A. L. Sm. On soil over rock, Land's End (H. H. K.), v.c. 1. The "only locality" previously recorded

as at Penzance. Another *Bacidia* collected by Mr. Knight from the Lizard is near to *B. scopulicola*, but is probably an undescribed species.

MICROGLÆNA BREADALBANENSIS Wh. & Wils. was described from material from the Breadalbanes. A plant collected from Brecknock Beacons (42) in 1927 has been compared with the type-specimen in the National Museum of Wales at Cardiff. The thallus is much better developed, is slightly rougher, and shows the cracked-areolate character much better. Correlated with the better development of the thallus, the asci and spores are better shown and are slightly larger. The spores are usually arranged in an obliquely uniseriate manner and their septation is variable in both the Brecknock and the type-specimen from Ben Cruichben, but in both they are somewhat irregularly muriform when mature. The only definite difference between the two specimens is in the reaction of the hymenium to iodine: in the Brecknock specimen a temporary bluish coloration appears, whilst in the type-specimen the coloration is wine-reddish. In the original description the spores are given as irregularly biseriate and 10 μ thick. In a perithecium of the type-specimen examined, the spores were often uniseriate (sometimes so obliquely arranged as to appear biseriate), irregularly muriform when mature, and sometimes broader than 10 μ.

THELIDIUM TERRESTRE Wats. On soil on bare parts of bank, Cushuish, v.c. 5. This is the second record for this plant, which was first found on a bank, about five miles away from the present locality. It also occurs on a bare hedgebank about a mile away from its original locality at Cheddon, near Taunton. Its relationship to *T. hospitum* Arn. is close, but the spores are rather smaller and smoother, the asci are larger, the perithecia are not truncate, and the thallus is rather more definite.

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

DACTYLORCHIDS IN FRANCE AND GREAT BRITAIN.—Dr. T. Stephenson (Bull. Soc. Bot. Fr. lxxv. pp. 481–495, 1928) gives an interesting account of our present knowledge of the group *Dactylorchis* occurring in France and Great Britain. The principal species are *O. maculata*, *O. latifolia*, and *O. incarnata*, to which should be added a complex series of marsh-orchids of which the most important are *O. prætermissa* Druce and *O. sesquipedalis* Willd.

O. maculata L. Two forms are enumerated, A and B. Form A is larger, 25–35 cm. high, the leaves are more flattened, the lower ones oval or oboval and generally obtuse; the floral spike is conical at first and the labellum has a prominent middle lobe, larger than the lateral which are often narrow. Form B is shorter, 15–25 cm. high on the average; leaves nearly all reflexed, the lower oval-lanceolate;

the floral spike is more cylindrical and usually shorter; labellum with the middle lobe generally very small, and even when it is fairly large it is not prominent; the lateral lobes are relatively more important. Form A corresponds to what is known on the continent as *O. maculata* L. type, though Dr. Druce feels convinced that form B is the true *O. maculata* L. Form B was first called in England *O. maculata* var. *præcox* Webster (1886), then *O. maculata* subsp. *ericetorum* Linton (1900), but Col. Godfery (Journ. Bot. 1921, 305 *et seq.*) has given good reasons for the admission of the name *O. elodes* Grisebach. In Great Britain and Ireland the two forms have an extended geographical distribution. *O. maculata* favours the borders of woods and the neighbouring meadows. *O. elodes* grows, often profusely, on stretches of heath and the edges of marshes. In Ireland a very beautiful form of *O. maculata* is found, having leaves always unspotted and flowers pure white (*O. O'Kellyi* Druce).

O. latifolia L. British specimens which the author has considered to belong to this species have more or less broad leaves, usually with accentuated spots or circles of dark brown, although some are not spotted; the labellum is broader than long, the lateral lobes regularly rounded and the middle lobe small and rounded; the colour of the flowers varies from pale purple-violet to dark purple-violet; these plants are found in humid places, generally in the company of other marsh-orchids.

O. purpurella T. & T. A. Stephenson. This new and interesting orchid was described in 1920. It is normally short, 12–15 cm. high, although it may reach 25 cm.; the leaves are carinate, lanceolate, and rather broad, generally having small black dots at the apex; labellum either rhomboidal and scarcely 3-partite or more rounded, with a small rounded middle lobe. In Great Britain it has been found in Wales, northern England, and also in Scotland and the Orkney and Shetland Islands. English forms were first taken to be *O. cruenta* Muell., but this is incorrect.

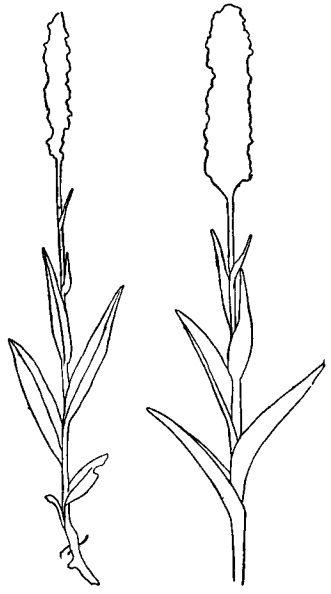
O. incarnata L. In English floras this species has sometimes been placed under *O. latifolia*, but it is quite distinct and is probably the most ancient of the group *Dactylorchis*. The leaves are fleshy, erect, yellowish green, without spots, broader at the base and generally hooded at the apex; the labellum is ±7 mm. long and broad, and normally has markings of simple lines in a lozenge-shape, evenly distributed on each side of the labellum; the colour is very variable, frequently flesh-pink but often also purple-violet of the usual orchid shades; other varieties are white, straw-yellow, lemon-yellow, brilliant purple or deep maroon. Var. *pulchella* Druce is a beautiful purple with the labellum-marking formed of accentuated deep purple-violet lines.

O. prætermissa Druce. This was first described in 1913. It is very common and was first considered a form of *O. latifolia* or *O. incarnata*. It has the habit of *O. latifolia*, with broad- or narrow-lanceolate leaves, spreading and not erect or joined in a hood at the apex as in *O. incarnata* and never spotted; the labellum is spreading and larger than in *O. incarnata*, the middle lobe being either small and

rounded or long and prominent; the marking is formed of dots and dashes, few or abundant; the colour is usually pale purple-violet, but sometimes also rich magenta, pale lilac, or white. This is much the most common marsh-orchid of the British Isles. There is a fine variety in Scotland and the north and west of England with a rich purple-violet flower—var. *pulchella* Druce.

O. sesquipedalis Willd. This beautiful species is absent from Great Britain and northern France. An account of it was given by Dr. Stephenson in Journ. Bot. 1925, p. 93, t. 572.

The leaf-habit is illustrated in the accompanying block kindly lent by Dr. Stephenson.



Orchis sesquipedalis Willd.
Habit of leaves.

The paper is illustrated by two photographic plates, each showing three species. The hybrids are not discussed, as this subject would need a special treatise to itself.—E. G. B.

POLLINATION OF *EPIPACTIS* (P. Martens in Bull. Soc. Roy. Bot. Belg. lx. pp. 109–11, 1928).—In a recent paper (ibid. lix. 1926, pp. 69–88, 18 figs.) the author has shown that in *Epipactis latifolia* All. direct pollination is effected by insects, small Coleoptera lifting up the wall of the anther, loading themeselves with pollen and then discharging part of it on the receptive portion of the

stigma. He has also noted that if the wall of the mature anther is straightened and the large end of the pollinium slightly raised, the whole pollinium continues spontaneously the movement so started, moves up and down in front, pivoting on the "bonnet" of the rostellum, and finishes by reaching the stigma itself.

More recent observations compel him to question the latter point. On all the flowers examined this year the pollinium, when raised, has resumed its first position or remained motionless even if forced to bend forward. The density of the viscous matter which attaches it to the rostellum seems to prevent the pivoting movement and no doubt it is the variable degree of viscosity or fluidity of this matter which explains the difference in the results.

Direct pollination by Coleoptera is shown to be very general, the majority of flowers being visited when scarcely open.

The author confirms the descriptions of Kirchner and of Kerner von Marilaun (Kirchner, *Blumen und Insekten*, 341, 1911; Kerner von Marilaun und Hansen, *Pflanzenleben*, ii. 451, 1921) and also his previous observations on autogamy (l. c. lix. 69–76)—spontaneous or brought about by insects.—E. G. B.

ANDROGYNY IN THE *CAREX DIOICA* Group, by Th. Arwidsson (Svensk Botanisk Tidskrift, xxii. p. 106, 1928).—Arthur Bennett (Journ. Bot. 1927, 351) described an androgynous *C. dioica* under the name *C. dioica* forma *isogyna*: it was the only British specimen he had seen. The present author states that the androgynous plants of this group can take the following forms:—(1) Two-thirds of the lowest part of the spike is composed of male, the upper third of female flowers. (2) Spikes of equally mixed male and female flowers or the female preponderating. (3) Some female flowers at the middle or at the apex of the spike. (4) From the same rhizome arise stems with spikes of male flowers only and stems with spikes for the greater part of female flowers.

Figures are given of an androgynous spike of *C. dioica* from Sweden and an androgynous *C. parallela*. The author gives exact localities in Sweden, Norway, and Finland where androgynous plants have been collected, and concludes with an enumeration of the literature bearing on this subject.—E. G. B.

OBITUARIES.

JOHN MERLE COULTER

(1851–1928).

PROFESSOR COULTER'S name has become familiar to botanists throughout the world from his association with the *Botanical Gazette*, for many years past one of the best-known botanical journals. And equally so, perhaps, from his association with the Department of Botany of the University of Chicago, of which he was the head from its foundation in 1896 until his retirement in 1925.

Born at Ningpo in China (Nov. 20, 1851), Coulter was educated

in America, his *alma mater* being Hanover College, Indiana. He left College in 1872 and worked for two years in the Rockies as botanist to the U.S. Geological Survey. The results of this work appeared in a *Synopsis of the Flora of Colorado*, by Prof. Thos. Porter and himself, in 1874, in which were also incorporated the results of the investigations of the earlier collectors. Coulter's *Manual of the Botany of the Rocky Mountain Region*, published ten years later, was a more important piece of work, on the lines of Gray's *Manual of the Botany of the Northern United States*. With Sereno Watson, Coulter also edited the sixth edition of Gray's *Manual* (1890). Other contributions to American taxonomy were a *Flora of Indiana* with his brother, M. S. Coulter, which appeared as a Supplement to the *Botanical Gazette* (1881), a revision of the "North American Umbelliferæ" (1888), and a "Synopsis of the Mexican and Central American Umbelliferæ" (1900), both in collaboration with the late Dr. J. N. Rose.

Meanwhile, Coulter held various academic positions—Professor of Natural Sciences at Hanover College (1874–9), Professor of Biology, Wabash College (1879–91), President of Indiana University and Professor of Botany (1891–3), and President, Lake Forest University (1893–96)—before he was appointed to the new Department of Botany at Chicago.

In 1875 he started the *Botanical Bulletin* as a medium for short floristic notes. From this modest sheet of four pages (subscription price, One Dollar) has developed the important journal familiar to the present generation of botanists. The name was altered with the second volume (with an increase in size to eight pages) to the *Botanical Gazette*, apparently in deference to the wish of some botanists, who feared that confusion might arise with the *Bulletin of the Torrey Botanical Club*. "However," the editor remarks "we have selected a name which we are assured by an accomplished scholar and botanist means about the same thing."

Coulter retained the editorship for fifty years, at times in association with other botanists, and when in 1926 Prof. Henry Cowles took over the responsibility, Coulter's name was retained as Editor Emeritus. In 1896 the Gazette became the property of the Chicago University and also a medium for the publication of the work of the School of Botany which Coulter was developing with the help of his assistant, C. J. Chamberlain. The work of this school is familiar to students in the volumes on the 'Morphology of the Seed-plants,' by Coulter and Chamberlain, which, besides embodying the results of the work of the Chicago school, supply a useful critical review of the subject, especially the details of sporangial development, fertilization, and embryology.

Coulter also shared in the production of a *Text-book of Botany for Colleges* (1911); and other works for students were *Evolution of Sex in Plants*, in the University of Chicago Science Series (1914), and a small handbook on *Plant Genetics* (with M. C. Coulter) (1918).

Coulter's interests were not confined to his editorial and professorial

work. He had taken his share in the work of Scientific Societies and Associations. Among other offices, he had been General Secretary and, later (1918), President of the American Association for the Advancement of Science, President of the Botanical Society of America, of the Chicago Academy of Sciences, and the American Association of University Professors.

Among the marks of recognition for his services to botanical science was the Foreign Membership of the Linnean Society, to which he was elected in 1921. He was also an Honorary Fellow of the Botanical Society of Edinburgh and a Corresponding Member of the British Association.

On resigning his professorship at Chicago in 1925, he became adviser to the Boyce Thompson Institute of Plant Research, Yonkers, N.Y. He had been a member of the National Research Council since 1923. He died on December 23 last, after a few weeks' illness.—A. B. R.

Richard Hind Cambage, C.B.E.

In the November number of the *Journal* we gave a short report of Mr. R. H. Cambage's Presidential Address to the Australian Association for the Advancement of Science at Hobart, and it is with much regret that we hear of his sudden death on November 28, at the age of 69. Though not a professional botanist, Mr. Cambage had made useful contributions to botanical knowledge in Australia. He held a Government appointment in New South Wales—Surveyor of Mines—and had served as Under Secretary for Mines. He was specially interested in *Acacia* seedlings and contributed a series of papers to the *Journal and Proceedings of the Royal Society of New South Wales* (1915–1924) on their form and development. He had served as President of this Society (1912–13), and was a frequent contributor to its *Journal* on subjects mainly of floristic interest. A series of notes on the native flora of New South Wales appeared in the *Proceedings of the Linnean Society of N.S.W.*

Mr. Cambage had wide scientific interests, and in the official intimation to its members and correspondents of "the great loss it has suffered by the sudden death of its President" the Australian Association refers to the loss to Australasian science of one of its most able and active supporters. He was President of the recently constituted Australian National Research Council, to the work of which he referred in his recent Presidential Address to the Association. His services to the Commonwealth were recognised by the conferment of the C.B.E.

Botanists who visited Australia in 1914 with the British Association will remember Mr. Cambage as one of the hosts at Sydney. He co-operated with the late Mr. Maiden in an account of the botany of certain areas of the colony in the British Association *Handbook* for New South Wales, and proved a very helpful guide in the long excursion to the Blue Mountains and the Jenolan Caves. He was elected F.L.S. in 1904.—A. B. R.

Richard Henry Yapp
(1871–1929).

By the untimely death of Professor R. H. Yapp, botanical science has lost an ardent investigator and the University of Birmingham a gifted teacher. Born in the village of Orleton in Herefordshire in 1871, he was educated at a Secondary School in Hereford, and, having lost his father at an early age, he was placed in business in Leominster. His strong inclination towards an academic career, however, led him to pursue his studies in evening classes and later on to attend lectures at Nottingham, which he did with such success that in 1895 he entered St. John's College, Cambridge, where he obtained a scholarship. Graduating with First Class Honours in Botany, he was awarded the Frank Smart Studentship of Gonville and Caius College, and was appointed botanist to the University scientific expedition to the Malay States. Of this excellent opportunity for a young naturalist to become familiar with tropical vegetation, he made the fullest use, and he always looked back with pleasure to this expedition, which was not without its adventures. Returning to Cambridge, he published several papers in the *Proceedings of the Cambridge Philosophical Society* and the *Annals of Botany* on plants collected in Malay, one dealing with "Myrmecophilous Ferns." His interest in the study of natural vegetation having been roused by his visit to the East, he was attracted by the peculiar environmental conditions of the fen flora and for many years he studied them carefully, publishing an account of the vegetation of Wicken Fen in the *New Phytologist*. Continuing his studies of marsh plants, he published an important paper in the *Annals of Botany*, dealing with the development and structure of the leaves of *Spiræa Ulmaria* as bearing on the problems of xeromorphy.

Elected to the Professorship of Botany in University College, Aberystwyth, Yapp commenced a detailed investigation of the interesting salt-marsh vegetation of the Dovey Estuary, two accounts of which appeared in the *Journal of Ecology*. His interest in this branch of botany was always profound, and, after serving on the committee of the Ecological Society for some years, he was elected President in 1921. His presidential address on the "Concept of Association" was followed a few years later by an equally interesting paper on the "Concept of Habitat," both of these publications indicating the development of his critical powers.

For these investigations and publications Yapp found time, in spite of onerous teaching and organising duties, not only while at Aberystwyth, but subsequently when he was elected to the Chair of Botany in Queen's College, Belfast, and, finally, as Mason Professor of Botany in Birmingham, a post he occupied since 1919. Here he was of late years busily engaged in planning and superintending the building and equipping of an excellent new laboratory, which was opened in the autumn of 1927. But, alas, Yapp was never destined to work in this spacious building. Already in the summer of that year he began to suffer, and at the beginning of 1928 the doctors had

diagnosed a serious ailment. But Yapp never lost courage or patience during his long illness. Cheerfully he set himself to complete some of the work he had had to lay aside when other duties were pressing, and though confined to bed he undertook and carried out the revision of the English Version of Prof. Maximov's book on the *Plant and its Relation to Water*, which dealt with problems closely related to his own investigations. The last proofs of this book were revised only a few weeks before his death, which occurred on January 22nd of this year.

Those botanists who were privileged to know Yapp will remember him as one of the most gentle and courteous of friends. Always keen to discuss botanical problems whether his own or those of others, he was ever ready with valuable advice and help. Those who saw something of his heroic behaviour during his illness will cherish the memory of a truly great man, and like these he had a most modest nature. His death is a great loss to botanical science, which can ill afford to lose so keen an observer and so ardent an investigator.—F. E. Weiss.

Percy Highley
(1856–1929).

Some of our readers will have a sense almost of personal loss in the death of Mr. Percy Highley which closed an association of more than fifty years with the Natural History Departments of the British Museum. During that period Mr. Highley has illustrated British Museum 'Guides' and 'Catalogues' and innumerable papers, official and otherwise, by members of the staff and other workers, in the publications of various Scientific Societies. Many of his drawings, both in black-and-white and water-colour, are exhibited in the public galleries—for instance, in the exhibits illustrating structure and classification of Sponges, Tunicates, Corals, &c., and especially those in the Botanical Gallery.

Percy Highley was born in London, Aug. 12, 1856. His father was the last of the old firm of medical book-publishers of Samuel Highley in Fleet Street; he studied medicine at Guy's Hospital, but did not practise. Through his father, Highley was brought in contact with Drs. Carpenter, Bent, Busk, and others. His first work was on the 'Challenger' Report, and included illustrations for the Polyzoa by Busk, the Sponges by S. O. Ridley and Dendy, the Corals by Moseley, and the Crinoids by P. H. Carpenter. In this way was begun his life-long association with the Natural History Museum.

His introduction to the Department of Botany was through George Murray, who taught him to make drawings of microscope preparations of Algæ, and to hunt out and draw Peridinieæ, Diatoms, &c., in the marine dredgings made largely by Murray himself. A number of these, unpublished, are in the Department, and in some are revealed the reproductive bodies of the Diatoms which had hitherto been very imperfectly known. Highley also illustrated Murray's short-lived *Phycological Memoirs* and his *Introduction to the Study of Seaweeds*. After Robert Morgan's untimely death in 1900, Highley became practically the unofficial draughtsman of the

Department. His work in the *Journal* is familiar to our readers, and he also prepared illustrations for papers by members of the staff in the *Journal and Transactions of the Linnean Society*, and for official publications, notably the *Monograph of British Lichens* (Lorrain Smith) and the *Flora of Jamaica* (Fawcett and Rendle); his last piece of work was the preparation of the drawings for a *Handbook of British Seaweeds* by Dr. L. Newton, now in the press.

Highley was a good draughtsman and lithographer, and could also dissect carefully and draw floral details or work out points in microscope preparations. He took great pains and interest in his work, but would not be hurried, and he possessed to the full what is generally condoned, perforce, as the artistic temperament. He always looked ill and had probably long suffered from anæmia, to a pernicious attack of which he eventually succumbed; but he was endowed with a cheery optimism, which must have stood him in good stead in the uncertainties attendant on his means of livelihood. The latter years of his life were rendered still more difficult by domestic trouble—his wife became an invalid—and his own increasing ill-health. He died at the home of his married daughter, his only child, at Wokingham, on January 23rd.—A. B. R.

SHORT NOTES.

Varieties of *Rosa tomentosa*.—I fear I have not made it clear that the Rose I have described as *R. tomentosa* var. *scabriuscula* Sm. f. *Leesii* mihi on p. 41 in my article "On some Varieties of *Rosa tomentosa* (Scabriusculæ)" is the one referred to by Ley in Journ. Bot. 1907, p. 208, as a specialised form of *R. scabriuscula* Sm. It was first found by Arnold Lees in 1871, and was frequently gathered by the Menai Straits in that and later years by Harbord Lewis and Fisher. It has been labelled *R. sylvestris* Lindl. or Woods, *R. britannica* Déségl., and *R. Jundzilliana* Baker, but, as Ley has pointed out, none of those names suit it so well as *R. scabriuscula* Sm. forma. It is only slightly biserrate, a fact which I omitted to include in my description.—A. H. Wolley-Dod.

Schefflera minimiflora Ridl., comb. nov.—I propose to substitute this name for *Schefflera micrantha* Ridl., *Flora of the Malay Peninsula*, i. 881 (*Paratropia micrantha* Miquel, Fl. Ind. Bat. Suppl. 337), as I find that Gamble, in Fl. Madras Presidency, pt. iii. 569 (1919), has previously used the combination.—H. N. Ridley.

Abnormal Secondary Thickening in Amarantaceæ.—The axes of the root and shoot in the Amarantaceæ show no normal secondary thickening, the increase in growth taking place outside the central cylinder by means of successive cambial layers. The first of these extra-fascicular cambiums is produced from the pericambium in the root and in the pericycle in the stem. Those which follow later are attributable to parenchymatous tissue derived from the pericambium or pericycle. The function is that of a normal cambium, secondary ground-tissue being produced both inside and outside with collateral bundles embedded in it.

Werner Schmid has investigated the problem of abnormal secondary thickening in this family in great detail ("Ueber Wurzel und Sprossachse der Amarantaceæ," Vierteljahrsschr. Naturforsch. Gesell. Zurich, lxxiii. 217–297 (1928)). His paper is illustrated with excellent micro-photographs and careful diagrams. A full list of the species examined and the sources of material is given.—A. W. EXELL.

THE PROBLEM OF SPECIES (Anderson, E., "The Problem of Species in *Iris versicolor* L. and *Iris virginica* L.," Ann. Missouri Bot. Gard. xv. 241–332 (1928)).—This paper, intended as a contribution towards solving the problem of species, is, in the words of its author, "an intensive and extensive survey of two closely related species" and "an attempt to present a fairly complete picture of the variation within two natural groups of individuals over their entire range." The plants chosen for the study were the blue flags of eastern North America (*Iris versicolor* of Asa Gray's *Manual of the Botany of the Northern United States*, ed. 7, which were selected primarily because they were a comparatively simple, stable, and well-marked group, and also because, being common, conspicuous, colonial, and perennial, they possessed features which materially reduced the labour involved in locating and studying large numbers of individuals. An attempt was made to visit as much as possible of the range of the flags during their flowering season, and over a period beginning in 1923 numerous colonies were studied in detail and measurements made on twenty to fifty individuals of the characters chosen for study. Representative plants were taken from each of the colonies and established in an experimental plot at the Missouri Botanical Garden, where they were subjected to genetical, morphological, and cytological studies. All this work was supplemented by taxonomic studies in various herbaria.

The *Iris versicolor* of Gray's *Manual*, ed. 7, is really made up of two distinct species. These are *I. versicolor* L., a northern and eastern species, and *I. virginica* L., a predominantly southern and western plant, the two having a narrow zone of contact in Michigan, Wisconsin, and Minnesota. An account is given of their history, geographical distribution, comparative morphology, and taxonomy, including for each a full synonymy and enumeration of herbarium specimens examined.

Wherever either species was studied, the individual plants of a colony were found to vary strikingly among themselves in every conceivable characteristic, both vegetative and floral. In order to summarize and average such differences a few were selected for concentrated study. The chosen characters were picked so as to fulfil the three conditions of being easily measurable, of showing some variability, and of not being easily affected by environmental influences. They included such characters as length, width, and taper of both sepals and petals, and length of anthers and stigmatic crests. Tables are given summarizing the first five years' measurements of these characters. It is at once evident from these tables that no single measurement will serve as a criterion for separating

the two species, and so, after pointing out the limitations of biometry in its application to taxonomic work, the author re-presents some of his data in the form of ideographs. These consist of a white rectangle, representing diagrammatically the length and breadth of a petal, superimposed on a black rectangle similarly representing a sepal. In this way four distinct measurements are combined in a simple figure so as to show at a glance the size and relative proportions of sepals and petals for any single flower. A set of such ideographs is given for each of twelve representative colonies of *I. virginica* and four of *I. versicolor*, each set comprising twenty ideographs drawn for as many individuals. The sets of ideographs demonstrate the striking variation in both size and proportion within every colony, and, in marked contrast to this, the general resemblance between colonies of the same species. While certain colonies have slight individual tendencies, there is practically no differentiation between the colonies from one region and another, the only generalization that can be made being that *I. versicolor* becomes on the average a little smaller towards the south and *I. virginica* a little larger. When composite "average" ideographs are formed by combining the average measurements for the individuals of each colony into a single diagram, the close resemblance between colonies of the same species is again evident, while at the same time the difference between the two species themselves is clearly brought out.

From experiments so far carried out in the experimental plot, whereby sister seedlings were grown side by side and the variation between them observed, it is concluded that *I. versicolor*, though usually self-fertilized, is frequently cross-pollinated under natural conditions. Other experiments show that *I. versicolor* and *I. virginica* are only partially fertile in crosses with each other, and that such hybrid seed as results has a low percentage of germination and produces seedlings showing hybrid vigour. Of the various crosses made only two have flowered, these being reciprocal crosses between the same two plants. The hybrids, though varying slightly amongst themselves, were remarkably uniform in general aspect. They were intermediate in all the differences which serve to separate the parent species, but on the whole resembled *I. versicolor* much more closely than *I. virginica*. They were partially sterile. Natural hybrids resembling those produced in the experimental plot were found at several points where the ranges of the two species overlap. These would be of more common occurrence but for the barriers which exist between the two species, including geographical barriers such as the extensive limestone areas west of the Alleghanies in which neither species is common, and physiological barriers which prevent them being wholly fertile with each other. At two localities, St. Ignace and Engadine, specially large hybrid colonies had arisen, and these were studied in greater detail. Descriptions of these two colonies are given, illustrated by ideographs which show the remarkable mixture of types to be found in such hybrid populations. The hybrid is accorded a special name, *I.* × *robusta*.

As a result of his investigations, the author concludes that the

Linnean species is a natural and permanent group, and that it, and not the Jordanian species, should therefore be the most effective one for purposes of classification. He considers that those who have believed the Jordanon to be of prime importance, taxonomically and phylogenetically, have ascribed undue importance to the fact that it comes true from seed. He gives an argument, illustrated by diagrams, to show that the division of a Linnean species into Jordanons is a mere corollary of the amount of inbreeding which has obtained in that species. The Linnean species may retain its individuality, though submitted to widely differing environments, for long periods of time, whereas the Jordanon is a relatively temporary unit of little taxonomic or phylogenetic significance. *Iris versicolor* and *I. virginica* must have persisted as recognizable units since they spread into their present homes at the close of the glacial period.

Concerning the bearing of his investigations upon the question of the origin of species, the author claims to have shown that for the material studied the differences between species are of an entirely different order from the differences between individuals. There is no evidence that these differences between individuals might eventually be compounded into differences comparable to those between the two species studied. The hybrid colony found at Engadine was apparently composed of similar true-breeding hybrids of natural origin. In view of the possibility of hybridization having been an important factor in the evolution of species, the author considers this apparent example of a new and constant form produced by the hybridization of two separate species as certainly very suggestive.—J. E. DANDY.

REVIEWS.

A. ENGLER: *Die Natürlichen Pflanzenfamilien.* Zweite stark vermehrte und verbesserte Auflage. Bd. 2. Peridineæ (*E. Lindemann*), Bacillariophyta (*G. Karsten*), Myxomycetes (*E. Jahn*). 8vo, pp. vi, 345, 447 text-figs. Engelmann: Leipzig, 1928. Price 33 R.M., 39 R.M. in half-leather.

THE great increase in our knowledge of the Peridineæ* (Dinoflagellata) since the first edition of the *Pflanzenfamilien* was published has necessitated a much more extensive treatment covering more than three times the original number of pages. The detailed oversight thus given over the manifold types of organisms belonging to the class is of considerable value at this juncture, since nothing of quite the same kind has hitherto been available. Lindemann deals with the class as an expert, at the same time the zoological point of view is rather more to the front than the botanical one. This is perhaps no great disadvantage in a work used mainly by botanists, but Lindemann hardly gives the more definitely algal types the importance they deserve. The inclusion of Klebs's *Cystodinium* and *Hypnodinium* in the genus *Gymnodinium* is scarcely warranted in the light of a comparison with other classes of Protophyta. It is

* Peridinieæ would seem to be a more correct spelling.

tantamount to an inclusion of forms like *Chlorococcum* and *Chlorella* in the genus *Chlamydomonas*. Nor is the scanty reference to Pascher's *Dinamœbidium* and *Dinothrix* satisfactory, in view of the importance of these forms for an understanding of the evolutionary tendencies within the class.

It would have been useful if the main characteristics of the various subdivisions had been given in the scheme of classification on p. 33; as it is, this appears rather redundant, as it affords no more information than can be gleaned from the list of contents. The Peridineæ are grouped as Adiniferæ (with *Haplodinium* and the Prorocentraceæ), Diniferæ (incl. all the other motile genera), and the Phytodiniferæ (incl. Klebs's Phytodiniaceæ). The Diniferæ are subdivided into Gymnodiniales, Amphilothales, Kolkwitziellales, Dinophysiales, and Peridiniales. The Dinophysiales are thus ranked equal with other subdivisions of the Diniferæ, and there are two new subdivisions, the Amphilothales (forms with an internal skeleton) and the Kolkwitziellales (forms with an unsegmented envelope). The Gymnodiniales include all the naked types, or such as have a simple membrane; they comprise the Pronoctilucaceæ and Noctilucaceæ without or with imperfect furrows, the Gymnodiniaceæ, the Warnowiaceæ with a complex ocellus, the colonial Polykrikaceæ, and the important family of marine parasites, the Blastodiniaceæ. *Hemidinium* and *Glenodinium* are placed among Peridiniales. Such a classification is in line with the modern point of view.

The greater part of the volume is devoted to the Bacillariophyta (Diatomeæ), and no better man than Karsten could have been found to bring Schütt's masterly treatment in the old edition up to date. The general account of this difficult class, which covers nearly one hundred pages, is excellent, and the detailed treatment of the reproduction of Diatoms by one who has himself contributed so much to our knowledge in these matters is most valuable. Karsten deals at considerable length with Schmidt's recent investigations on the reproduction of *Biddulphia sinensis* and concludes that the latter has definitely established the occurrence of reduction in this species prior to the formation of gametes (microspores), as appears universally to be the case in the pennate Diatoms. Karsten suggests that his original hypothesis as to the occurrence of reduction during the germination of the zygote in *Corethron valdiviæ* may still hold, but it hardly seems likely that reduction division should take place at two such different points in the life-cycle of rather closely related forms. The movements of pennate Diatoms are dealt with in detail, but one could have wished for more particulars relating to the raphe of the Nitzschioideæ. The raphe of *Eunotia* is regarded as primitive, which may be a correct point of view, but that does not necessarily mean that it is the forerunner of the raphe of Naviculaceæ, as seems to be implied. In the section (p. 111 *et seq.*) devoted to the occurrence of Diatoms, one misses a reference to terrestrial forms, nor are either Petersen's or Bristol's paper cited in the list of literature on p. 107. In the account of the periodicity of Diatoms (pp. 195–199) mention might have been made of Pearsall's views and of the writer's work on

the periodicity of epiphytic Diatoms. But these are slight deficiencies in an account that is most valuable for its mass of detail and the clear presentation of the subject-matter.

The system of classification adopted is one that has been worked out jointly with Hustedt, whose detailed synopsis of European Diatoms in Rabenhorst's *Kryptogamenflora* is at present appearing. Practically no changes have been made in the grouping of the Centrales (Centricæ of the last edition), save that among the Actinodiscoideæ a fifth subdivision, the Actinoclavineæ, has been added to accommodate Müller's genus *Actinoclava*. The Pennales (Pennatæ) are subdivided into Araphideæ (without a raphe), Raphidioideæ (with the beginnings of a raphe), Monoraphideæ (one valve with a true raphe), and Biraphideæ (both valves with a raphe). The Araphideæ comprise the Fragilariaceæ with Tabellarioideæ, Meridionoideæ, and Fragilarioideæ, except for the Eunotiaceæ which constitute the Raphidioideæ. *Ceratoneis* and *Amphicampa* are, however, left among the Fragilarioideæ as members of a new subdivision, the Amphicampeæ. The Monoraphideæ include the Achnanthaceæ, while the Biraphideæ comprise the remaining pennate Diatoms which are grouped as Naviculaceæ, Epithemiaceæ, and Nitzschiaceæ. A special family (Rhopalodioideæ) of Epithemiaceæ is created for the genus *Rhopalodia*. These changes are not considerable and are in part on the lines suggested by Forti. They afford a rather more logical classification than the original one of Schütt.

The short section on Myxomycetes (excluding Plasmodiophoreæ and Acrasieæ) is contributed by the well-known expert Jahn. The general account is brief, but adequate. The affinities of the Myxomycetes are discussed in detail and the derivation of the group from Flagellata is not supported. The classification adopted is rather different from that of Schröter. The members of the class are grouped in nine series, the first of which, the Hydromyxales, comprises *Vampyrella* and other aquatic forms. Next follow the Exosporales (*Ceratiomyxa*), while the remaining seven classes belong to the types with internal spore-formation. *Chlamydomyxa* is treated in an appendix.

The volume is throughout provided with a wealth of excellent illustrations.—F. E. FRITSCH.

The Colloid Chemistry of Protoplasm. By L. V. HEILBRUNN. 8vo, pp. viii, 356, tt. 15. Borntraeger: Berlin, 1928. Price R.M. 21.

THE last two decades are remarkable for the rapid expansion of the margins of the material sciences. Of botany and chemistry this is especially true: the student of plant physiology invades the realms of chemistry in the hope of revealing the many secrets of the life of the plant. But before he is quit of his own domain, he meets the chemist, yclept biochemist or physical chemist, exploring in the vegetable kingdom. There is, in fact, no definite limit between the sciences: as the late Sir William Bayliss once said to the present writer, "There is but one science, and that is not a subject, but a method."

This freedom of search has sometimes led to great results. Pfeffer's work on osmosis was the foundation-stone of a great physico-chemical structure, and the work of Willstätter laid bare the structure of the anthocyans and of chlorophyll; but although the wider technique has enabled a better understanding of some biological phenomena and has exposed new problems, the discoveries made pertain to isolated bits of machinery which often cannot be fitted into the complex mechanism of the living cell without invoking further hypotheses. Wherefore we are as distinct as ever from a sure knowledge of the fundamentals of life. Indeed,

> "We are afflicted by what we can prove
> We are distracted by what we know."

These thoughts were occasioned by reading Heilbrunn's *Colloid Chemistry of Protoplasm*, in which book the author has assembled the results of some seven hundred and sixty memoirs. In so doing, he has kept in the forefront what protoplasm is rather than what protoplasm can do; for although "there is one kind of flesh of men, another of fishes, and another of birds," and, it may be added, another of plants, since "all flesh is grass," there is a fundamental similarity of living organisms which means a fundamental basis of life. To quote Heilbrunn's words: "Those characteristics of protoplasm which are universal are almost certain to be intimately related to the machinery of the living process, whereas a characteristic peculiar to a few cells must be related rather to the life of these particular cells than to life in general. The biologist whose primary interest is to gain an insight into the mechanism of life can well afford to neglect specific properties of certain types of protoplasm in focussing his attention on those properties which are universal."

The first method of studying the structure of protoplasm was the microscopic examination of living cells. This gave important results, one of which was the great observation by Robert Brown, who was the first to describe those movements of particles in protoplasm which are now termed Brownian; the study of these movements has advanced our knowledge of the colloidal state and has played a part in the elucidation of the structure of the atom.

With the advance of microscopic technique, methods of fixing, and staining, great strides were made in the knowledge of the morphology of protoplasm, so that cytology became a specialized branch of botany. It has given many certain results and others less certain, the interpretation of which may be a matter for dispute—as will be realized by those who have followed a recent controversy in the pages of *Nature*,—for the methods of fixation in killing the protoplasm may give rise to structures which do not obtain in the living state.

The recent technique of the ultra-microscope and micro-dissection should yield more certain results, but the difficulties in interpreting observations are considerable and great mistakes have been made. Thus Heilbrunn, in criticizing an author's work, remarks that "a method which even occasionally permits of an error of 20,000 per cent. can scarcely be regarded as reliable."

The results obtained by the applications of modern technique may

be indicated by a *résumé* of some of the conclusions drawn by Heilbrunn in his last chapter.

The activity of protoplasm is involved in changes in its colloidal structure, the change from gel to sol and from sol to gel; if either of these states is kept constant, protoplasmic activity ends, and the cell is in a condition of anæsthesia or else it is dead. In general terms, the formation of an irreversible gel results in death.

The numerous types of protoplasmic activity have certain common features: thus, stimulation by mechanical pressure or by an electric current produces a rapid reaction which may be prevented by fat solvents, such as ether in 1 to 2 per cent. concentration. The reaction induced by the external agent is an increase in the viscosity of the protoplasm, which may amount to gelation or coagulation; on the other hand, the low concentration of fat solvent results in a decrease in viscosity.

The increase in the viscosity of protoplasm is accompanied by vacuolation: three stages may be distinguished; the first is the liberation of free calcium, the second is the union of the calcium with another substance to form a reactant, *e. g.*, ovothrombin in the egg of the sea-urchin, and the third is a reaction between ovothrombin, or a comparable reactant, and protein to form a precipitation membrane, in which reaction calcium is set free and is available for a repetition of the reaction.

Substances like ovothrombin lower surface tension—that is, they are surface active and may quickly travel over surfaces. This is of importance in questions relating to the transmission of stimuli. Thus it has been shown that the reaction following a traumatic stimulus of a plant-tissue radiates from the wound: first, there is a movement of the nuclei of the cells adjacent to the wound towards the wounded surface; this is followed by a wave of increased viscosity which travels from the wounded part to the neighbouring cells; and, lastly, there is a wave of vacuolation of the protoplasm.

These conclusions are based on observations on the viscosity, elasticity, and electrical charges of protoplasm; the changes effected by temperature and other physical factors; and the action of acids, alkalies, salts, and fat-solvents. These, together with other matters, are considered by Heilbrunn in his *Colloid Chemistry of Protoplasm*. The author has done his work remarkably well, and has achieved a valuable and very welcome review. The arrangement is logical, the writing is clear; there is an extensive bibliography and a subject and an author index. Naturally, there are features to which exception may be taken; the continuance of Loeb's term "cytolysis," for example, and the inclusion of some observations which are almost certainly incorrect. Further, it would have been of great help to those who are not specially versed in the subject, if greater use had been made of the judicial summary, especially when the evidence is more than ordinarily intricate. But these are matters of individual opinion, and their commission and omission do not detract from the high assessment of the work.—T. G. Hill.

FIFTH INTERNATIONAL BOTANICAL CONGRESS.

We have received the following notice from Dr. Briquet, from which it will be observed that the time for submitting motions on the subject of Nomenclature has been extended to the end of September next:—

Motions on the subject of Nomenclature for consideration by the Congress should be in the hands of the Rapporteur général, Dr. John Briquet, before *September 30, 1929*.

Motions must be presented in the form of additional articles (or amendments) to the Rules of 1905–1910, drawn up in the form adopted in the *International Code*, and must be drafted as briefly as possible in Latin, English, French, German, or Italian. At least 100 printed copies must be presented.

According to the decisions of the Brussels Congress of 1910, only motions relating to new points which were not settled in 1905 and 1910 can be presented. Motions which do not answer to these conditions shall only be discussed if the Cambridge Congress of 1930 decides to take them into consideration.

For further information about the programme of work for nomenclature, apply to the Rapporteur général, Dr. John Briquet, Conservatoire botanique, Geneva (Switzerland).

BOOK-NOTES, NEWS, ETC.

Linnean Society.—At the General Meeting on February 14th, the President announced that the Hooker Lecture would be delivered by Dr. E. J. Allen, F.R.S., Director of the Marine Biological Laboratory, on March 14th.

Mr. G. Taylor exhibited a series of lantern-slides of Scottish plants growing in their natural habitats.

It was pointed out that the alpines which are distributed over the range of Lawers-Caerlochan schist are sometimes peculiarly local. Slides of many of the more interesting of these plants were shown, and, in addition, photographs of the rarer plants of the Pine-wood association and of rare Scottish plants with extremely limited distribution.

Mr. E. G. Baker called attention to the disappearance of the rarer Scottish alpine plants, and mentioned as an example that he had failed to find *Eriophorum alpinum* in Scotland, although there were a large number of specimens in the British Museum collected in bygone days.

Mr. H. W. Pugsley endorsed Mr. Baker's remarks regarding the growing scarcity of the rarer Scottish alpine species, and suggested that the depredations of rock-garden collectors might have something to do with it. He commented on the unusually large size of the specimens of *Listera cordata* shown in one of the photographs.

In his reply, Mr. Taylor, in reference to the questions regarding the relation of *Primula stricta* to *P. scotica*, stated that the latest view, as set forth by Prof. W. Wright Smith, was that *P. scotica*

itself was merely a subspecies of *P. farinosa*. He also stated that *Eriocaulon septangulare* was not found on the Scottish mainland, but occurred on some of the islands, and was identical with the North American plant.

The Botanical Secretary summarized a paper by Prof. S. R. Bose on "The Biology of Wood-rotting Fungi." The paper deals with twelve species of woody fungi, including *Trametes gibbosa*, *Polyporus adustus*, *Polystictus velutinus*, and *Stereum hirsutum*. The speaker commented on the attention that recently had been paid to the cultivation of the larger fungi. This is usually much less successful than the culture of microfungi, where all groups except rusts and mildews may be said to have proved amenable to methods similar to those used in bacteriology. Whereas with microfungi it is usually possible to obtain normal fruit-bodies, these are comparatively rare in cultures of the larger fungi; when sporophores are obtained they are frequently abnormal.

Botanical Appointments at London University.—We have pleasure in noting the following appointments at University College:—Dr. T. G. Hill to the University Chair of Plant Physiology, and Dr. E. J. Salisbury to the Quain Chair of Botany. Our good wishes on his retirement are also accorded to Prof. F. W. Oliver, who relinquishes the Quain Chair after nearly forty years of strenuous and eminently successful work.

Royal Society.—Among the fifteen candidates recommended by the Council for election into the Society we note the name of Prof. A. H. R. Buller, Professor of Botany, University of Manitoba, Winnipeg, Canada. Professor Buller is well known for his work in Mycology.

We are glad to note that the Empire Marketing Board has made a grant to the Royal Botanic Gardens, Kew, to assist in the preparation of floras of East Africa, British Guiana, and Trinidad and Tobago.

We hear with regret of the death of Prof. V. F. Brotherus, of Helsingfors, the eminent Bryologist. Some account of his work will be given in our April number.

The London School of Hygiene and Tropical Medicine (University of London) have recently instituted courses in Tropical Hygiene for non-medical men and women proceeding to the tropics. A course, of nine lectures, will be given from April 24th to May 9th. Further courses will also be arranged later.

Full particulars and a synopsis of the lectures can be obtained from the Secretary, Malet Street, W.C. 1.

A Correction.—The "Notes for Students" in the *Botanical Gazette* for December last, p. 473, contains an erroneous reference to our "Supplement" on Gossweiler's Plants from Angola and Portuguese Congo. The list itself is attributed in error to Gossweiler, who is also referred to as having "described a new genus of Leguminosæ, *Dalbergiella*." Mr. E. G. Baker is the author of the genus, as is clearly shown by reference to the publication.

H. Nicholls, pinx.

Cross-pollination of *Cryptostylis leptochila* F. Muell. by the male of an Ichneumonid (*Lissopimpla semipunctata*)

POLLINATION OF AN AUSTRALIAN ORCHID, *CRYPTOSTYLIS LEPTOCHILA* F. MUELL.

By Mrs. Edith Coleman.
(With Note by Col. M. J. Godfery.)

(Plate 590.)

Since publishing a paper on this subject (*Victorian Naturalist*, May 1927), I have read with interest several articles in the *Journal of Botany* by Colonel M. J. Godfery on the fertilisation of certain *Ophrys* species.

It is interesting to note how similar have been the observations of Monsieur Pouyanne in Algeria and those of Colonel Godfery in France to those made here in Australia. As in the Algerian and French instances, an Australian orchid is pollinated in an extraordinary manner by a hymenopteron, which enters the flowers "backwards," thus removing the pollen on the tip of its abdomen instead of on its head!

The orchid, *Cryptostylis leptochila* F. Muell., occurs only in Victoria and New South Wales. The insect, *Lissopimpla semipunctata* Kirby, ♂, belongs to a large family of ichneumon-wasps which parasitise the larvæ of other insects.

Only males visit the orchids, in circumstances that leave no room for doubt that they are stimulated by sex-instincts, and enter the flowers under the misapprehension that these are females of their kind.

Though the orchid increases in the vegetative manner it relies on the collaboration of insects for an occasional cross, and its method of achieving this end is one of the most remarkable cases of adaptation.

The shape and colour of the labellum suggest the body of the female wasp, the glistening glands corresponding with the brilliant white spots on the abdomen of the insect. The narrow sepals and petals possibly suggest the antennæ, ovipositor, and guides.

The colour of the labellum varies. In a freshly-opened flower it is often of a pale pink with dark reddish-brown lines and glands. If not pollinated it may remain open for weeks, when, as in several other species of our terrestrial orchids, the colour deepens into a rich red.

The female wasp has never been seen near the orchids, yet one may expose a few spikes in a locality where they are not known to occur, and in a few moments they are visited by the male insect.

During January large numbers of these males frequent the flowers, suggesting that the females have not yet emerged, or that they are busily engaged in carrying out their own special functions.

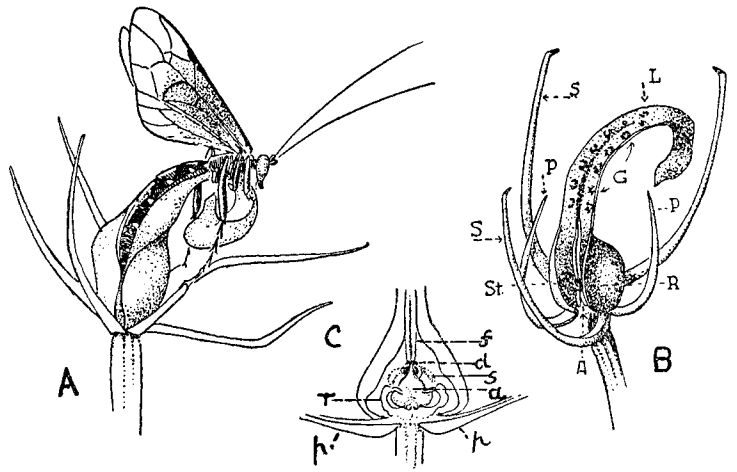
Apart from the resemblance of the flowers to the female wasps it is fairly certain that their perfume, though almost imperceptible to us, is conveyed to the male wasps over quite long distances.

In entering the orchid the abdomen of the insect takes a sickle-shaped curve and its tip possibly penetrates the stigma. Its upper surface, at the last segment, rests on the prominent rostellum, on which, when ready to emerge, the wasp exerts pressure.

This pressure releases the pollinia and they are withdrawn on the body of the insect. They adhere at right angles to the abdomen, the curve of which has allowed their withdrawal clear of the stigma.

The usual depression of the caudicle and the straightening of the insect's abdomen bring the pollinia parallel to it, slightly projecting beyond the tip, in the exact position for striking the stigma of the next orchid visited.

If not disturbed the insect undoubtedly effects cross-pollination of the most beneficial type, for, before the impulse again prompts it to enter a flower, it will most likely have flown to a distant spike.



A. Ichneumon (*Lissopimpla semipunctata*) visiting flower of *Cryptostylis leptochila*. The insect with abdomen inserted is clasping the labellum.

B. Flower. *S*, sepals; *p*, petals; *L*, labellum showing the paired dark spots (*G*) which suggest the markings on the abdomen of the insect; *A*, anther; *R*, rostellum; *St*, stigma.

C. Enlarged view of base of labellum and the column. *f*, fleshy fold of labellum; *a*, anther; *d*, viscid disc; *s*, stigma seen behind the anther; *r*, pair of auricles on base of column; *p*, lateral petal.

(From drawings by Mr. Tarlton Rayment.)

But if disturbed it may enter a second, and even a third, flower on the same spike—not quite such a desirable cross as that from a distinct plant.

Very occasionally a disturbed insect has re-entered the same flower, in which case it impregnates the orchid with its own pollen, removed on the first visit.

During January the wasps are particularly eager. On two occasions a flower, with its visitor, has been dropped into a killing-bottle. Becoming disengaged from the flower it was tipped out of the bottle on to a table, where it lay apparently dead. In a few seconds it revived, swiftly entered another flower, and removed a second pair of pollinia.

The case is not so singular as was at first supposed, for observation of several other Australian orchids points clearly to similar partnerships.

NOTE:—*Lissopimpla semipunctata* appears to visit *Cryptostylis leptochila* exclusively, for, although *Cryptostylis subulata* Labill. sometimes grows in close association with the latter, the insect does not appear to visit it, for no hybrid has been found between them. Dr. R. S. Rogers, the leading authority on the Australian Orchidaceæ, has never seen a hybrid in the genus *Cryptostylis*. In this respect it resembles the North African *Ophrys speculum*, which is solely visited by *Dielis ciliata* (Journ. Bot. 1925, p. 34). The removal of the pollinia on the end of the insect's abdomen is exactly parallel with the case of *Ophrys fusca* and *O. lutea*, in which the species of *Andrena* concerned assume the same reversed position.

Some doubt has been expressed as to whether the resemblance of the lip of the flower to the female *Lissopimpla* is sufficient to deceive the male. It seems to be agreed that the vision of insects is very inferior to ours. But so long as one or two salient points are suggested, exact resemblance to the insect concerned is unnecessary. The metallic blue centre of the lip and its fringe of red hair in *Ophrys speculum* are quite enough to convince the male *Dielis ciliata* that he sees the sheen of blue wings and the red-fringed abdomen of his long-looked-for mate. The shadowy and indefinite markings on the lip of *O. fusca* and *O. lutea* (which only suggest an insect to us when viewed from a distance) are quite enough to persuade an *Andrena* that he has found what he wants. In her second paper in the *Victorian Naturalist*, 1928, p. 334, Mrs. Coleman says:—"A glance at the strange labellum . . . . with its double row of dark glistening glands that gleam in the hot sunshine . . . . is perhaps sufficient to justify the theory of an attraction based on the resemblance of the flower to a female wasp. Even to our eyes the likeness is apparent. To the inferior eyesight of the insect the resemblance may be still more convincing." Further, in all the above cases, insects are attracted to the flowers from a distance, showing that by the emission of scent or of some other attractive agency, the flowers are able to convey knowledge of their existence. That the appeal is not to the desire for food, but to the strong sexual urge of the male, was sufficiently evident in the case of certain species of *Ophrys*, and is confirmed in a remarkable manner by Mrs. Coleman's discovery that the sexual claspers of the male actually become engaged with the base of its labellum, so that resistance can be felt when the insect is pulled away.—M. J. GODFERY.

EXPLANATION OF PLATE 590.

(Drawn by Mr. W. H. Nicholls.)

Fig. 1. Flower fully expanded, slightly enlarged. Fig. 2. Flower-spike, nat. size. Fig. 3. Leaves showing upper and under faces.

Fig. 4. Pair of pollinia, much enlarged.
Fig. 5. Male of *Lissopimpla semipunctata*, after a visit to the flower, bearing a pair of pollinia on tip of abdomen. Fig. 6. Female of *L. semipunctata*.

[We are indebted to the Council of the Entomological Society of London for kind permission to use the illustrations, which appeared in the *Transactions* of the Society, Dec. 31, 1928.—Ed.]

NEW AND NOTEWORTHY SPECIES OF *COMBRETUM* FROM WESTERN TROPICAL AFRICA.

By A. W. Exell, M.A., F.L.S.

The following paper contains descriptions of some new species of *Combretum* from Western Tropical Africa and notes on various points of taxonomy and nomenclature—the area dealt with extending as far south as the boundary between Portuguese Congo and Angola proper. I have followed, in this work, the sections proposed by Engler and Diels in their *Monograph of the African Combretaceæ*. These sections seem to represent, in the main, natural groups; and, though the discovery of many new species since the date of the monograph may lead to some reorganisation of the sections, I find myself in general agreement with the system of classification proposed in it.

I have also indicated, in a few instances, the relationship of some of the more recently described species from the area.

Sect. Hypocrateropsis Engl. & Diels.

C. Butayei De Wild. in Ann. Mus. Congo, v. i. 196 (1904). This is undoubtedly the same as the earlier *C. laxiflorum* Welw., thus extending the range of that species to the Belgian Congo, where it is widely distributed. Native name "Soati" at Katompe, Belgian Congo (fide *De Giorgi*) and "Maçasso" in the Territory of the Lobangulæ, Angola (fide *Marques*).

Combretum Giorgii De Wild. & Exell, sp. nov. *Frutex* vel *arbor*, ramulis primo minutissime pubescentibus vel brevissime tomentellis demum glabrescentibus. *Folia* opposita vel nonnunquam subternata petiolata, petiolo brevissime tomentello glabrescente, elliptica vel oblongo-elliptica apice acuta paullo acuminata basi obtusa vel rotundata supra glabra subtus lepidota, lepidibus discoideis conspicuis distinctis densis sed vix contiguis, costa media supra impressa subtus prominente, costis lateralibus utrinque 6–8 infra in axillis nonnunquam barbulatis. *Flores* tetrameri sessiles in spicas elongatas paniculatas axillares vel terminales dispositi. *Bracteolæ* parvæ subulatæ tomentellæ caducæ quam receptaculum inferius multo breviores. *Receptaculum* inferius elongato-fusiforme dense lepidotum, lepidibus contiguis, cetera glabrum, superius patelliforme ut in receptaculo inferiore lepidotum glabrum. *Calycis segmenta* late ovata. *Discus* patelliformis crassiusculus pilosus. *Petala* parva spathulata glabra; *Stamina* 8, paullo exserta. *Stylus* subulatus glaber quam stamina parum brevior. *Fructus* suborbicularis lepidotis 4-pterus, alis modice latis tenuibus.

Hab. Belgian Congo: "Arbuste," Kitengwa, fl. Oct., *De Giorgi* 167 (Type in Herb. Brussels); "Arbre de brousse," fl. Jan., without locality, *Claessens*, 86, K 273 (Herb. Brussels); "Petit arbre, 5–6 m., à écorce grise, cime dense, fleurs petites jaunes, odorantes à anthères noires," at an alt. of about 1250 m., on the road from Pweto to Baudouinville, Valley of the Mlobozi, fl. April, *Robyns*, 2215; Kabolo, fl. July, *De Levoy* 151 (Herb. Brussels); N'Kombo, fl. March, *De Levoy* 893 (Herb. Brussels); Lake Moero, Mpueto, leg. *Chargois*, s. n., in fruit (Herb. Brussels).

Native name "Swatchi" (fide *De Levoy*) or "Swaadschi" (fide *Robyns*). "Employé pour faire les ustensiles utilisés pour faire la bouillie de farine" (*Robyns*).

Leaves 5–11 × 2–4 cm.; *petioles* 5–12 mm. long; *inflorescences* composed of elongated spikes 4–8 cm. long forming axillary and terminal panicles up to 15 cm. long; *lower receptacle* 2 mm. long; *upper receptacle* 2 mm. across, or 4 mm. across including the calyx-lobes when fully expanded; *petals* 1·5 × ·5 mm.; *stamens* 1·8 mm. long; *style* 1·5 mm. long; *fruit* 2 × 1·8 cm. (somewhat immature), with wings about 6 mm. across.

This species belongs to Sect. *Hypocrateropsis* Engl. & Diels, and must be placed in the vicinity of *C. imberbe* Wawra, *C. primigenum* Marloth, *C. padoides* Engl. & Diels, and *C. contractum* Engl. & Diels, all of which agree with *C. Giorgii* in having a pilose disc. *C. Giorgii* can be distinguished from *C. imberbe* and *C. primigenum* by its paniculate inflorescences, absence of thorns, and less densely scaly leaves; while it differs from *C. padoides* and *C. contractum* by its much larger leaves and inflorescences.

Sect. Tomentosæ Engl. & Diels.

C. pecoense Exell in Journ. Bot. 1928, Suppl. Polypet. p. 165. A new species from the Portuguese Congo, forming an addition to this section which formerly contained the single species *C. tomentosum* G. Don.

Sect. Paucinerves Engl. & Diels.

C. paucinervium Engl. & Diels in Mon. Afr. Pfl. iii., Combretaceæ, 17 (1899). Gaboon: near Libreville, *Klaine*, 3018 (Herb. Mus., Paris and Herb. Mus. Brit.). Originally described from the Cameroons, this is apparently a very rare species, and another record of it is of interest.

C. obanense Hutch. & J. M. Dalz. in Fl. West Trop. Afr. i. 221 (1927). (*C. paucinervium* Engl. & Diels var. *obanense* Bak. fil. in Cat. Talbot's Nigerian Pl. 38 (1913).) This is undoubtedly correctly regarded as a distinct species rather than a variety of *C. paucinervium* Engl. & Diels, although certainly related to it and belonging to this section.

Combretum pengheense De Wild. & Exell, sp. nov. *Frutex* scandens, ramulis juventute in sicco atro-ferrugineo-lepidotis mox glabrescentibus demum teretibus nitidulis. *Folia* opposita petiolata, petiolo atro-ferrugineo-lepidoto, ovalia elliptica vel anguste elliptica apice acuta vel nonnunquam acuminata basi acuta nonnunquam inæqualia margine incurva in sicco undulata, omnino glabra supra nonnunquam sparsissime argenteo-lepidota infra lepidota sed lepidibus appressis congestis haud conspicuis, costa media supra impressa subtus valde prominente, costis lateralibus utrinque 8–10, reticulo supra infraque prominulo. *Flores* tetrameri sessiles in spicas paniculatas axillares et terminales dispositi. *Bracteolæ* parvæ subulatæ quam receptaculum inferius quadruplo breviores. *Receptaculum* inferius elongato-fusiforme distincte lepidotum, lepidibus basin versus congestis, cetera glabrum, superius patelliforme fere glabrum. *Calycis segmenta* triangularia vel ovato-triangularia glabra. *Discus* patelliformis margine dense pilosus. *Petala* lineari-spathulata glabra. *Stamina* 8, quam petala duplo longiora. *Stylus* glaber quam stamina brevior. *Fructus* ignotus.

Hab. Belgian Congo: "Liane à fleurs blanches," in forest, at Penghe, fl. Jan., *Bequaert* 2091 (holotype in Herb. Brussels).

Leaves 11–12 × 3·5–6·5 cm.; *petioles* 10–12 mm. long; *inflorescences* composed of spikes up to 3 cm. long forming panicles about 8 cm. long; *lower receptacle* 1·5–2·5 mm. long; *upper receptacle* 2·5 mm. across, or nearly 5 mm. across including the calyx-lobes; *petals* 1·5–2 × ·4 mm.; *stamens* 3–3·5 mm. long; *style* 2 mm. long.

This species has distinctly larger flowers than any others of this section.

C. homalioides Hutch. & J. M. Dalz. in Fl. West Trop. Afr. 221 (1927), *nomen* et in Kew Bull. 1928, p. 225. This species, or a very closely allied form, has recently been recorded from the Portuguese Congo (see Journ. Bot. 1928, Suppl. Polypet. p. 165).

Sect. Olivaceæ Engl. & Diels.

C. mayumbense Exell in Journ. Bot. 1928, Suppl. Polypet. p. 165.

The following new localities may be cited for this species:—Belgian Congo: Landa, fl. June, *Vanderyst* 5501; "arbre au bord des eaux," Mobwasa, *De Giorgi* 882 (Herb. Brussels; Herb. Mus. Brit.); Nala, *Boone*, 35 (Herb. Brussels). Boone gives the following note with his specimen:—"Arbre, moyenne grandeur, souvent atteindre de 15 à 20 metres, bois blanc, peu ussitant (usité?). L'écorce pilé et boullie (bouillie?) est employé comme medicament pour les foulures de poignets etc. Noms indigènes 'Kande,' 'Gayalaga,' 'Moyogot' and 'Biba.'"

C. Afzelii Engl. & Diels in Mon. Afr. Pfl. iii., Combretaceæ (1899), 22, non G. Don. Up to the present known from Upper Guinea and the Cameroons, this species is now recorded from the Belgian Congo. Belgian Congo: "Liane à fleurs blanches odorantes en belles inflorescences terminales," in forest, along the banks of the River Rubi, fl. Dec., *Robyns* 1130 (Herb. Brussels; Herb. Mus. Brit.); near Malela, young fr. Jan., *Vermoesen* 1328 (Herb. Brussels; Herb. Mus. Brit.); "Liane à fleurs blanches," in forest, on the bank of the Ituri, Penghe, fl. Feb., *Bequaert* 2417 (Herb. Brussels; Herb. Mus. Brit.).

Hutchinson and Dalziel, in Fl. West Trop. Afr. i. 221 (1927), have already indicated that *C. conchipetalum* Engl. & Diels cannot be distinguished from this species.

C. Demeusei De Wild. in Ann. Mus. Congo, v. iii. 235 (1910). (*C. Mildbraedii* Hutch. & J. M. Dalz. in Fl. West Trop. Afr. i. 221 (1927).) There is little doubt of the identity of these two species, in spite of the, up to the present, discontinuous distribution, the species having been recorded from French Guinea, Togoland, and the Belgian Congo.

Combretum Letestui Exell, sp. nov. *Arbor* vel *frutex*, ramulis gracilibus mox glabrescentibus teretibus lævibus nitidulis. *Folia* opposita petiolata, petiolo glabro supra canaliculato, oblique ovata vel ovato-lanceolata acuminata supra nitida subtus lepidota, lepidibus sæpius congestis et inconspicuis nonnunquam albis conspicuis, costa media supra prominula infra prominente, costis lateralibus utrinque 5–6 supra infraque prominulis. *Flores* tetrameri sessiles in spicas paniculatas terminales et axillares dispositi. *Pedunculi* ferrugineo-scariosi et ferrugineo-pubescentes. *Receptaculum* inferius ferrugineo-lepidotum, superius cupuliforme latiore quam longiore ferrugineo-scariosum. *Calycis segmenta* triangularia acuta. *Discus* parvus subpatelliformis glaber. *Petala* minuta spathulata glabra. *Stamina* 8, quam petala duplo longiora. *Stylus* brevis crassiusculus.

Hab. Gaboon: Nyanza Region, *Le Testu* 2031 (type-specimen in Herb. Mus. Brit.)

Leaves 7–9 × 3–4 cm.; *petioles* up to 1 cm. long; *inflorescences* forming terminal panicles up to about 10 cm. long and 7 cm. across; *lower receptacle* 1·3 mm. long; *upper receptacle* 1·2 × 2·5 mm., including the calyx-lobes, the latter measuring 1 × ·8 mm.; *stamens* 2 mm. long; *petals* 1 × ·2–·3 mm.; *style* ·5 mm.

This species is near to *C. cuspidatum* Planch., under which name it was distributed. It differs in having inflorescences with reddish scales, while those of *C. cuspidatum* are almost tomentose, and smaller more gradually acuminate leaves with the principal nerves fewer and relatively wider apart.

Combretum calvescens Exell, sp. nov. *Frutex* scandens?, ramulis primo fulvo-tomentosis demum glabrescentibus. *Folia* petiolata, petiolo primo fulvo-tomentoso demum glabrescente, late elliptica vel oblongo-elliptica, apice breviter acuminata basi rotundata, omnino juventute fulvo-tomentosa mox glabrescentia demum glabra vel fere glabra, costis lateralibus utrinque 8–9 supra parum impressis subtus prominentibus. *Flores* tetrameri in spicas valde ramosas panicu-

latas terminales et axillares dispositi. *Pedunculi* primo fulvo-tomentosi demum glabrescentes. *Receptaculum* inferius fusiforme primo nonnunquam sparse pubescens plerumque mox glabrescens, superius cupuliforme fere glabrum. *Discus* vix conspicuus, margine haud libero, glaber. *Petala* transverse elliptica vel subreniformia breviter unguiculata glabra. *Stamina* 8, exserta. *Stylus* exsertus filiformis glaber.

Hab. Belgian Congo: Kibambele, *Vanderyst* 4148 (holotype in Herb. Mus. Brit.; Herb. Brussels).

Leaves 9–14 × 4–8 cm.; *petioles* 10–15 mm. long; *bracts* up to 3 mm. long; *lower receptacle* 1–1·2 mm. long; *upper receptacle* 1·5 × 2 mm.; *petals* about 1 mm. long and 1·8–2 mm. broad; *stamens* 5–6 mm. long; *style* 4–4·5 mm. long.

This species is nearest to *C. Afzelii* Engl. & Diels, but can be distinguished by the leaves, which are shortly acuminate and not rounded at the apex, and by the tawny tomentum which covers the young parts of the plant. This tomentum apparently wears off very completely, as the older leaves and one inflorescence are almost glabrous. It seemed at first probable that *Vanderyst* 4148 in the Brussels Herbarium and a small piece in the top right-hand corner of the sheet of the same number in the British Museum Herbarium did not belong to the same species as the remainder of the specimen in the British Museum Herbarium; but I am of the opinion that they are different states of the same species. If future collecting should show that there is a mixture under *Vanderyst* 4148, the name *C. calvescens* is to go with the larger glabrescent specimen in the British Museum Herbarium.

Combretum eke Exell, sp. nov. *Frutex* ?, ramulis teretibus juventute sparse pubescentibus mox glabrescentibus. *Folia* petiolata, petiolo glabro, ovata obovata vel oblongo-ovata apice acuminata basi acuta obtusa vel rotundata, omnino nitidula glabra, costis lateralibus utrinque 9–11 supra vix conspicuis subtus prominentibus. *Flores* tetrameri in spicas elongatas paniculatas dispositi. *Receptaculum* inferius fere glabrum nonnunquam sparse lepidotum, superius campanulatum plerumque dense albo-lepidotum. *Discus* glaber margine haud libero. *Petala* suborbicularia glabra. *Stamina* distincte biserialia exserta. *Stylus* exsertus. *Fructus* ignotus.

Hab. Belgian Congo: River Skelembe, Coquilhatville region, *Bonnivair* 22 (holotype in Herb. Mus. Brit.; Herb. Brussels).

Leaves 8–14 × 3·5–7 cm.; *petioles* up to 12 mm. long; *spikes* 4–6 cm. long; *lower receptacle* 1·5 mm. long; *upper receptacle* 1·5–2 × 2 mm.; *stamens*: longer ones 3·5 mm. long, shorter ones 2·2 mm. long; *style* 3·5–4 mm. long.

Native name "eke."

This species is near to *C. Afzelii* Engl. & Diels, from which it can be distinguished by the shiny acuminate leaves. It can be readily distinguished from most other species of the section by the conspicuous yellowish-white scales on the upper receptacle which seem usually to be densest towards its apex.

(To be continued.)

NOTES ON *MELAMPYRUM*.

By C. E. Salmon, F.L.S.

Dr. Ralph v. Soó, the latest Monographer of the genus *Melampyrum* (in Fedde, Repert. spec. nov. xxiii. 895–957 and xxiv. 47–113 (1926–27)), has kindly determined some gatherings submitted to him, and I give below the results of this examination.

M. arvense L., typus.

"Caulis 25–40 cm. altus, internodiis numerosis, ±brevibus, ramosus, rami stricti, oblique erecti. Folia caulina anguste lanceolata, 5–8 mm. lata, intercalaria 0–1 paria. Cotyledones desunt. Inflorescentiæ initium ad nodum 8.–12. situm. Bracteæ punctatæ, purpurascentes, rarius impunctatæ, virides vel albidæ."

Essex, N.; v.c. 19. Heydon, near Walden (G. S. Gibson). White Notley, 1869 (Herb. F. A. Lees). *Norfolk, E.; v.c. 27.* Costessy, near Norwich (J. Backhouse).

Subsp. pseudobarbatum (Schur) Wettst.

"Caulis 25–50 cm. altus, internodiis multis, abbreviatis, perramosus, rami arcuati, patentes. Folia caulina anguste lanceolata, 5–10 mm. lata, intercalaria 2–4 paria. Cotyledones desunt. Inflorescentiæ initium ad nodum (10.)–12.–16. situm. Bracteæ purpureæ vel albidæ."

Isle of Wight; v.c. 10. Field above St. Lawrence, abundant, 1900 (C. E. S.).

M. cristatum L. subsp. Ronnigeri Pöverl.

"Caulis 15–30 cm. altus, internodiis 5–7 brevibus vel elongatis, ramosus, rami breviores, stricti, oblique erecti. Folia angustiora, 5–8 mm. lata, intercalaria 0–1 paria. Inflorescentiæ initium ad nodum 6.–8. situm. Cotyledones desunt. Spica 3–4 cm. longa, bracteæ purpureæ, corolla versicolor."

Essex, N.; v.c. 19. Woods at Walden (G. S. Gibson). *Suffolk, W.; v.c. 26.* Near Elmswell, 1898 (J. T. Powell). *Cambridge; v.c. 29.* Hardwick Wood, 1916 (C. E. S.) ("ad typum vergens"). *Hunts; v.c. 31.* Monk's Wood (Herb. J. A. Power).

It would appear that the plant designated by Soó as "typus" is rare or wanting in Britain. Its description reads—"Caulis 20–50 cm. altus, internodiis numerosis brevibus, perramosus, rami arcuati, patentes. Folia caulina 5–8 mm. lata, intercalaria 2–5 paria. Cotyledones desunt. Inflorescentiæ initium ad nodum 7.–12. situm. Spica elongata, bracteæ luteovirides vel purpurascentes, corolla lutea vel purpurea (cfr. lus.)."

M. silvaticum L. subsp. subsilvaticum Schinz & Ronn.

"Caulis 15–30 cm. altus, internodiis elongatis, ramorum paribus 1–3 strictis, ascendentibus vel erectis. Folia caulina 2–10 mm. lata, ±carnosa, intercalaria 0. Cotyledones desunt. Inflorescentiæ initium ad nodum 4.–6. situm. Bracteæ apud typum integerrimæ."

Yorkshire, mid-west; v.c. 64. Ribblehead, 1891 (J. Beanland). *Durham; v.c. 66.* Near Winch Bridge, Teesdale, 1883 (H. T. Mennell).

Our ordinary British plant appears to be this subspecies and not Soó's "typus," which he describes thus—"Caulis 15–35 cm. altus, perramosus, internodiis numerosis, brevibus ramis horizontaliter patentibus vel procumbentibus vel ascendentibus. Folia caulina 5–8 mm. lata, intercalaria 0–2 paria. Inflorescentiæ initium ad nodum 5.–8. situm. Bracteæ plerumque integerrimæ, cotyledones desunt."

M. PRATENSE L. subsp. VULGATUM (Pers.) Ronn. f. LANCEOLATUM Spenn. "Folia anguste lanceolata, vel elliptico-lanceolata, 8–15 mm. lata."

Hants, N.; v.c. 12. Bishopstoke, 1896 (C. Cotton) (Rep. Wats. Ex. Club 1896–7, 13). *Berks; v.c. 22.* Wellington College, 1918 (G. C. Druce) (Rep. B. E. C. 1918, 520). ("> f. ovatum Spenn.")

f. OVATUM Spenn.

"Folia ovato-lanceolata, 20–35 mm. lata."

Somerset, N.; v.c. 6. Wood, Weston-in-Gordano, 1920 (I. M. Roper) (Rep. B. E. C. 1920, 243). *Norfolk, W.; v.c. 28.* Watton, 1918 (F. Robinson) (Rep. B. E. C. 1918, 521).

Subsp. OLIGOCLADUM (Beauv.) Soó.

"Caulis 20–30 cm. altus, simplex vel ramorum paribus 1–2 brevibus raro florigeris, internodiis elongatis. Folia 6–8 mm. lata (cfr. formas) intercalaria 0, rarius 1 paria (f. *rigidum* Beauv., M. 494 pro subvar.). Cotyledones adsunt. Inflorescentiæ initium ad nodum 3.–5. situm. Bracteæ uti ssp. *vulgati*."

Berks; v.c. 22. Unwell Wood, 1886 (W. R. Linton) ("proxima f. *platyphyllum* Beauv."). *Co. Mayo.* Near Mallaranny, 1899 (E. S. Marshall). ("> subsp. *hians* (Druce) Beauv. f. *britannicum* Beauv.")

Subsp. PURPUREUM (Hartm.) Soó f. SCOTIANUM (Beauv.) Soó.

[In the Monograph this form is placed under subsp. *montanum* (Johnst.) Soó.]

"Folia paullo latiora, 2–3 mm. lata, inflorescentiæ initium ad nodum 3.–4. situm, corolla purpurascens? (sec. diagnosim Beauv. hoc pertinere videtur, anne ssp. propria?). Scotia."

Perth, mid; v.c. 88. Schiehallion, 1913 (D. A. Haggart); Sow of Athol, 1922 (C. E. S.). *Westerness; v.c. 97.* Carn Liath, N. of Loch Laggan, 1916 (E. S. Marshall). (Ref. No. 4261.)

Subsp. MONTANUM (Johnston) Soó.

"Caulis usque 25 cm. altus, a basi ramosus, internodiis numerosis, brevibus, ramis brevibus, oblique erectis. Folia caulina linearilanceolata, 2 mm. lata, intercalaria 2–4 paria. Cotyledones desunt. Inflorescentiæ initium ad nodum 6.–8.–(9.) situm. Corolla lutea vel albida, fauce hianti. Bracteæ inferiores subintegerrimæ, superiores basi ±denticulatæ."

Yorkshire, N.W.; v.c. 65. Birk Rigg, 1887 (A. J. Crosfield). *Durham; v.c. 66* or *Yorkshire, N.W.; v.c. 65.* Teesdale (J. Backhouse). *Cumberland; v.c. 70.* About Watendlath, near Keswick, 1920 (C. Waterfall). *Perth, mid; v.c. 88.* Ben Laoigh, 1907 (P. Ewing). *Perth, E.; v.c. 89.* Glas Tulachan, Glen Shee, 1882 (H. T. Mennell). *Forfar; v.c. 90.* Canlochan, 1897 (P. Ewing) ("vix a subsp. *paludoso* differt"). Wooded rocks, foot of Craig Maid, 1912 (C. E. S.).

Var. ERICETORUM D. Oliver.

"Ramis elongatis, patentibus vel arcuatis, folia latiora, 4–5 mm. lata, intercalaria 0–2 paria (anne ssp. propria?").

Cheshire; v.c. 58. Wybunbury Moss, 1895 (E. S. Marshall). (Ref. No. 1506). *Yorkshire, mid-west; v.c. 64.* Hill near Cocket Moss, near Settle, 1911 (C. E. S.). *Yorkshire, N.W.; v.c. 65* or *Durham; v.c. 66.* Teesdale, 1881 (H. T. Mennell). *Westmorland; v.c. 69.* Stank Wood, near Appleby, 1911 (C. E. S.). *Perthshire, mid; v.c. 88.* Near Inch Garth, Keltney Burn, 1913 (C. E. S.) (Rep. Wats. Ex. Club, 1913–14, 452).

Subsp. HIANS (Druce) Beauv.

"Caulis ramosus, internodiis minus numerosis, elongatis, ramis elongatis, suberectis. Folia caulina 3–10 mm. lata, anguste-lanceolata, intercalaria 0–1 paria, cotyledones desunt. Inflorescentiæ initium ad nodum 4.–6. situm. Bracteæ inferiores subintegerrimæ, superiores ±dentatæ. Corolla lutea, fauce valde aperto, hianti."

Easterness; v.c. 96. Near Kincraig, 1891 (A. Somerville). *Co. Wicklow.* Vale of Avoca, Ireland, 1835 (Herb. J. W. Curtis).

f. PLATYPHYLLUM Beauv.

"Folia 10–15 mm. lata."

Somerset, S.; v.c. 5. Porlock Weir, 1898 (C. E. S.).

f. BRITANNICUM Beauv.

"Folia usque 20 mm. lata, inflorescentiæ initium ad nodum 3.–4. situm."

Yorkshire, N.W.; v.c. 65. Near Winch Bridge, Teesdale, 1911 (C. E. S.).

DURIÆI ITER ASTURICUM BOTANICUM.

By C. C. Lacaita, M.A., F.L.S.

In 1835 Durieu de Maisonneuve* explored the western part of Asturias, the Province of Oviedo, on the north coast of Spain, which then was a region botanically unknown. His collections were studied by that meticulous botanist Jacques Gay, and, when published in the following year, were distributed with labels drawn up by Gay,

* This is the usual spelling, but Gay spells it Maison-Neuve, and Desmoulins spells Du Rieu, and consequently gave the name *Cerastium Riæi* instead of *Duriæi* to one of Durieu's plants.

containing the original diagnoses of 32 species, new, or at the time thought to be new.

The *Annales des Sciences Naturelles* for 1836 (ser. 2, vol. v.) contains an account by Gay of Durieu's journey, written in Latin, under the title of *Duriæi Iter Asturicum Botanicum*, which breaks off at page 355 of that volume. Although a continuation is there promised—"*continuabitur*"—no more ever appeared, nor can I find any more in the original MS., which may be seen in vol. xv. of Gay's MSS. preserved at Kew. What happened? Was no more written? The intention to publish the diagnoses is evidenced by the existence of certain uncorrected printer's proofs, attached to the specimens from herb. Gay at Kew, and marked by the author "December 23rd, 1837, ined." It is odd that there should be no reference to the missing sequel in later parts of the Ann. Sci. Nat. Was there a quarrel? The subject is referred to by Desmoulins in Cat. Dordogne, (1849) 41, "la publication de l'*Iter Asturicum* ayant été suspendue, au grand détriment de la science et sans espoir de reprise."

In the *Iter* Gay mentions the plants collected by Durieu, without any formal list, giving names to sundry new species, but as there are no diagnoses these are *nomina nuda*, although regularly quoted in *Index Kewensis*. Even Willkomm, in *Grundzüge der Pflanzenverbreitung auf der iberischen Halbinsel*, p. 11, inaccurately says that Gay *described* the species in Ann. Sci. Nat. It has therefore been more usual to refer to them as "Gay in Durieu Pl. Astur. Exsicc. no. —", the diagnoses or descriptions being printed on the labels. As these are only accessible where sets of the Pl. Astur. Exsicc. are to be found, and as later authors—*e. g.*, Willkomm—have frequently substituted their own descriptions for Gay's original ones, it may be useful to publish those that are preserved in Gay's MSS. at Kew in the same volume as the *Iter*. These are mostly identical with those on the labels, though occasionally with some slight verbal difference, but a few are much fuller. Five out of the whole number described are missing from the MSS. which Gay, *more suo*, wrote on little scraps of paper; some may have been misplaced in another of the many volumes of the MSS., but so far I have been unable to trace them. These missing descriptions can be recovered from the printer's proofs mentioned above; but for one of them, *Cerastium Riæi*, no. 30, Gay does not appear to have drawn up any diagnosis, for the curious reason explained under that number.

Extracts from Gay's MSS.*

1. Avena sulcata Gay (December 23rd, 1837, ined.). [Durieu, Pl. Astur. 176.]

A. radice perenni, fibrosa; culmis brevissimis; foliis brevibus, planis, late linearibus, obtusiusculis, margine scabriusculis, vaginis glabris, lævissimis; panicula simplici, contracta; spiculis 3–5-floris; glumis lævissimis, inferiore 5-nervi, superiore paulo longiore, trinervi; flosculis gluma longioribus, rachilla sub flosculis villosissima; paleis

* By kind permission of the Director of the Royal Botanic Gardens.

lævibus, exteriore infra medium sulcato-quinque-nervi, medio dorso aristata, arista nuda.

Habitat in pascuis alpium Asturicarum, locis editissimis; nominatim in montibus *port de Leitariegos* et *pic d'Arvas*, ibi medio Augusto florens (*Durieu*).

Culmi bipedales, foliorum vaginis longè tecti, apice nudi. *Folia* planissima, uninervia, utrinque subtiliter striata, præter scabriusculum marginem lævissima; radicalia numerosa, cæspitosa, erecta, 3–4 uncias longa, 2½–3 lin. lata, vaginis brevibus, laxè amplexantibus, lævissimis; culmea duo, longè et tubulosè vaginata, limbo inferioris 1–1½-unciali, superioris 3–4 lin. longo, ligula inferioris longissima (5 lin. longa), ovato-lanceolata, acuminata. Panicula racemiformis, maximùm semipedalis, ramis geminatis, gracilibus, erectis, scabriusculis altero mono-, altero (longiore) di-stachyo, summis omnibus monostachyis. *Spiculæ* cuneatæ, 7 lin. longæ, ex argenteo et castaneo variegatæ. Glumarum nervi valdè inæquales, medius solus excurrens, laterales subtiliores, gradatim breviores, extimi in gluma inferiore brevissimi, obsoletissimi. *Flosculi* remotiusculi, teretiusculi. *Palea inferior* ovato-lanceolata, convexa, apice profundè emarginata et inæqualiter quadridentata, dentibus duobus intermediis longioribus, sæpè setaceis elongatis; *interior* triente ferè brevior, lanceolata, integra, tenuissimè membranacea, bicarinata, carinis dense ciliatis. *Antheræ* virgineæ dimidio flosculo breviores. *Ovarium* supernè hispido-villosissimum.

Obs. Species pulchra, ex *pratensis*, *pubescentis*, *planiculmis*, etc. grege, à quibus omnibus facilè dignoscitur ob paleam exteriorem sulcato 5–7 nerviam, non planam remotè trinerviam, et folia radicalia pro plantæ modulo brevissima, latissima. Nequit esse *Av. scabriuscula* Lag. Gen. et Spec. nov. no. 52 (in planitie Legionensi, locis arenosis crescens), cui folia involuto-subulata ab auctore tribuuntur. Etiam *Av. alpina* Smith (*Av. planiculmis*, Engl. Bot. tab. 2141), ex icone et descriptione, longe aliam speciem sistere videtur.

2. Holcus tenuis Gay. [Durieu, Pl. Astur. 177.]

H. annuus, gracilis spithamæus; geniculis glabris; foliis angustissimis, utrinque pubescentibus, vaginis superioribus glaberrimis; paniculæ laxæ ramis filiformibus hirtis; glumis lanceolatis, ad carinam scabris, superiore longissime acuminata; flosculi superioris (hermaphroditi) arista geniculata, triplum flosculum æquante.

Habitat in rupibus Asturiæ-occidentalis pedemontanæ ad S. Annam prope Cangas de Tineo. Julio ineunte florens (*Durieu*).

Holco molli affinis, at diversus radice non repente nec perenni, sed fibrosa, annua; totius plantæ statura humili et tenuitate; culmorum nodis glabris, non villosis; glumis ad carinam scabris, non ciliatis, superiore longissime acuminata, acumine setaceo-subulato; flosculi superioris arista triplum non duplum flosculum æquante.

Non absimilis *H. annuus* Salzm. (Trin. in Mey. Verz. Pfl. Cauc. p. 17), è Tingide et insulis maris Caspii oriundus, differt a nostro glumis ad carinam longe ciliatis, ex apice obtusiusculo longè setigeris, non sensim et absque saltu acuminatis, flosculi superioris arista vix longitudine flosculi, etc.

3. Carex filifolia, Gay. [Durieu, Pl. Astur. 204.]

C. spicis sexu distinctis; mascula solitaria; fœmineis 1–2, sessilibus, breviter bracteatis, paucifloris, fructiferis echinatis, apice summo masculis; squamis fœmineis ellipticis, obtusissimis, muticis; utriculis squamâ dimidio ferè longioribus, glabris membranaceo-marginatis, ex ovata basi longè acuminato-rostratis, rostro scabriusculo, longiusculè bidentato; stigmatibus 3; nuce acutè trigona; foliis filiformibus triquetris, culmo gracili obtusè trigono dimidio brevioribus, radice repente.

Habitat in declivibus paludosis montium asturicorum humiliorum (speciatim in monte *del Chorro* et in *Sierra del Aguilero* propè *Gradum*), ibi Junio ineunte fructificans (*Durieu*).

Radix repens. *Culmi* erecti, 1–2-pedales, graciles lævissimi, obtusè trigoni, basi foliati, lateribus bisulcatis. *Folia* culmo dimidio breviora lævissima, filiformia, triquetra, latere interiore angustissimè canaliculata, recentia tenacissima. *Spica* mascula unica, terminalis, 8–11 lin. longa, teretiuscula, gracilis, squamis uninerviis, obovato-ellipticis, obtusissimis, fulvis, albo-marginatis, apice eroso-denticulatis. *Spicæ* fœmineæ 1–2, masculæ proximè subjectæ, eaque dimidio breviores, sessiles, paucifloræ, ellipsoideæ, 3–5 lin. longæ, totidem latæ, apice summo plerumque (6 : 8) masculæ; inferior bracteata, bractea subulata, duplam spicam nunquam excedente, basi non aut vix vaginante. *Squamæ* fœmineæ uninerves, muticæ, atro-fuscæ, albo-marginatæ; inferiores oblongo-ellipticæ acutiusculæ; reliquæ latè ellipticæ, obtusissimæ, retusæ. *Utriculi* squamâ suâ dimidio ferè longiores, 3 ferè lineas longi, valde divergentes, membranaceo latè marginati, glaberrimi, ex ovata basi longè acuminato-rostrati, latere interiore plani, 6-nervii, exteriore convexiusculi, 8-nervii, margine membranaceo integerrimo, rostro remotè serrulato, acutè longiusculè bidentato. *Stigmata* 3, longissima, reflexa. *Nux* utriculo plus triplo brevior, ellipsoidea, acutè trigona, viridula, facie interiore exterioribus paulò latiore.

Obs. Prorsus nova mihi videtur, nec ulli quam noverim aut descriptam invenerim arctè cognata.

4. Carex leiocarpa Gay & Dur. [Durieu, Pl. Astur. 206.]

C. spicis sexu distinctis, mascula solitaria, fœmineis 2–3, remotis bracteatis paucifloris, erectis, omnibus exsertè pedunculatis; squamis fœmineis oblongo-ellipticis, obtusissimis, muticis; utriculis squamâ paulò longioribus, glaberrimis, lævissimis, ellipsoideis, obtusè trigonis, abruptè brevissimè rostratis, ore integro; stigmatibus 3; nuce ellipsoidea, obtusissimè trigona; foliis planis; gramineis, culmo trigono ferè triplò brevioribus; radice repente.

Habitat in montium Asturicorum (*pic de Canellas, pic de la Sarrantina, pic d'Arvas, puerto de Leitariegos*, etc.) pascuis alpinis, ibi medio Julio fructifera (*Durieu*).

Radix repens, multos steriles foliorum fasciculos emittens. *Culmi* pedales, erecti, trigoni, striati, lævissimi, basi foliati. *Folia* culmo triplò ferè breviora, 5–6 uncias longa, rigidula, plana, graminea, 1½–2 lin. lata, acuminata, utrinque striata, margine scabriuscula. *Spica* mascula unica, terminalis, 7–8 lin. longa, nunc teretiuscula, nunc medio plus minus dilatata, squamis uninerviis, lineari-lanceolatis, obtusis, castaneis, angustè albo-marginatis.

Spicæ fœmineæ 2–3, distantes, oblongo-ellipticæ, seu teretiusculæ, 5–7 lin. longæ, pauciforæ, omnes bracteatæ et exsertè pedunculatæ, superior masculæ approximata. *Bracteæ* foliaceæ; inferior $2\frac{1}{2}$–$4\frac{1}{2}$ unc. longa, tubo 6–7 lin. longo, limbo lineari-lanceolato, supernè valdè attenuato; intermedia $\frac{1}{2}$–$1\frac{3}{4}$-unciali, tubo 4 lin. longo, limbo angustissimo; tertia (si adest) 3 lin. longa, tota tubulosa, limbo prorsus nullo. *Pedunculi* perindè valdè inæquales, inæqualiter trigoni, ad unum angulum scabriusculi; inferior $1\frac{1}{2}$–$2\frac{1}{2}$ uncias longus, folio suo quidquam brevior, fructifer erectus vel subnutans; intermedius 5–7 lin. longus, folio suo nunc paulò longior, nunc plus dimidio brevior, tertius (si adest) brevissimus, bracteam suam rudimentalem æquans, non superans. *Squamæ fœmineæ* laxæ, oblongo-ellipticæ, obtusæ, muticæ, convexè carinatæ, membranaceo-marginatæ, ad carinam virides, cæterum atro-fuscæ. *Utriculi* squamam suam paulò superantes, laxi, erecti, oblongo-ellipsoidei, obtusè trigoni, abruptè brevissimè rostrati, glaberrimi, lævissimi, fusci, lateribus æqualibus, interiore enervi, duobus exterioribus trinerviis, rostri ore membranaceo, integro, demum lacero. *Stigmata* 3, longissima, reflexa, subulata, hispida. *Nux* totum utriculum implens, ellipsoidea, obtusissimè trigona, fusca, lateribus æqualibus convexiusculis.

Obs. En altera *Carex*, nulli in Schkuhrii, Wildenowii etc. monographiis descriptarum conveniens, et verisimiliter nova. Staturâ, inflorescentiâ et toto habitu similis *C. sempervirenti* Vill. (*C. ferrugineæ* Schk.), quæ tamen utriculis compressis, longè acuminatis, ad angulos valdè hispidis, etc. diversissima.

5. Luzula cespitosa Gay (23 Dec. 1837, ined.). [Durieu, Pl. Astur. 216.]

L. dense cespitosa; radice fibrosa; fasciculis basi constrictis, squamatis; foliis angustissimis, canaliculatis; racemo subsimplici; bracteis omnibus ciliatis; perigonii laciniis oblongo-lanceolatis, exterioribus acuminatis, interioribus paulò brevioribus mucronatis, capsulâ triquetro-ovatâ suprà medium coarctatâ paulò brevioribus.

Habitat in summis alpium Asturicarum, oppido *Cangas de Tineo* vicinarum, summis cacuminibus frequens, nominatim in monte *pic d'Arvas*, ubi etiam *L. pediformis* (quæ tamen in hisce montibus rarissima et seriùs floret) invenitur. Sua *L. cæspitosæ* specimina medio Julio florifera legit Durieus.

Luzulæ pediformi affinis, sed omnibus partibus gracilior et crescendi modo diversissima. Radix fibrosa, tenuis, non in rhizoma obliquum elongatum incrassata. Ex una radice multi exsurgunt fasciculi, densè cespitosi, rigidi, basi in columnam constricti et foliorum emortuorum basibus squamæformibus vaginati; *Sesleriam tenuifoliam* et *Kœleriam setaceam* eximiè referentes! Folia radicalia 2–3-uncialia, rigidula, erecta, angustissima, teretiusculo-subulata, 6-striata, facie

angustè canaliculata, emortua latiora, planiuscula, maximum ¾ lin. lata (quæ in *L. pediformi* plana, 2–2½ lin. lata); culmea 2 (in *pediformi* minimùm 3), consimilia. Culmi graciles, 8–9 unciales. Racemus plùs dimidio minor, maximùm 10-florus. Flores paulò minores, alii solitarii, alii in glomerulos paucifloros digesti. Capsula suprà medium distinctè coarctata et deinde in pyramidem continuata (quæ in *pediformi* ovoidea, sine saltu pyramidata). Semina flava, non castanea; chalaza brevior, hemisphærica, non conica.

6. Serapias occultata Gay. [Durieu, Pl. Astur. 226.]

S. foliis lineari-lanceolatis, inferioribus patulis, una alterave superiore bracteæformi; bracteis erectis, ovato-lanceolatis, acuminatis opacis; floribus spicatis, parvis, adpressis, bracteâ æquilongâ spathaceâ occultatis; perigonii segmentis 3 exterioribus in unum ovario angustius coalitis; labelli trilobi parte dimidia inferiore lobisque lateralibus bracteâ inclusis, medio lobo exserto, dependente, brevi, angustè lineari-lanceolato.

Habitat in Asturiæ pascuis siccis maritimis circà portum Gijon, nominatim in promontorio Punta del Corono, ibi exeunte Majo florens.

Statura *Serap. Linguæ*, quæ differt, (1) floribus paucibus, majoribus brevius spicatis, liberis, patulis, non cauli adpressis et bracteâ involutis, (2) bracteis flore brevioribus, membranaceis, patulis, non erectis, opacis, floremque æquantibus, (3) perigonii segmentis exterioribus in unum latè ovatum, ovarioque longius, non angustè lanceolatum et ovario æquilongum, (4) labelli dimidia parte inferiore cum lobis lateralibus (hypochilio Rich.) patula, semi-exserta non erecta inclusa, (5) labelli lobo medio (epichilio Rich.) triplo longiore et latiore, etc.

Foliorum inferiorum vaginæ rubro-maculatæ, flores 3–12. Labelli lobi laterales purpurei, occultati, bracteâ omnino inclusi; lobus medius angustissimus, ferè linearis, testaceo-luridus, magis quam in *Lingua* pilosus, anthesi ineunte recte dependens florique adpressus, posteà patulus (*Durieu, ex vivo*).

Procul dubio genuina species, quam ego inter descriptas (præter *cordigeram* et *Linguam* verisimiliter omnes spurias) non invenio.

7. Rumex suffruticosus Gay. [Durieu, Pl. Astur. 236.]

R. caule ramosissimo, infernè lignoso; foliis rameis omnibus petiolatis, lineari-lanceolatis, hastatis, lobis subulatis, indivisis; floribus dioicis, fœmineis racemosis, paniculatis; pedicellis infra medium articulatis; sepalis exterioribus longè suprà pedicelli articulum nascentibus, demum patulis, non reflexis, interioribus cordato latè ovatis, obtusissimis, integerrimis, reticulato-venosis, neutro granifero; stylis ovario adnatis; cariopsi sepalis internis dimidio breviore, oblonga, apice basique æqualiter attenuata et acutata.

Habitat in petrosis alpium Asturicarum, videlicet in meridionali declivitate et paulò infra cacumen montium altissimorum *pic d'Arvas* et *pic de Canellas*, exeunte Julio fructificans (*Durieu*).

Radix non visa. *Caulis* pedalis et ultrà, adscendens, lignosus, nudus, purpureo-fuscus, ramosissimus, ramis intertextis, 7–8 uncias

longis, herbaceis, foliosis, tetragonis, glabris, lateribus unistriatis. *Folia* radicalia et caulina nulla; ramea omnia petiolata, petiolo supputato pollicaria, viridia, utrinque glaberrima, omnia hastata; petiolo filiformi, apice parum dilatato; lamina paulò longiore, uninervi, angustè lineari-lanceolata, acuta, 6–8 lin. longa, maximum unam lin. lata, margine subrevoluta; lobis lamina dimidio brevioribus; dimidò angustioribus, subulatis, oppositis, patentissimis reflexisve, apice sæpè sursum arcuato. *Ochreæ* ad foliorum basin parvæ, membranaceæ, truncatæ. *Flores* dioici; masculi hexandri, minuti, remotè verticillati, in unoquoque verticillo 2–3, antheris filamento brevissimo majoribus; fœminei majores, in unoquoque verticillo 3–6, verticillis racemosis, racemis in ramorum apice 6–8, paniculatis, panicula fructifera satis conferta, oblongo-obovoidea, 2–3 uncias longa, aphylla. Fœmineorum pedicelli capillares, paulò infrà medium articulati. *Perigonii* fructiferi segmenta exteriora a pedicelli articulo longè remota, parva patentissima, nunquam verò reflexa; interiora plus triplo longiora, unam et dimidiam lineam longa, libera (basi non connata), erecta, latè cordato-ovata, obtusissima, integerrima, membranacea, reticulatim venosa, primò purpurea, demum pallida. *Staminum* rudimenta nulla. *Cariopsis* perigonio interiore dimidio brevior, parva, libera (cum sepalis interioribus basi non concreta), oblonga, acutè trigona, apice basique æqualiter attenuata et acutata, lucidula, castanea. *Styli* cum cariopseos angulis longè connati. *Stigmata* in suppetentibus jam lapsa.

Obs. Pertinet ad *Acetosam* subgenus, in quo species ferè omnes sepalis exterioribus gaudent demum spontè reflexis. Quæ paucissimæ abludunt (*R. Acetosella*, *R. multifidus* et similes) caulem habent tenuem, totum herbaceum, flores minutissimos, pedicellos apice summo articulatos (malè Campdera (Rum. p. 123 et 124) *Rumici Acetosellæ* et *multifido* pedicellos inarticulatos tribuit), sepala interiora ovata, neutiquam cordata, longitudine et latitudine cariopseos, basi cum cariopsi concreta, exteriora sepala interioribus arctè adpressa, ideoque verè erecta, non patentia, cariopsis denique ellipsoideo-triquetra, non oblonga, quibus notis dictæ species a nostra omnino abhorrent. Hæc itaque nova est censenda et ab omnibus tum in Campderæ monographia, tum in Schultesii Syst. Veget. descriptis distincta. Paniculæ ejus *R. Acetosam* et affines non malè referunt, qui tamen caulibus herbaceis, sepalis interioribus graniferis, exterioribus reflexis pedicelloque adpressis diversissimi. Nostra propriam fortè sibi poscit sectionem inter Campderianas § et §§ (Monogr. p. 68) locandam, sepalis exterioribus non reflexis ab §, habitu et sepalis exterioribus non omnino erectis a §§ distinguendam.

Folia recentia insipida, neutiquam acida (*Durieu in litt.*), quâ nota ab omnibus affinibus differt noster.

(To be continued.)

OBITUARY.

Viktor Ferdinand Brotherus
(1849–1929).

Viktor Ferdinand Brotherus was born in the Åland Islands of Finland, November 28, 1849. His death occurred early in February at Helsingfors, where he had lectured for many years. As a bryologist his reputation is deservedly world-wide. In pursuit of his botanical studies he made expeditions to the Caucasian Alps (1877 and 1881), and into the wilds of Central Asia (1896). He was elected a Foreign Member of our Linnean Society in 1920, and was an honorary member of several learned societies in his own and other lands. During the course of a long and active life he found time to carry out investigations of the mosses of practically the whole world. His published works form a comprehensive bibliography amounting to nearly 100 papers and books, and testify to the extent of his researches in the field, but more especially in the herbarium. They comprise papers dealing with such widely separated regions as Scandinavia, the Caucasus, Australasia, the Philippines, India, East Asia, Tropical Africa, South America, etc. His most outstanding and best known work—the 'Musci,' in Engler and Prantl's *Pflanzenfamilien*—is a masterly exposition of bryological classification in accordance with modern views; it was published in parts between 1901 and 1909, with a second edition in 1924–25. His moss-herbarium at Helsingfors has been estimated to contain fully 110,000 specimens, representing upwards of 15,000 species.—A. Gepp.

SHORT NOTES.

Woodwalton Violets.—After much recent study of this group and a renewed sight of those I collected at Woodwalton twenty years ago, I have come to the conclusion that there are three prominent species, producing endless varieties—(1) *canina* with its rigidity, (2) *stagnina* with its flaccidity, pointed leaf-blades, and very round flowers, and (3) *montana* with its flaccidity, unsymmetrical leaf-outline, and narrower, longer, more ragged petals. And that all three are represented in most of the plants, especially in those which I ventured to name provisionally "triple hybrids." This conviction has been strengthened by some drawings recently received from Mr. R. W. Butcher of Cambridge.—E. S. Gregory.

Asplenium Adiantum-nigrum Linn., near Goathland, North Yorks.—On the 17th November, 1928, Dr. W. Arthur Sledge of Leeds found *Asplenium Adiantum-nigrum* growing on masonry near Goathland. A specimen of this fern has been submitted to Dr. G. C. Druce, and he refers to it as "an obtuse form" of the Black Spleenwort. It is not included in Canon Fisher's *List of the Whitby Flowering Plants* among the cryptogams given therein, and to the best of my knowledge and belief it has not been recorded in the Whitby district. Baker includes it in all areas. Now the Esk area covers a tract of country from Marske to the south of Robin Hood's Bay along the coast, and to Rosedale inland. Canon Fisher's Whitby district is, therefore, a large portion of this area. I consequently conclude that *Asplenium Adiantum-nigrum* is a rare plant in Baker's Esk area, No. 4.—R. J. Flintoff.

The Economic Possibilities of Rice Grass (*Spartina Townsendii*).—James Bryce (*Journal of Ministry of Agriculture*, Dec. 1928) describes the experiments carried out by the East Anglian Institute of Agriculture in Essex. The experimental plantations of *Spartina* were only begun in 1925, so it is early yet to form any conclusions on the erosion or accretion problems. Meanwhile, the aim has been to introduce the plant to as many and varied situations and conditions as possible and to watch developments. The plantations at Northey Island near the head of the estuary of the Blackwater have been the most successful so far. The main objects of these plantations were to establish a type of vegetation more suitable than that already in possession, for the purposes of fodder and to counteract erosion. Out of the three plots laid down, two were successful, one inside and the other outside the sea-wall. The unsuccessful plot was on a wide "pan" of soft bare mud in an angle between the sea-wall and the saltings. The owner of the island was so satisfied with the progress of the two plantations by the end of 1926 that he has now planted about 15 acres, and has reason to hope that before long he will be able to increase considerably his head of stock as a result.

In 1926 Rice-grass was introduced on some of the more exposed mud flats in the Blackwater estuary. Four small plantations were made, two of which were complete failures. These were both on the lower *Zostera* flats, where the mud is very soft and the plants are exposed to strong currents and heavy wash. At Goldhanger, however, three plants out of a hundred managed to survive, and these by July 1928 had doubled their number of shoots, flowered for the first time, and were at last beginning to spread. At Bradwell, where the site chosen resembles the sites at Northey, the results are distinctly promising.

In April 1927 the sloping lower face of a new section of sea-wall at Mundon was planted up, and, although there has been a small mortality amongst the plants, the remainder have grown well.

The results of these experiments have aroused considerable interest among occupiers of land along the Essex coast, and there is consequently a demand for more information on the subject, but the work will have to be continued and extended before it will be possible to draw up hard-and-fast rules for the guidance of those desirous of utilizing *Spartina Townsendii*.

The same *Journal*, for January 1929, contains an article by F. Knowles on the composition and nutritive value of the grass.

A sample obtained on July 4th, 1927, was chemically analysed and was found to have a somewhat similar composition to good or very good meadow-hay, but the mineral composition was somewhat unusual, as might be expected from its habit of growth.

Feeding trials as to the digestibility of the animal nutrients present when made into hay proved that the hay had no deleterious properties, but a nutritive value equal to that of poor meadow-hay. As the *Spartina* hay used for these trials was made under bad conditions, it seems reasonable to suppose that it could be equal to good meadow-hay if made under favourable conditions. It is also suggested that *Spartina* silage might be better suited for stock than either the green plant or the hay, as a good deal of the salt would probably be expelled during ensiling.—Doris Powell.

Epipactis atrorubens Schultz in Devon.—Remembering that the late Dr. O. St. Brody did much botanical work in the Bristol district, as noted in my *Flora*, Mr. C. E. Salmon has kindly sent me a portfolio of twenty-four pressed orchids—admirably prepared and mounted—collected by St. Brody during the last ten years of his life. The set had been presented to a person at Lynmouth shortly before his death. Its main interest attaches to a specimen of *Epipactis atrorubens* Schulz from "moist ground, Crown Hill, Plymouth." If this be reliable, and the plant seems right, a rare species is added to the flora of Devon. Before acceptance, however, one would like to clear up a few mysteries. To begin with, this orchid is a plant of dry limestone, not of moist ground on slate and granite. Then Briggs who, so far as I know, left nothing in his area to be gleaned after his day, records *E. latifolia* only from the vicinity of Crown Hill. The labels on these specimens bear St. Brody's name in print, but were not written by him. Together with the accompanying list, they are in a schoolboy hand. Moreover, there are one or two misnomers, errors for which we cannot believe the Doctor to have been responsible. As the sheets all bear the same serial number, it may be conjectured that similar sets had been prepared for sale, St. Brody being destitute of means, and that this one was put together during his last illness. Should this surmise be correct, some reader of the *Journal* may possess material needed to substantiate the Devon claim.—J. W. White.

JOHN RAY'S LETTERS*.

The Ray Society has now devoted a third volume to the life and correspondence of the great naturalist whose name it commemorates. The first, *Memorials of John Ray*, issued in 1846 under the editorship of its Secretary, Dr. Edwin Lankester, was followed in 1848 by *The Correspondence of John Ray*, prepared by the same editor. The present volume is the outcome of a rediscovery in the Bodleian library of a number of letters of John Ray which supplement the volume of *The Correspondence*. For, as Dr. Gunther explains in his Preface, "whereas some four-fifths of certain parts of that volume are devoted almost exclusively to the letters of his correspondents to

* 'Further Correspondence of John Ray,' edited by Robert W. T. Gunther, M.A., LL.D. 8vo, pp. xxiv, 332, with 2 portraits, 2 pls., and 6 text-figs. Ray Society: London, 1928.

him, the Bodleian collection consists of the more important of Ray's own letters to his two Oxford correspondents, John Aubrey, the antiquary, and Edward Lhwyd, Keeper of the Ashmolean Museum." In addition, "an enquiry at the Royal Society resulted in the finding of a series of nine letters in Ray's holograph addressed to the Secretaries, Henry Oldenburg, Waller and Tancred Robinson, between 1670 and 1693." The contents were probably reported at the meetings of the Society, and some were published in the *Philosophical Transactions*; others, however, have never been printed, and none are noticed in the *Correspondence*. In compiling the latter work "Dr. Lankester appears merely to have reprinted the collection of letters edited in 1715 by Dr. William Derham under the title of *Philosophical Letters*, with many omissions, and to have added thereto the correspondence between Ray and Sir Hans Sloane," now in the Sloane MSS. in the British Museum. Many of the original letters which were in part included in the *Philosophical Letters* of 1718 are fortunately available. After passing through several hands they were presented (not sold) by Mr. J. D. Enys to the Trustees of the British Museum, and are now in the Botanical Department. Dr. Gunther has therefore been able to include the missing passages which from their personal details have often a special interest. Thus there is ample justification for the publication of this third volume for which our thanks are owed to the Ray Society. And the Society is to be congratulated on having had the services of so able an editor as Dr. Gunther.

The text is preceded by a chronological table of Ray's letters included in the two volumes of 1848 and 1928 respectively. They cover a period from January 3, 1658–1659 to January 7, 1704–1705, and represent therefore the greater part of his life—Ray was born in November 1627 and died Jan. 17, 1704–1705.

The arrangement of the text is as follows:—

I. Two short lives of John Ray. The first, probably the original draft (in the Bodleian library) for a Life of Ray, by his great friend the botanist, Samuel Dale of Braintree; and the second by James Petiver, an intimate friend of Ray, now in the Sloane MSS. in the British Museum. Both have appeared in the *Essex Review*.

II. The Correspondence between Ray and Peter Courthope of Danny, 1658–1673. This, the earliest series of letters, was not known either to Dr. Derham or Dr. Lankester, but extracts were published in 1858 by the Sussex Archæological Society, from whose Journal the present account has been taken. "The original letters are believed to be preserved in the fine old house at Danny, the residence of Ray's friend and college pupil, Peter Courthope," but the manuscripts "at present are unfortunately not available for study." Dr. Gunther gives extracts from seventeen letters, the first of which was written when Ray was Junior Dean of Trinity College, Cambridge. He asks his friend's advice as to entering the priesthood, which would mean "farewell to my beloved studies and employments" and taking "to the study of that which they call divinity." Ray was however ordained, but refused to "conform" at the Restoration

in 1660; in the second letter (Sept. 1660) he explains his position to his friend. The other letters, some of which are from Cambridge, indicate the struggle between conscience and interest, which ended in his refusal to subscribe to the Act of Conformity and his loss of preferment.

III. Ray-Willughby Correspondence. Unfortunately, the correspondence between Ray and his pupil and friend Francis Willughby cannot now be traced.

IV. Ray and the Royal Society. These communications cover a period of more than thirty years and illustrate Ray's versatility and wide interests. The first—observations at Rome on the comet of 1664—was communicated by Samuel Dale after Ray's death. The earliest reference to any contribution by Ray, who had been elected F.R.S. on Nov. 7, 1667, was on the motion of sap in trees, describing experiments by his friend Willughby and himself. Seven letters by Wray (as he still spelt his name) to the Secretary are preserved in the Society's archives. The earliest, Jan. 5, 1670, communicates experiments by Dr. Hulse and Mr. Fisher on the effect of the juice of ants on blue flowers. Another (1671) describes at length his dissection of a young porpoise—it was read at the meeting of Nov. 9, 1671, and the writer being present received the thanks of the Society. Ray's two discourses on the *Seeds of Plants* and the *Specific Differences in Plants* (read Dec. 17, 1674) are also reproduced, and are well worth perusal. Dr. Gunther also includes letters and references to letters bearing on Ray's work in completing and arranging the publication by the Society of his friend Willughby's *History of Fishes*; Willughby died in 1670, the book was published in 1685.

V. Letters from Ray to Martin Lister, Fellow of St. John's College, Cambridge (1666–1676), and VI. to Dr. Tancred Robinson, Secretary of the Royal Society (1683–1694). These are the letters presented by J. D. Enys to the Botanical Department of the British Museum. A number of extracts are included, many written in Latin. The later ones are from Black Notley, to which he removed in 1679 into a house of his own erection (previously occupied by his mother, who died in 1678), where he lived until his death. The letters include references to his botanical journeys, botanical and other notes, and, later, references to his *magnum opus*, the *Historia Plantarum*, which the Royal Society ordered to be printed Sept. 18, 1685. The first volume was published in 1686, the second in 1688, and the third—the Supplement—about six months before his death, in 1704.

VII. Letters from Ray to John Aubrey the Antiquary (1676–1695), includes fourteen letters by Ray, now in the Bodleian library. These, which Dr. Gunther prints in full, contain various botanical notes; Ray's Notes to Aubrey's MS. *Natural History of Wiltshire* are also included. In 1678 Ray writes: "The study of plants I never lookt upon as my businesse more than I doe now, but my diversion only; wch yet since I am not qualified to serve God & my generation in my proper function [Divinity], I have been more bold to bestow a good proportion of my time on." In the last letter, from Black Notley, May 7, 1695 (which he describes as "a corner of ye World barren of Wits"), he writes: "My *Synopsis Method. Stirpium Britann.* is now printing ye 2d time, with ye Addition of above half an hundred new species of Mosses and of Fuci and Fungi together almost as many." (The first edition appeared in 1690.)

IX. The correspondence between Ray and Edward Lhwyd (1689–1703) is printed for the first time—the originals are in the Bodleian library. Lhwyd succeeded Dr. Plot as Keeper of the Ashmolean Museum in 1690 and died at his post in 1709. This, by far the largest section, occupies just one hundred pages and is full of botanical notes and references to his works, botanical and zoological, projected or in preparation. In 1691 he refers to his "Miscellaneous Discourses concerning the Dissolution and Changes of the World," published in 1692. The presence of "formed stones"—fossil shells, bones of fishes, etc.—was a great problem for naturalists in view of the orthodox history of the Creation. Ray found himself unable to accept them as *lusus naturæ* or as the results of subsequent dispersion by the Great Deluge. He recurs to this subject on several occasions, and in the last letter (Feb. 1703), where he pleads his "present uneasy condition" as an excuse for negligence in correspondence, he writes "I can hardly shake off my former opinion," that the beds of Oyster-shells formed in Kent, Surrey, and other places "were originally beds of living oysters, breeding and feeding in the places where they are now found, wch were anciently ye bottome of the sea."

X. Finally, Dr. Gunther prints a list of notes of letters from Ray to Dr. Robinson, from a long list of letters (1683–1704) to and from Ray in the handwriting of Dr. Derham, which is among the Ray letters in the Department of Botany. Dr. Gunther remarks: "They provide us with accurate dates for many events and are a monument to Ray's assiduity as a letter-writer."

The collection concludes with a few extracts from unpublished letters of several contemporary men of science, which shed interesting side-lights upon Ray's heroic struggle for life in which to complete his great *Historia Plantarum* and also upon the difficulties of its production.

We have said enough to indicate the remarkable interest of this volume, which, however, is not to be regarded as a final contribution. Dr. Gunther writes in his Preface: "The time for a final biography of the great East Anglian savant can, however, hardly be said to have come, for there is a rumour of yet other materials still unpublished, and at the present moment inaccessible."

The illustrations include a frontispiece portrait of John Ray, from the portrait in the National Portrait Gallery, a reproduction from an engraving of Ray's house at Black Notley, a photograph of his tomb in the churchyard, and also a portrait of Samuel Dale, a letter from whom to Dr. Hans Sloane, Secretary of the Royal Society, giving an account of what manuscripts were left by Mr. John Ray, was published in the *Philosophical Transactions* two years after Ray's death.

A. B. R.

REVIEWS.

The Ferns (Filicales), treated comparatively with a View to their Natural Classification. Volume III. *The Leptosporangiate Ferns.* By F. O. Bower, Sc.D., LL.D., F.R.S., Emeritus Professor of Botany in the University of Glasgow. Royal 8vo, pp. viii+306. With 177 illustrations. Cambridge University Press, 1928. Price 30*s.* net.

In this, the third, volume of his great work, the author brings to an end his long study of the phylogeny of the Ferns. The aim that he had in mind was to discover trustworthy data upon which he could construct a natural classification of the group. The systems of classification evolved by the older pteridologists depended too much upon superficial characters and contained sundry large unnatural genera, such as *Polypodium*, *Acrostichum*, and *Gymnogramme*, composed of groups of species not really related to one another. Subsequent authors have dug into these unwieldy assemblages and split off groups of species of marked affinity, constituting them as proper genera; and thus in course of time the taxonomy of ferns has undergone a gradual improvement, thanks to the efforts, not only of workers in the herbarium and in the laboratory, but also of palæontologists.

Professor Bower has devoted himself to an intensive study of the phylogeny of ferns, starting from the earliest available fossil fragments and working forward to the more recent forms and to the living ferns which we know, thus endeavouring to reconstruct the chief evolutionary sequences upon a foundation of organography.

In his first volume, published in 1923, he considered and defined the criteria upon which a phylogenetic study of the Ferns should be based. Having fixed upon twelve of these criteria, he was able to recognize in each phyletic sequence that he investigated what states were primitive and what were relatively advanced—be it in external morphology, vascular structure, venation, sorus, sporangia, spore-output, etc.

In the second volume (1926) the method explained in Vol. I. is applied to those Ferns which must be regarded as primitive. The Cœnopteridaceæ, the fossil remains of which are plentiful in the Coal Measures, exhibit so wide a range of size, form, and structure as to suggest an approximate source for the ferns that have followed after. With this Palæozoic ancestry in the background, there are six lines of descent still in existence which have their roots in the distant past and are distinctly primitive in their characters. These are the Ophioglossaceæ, Schizæaceæ, Hymenophyllaceæ, Osmundaceæ, Gleicheniaceæ, and Marattiaceæ. Three of them (the first, third, and sixth) have produced no modernised derivatives; the Schizæaceæ and Gleicheniaceæ, on the other hand, suggest origins for the great groups of modern ferns with marginal and superficial sori respectively; and the Osmundaceæ provide a starting-point for the Gymnogrammoid group.

In the present volume, the third and last of the series, the modern ferns, the Leptosporangiatæ, are discussed in detail. They comprise six main groups—Davallioids, Pteroids, Gymnogrammoids, Blechnoids, Dryopteroids, Dipteroids,—and we are shown how they may be presumed to have arisen. To put it shortly:—(1) the Schizæaceæ represent the source of the ferns with marginal sori [marginales], the line being carried on by the Dicksoniaceæ with two main branches leading to the Davallioids and the Pteroids, and some smaller branchlets—*Hypolepis*, *Leptolepia*, and *Monachosorus*. In the Pteroids the sori have lost their individuality and become fused into a continuous marginal line. (2) The Osmundaceous genus *Todea* suggests a source from which the Gymnogrammoids may have arisen through such intermediate links as *Plagiogyria* and *Llavea*; and from the Gymnogrammoids it is presumed that the epiphytic group of the Vittarioids have branched off. (3) The Gleicheniaceæ represent the source of a larger ramification of ferns with dorsally situated sori [superficiales]. Of the primary derivatives, one, Matoniaceæ, forms a blind end; another, Dipteridaceæ, leads on to the Dipteroids (*Platycerium*, *Pleopeltis*, etc.); while the third, Protocyatheaceæ, gives off two branches—one of its genera, *Metaxya*, pointing the way to *Syngramme* and *Elaphoglossum*, whilst the other genus, *Lophosoria*, leads on to Cyatheaceæ; and from the Cyatheaceæ are derived the Onocleoids and Blechnoids on the one hand, and on the other the Woodsioids, which lead on to the Dryopteroids; and from the latter are derived the Asplenioids.

The bare outline of results sketched above becomes much easier to follow when plotted down on paper, after the fashion of a family-tree. It makes no mention of the vast amount of research and critical investigation undertaken by Professor Bower, and embodied in his three volumes with the skill of a keen thinker and clear-minded exponent. The arguments are ably set forth and, based as they are on verifiable facts, they should stimulate the student, not merely to accept, but to examine for himself and carry onward the phyletic research on the lines laid down in this work. The author has been peculiarly happy in the discovery of various important links in little-known or obscure species and in his ingenious adaptation of them in the building up of his scheme.

During the perusal of this far-reaching treatise one naturally bears in mind the position which our British ferns occupy in the system. But it is surprising to find that the common Polypody and, indeed, the subgenus *Eupolypodium* to which it has always been referred are not included in the survey. It is a pleasure therefore to call attention to Professor Bower's able address on "The Evolutionary Relations of the British Ferns," printed in *The Naturalist* of January 1929, pp. 15–29, where he has much of interest to say about our native ferns and discusses the case of *Polypodium vulgare* in the light of some recent work by Dr. Carl Christensen. That author has come to the conclusion that this species does not, in fact, belong to *Eupolypodium*, but to another subgenus, *Goniophlebium*, of which

it is an extreme member with free veins. Professor Bower does not give it a definite place in his scheme, but drops a hint that along with *Goniophlebium* it may prove to be of kin with the Dipteroids. —A. G.

Principles of Plant Physiology. By ORAN RABER. 8vo, pp. xiv, 377; with portraits and 29 text-figs. Macmillan Co.: New York, 1928. Price 12*s.* 6*d.*

THERE is a marked lack of a modern text-book of plant physiology in a comparatively small compass; in England and America workers have mostly to be satisfied with translations. Plant physiologists will therefore look with sympathy on an author who comes forward and shoulders a difficult task that others have shirked.

The title of this book is no doubt meant to suggest that the work is not a text-book, but no attempt is made to enumerate these principles; it is doubtful if such exist or if they are anything more than general biological principles. The book, however, presents a number of commendable features: for example, the first and last chapters, which are unusual in works on plant physiology. Chapter I. deals with the position of plant physiology in biology and its relation to the natural sciences generally. The last chapter is entitled "Mechanism and Vitalism," and deals with these opposed views in a way which will be illuminating to most students; the author makes clear that in his work of investigation the biologist must be a mechanist. Chapter II. deals with the cell and colloidal conditions; Chapters III.–V. are concerned with chlorophyll and the process of photosynthesis, and VI. and VII. with other methods of obtaining food-materials such as chemosynthesis, and IX. with nitrogen assimilation and the nitrogen cycle. Succeeding chapters review nutrition and the "balancing function" of salts and the biochemistry of carbohydrates, fats, and proteins. The diffusion of gases, osmosis and imbibition, ascent of sap, storage and translocation, digestion and respiration are other subjects to which chapters are devoted. The book concludes with a chapter on growth, two on the phenomena of irritability, and one each on movement, reproduction, and death.

It is a pity that the book is marred by such numerous mistakes of fact and of interpretation. On p. 29 Sachs's experiment with double-walled bell-jars is said to show that red rays are more important in photosynthesis, whereas in such an experiment the energy values of the red and blue light are so different that little comparison is possible. In Chapter VI. too much stress is laid on Baly's results and theories in relation to photosynthesis. On pp. 112 and 114 there are mistakes concerning sugars and their optical activity, and on p. 166 as to the anthocyan nature of litmus. In dealing with the wilting coefficient of the soil, although reference is made at the end of the chapter to papers which insist on the dynamic aspect of wilting—the result of a want of balance between the two rates of transpiration and of absorption,—yet the problem is treated as a purely static one. On p. 178

the expression "passing 110 volts of electricity between metal electrodes" is misleading, suggesting as it does that volts are a measure of quantity rather than of intensity. The treatment of osmotic pressure is unsatisfactory. A volume-normal solution of sucrose gives an osmotic pressure of about 34 not 22·4 atmospheres. Pfeffer used volume-normal solutions, and the results he obtained were all too low owing to the fact that his membranes were leaky and allowed some sugar to escape. In this chapter the illuminating conception of the suction pressure (sometimes erroneously called the water-absorbing power) of the cell is very cursorily treated in nine lines; no student could gain from this a clear picture of the relationship of absorption to the osmotic pressure and wall-pressure of the cell. On p. 226, when dealing with the ascent of sap, the author neglects completely his earlier reference, and speaks of an "osmotic gradient" between the root-hair and the central cylinder, when all that is required is a suction pressure gradient. One may point out that there is a mistake in defining Sachs's "grand period" of growth; and surely a student should not be encouraged in loose thinking by the form of question 3 at the end of Chapter XXVII. There gravity is described as "attracting a root with a force X and moist soil at one side is attracting it with the force Y." The attraction of gravity on the root as a whole has apparently little to do with geotropic movement, and moist soil certainly exerts no force at all on a root. All the moisture can do is so to alter the growth of the root as to cause a curvature.

The mistakes and misconceptions occurring in the book are unexpectedly numerous, but they do illustrate the difficulties with which any single author is faced who sets out to survey the whole complex field of plant physiology. They must not be taken to detract unduly from the value of the book, which is a useful survey of a field in which text-books are too few. The author has, however, often been unduly handicapped by attempting the impossible task of reviewing within a comparatively small compass a large body of often conflicting data.—V. H. B.

PLANT PESTS.

The Principles of Applied Zoology. By ROBERT A. WARDLE, M.Sc., Professor of Zoology, University of Manitoba. 8vo, pp. xii + 427, with 55 text-figs. Longmans, Green & Co.: London, etc., 1928. Price 21*s.*

Agricultural Entomology. By D. H. ROBINSON, B.Sc., Harper Adams Agricultural College, and S. G. JARY, B.A., Lecturer in Economic Entomology, Reading University. 8vo, pp. xii + 314, with 149 text-figs. Duckworth: London, 1929. Price 15*s.*

Les Ravageurs des Arbres Fruitiers. Traitemens, Pratiques. Tome I. par H. LATIÈRE, B. TROUVELOT et F. WILLAUME, Ingénieurs Agronomes. 8vo, pp. 97, with 206 text-figs. and 7 plates. Bibliothèque Générale d'Agriculture. Maurice Mendel: Paris, 1928. Price 18 francs (paper cover).

THE botanist who loves his garden will find much of helpful interest in the above volumes.

Of the three sections comprising the subject-matter of the 'Principles of Applied Zoology,' the second, entitled "Agricultural and Horticultural Zoology," is the largest. This includes a chapter on Soil-organisms—a discussion of the groups of animals whose activities bear upon the question of soil-fertility, namely, the soil protozoa and the earthworms, or which are directly inimical to the plant-grower, notably the eel-worms, slugs, termites, ants, and certain types of insect-larvæ. Succeeding chapters deal with Insect-pests, the various types of which are described, and as effective control of an insect-pest cannot be achieved until "an accurate and comprehensive conception has been established concerning the four groups of data which deal respectively with the life-cycle, the distribution, the behaviour, and the mortality factors of the pest under review," these four subjects are discussed in some detail. A perusal of these chapters on the life and habits of the enemy will render possible a more effective attack than would otherwise be the case. Chapters on Vermin Repression and Bird Encouragement have also an interest for the plant-cultivator. The other parts of the volume deal respectively with Medical and Veterinary Zoology and Animal Industries. Finally, there is an extensive bibliography, the items of which are grouped under subject-headings.

'Agricultural Entomology' comprises, first, a general account of the structure, life-history, and system of classification of insects, and, secondly, an "Economic Section" in which individual insects which are important pests are described under their respective orders. The varieties of plants attacked and the nature of the damage are indicated and control measures, where such exist, are also described. The descriptive matter is clear and concise, and the numerous illustrations are a helpful adjunct to the text. A chapter is devoted to the principles of insect control, the methods of which are classified as Direct, Indirect, and Biological. Direct methods aim at the actual destruction of the insect, in which insecticides play an important part, and a chapter is devoted to their composition and application. Three Appendixes deal respectively and briefly with pests which are not insects, namely, other Arthropoda of economic importance—wood-lice, spiders, mites, centipedes, millipedes; Eel-worms; and Mollusca (snails and slugs). Finely ground copper sulphate is recommended as a deadly specific for slugs; young ducks are also "very effective."

The object of the third work is to supply a rough and ready method of determination of the cause of injuries to fruit trees, due mainly to injurious insects. The determination is effected by means of a series of keys based on the characters of the damage effected or of the injurious agent. Some assistance is given by means of a number of rather crude drawings. The keys are preceded by a short general account of the structure, life-history, and classification of insects.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY.—At the General Meeting, on February 28th, three papers were read on the occurrence of natural hybrids in plants.

The first paper was by Dr. A. W. Hill, on "Hybridization in the New Zealand Flora, with special reference to *Gaultheria*."

Some 290 groups of wild hybrids have now been noted in New Zealand by Drs. L. Cockayne, H. H. Allan, and Messrs. G. Simpson and J. Scott Thomson. These belong to 42 families and 22 genera, and the majority consist of great polymorphic swarms. They are found abundantly in such genera as *Hebe*, *Celmisia*, *Olearia*, *Ranunculus*, *Myrtus*, *Aristotelia*, *Nothofagus*, *Phormium*, &c., and in the last genus open up questions of great economic importance. Species which cross are usually of the same growth-form, but this is not always so, for the tree-form hybridizes with the divaricating bush-form, as seen in *Plagianthus betulinus* × *divaricatus*, and the cupressoid *Hebe Astoni* with the leafy *H. buxifolia*.

Three species may sometimes hybridize, and intergeneric hybrids are known. A specimen was shown of the hybrid *Leucogenes grandiceps* × *Raoulia bryoides*. Dr. Allan has synthesized two hybrids, producing plants like those found in the wild state, and the seed from assumed hybrids has produced a polymorphic progeny. This is also the case with the seed of hybrid Gaultherias, collected by the speaker in New Zealand, from which numerous seedlings have been raised at Kew.

Examples were shown of the hybrids resulting from the cross *Nothofagus cliffortioides* × *N. fusca*, and also a series of specimens of the hybrids *Myrtus bullata* × *M. obcordata* exhibiting every gradation from one species to the other.

Life-size prints of the actual leaves taken from wild hybrid *Ranunculus* swarms, made by Messrs. G. Simpson and J. Scott Thomson, were also exhibited. These included a series of leaves of *Ranunculus Lyallii* × *Buchanani* var.; Cheesman's *R. Matthewsii* was described from similar hybrid material.

A long series of *Gaultheria* hybrids, collected by the speaker on Rainbow Mountain and at Waimarino (North Island), and elsewhere, supplemented by specimens collected by Dr. Cockayne and others, was exhibited. These showed the gradual passage from *G. oppositifolia* to *G. antipoda*; from *G. oppositifolia* to *G. rupestris*, thence to *G. perplexa*, and a series of hybrids between *G. perplexa* and *G. antipoda*, and *G. rupestris* and *G. antipoda*.

Most of the hybrid Gaultherias produce viable seeds. *Gaultheria fagifolia* Hook. f. is one of the hybrid swarms of either *G. oppositifolia* × *antipoda* or of *G. oppositifolia* × *rupestris*.

The second paper was by Mr. E. M. Marsden-Jones and Dr. W. B. Turrill, on "Hybridization in certain Genera of the British Flora." The results of genetical experiments and field-investigations on certain British plant-genera were outlined. Crossing *Saxifraga rosacea* and *S. granulata*, a non-segregating F_2 generation was obtained with a chromosome-number double that of its parents. The special interest of this tetraploid was discussed.

Contrasts in the behaviour of *Silene* and *Centaurea* as found in the British flora were detailed. Wild hybrids between *S. maritima* and *S. vulgaris* are now known from several English counties, but crossing between these species has little or no effect on general populations. In *Centaurea*, on the contrary, hybridization has been rife in the southern and south-central counties of England, and has affected whole populations. Many of the so-called "species" of *Centaurea* included in recent British plant lists are of hybrid origin, as proved by synthetical and analytical experiments and by extensive field-work.

The conclusion was stated that hybridization has been an important factor in the origin of polymorphism in such genera as *Centaurea*, and that it has led to the making of what have been regarded as species by some taxonomists. On the other hand, in such genera as *Silene* interspecific hybridization is, at least now, of secondary importance, except for its genetical interest. It follows that, in the authors' opinion, hybridization is one, but only one, of the factors of organic evolution, using that term in its widest sense.

The third paper was by Prof. C. E. Moss, D.Sc., on "Some Natural Hybrids of *Clematis*, *Anemone*, and *Gerbera* from the Transvaal."

Clematis brachiata Thunb. is a rather common plant around Johannesburg, and a local plant near Pretoria; it has the habit of *C. vitalba* Linn. *C. Stanleyi* Hook. is abundant in the same districts, and in the same general type of habitat. This species, in the speaker's opinion, should be transferred to the genus *Anemone* Linn.

In a few places near Johannesburg, numerous intermediates occur between these two very different species; and these intermediates connect up all the distinguishing characters of the two plants. The intergrading plants are absent from those situations where only one species occurs. The speaker had no doubt that the intermediates are fertile natural hybrids which cross with each other, and with the putative parents. It is fair to regard them as bigeneric hybrids.

A third species, *C. Oweniæ* Harvey, is abundant around Pretoria, and rare near Johannesburg. This species is very closely allied to *C. brachiata*, of which it has the habit. Sometimes *C. brachiata* and *C. Oweniæ* grow together, and then intergrading forms may occur. These forms have not been found where only one of the species occurs; they are doubtless hybrids. The two species themselves are rather difficult to identify, and the natural crosses are also difficult to detect. When all three species occur together, the hybrids become as complicated as the hybrids of *Primula* in the woods of Cambridgeshire, where the primrose, the cowslip, and the oxlip form a medley of abundant hybrids.

Gerbera discolor Sond. is common in marshes and by streams near Johannesburg and Pretoria. It is a herbaceous perennial, almost resembling *Leontodon hispidus* Linn. in habit and size. It has leaves which are green and glabrous above, and snow-white with felted hairs underneath. It has a head of yellow flowers and a brownish pappus.

G. plantaginea Harvey is also common in the same districts; but it occurs on the dry grass-veldt. It is of the same size and habit as *G. discolor*; but its leaves, though hairy, are green on both sides. Its flowers are pink and white, as in *Bellis perennis* Linn., and its pappus is purple. Sometimes the two species occur cheek by jowl; and then a connecting series of very beautiful natural hybrids occurs.

This case also is complicated by the existence of a third, undescribed, species, and again hybrids occur, in which three species join. In the Woodbush Mountains, Transvaal, the speaker found evidence of hybrids in which at least four species seemed to join.

A study of natural hybrids in such cases as the above has led to the following general conclusions:—

Bigeneric hybrids occur in nature, but, in the case of "good" genera, are probably rare. Bigeneric natural hybrids may be fertile.

Hybrids between well-defined species also occur in nature, but are not common. These hybrids are often fertile.

These two classes of hybrids, when they do occur, are often very striking, and can be easily detected.

Hybrids between closely-allied species are abundant in nature, and are usually fertile. They are rarely striking, and are usually difficult to detect. The more closely allied species are, the more difficult it is to detect their hybrid progeny.

There is no theoretical limit to the number of putative parents which may take part in the formation of natural hybrids in a given locality. The more species taking part in the formation of a medley of natural hybrids, the more debatable becomes any determination of the possible parent species of any given specimen.

The view that two "species," when linked up by intermediates, really constitute only one variable "species" is not of general application. The theory cannot be applied with certainty in any particular case until it is known that the intermediates are due to "real" variation or are a result of hybridization.

The speaker has come across no case of natural hybrids which has led him to suppose that natural hybrids may give rise to species.

Dr. R. Lloyd Praeger gave an account of his experience of the occurrence of natural hybrids in the *Sempervivum* group of plants, especially in the Canary Islands. Out of some fifty species, at least thirty-five are known to cross, and the group is the most hybrid-producing one in the Canary Islands. Examples were given of the characters of some of the hybrids. Barrenness of the hybrids in the group is undoubtedly general.

Dr. C. L. Huckins drew attention to the fact that Lotsy's theory of evolution by hybridization includes the possibility of "hybridization" within a single nucleus. In 1920 Lotsy suggested that the mutants of *Œnothera* might have arisen through parts of chromosomes being broken off and attached to other chromosomes. Since that date cytological evidence of such changes has been found in *Datura* and in *Drosophila*. By this means new characters may appear in a manner which simulates gene mutation. This feature, which we may call "internal hybridization," may be as important or even more important than ordinary hybridization in producing variation, because it does not commonly affect viability to the extent that ordinary species-hybridization may do.

At the General Meeting, on March 14, the Hooker Lecture on "The Origin of Adaptations" was given by Dr. E. J. Allen, F.R.S.

THE GARDENER'S YEAR BOOK, 1929.—The Editor (Mrs. D. H. Moutray Read) has again brought together a great deal of information interesting and useful to gardeners and garden-lovers. Part I. contains a very full chronicle of events of interest in 1928, obituaries, notes on botanical expeditions, reports from experimental stations (a new feature), descriptive lists of Botanic Gardens, Horticultural Institutions, Colleges, etc., and Societies, and lists of New and Noteworthy Plants and of Horticultural Publications. There are also several articles, including a chatty description of several gardens, each of some special interest, an account of the Horticultural work of the Ministry of Agriculture, by J. Lockton Bryan, and a somewhat pessimistic article on 'Our Fruit and Vegetables,' by S. L. Bensusan, deploring the waste of production due to lack of co-operation between the grower and the salesman. Part II.—Cultural—is a series of special articles on various subjects: Mr. C. B. Tahourdin relates some of his experiences in the cultivation of British Orchids, and a chapter on "Garden Enemies" contains much useful information; there is also a chapter on pruning, with a calendar. A series of Appendixes contains "tabular matter," calendars of planting, various lists, and horticultural fixtures for 1929. The volume contains 319 pages, and some good photograpic plates. The price is 5*s*. (Philip Allan & Co., London).

BOTANICAL SOCIETY OF SOUTH AFRICA.—The recently issued Journal for 1928 (Pt. XIV.) refers to the steady growth of the Society, the membership of which now reaches 1000. Mrs. Bolus contributes an article on "Gladiolus as represented in South Africa." The South African species are the source of the innumerable garden varieties—about 130 wild species are already known in South Africa, and these include blue-flowered species and species with a delicious fragrance. Two coloured plates reproduced from drawings by the late Mary Page and Miss B. O. Carter illustrate the article. The Editor supports a plea by Sir James Rose-Innes for the proclamation of the whole of Table Mountain as a Native Reserve for the protection of the flora. The completion of an aerial cable-way up the mountain, which will bring troops of excursionists, adds a new danger.

PROFESSOR F. O. BOWER, F.R.S., has been nominated by the Council of the British Association to preside at the Bristol meeting in 1930. Prof. Bower is one of the most eminent exponents of plant-morphology, and his nomination will be welcomed by his fellow-botanists. On two occasions only in the history of the Association has the highest office been held by a botanist—at Norwich in 1868 by Sir Joseph Hooker and at Dublin in 1908 by Sir Francis Darwin.

DRAWINGS OF WEST AUSTRALIAN PLANTS.—A small exhibition of coloured pastel drawings by Miss Maud Egremont of typical West Australian plants has been placed in the Department of Botany, British Museum. The drawings have been kindly lent by the artist.

NOTES ON JAMAICA PLANTS.

By S. MOORE.

(Continued from Journ. Bot. 1928, p. 167.)

COMPOSITÆ.

NOTOPTERA.

URBAN established the genus *Notoptera* (Symb. Ant. ii. 466) upon *Bidens hirsuta* Swartz (*Salmea hirsuta* DC.). He took for the type specimens with leaves cordate at base; of others with rounded leaves he made a var. *Eggersii*. But Swartz's type in Herb. Mus. Brit. has rounded leaves, so that the proposed variety in these circumstances falls to the ground, and validity for a variety must be found in the cordate leaves. Blake (in Journ. Bot. 1925, 225) thinks var. *Eggersii* not distinct enough to merit varietal rank, and as examination of a series of specimens seems to confirm this view no new varietal name is required.

PECTIS.

P. Plumieri Grisebach (Fl. Br. W. Ind. 378, 1861) was founded on a plant with shortly peduncled heads. Urban (Symb. Ant. v. 283) reduced Grisebach's species to the continental *P. elongata* H. B. K., and in this Rydberg (N. Am. Fl. xxxiv. 210) agreed. But instead of the short peduncles of *P. Plumieri*, the last-named species has peduncles longer than the heads, and its achenes, both of disk and ray, each bear 20–25 setæ. On the other hand, the ray achenes of *P. Plumieri* have but 3–5 (very rarely 6) setæ to the pappus, and those of the disk only 8. The pappus being the chief differential feature in this genus, the great numerical disparity just mentioned does not seem to support the view of Urban and Rydberg, and consequently Griesbach's species should be considered distinct from *P. elongata*.

Among the synonyms for *P. elongata* H. B. K. (1820) cited by Urban (*l. c.*) is *P. floribunda* A. Rich., founded in 1850 on a Cuban plant (Sagra Cub. xi. 36). The description reads so much like that of *P. Plumieri* that it seemed desirable to find out whether the two were conspecific. Examination of a piece of Richard's type in the Paris Museum, kindly lent by Professor Lecomte, showed that *P. Plumieri* was identical with *P. floribunda*; the latter name, therefore, as the oldest trivial, must be used for the Jamaica plant.

P. linearifolia Urb. would appear to be a rare plant in Jamaica, its only recorded collector, so far as ascertained, being Macfadyen (in Herb. Kew). Miss Iris Maxwell (now Mrs. Sangster) has, however, recently sent specimens to the British Museum Herbarium found at Giddy Hall, St. Elizabeth.

CALEA.

Eupatorium schizanthum Griseb. (Fl. Br. W. Ind. 361) is a very rare plant, for, although the species was established nearly 70 years ago upon a specimen of McNab's gathering, it would seem to have evaded the search of later collectors, and is still known only from

McNab's specimen in the Edinburgh Herbarium. Grisebach regarded this plant as conspecific with that figured in Sloane's History, tab. 151, f. 3, but later on (*l. c.* p. 379) he claims the same figure for *Calea jamaicensis* L. On Sloane's tab. 151 are figured, and in his history i. 257 are described, two plants under the name *Conyza fruticosa Cisti odore* &c., one (t. 151, f. 2) with smaller heads and achenes ("capitulis et semine minoribus"), the other (f. 3) with those organs larger. On referring to Sloane's Herbarium, the former of these is seen to be *Eupatorium villosum* Sw., as Grisebach himself notes, while the other is *Calea jamaicensis* L. These two plants are fairly similar in general appearance, although of course different in respect of style-arms and pappus; but the resemblance between *E. schizanthum* and *C. jamaicensis* is so extremely slight that it is difficult to understand how Grisebach could confuse them: evidently he afterwards found out his mistake, and by inadvertence allowed the reference to *E. schizanthum* to remain unexpunged.

In the Jamaica Herbarium are specimens of a *Calea* with leaves markedly smaller than those of *C. jamaicensis*, and deserving of a varietal name. It is proposed to call this

C. jamaicensis L. var. PARVIFOLIA, var. nov., a typo distans ob folia manifeste minora, et solummodo 10–15 × 5–8 mm.

SENECIO.

Senecio dolichanthus, sp. nov. *Frutex* glaber usque ad 30 dm. alt.; ramulis robustis longitrorsum striatis; *foliis* petiolatis obovatis vel obovato-oblongis mucronatis basi obtusis nisi rotundatis margine ultra medium grosse calloso-dentatis pergamaceis pag. utravis nitidis costis lat. utrinque circa 10 una cum costa media reticuloque laxo optime visibilibus; *corymbis* foliis circa æquilongis pleiocephalis subcongestis; *capitulis* radiatis 6-floris luteis; *pedunculis propriis* quam involucrum plane brevioribus sparsim bracteatis; *involucro* subcylindrico, superne sæpe leviter contracto phyllis 5–6 oblongis obtusis apice sphacelatis piliferisque coriaceis margine anguste membranaceis; *receptaculo* fimbrillifero; *radii flosculis* 2 ligulis exsertis late oblongis 3-dentatis; *disci flosculis* 4 horum corollis exsertis; *styli* ramis obtusis penicillatis; *achæniis* lineari-oblongis basi prominenter callosis 10-costatis obscure puberulis; *pappi* setis scabridis albis.—*S. Fadyenii* Griseb. var. *dolichanthus* Krug & Urb. Symb. Ant. i. 470.

Hab. Jamaica, Monkey Hill, *Hart* J. P. 1359; near Woodcutter's Gap, Port Royal Mts., and near Vinegar Hill, *Harris* 5113, 6352.

Ramuli aliquanto complanati, circa 5 mm. crass. Folia in sicco griseo-brunnea, 10–14 × 4–6·5 cm.; petioli applanati, 2·5–4·5 cm. long. Corymbi circa 10 cm. long., 6–12 cm. lat.; horum rami pauci ±4 cm. long. Pedunculi proprii plerumque 2–3 mm. long. Involucrum 9·5–10 mm. long., 2·5 mm. lat., in sicco fusco-brunneum; calyculi phylla perpauca, subulata, 1 mm. long. Ligulæ (lamina) 5 mm. et disci corollæ 9–10 mm. long.; harum lobi triangulares, acuti, 1·5 mm. long. Achænia 2 mm., pappus 8 mm. long.

The affinity of this species is plainly with *S. Fadyenii* Griseb., hitherto, it is believed, found only by Macfayden, although an unsatisfactory specimen at Kew of Miss Perkins's gathering (Blue Mts., near Vinegar Hill, 1244) probably belongs here. *S. Fadyenii* has membranaceous leaves, in the lower third gradually narrowed into the petiole, and with less conspicuous toothing, markedly smaller heads with short and loose instead of closely imbricated involucral leaves, shorter receptacular paleæ, florets smaller in all respects, and nearly smooth pappus-setæ.

A FEW GENERAL REMARKS.

Of the genera of Compositæ, numbering now well over 800, not one is confined to Jamaica, and only 47 are native there, excluding *Zinnia*, *Tithonia*, *Tagetes*, *Lapsana*, *Crepis*, and *Hypochæris*, which are introductions from the Old World or escapes from cultivation. A point of interest is the relatively high percentage of endemism among representatives of the three great genera *Vernonia*, *Eupatorium* and *Senecio*, each numbering about 1000 known species, as contrasted with the low percentage of Jamaican species in each of those cases. Thus *Vernonia* is represented only by 8 species, but all are restricted to Jamaica except *V. anthelmintica* Willd., an Indian introduction, and the common weed *V. cinerea* Less. There are 25 species of *Eupatorium*, 16 of them unknown outside Jamaica, while only 6 species of *Senecio* are Jamaican, but all are endemic, thus giving percentages of 75, 64 and 100 in respect of endemism. This certainly seems remarkable, considering the admirable adaptation to wind-dispersal possessed by the achenes of these plants *. Further, of genera with 100 to 400 species, *Baccharis* (400 species) has but 2 Jamaica representatives, of which 1 (50 per cent.) is endemic; *Mikania* (200 species) with 7 Jamaican, has 5 (71 per cent.) endemic; *Bidens*, 6 species, 3 (50 per cent.) endemic. On the other hand, none of the six Jamaica species of *Pectis* is endemic; *Brickellia*, with nearly 100 species, has but one in the Island, the widely-distributed *B. diffusa* A. Gray; while only two of the 70 species of *Spilanthes* are Jamaican, neither endemic. Moreover, *Trixis*, a genus of some 50 species, has only one species in Jamaica, and that not endemic. Worthy of mention is *Chænocephalus*, a genus of 11 species, of which 5, all endemic, are Jamaican; thus little more than half its known species are found outside the Island. In contrast with this, *Calea*, with about 100 species, has only 1, an endemic, in Jamaica.

Relatively small as the area of Jamaica is when compared with that of Hispaniola and especially of Cuba, and though considerable activity was shown so early as the 18th century over the Island flora and has continued, with intervals, till the present time, a botanist visiting Jamaica now might still hope to come across rarities and even plants new to science. As a fact, some of the old finds still

* But see on this Guppy, *Plants, Seeds and Currents in W. Indies and Azores*, pp. 422–439.

await confirmation by a modern collector. For instance, *Vernonia rigida* Sw., which Swartz says he found on limestone hills in the north of the Island; *Eupatorium tetranthum* Griseb., not reported since the time of Purdie and Macfayden (about 1850), *E. cordifolium* Sw., a find of the describer, and *E. schizanthum* Griseb., discovered by McNab in the middle of last century and not obtained since; also *Mikania Swartziana* Griseb. since Wright's time (1765–85) met with only by Purdie, and *Salmea sessilifolia* Griseb., a Westmorland discovery of Purdie's, known only from incomplete material in the Kew Herbarium.

To anyone wishing to do floristic work in the Island, the following districts may be recommended as most likely to repay the necessary labour. The Blue Mountains, especially the extreme eastern portion; the Upper Clarendon district, still yielding novelties; the Cockpit country, where, taking Troy at its entrance as a type, many rare and most probably new species wait to be found; and the western districts, including Westmoreland, the scene of many of Purdie's discoveries.

NOVITATES AFRICANÆ.

(Continued from Journ. Bot. 1928, p. 233.)

Gladiolus Louwii L. Bolus (*Dracocephali*) (*Iridaceæ–Ixieæ*). *Planta* florifera 25–60 cm. alta, caule florifero stricto sat gracili, ad 4 cm. diam., 4-foliato, internodio supremo per 7–8 cm. exserto. *Folia* caulina viridia, infimum vaginiforme, ad 4 cm. longum; tertium longissimum, ad 13 cm., vagina vera ad 6 cm., lamina vera ad 3–4 cm., longa; folia radicalia hysterantha, e gemma distincta producta, 7, sine vaginis 2 basalibus pilosis, 6–9 cm. longis, quintum longissimum, ad 67 cm. longum (an cum ætate longius); lamina vera 33 cm. longa, ad 1·3 cm. latum, nervo medio prominente, cum marginibus vix incrassatis viridi, lamina superne glabrescente, inferne cum vagina pilosa. *Spica* 16–23 cm. longa, laxe 4–6-fl., floribus secundis. *Bracteæ* erectæ, obscure carinatæ, 6–4 cm. longæ, bracteolis fere ad apicem coalitis, 4·1–3·7 longis. *Perianthium* luteum, crebre minuteque rubro-maculatum, interne rubro-vittatum, tubo 3·5 cm. longo, segmento supremo obtuso, 5·2 cm. longo, 2·6 cm. lato, lateralibus imbricatis, galea parallelis, 4·8 cm. longis, 2·7 latis, ovatis, acutis, segmento infimo ovato-oblongo, obtuso, 2·2 cm. longo, ad 1 cm. lato, lateralibus obovato-oblongis, obtusis vel abrupte acutis, 1·7 cm. longis, 9 mm. latis. *Stamina* ad galeam adpressa, per 1 cm. ejus apicem deficientia, antheris purpureis, 1·7 cm. longis. *Stylus* apicem antherarum attingens, stigmatibus inclusis, 5 mm. longis, ovario acute angulato, 1 cm. longo.

Hab. Tropical Africa, Plateau, Kenya Colony, *Tom Louw* (National Botanic Gardens, 2167/27).

Described from several living specimens which flowered at Kirstenbosch, January 1929. The produced leaves were taken at the end of February. No seeds were set, the copious nectar suggesting bird-pollination. The nearest affinity appears to be with *G. sulphureus* Baker, with which the flowering stem agrees, except that the bracts are much longer, the perianth is red rather than yellow, and the hood is longer than the tube. No mention, however, is made of the hysteranthous leaves, which very probably also occur in *G. sulphureus*.

Gladiolus Vogtsii L. Bolus (*Iridaceæ–Ixieæ*). Glaber, ad 1 met. altus. *Caulis* omnino vaginatus, nisi internodium supremum leviter exsertum. *Vaginæ* basales 8–15 cm. longæ. *Folia* basalia 4, nervo medio, cum nervo primario utrinque, prominente, viridia, 42–60 cm. longa, 2–2·2 cm. lata; caulina 2, 33–16 cm. longa, vaginis 17–10 cm. longis. *Spica* simplex vel rarius 1-ramosa, spatha 7 cm. longa; flores 11, secundi, sat densi. *Bracteæ* erectæ obtusæ, 4–3 cm. longæ; bracteolæ 3·7–2·5 cm. longæ, parte libera acuta, 2 mm. longa. *Perianthium* sordide luteum, dense rubro-maculatum more sectionis *Dracocephali*; tubus inferne erectus, e medio adscendenti-patens, gracilis, superne vix infundibuliformis, apice 7 mm. diam., 4·4 cm. longus; segmenta acuminata; exteriora lateralia porrecta, demum leviter recurva, fere ovalia, 3·4 cm. longa, ad 2 cm. lata; infimum e medio recurvum, 2·5 cm. longum, ad 1·2 cm. latum; supremum adscendens, haud vel vix cucullatum, ad 3·2 cm. longum, ad 1·5 cm. latum; interiora lateralia recurva ovato-lanceolata, 2 cm. longa, 8 mm. lata. *Stamina* adscendentia, haud adpressa; antheræ pallidæ, dimidium segmenti attingentes vel parum ultra, 1 cm. longæ. *Stigmata* stamina leviter superantia, 7 mm. longa; ovarium 9 mm. longum.

Hab. Transvaal, *L. R. Vogts* (National Botanic Gardens, No. 617/28).

Described from several living specimens flowering at Kirstenbosch during February, 1929. The corms were sent by Mr. Vogts as being from the north-eastern parts of the Transvaal. The nearest affinity appears to be with *Antholyza laxiflora* Baker, which, in the first instance, was published as *Gladiolus antholyzoides* Baker, and is no doubt on the border-line between these two genera. Our species differs in having much broader leaves, longer perianth-segments, and shorter stamens. The perianth-tube, although unusually cylindrical for *Gladiolus*, has not the lower filiform portion more or less abruptly differentiated from the upper cylindrical portion, as is characteristic of *Antholyza*. The colouring of the perianth and the recurved lower segments suggest *Dracocephali*; but the set of the scarcely concave hood would seem to exclude it from that section.

TRITONIA ATRORUBENS L. Bolus, comb. nov. *Gladiolus atrorubens* N. E. Br.; *Tritonia Flanaganii* Bolus f.

IXIA ROCHENSIS L. Bolus, comb. nov. *Tritonia rochensis* Ker; *Ixia paniculata* Delaroche, var. *rochensis* Baker.

Watsonia Stanfordiæ L. Bolus (*Eu–Watsonia*). *Planta* ad 80 cm. alta, caule sat gracili. *Cormus* 3·5 cm. diam., tunicis e fibris tenuibus compositis. *Folia* radicalia producta 2 visa, ad 40 cm. longa, 1·5 cm. lata, nervo medio leviter, marginibus vix, incrassatis,

nervis intermediis crebris inconspicuis, caulina 5, infimum 5 cm. supra basin positum, radicalia superans, 39 cm., vagina vera 4 cm. longa, secundum 18 cm., vagina vera 8 cm. longa, cetera vaginiformia, 7–3 cm. longa, internodiis 3 supremis bene exsertis. *Spica* terminalis 9-fl., floribus distichis, axi fructifero conspicue flexuoso. *Bracteæ* e basi ab axi divergentes (in vivis angulo 40°), purpurascentes, omnino membranaceæ, 1·7–1·3 cm. longæ, bracteolis æquilongis, fere ad apicem coalitis. *Perianthium* fere strictum, deinde curvatum, saturate roseo-purpureum, ad 7 cm., tubo parte filiformi 1·3 cm., parte cylindrico 3·3 cm. longo; segmenta obtusa, exteriora 8 mm., interiora 1·2 cm. lata. *Stamina* arcuata, parum ultra dimidium segmenti attingentia, antheris atratis, stigmata leviter superantibus. *Capsula* rostrata, inferne angustata, ad 2 cm. longa, ad 8 mm. diam., seminibus 6–8 mm. longis.

Hab. Cape Province: Stellenbosch Div., kloof at Banhoek, fl. Dec. 1928, *K. C. Stanford* (Bolus Herbarium).

Described from one complete living specimen and a partial one. The two radical leaves seen were perfect, and there were burnt-off remains probably from a previous year's growth.

Watsonia Starkeæ L. Bolus (*Eu-Watsonia*). *Planta* 1·5 met. alta, caule basin versus ad 1·2 cm. diam. *Folia* radicalia producta 3, glauca, nervo medio marginibusque inconspicuis cum nervis intermediis crebris, ad 50 cm. longa, ad 3·5 cm. lata, caulina 5, infimum ad 62 cm. longum cum vagina vera 9 cm. longa, supremum 8·5 cm. longum cum vagina vera 6 cm. longa, axillo ramulum floriferum gerente, internodiis 2 supremis bene exsertis. *Spica* terminalis ad 40 cm. longa, 36-fl., ramulis 4–5, ad 12-fl., 4 e spathis bracteiformibus (sine vagina vera) orientibus. *Bracteæ* e basi ab axi divergentes (angulo 30°), 1·1–0·8 cm. longæ, bracteolis parum brevioribus vel æquilongis, omnino coalitis. *Perianthium* externe pallide salmoneum, interne pallide roseum, 4·5 cm., tubo 2·8 cm., parte filiformi 1·3 cm., longa; segmenta concava, obtusa, exteriora 1·5 cm. longa, 9 mm. lata, interiora 1·9 cm. longa, ad 1·4 cm. lata. *Stamina* arcuata, fere ad apicem segmenti attingentia, antheris atropurpureis, 1·1 cm. longis. *Stigmata* antheras leviter superantia, alba, ramulis ultimis 2 mm. longis; ovarium 5 mm. longum. *Capsula* subobconica, ad 1·5 cm. longa, ad 8 mm. diam.

Hab. Cape Province, ? Oudtshoorn Div., Swartbergen, *Letitia Starke* (National Botanic Gardens, 10/27).

Described, together with the variety *rubra*, from several living specimens flowering at Kirstenbosch during December 1928, fruiting February 1929.

Var. rubra. A forma typica foliis caulinis 7, bracteis ad 1·8 cm. longis, perianthio rubro, leviter minore, differt.

Watsonia socium Mathews & L. Bolus (*Eu-Watsonia*). *Planta* 57 cm. alta. *Cormus* parvus emarcidusque, utrinque cormum novum emittens, tunicis paucis, e fibris tenuioribus compositis, vaginis basalibus 3–5 cm. longis. *Folia* radicalia producta 4, 2 brunnea rigida, tamen immo basi herbacea, ad 39 cm. longa, 2 omnino viridia, submitentia, nervo medio leviter, marginibus haud incrassatis, nervis intermediis crebris inconspicuis, ad 49 cm. longa, ad 1 cm. lata; caulina 7, infimum 8 mm. supra apicem cormi oriens 10 cm. longum, lamina 2 cm. longa, 5 mm. lata, secundum 13 cm. longum, lamina 5·5 cm. longa, cetera plus minusve vaginiformia, 13–3·5 cm. longa, omnia internodiis longiora. *Spica* simplex, ad 37 cm. longa, sat dense ad 18-fl., floribus erecto-patentibus. *Bracteæ* axem dimidio inferiore amplectentes, deinde leviter divergentes, ventricosæ late oblongo-ovatæ, parum supra medium attenuatæ, acutæ vel superiores obtusæ, herbaceæ, marginibus apice membranaceis exceptis, 3–1·5 cm. longæ, ? cm. latæ, inferiores bene, ceteræ leviter internodia excedentes; bracteolæ omnino coalitæ, 2·1–1·5 cm. longæ. *Perianthium* rubro-aurantiacum 8–8·5 cm. longum, tubo 4·5–5·5 cm. longo, parte filiformi 2·2 cm. longa, apice ad 1 cm. diam., segmentis exterioribus ad 1 cm., interioribus ad 1·4 cm., latis, omnibus basi auriculatis, ovali-oblongis obtusis apiculatis. *Stamina* arcuata, ultra dimidium segmenti attingentia, antheris purpureis, 1·1 cm. longis, staminodiis 3, 1 mm. longis. *Stigmata* apicem segmenti attingentia vel parum ultra, circa 3 mm. longa.

Hab. Natal, Swartkop, prope Maritzburg, fl. Nov., *Misses de Mole and Kisch* (National Botanic Gardens, 937/25).

The collectors write in 1928:—"The Swartkop Watsonias we dug up from stony ground were not more than 15 or 18 inches high, and now after two or three years' cultivation they are 3 ft. high with thick stems and much finer flowers." Described from several living plants which flowered at Kirstenbosch, Oct.–Nov. 1926.

Watsonia Cooperi L. Bolus, comb. nov. *Tritonia Cooperi* Baker.

Lapeyrousia graminifolia L. Bolus, comb. nov. *Tritonia graminifolia* Baker.

Tritonia Nelsoni Baker includes *Tritonia petrophila* Baker.

Gethyllis multifolia L. Bolus (*Amaryllidaceæ–Amarylleæ*). *Bulbus* ut videtur in sicco 4·5 cm. diam. *Vagina* basalis subtruncata, 4·5 cm. longa. *Folia* 25–30 in fasciculo, anguste linearia (in vivis fortasse subteretia), superne laxe spiraliter torta, pubescentia, setis sparsis, pallide brunneis, supra terram ad 15 cm. longa, 1 mm. lata. *Perianthium* pallide roseum, glabrum; tubus supra terram per 2·5 cm. exsertus; segmenta oblongo-lanceolata acuta, inferne leviter angustata, 3 cm. longa, ad 1 cm. lata. *Stamina* 12 monantheræ; filamenta 4 mm. longa; antheræ 7 mm longæ. *Stylus* strictus, ultra tubum perianthii per 1·6 cm. exsertus, dimidium antherarum attingens; stigma 1 mm. diam.

Hab. Cape Province: Worcester Div., Hex River Valley, near De Doorns, in leaf, Sept. 1908, *H. Bolus*, 13056.

Described from dried and living specimens which flowered in our garden, Dec. 1908.

Gethyllis unilateralis L. Bolus, *Bulbus* haud visus. *Folia* marcescentia tantum visa, in fasciculo ad 20, anguste linearia vel

subteretia, leviter spiraliter torta, inconspicue ciliata, ad 12 cm. longa, 1 mm. lata. *Perianthium* roseum vel pallide roseum; tubus ad 11·5 cm. longus vel ultra supra terram exsertus, 3 mm. diam.; segmenta acuta vel abrupte acuta, ad 3·5 cm., sæpius 2–3 cm., longa, 1–1·8 cm. lata. *Stamina* 6, monanthera; filamenta gracilia, 3–5 mm. longa; antheræ demum valde circinato-revolutæ. *Stylus* unilateralis, filamenta bene superans; stigma cum ætate 1 mm. diam. vel ultra.

Hab. Cape Province: sandy places along the railway line between Oudtshoorn and Montagu Pass, fl. Nov. 1917, *G. S. Oettlé* (Bolus Herbarium, No. 14463).

Gethyllis linearis L. Bolus. *Bulbus* ca. 1·5 cm. diam. *Folia* 8–10 in fasciculo, linearia plana, e parum supra basin arte spiraliter torta, glabra subglauca, ca. 6 cm. longa, 2–3·5 mm. lata. *Perianthium* roseum; tubus 8 cm. longus vel ultra; segmenta oblongo-obovata, sat abrupte acuta, 3–3·5 cm. longa, ad 1·4 cm. lata. *Stamina* 6, monanthera; filamenta antheris æquilonga, 4–5 mm. longa. *Stylus* unilateralis, ultra tubum perianthii per 1·6 cm. exsertus; stigma demum ad 1·5 mm. diam.

Hab. Cape Province: Van Rhynsdorp Div., near Van Rhynsdorp, fl. Oct. 1918, *H. S. van Zijl* (Bolus Herbarium, No. 15187).

Described from living specimens. Leaves were produced in my garden from July–September 1919.

Gethyllis grandiflora L. Bolus. *Bulbus* 5·5 cm. diam.; tunicæ collis membranaceæ tenuissimæ, conspicue transverse nervosæ, ecoloratæ. *Folia* sæpius per anthesin emarcida sed tamen in fasciculo unico viso contemporaneo cum flore 45, fere omnia herbacea, anguste linearia, glabra, superne spiraliter torta, supra terram ad 14 cm. longa, 2–3 mm. lata. *Perianthium* glabrum, album plus minusve roseo-suffusum; tubus 6 cm. longus, basi 4–5 mm., apice 9 mm. diam. breviterque infundibuliformis; segmenta acuminata, interiora semper exterioribus latiora, ovata, ad 3·5 cm. lata, vel oblongo-ovata, 2 cm. lata, 5–6·5 cm. longa. *Stamina* 6, 8–11-anthera, antheris breviter stipitatis, vel stipite ad 5 mm. longo, 1·2 cm. longis, filamenta multo superantibus. *Stylus* strictus ultra tubum per 8 mm. exsertus; stigma parvum.

Hab. Little Namaqualand: "abundant on sandy flats 4 miles S. of Doornpoort," Richtersveld, fl. Oct. 1926, *Pillans*, 5453.

Described from dried specimens. In one flower the stamens appear to have stout filaments bearing several shortly-stalked anthers, and in others the primary filament is so much reduced that the stamens might be described as numerous and arranged in six groups.

Gethyllis longituba, L. Bolus. *Bulbi* 2·5 cm. diam., 2–3 e caule incrassato, 6 cm. diam., orientes. *Vagina* superne purpureo-maculata, ad 4 cm. longa, 1 cm. diam. *Folia* in fasciculo ad 18, anguste linearia, spiraliter 1-torta, glauco-viridia glabra politaque, nisi marginibus ciliatis, ciliis patentibus vel adscendentibus, vix rigidis, albis, supra terram 13 cm. longa, 3–6 mm. lata. *Spatha* 7·3 cm. longa, per 3 cm. vaginans. *Pedunculus* 3 cm. longus. *Perianthium* glabrum; tubus ad 17 cm. longus, apice 1 cm. diam.; segmenta lineari-lanceolata, superne gradatim attenuata, interne pallide, externe saturate rosea, ad 5·5 cm. longa, interiora ad 1·2 cm. lata, exteriora parum angustiora. *Stamina* ad 36, monanthera; filamenta 2–3 mm. longa; antheræ demum arte circinato-recurvæ, 1·3 cm. longæ. *Stylus* strictus per 1 cm. ultra tubum exsertus; stigma parvum. *Fructus* oblongo-ovalis, 4 cm. longus, 1·7 cm. diam.; semina obovata, ad 5 mm. longa.

Hab. Cape Province: Clanwilliam Div., Klaver, *D. Davis* (National Botanic Gardens, No. 2256/26).

Described from living species which flowered at Kirstenbosch in December 1927, fruited May 1928, and produced leaves in June.

Gethyllis campanulata L. Bolus. *Bulbus* globosus, 4·5 cm. diam. *Folia* in fasciculo 8–10, hysterantha anguste linearia, vix spiraliter torta, marginibus nervisque parce setulosis, setis canis, supra terram 5–7 cm. longa, ad 1·5 mm. lata. *Perianthium* niveum val rarius externe pallide roseo-suffusum; tubus 5 cm. longus, basi 4 mm., apice 3 mm., diam.; segmenta erecta conniventia imbricantiaque itaque campanulam, 3·5 cm. diam., formantia, oblongo-elliptica acuta, 4·3 cm. longa, exteriora ad 2·2 cm., interiora ad 2 cm. lata. *Stamina* 12, in 6-paria disposita, filamentis paris basi breviter connatis, patentibus, 6 mm. longis; antheræ 1·2 cm. longæ, nunc spiraliter tortæ, nunc circinato-recurvæ. *Stylus* strictus, per 1·3 cm. ultra tubum exsertus, in stigma minute trilobum vix dilatatus.

Hab. Cape Province: Clanwilliam Div., Nieuwoudtville, *R. H. Compton* (National Botanic Gardens, No. 1533/26).

Described from living specimens which flowered at Kirstenbosch in November 1927 and 1928.

Forbesia Galpinii L. Bolus (*Amaryllidaceæ–Hypoxideæ*). Planta 3–4 cm. alta. *Cormus* atratus, 6 mm. diam. *Folia* 5, infimum dimidio inferiore membranaceum vaginansque, anguste linearia, pilosa, pilis longis albis in fasciculis sparsis, sæpius prope margines revolutas, dispositis, lamina sæpius ad 2 cm. longa, vix ad 1 mm. lata. *Pedunculus* 1–1·5 cm. longus. *Perianthium* ad 3·2 cm. longum, tubo gracillimo, apicem versus per 4 mm. leviter ampliato, albo, ad 2·5 cm. longo; segmenta lilacina, 1·5–2 mm. lata. *Stamina* 2-seriate, antheris ovatis, dorsifixis, inferioribus fere vel omnino sessilibus, superioribus exsertis, filamentis brevissimis. *Stigmata* brevia crassaque ad basin antherarum inferiorum (interiorum) attingentia.

Hab. Orange Free State: Mon-aux-Sources, fl. Dec. 1928, *E. E. Galpin* (National Botanic Gardens, 2068/28).

Described from three living specimens sent to Kirstenbosch. The mauve and white perianth and the small size distinguish this species at a glance from the rest of the genus.

Haworthia variegata L. Bolus (*Liliaceæ–Aloineæ–Chloracanthæ*). *Caulis* abbreviatus, multifarie 20–30-foliatus, basi reliquis

onustus, rosella 3·5 cm. diam. *Folia* erecta levia, saturate brunnea, pallido-variegata lineari-laneeolata, e medio attenuata, in setam albam mollem 2 mm. longam terminantia, marginibus aculeato-denticulatis, dentibus patentibus, inferne obsoletis, supra plana, nervo medio subprominente, infra superne carinata, carina aculeato-denticulata ad 5·5 cm. longa, ad 1 cm. lata, ad 2 mm. diam. *Pedunculus* simplex gracilis, 22 cm. longus, ad 1·5 mm. diam., squamis 10–12 semi-amplexicaulibus deltoideis, ad 1·1 cm. longis, cum seta ad 7 mm. longa. *Racemus* 6 cm. longus, 6–8-fl., floribus adscendentibus; bracteæ 3–4 mm. longæ; pedicelli 1 mm. longi. *Perianthium* 1·1–1·4 cm. longum, tubo 1 mm. longo; segmenta linearia obtusa, exteriora albida, late brunneo-vittata, interiora subviridia. *Filamenta* ad 5 mm. longa. *Ovarium* 3 mm. longum.

Hab. Cape Province: Riversdale Div., Boterkloof, "on limestone hills a few miles inland from Still Bay, facing north," Dec. 1928, *Emily Ferguson* (Bolus Herbarium, No. 18900).

Described from living specimens which flowered in my garden during January and February, 1929. Mrs. Ferguson found them "in large clumps, almost a foot in diameter, and growing rather deep in the soil." Closely allied to *H. angustifolia* Haw., from which it differs in having the leaves variegated with a paler brown than that of the ground-colour, the keel more pronounced and, with the margins, rigidly ciliate, and the much shorter perianth-tube.

Erica Salteri L. Bolus (§ *Ephebus*). *Rami* erecti gracillimi, ad 20 cm. longi, cum ramulis partibusque herbaceis pubescentes, setis patentibus canis brevibus; internodia sæpius 3–6 mm., ad 1·2 cm., longa. *Folia* fere erecta vel patentia, 3-nata, angustissime linearia, subacuta, anguste sulcata, 2–3 mm. longa, ad 0·4 mm. lata. *Flores* solitarii vel rarius 2–3-nati, ramulos breves decurvatos terminantes; pedunculi 1 mm. longi vel parum ultra. *Bracteæ* 3, angustæ, infima 0·75 mm. longa, parum infra medium, ceteræ supra medium pedunculi positæ. *Sepala* erecta linearia, inferne leviter ampliata, 1·5 mm. longa. *Corolla* pallida vel dilute rosea, pilis canis, ad 2·5 cm. longa, apice complanata ad 3 mm. diam., tubo parum supra basin constricto, deinde in craterem ampliato, faucibus levissime contracto, ad 1·5 mm. longo, segmentis obtusis. *Stamina* inclusa, filamentis 0·75 mm. longis, antheris muticis, parum supra basin dorsifixis, oblique ovato-lanceolatis, poro dimidio lobi minore, ca. 0·5 mm. longis. *Ovarium* depresso-globosum glabrum; stigma inclusum, antheras parum superans, capitellatum.

Hab. Cape Province: Cape Peninsula, "marsh at head of stream flowing over the plateau on the Muizenberg into Silvermine Stream," fl. Nov.–Dec., *T. M. Salter* (Bolus Herbarium, No. 18877).

Closely allied to *E. limosa* L. Bolus, from which it differs chiefly in having narrower bracts and sepals, and in being more pubescent. Described from living specimens.

Erica Phillipsii L. Bolus (§ *Ephebus*). *Fruticulus* erectus, "30–60 cm. altus." *Ramuli* pubescentes, setis patentibus canis brevibus. *Folia* fere erecta, apice incurva, imbricata, sparsa vel subquinata, linearia acuta, obscure ciliolata, glandulis sessilibus interjectis, 5–7 mm. longa, cum petiolo 1·2 mm. longo. *Flores* rite 5-nati, vel ramulis floriferis abbreviatis, interdum approximatis, quasi umbellati. *Pedunculi* sat graciles pubescentes, 6–8 mm. longi. *Bracteæ* lineares herbaceæ, infima medio vel bene supra medium pedunculi posita, ceteræ subapproximatæ vel approximatæ, 4–5 mm. longæ. *Sepala* linearia, inferne leviter ampliata, glabra vel puberula, interdum glandulis sessilibus marginibus onusta, 4 mm. longa. *Corolla* urceolata puberula, 5–6 mm. longa, cum lobis obtusis, 1 mm. longis. *Filamenta* linearia, apicem versus ampliata; antheræ manifestæ vel inclusæ, terminales oblongæ acutæ, basi obliquæ, ca. 1 mm. longæ, lobis ad basin distinctis, aristulatæ aristis patentibus, poro dimidium lobi æquante vel minore. *Ovarium* demum globosum puberulum, setis canis patentibus; stigma manifestum vel breviter exsertum, capitatum.

Hab. Cape Province: Tulbagh Div., Great Winterhoek Range, alt. 1800 met., fl. April 1916, *E. P. Phillips*; Little Winterhoek, alt. 1080 met., fl. April 1926, *T. P. Stokoe*.

NEW AND NOTEWORTHY SPECIES OF *COMBRETUM* FROM WESTERN TROPICAL AFRICA.

By A. W. Exell, M.A., F.L.S.

(Continued from p. 104.)

Sect. Longipilosæ Engl. & Diels.

C. Bosoi De Wild. in Ann. Mus. Congo, ser. v. i. 195 (1904). This cannot be distinguished from the earlier *C. longipilosum* Engl. & Diels.

Sect. Mucronatæ Engl. & Diels.

C. Smeathmannii G. Don in Trans. Linn. Soc. xv. 424 (1827). This antedates the name *C. mucronatum* Schum. & Thonn. ex Schum, in Kong. Danske Vid. Selsk. Naturvid. og Mathem. Afhandl. iii. 204 (1828), which is erroneously in use for this species.

Sect. Ciliatipetalæ Engl. & Diels.

C. kwinkiti De Wild. in Ann. Mus. Congo, v. iii. 237 (1910). The following new locality may be cited for this species:—

Portuguese Congo: "A small tree," at an alt. of 1000 m., Zombo Plateau, *M. T. Dawe*, 136 (Herb. Kew).

C. Gueinzii Sond. in Linnæa, xxiii. 43 (1850). This species has been recorded over a wide area of Tropical Africa, often under the name of *C. splendens* Engl. After examination of a wide range of material from Angola and Rhodesia, I am unable to find any constant distinction between *C. Gueinzii*, *C. holosericeum* Sond., and

C. arbuscula Engl. & Gilg. The species is apparently rather variable and of considerable range. It just enters the area dealt with in this paper :—

Belgian Congo: Sakania, *F. A. Rogers* 10,285 (Herb. Mus. Brit.); Elisabethville, *F. A. Rogers* 10,292 (Herb. Kew).

C. pascuorum Gilg & Ledermann ex Engl. in Veg. der Erde, Pflzw. Afr. iii. 2, 698 (1921), sine diagn. lat. A short Latin diagnosis is appended :—

Frutex erectus parvus. *Folia* oblonga vel oblongo-lanceolata supra fere glabra subtus dense lepidota, lepidibus contiguis sed distinctis, costa media infra dense pubescente. *Receptaculum* inferius dense lepidotum fere glabrum, superius cupuliforme extus sparse lepidotum fere glabrum. *Petala* cordata margine ciliata.

Hab. Cameroons: Mao Banjo, *Ledermann* 2556 (lectotype, Herb. Berlin); Balringo, Babungo, *Ledermann* 1694 (Herb. Berlin); Riban, *Ledermann* 2123 (Herb. Berlin).

Sect. Glabripetalæ Engl. & Diels.

C. dolichopodum Gilg ex Engl. in Veg. der Erde, Pflzw. Afr. iii. 2, 700 (1921), sine diagn. lat. A short Latin description is appended to amplify the brief citation by Engler :—

Frutex erectus? *Folia* suborbicularia vel ovata apice obtuse acuminata, omnino glabra subtus sparse et minute papillata, plerumque 4-verticillata. *Flores* in spicas ramosas axillares dispositi. *Receptaculum* inferius glabrum dense lepidotum quam superiore longiore, superius campanulatum glabrum sparse lepidotum. *Petala* obovata glabra.

Hab. Cameroons: "Gallerie mit grossen breiten Baümen an einem felsigen Bach, alt. 700 m.: Strauch 1·5–2 m., Blumenblätter weiss, Blätter zart grün," Gauro Putju, Dodo, *Ledermann* 3020 (holotype, Herb. Berlin). Engler states that the species also comes from Togoland.

C. crotonoides Hutch. & J. M. Dalz. in Fl. W. Trop. Afr. i. 220 (1927) et Kew Bull. 1928, 224. *Heudelot* 386 (Herb. Paris; Herb. Mus. Brit.), though the leaves are still somewhat immature, has young fruits as well as flowers. A study of this specimen leads me to the opinion that *C. crotonoides* is perhaps the flowering stage of *C. lamprocarpum* Diels (in Engl. Jahrb. xxxix. 500 (1907)), hitherto known only in the fruiting stage.

C. Kerstingii Engl. & Diels in Engl. Jahrb. xxxix. 499 (1907). This species was considered by Hutchinson and Dalziel (*op. cit.*) to be a synonym of *C. ghasalense* Engl. & Diels, from which it differs in having leaves which are densely covered with white scales below. It is, in fact, very close to *C. lamprocarpum* Diels. The mistake apparently arose owing to the fact that various Kersting specimens were sent to Kew erroneously named *C. Kerstingii*. The true *C. Kerstingii* is represented by *Kersting* 615 (type), 38, 189 (Herb. Berlin).

Combretum Englerianum Exell, nom. nov. (*C. tenuipes* Engl. in Veg. der Erde, Pflw. Afr. iii. 2, 703 (1921), non Engl. & Diels). A short Latin description is appended to amplify that given by Engler :—

Folia petiolata, petiolo glabro, elliptica apice basique acuta supra nitida glabra infra albo-lepidota, lepidibus conspicuis distinctis margine plerumque fere contiguis. *Flores* tetrameri in spicas elongatas dispositi. *Receptaculum* inferius rufo-lepidotum fere glabrum, superius cupuliforme fere glabrum sparse rufo-lepidotum. *Petala* transverse elliptica glabra. *Fructus* ovalis dense ferrugineo-tomentellus 4-alatus, alis modice latis et tenuibus.

Hab. Cameroons: "Dicker Baum, Blth. gelblich," in grass-steppe, Bosum, *Tessmann* 2253 (lectotype in Herb. Berlin); Ssanga-Uham, Jade Plateau, *Elbert* 350 (Herb. Berlin); at an alt. of 800 m., Mbussa, Kongola, 6° N., 14°–14° 20′ E., *Mildbraed*, 9113 (Herb. Kew); Buar, Uham, *Mildbraed* 9425 (Herb. Kew).

This species, which should not be confused with *C. tenuipes* Engl. & Diels, which belongs to Sect. *Hypocrateropsis* Engl. & Diels and comes from the Transvaal, is near to *C. lamprocarpum* Diels, from which it can be distinguished by the almost glabrous receptacle with reddish scales, which are very dense on the lower receptacle and quite sparse on the upper.

This species is very near *C. Welwitschii* Engl. & Diels, from Angola, but it seems to be distinguishable by the nearly glabrous receptacles. Only young leaves and flowers are known.

C. Elliotii Engl. & Diels in Mon. Afr. Pfl. iii., Combretaceæ, 42 (1899). The range of this species is extended to the Ghasal region by the identification with it of *C. brunneum* Engl. & Diels, *loc. cit.* p. 48. The latter species was described without flowers and placed by the authors in their Sect. *Glabripetalæ*, but I have little doubt of its identity with *C. Elliotii*.

C. nigricans Leprieur MS. ex Guill. & Perr. Fl. Seneg. i. 290 (1833). This species, at present known only from leaves and fruits, was placed by Engler & Diels in Mon. Afr. Pfl. iii., Combretaceæ, 19 (1899) at the end of their Sect. *Paucinerves* following the statement in the original description that it was near to *C. altum* Perr. After examining the specimens in the Herbarium of the Paris Museum, I am of the opinion that it should come in Sect. *Ciliatipetalæ* Engl. & Diels, near to *C. Elliotii* Engl. & Diels, from which it can be distinguished by the larger leaves, which are finely tomentose below. Flowers of the species are needed accurately to determine its position.

C. Gossweileri Exell in Journ. Bot. 1928, Suppl. Polypet. p. 166. According to the present classification this species would come into this rather heterogeneous section. It may be included here for the present until some reorganisation of the sections can be attempted. This distribution is extended to Katanga by the identification published below :—

Belgian Congo: at an alt. of about 4000 ft., Elisabethville, *F. A. Rogers*, 26243 (Herb. Kew).

Sect. SPATHULIPETALÆ Engl. & Diels.

C. ZEYHERI Sond. in Linnæa, xxiii. 46 (1850). The citation recorded below extends the distribution of this species into Katanga.

Hab. BELGIAN CONGO: Prince Leopold Farm, Katanga, *Quarré* 406 (Herb. Brussels).

C. DILEMBENSE De Wild. in Fedde Rep. xi. 515 (1913). This should certainly come near to *C. Zeyheri* Sond., from which it seems to be just distinguishable by the almost glabrous upper receptacle and pubescent but scarcely tomentose lower receptacle. In *C. Zeyheri* the upper receptacle is distinctly hairy and the lower receptacle thickly tomentose. *Ritschard* 1431, from Mukulakulu, is probably a mature specimen of this species. The fruits seem indistinguishable from those of *C. Zeyheri*, but the leaves are acute at the apex and slightly acuminate, while those of *C. Zeyheri* are obtuse or rounded. If acuminate, they are rather abruptly so.

C. SINUATIPETALUM De Wild. in Ann. Mus. Congo, ser. iv. 215 (1903). This species was placed by the author in Sect. *Ciliatipetalæ* Engl. & Diels, but from the shape of the petals it seems to have affinity with Sect. *Spathulipetalæ*. If the fruit turns out to be very large it should undoubtedly come in this group, but up to the present only flowering material is known.

Sect. LASIOPETALÆ Engl. & Diels.

Combretum capitatum De Wild. & Exell, sp. nov. *Frutex* scandens, ramulis primo fulvo-pilosis mox glabrescentibus demum cortice griseo obtectis. *Folia* petiolata, petiolo fulvo-piloso, elliptica ovalia vel obovata apice acuta acuminata basi rotundata vel obtusa supra glabra nitidula subtus ad nervos fulvo-sericea cetera glabra vix conspicue punctulata, costis lateralibus utrinque 7–8. *Flores* pentameri in spicas capituliformes pseudo-umbellatas supra-axillares conferti. *Receptaculum* inferius elongato-fusiforme superne constrictum subsericeo-pubescente quam superiore duplo longiore, superius cupuliforme sparse pubescente. *Calycis segmenta* late triangularia. *Discus* margine piloso vix libero. *Petala* ovali-oblonga extus tomentella. *Stamina* exserta. *Stylus* subulatus exsertus.

Hab. BELGIAN CONGO: "bords boisés de la Tshopo, arbuste liane, fl. blanches," Stanleyville, *Bequaert* 7007 (holotype in Herb. Brussels).

Leaves 5–9 × 2·5–4 cm.; *petioles* 4–5 mm. long; *peduncles* up to 2·5 cm. long; *inflorescences* about 2 cm. in diam.; *lower receptacle* 5–6 mm. long; *upper receptacle* 2·5–3 mm. long and 5 mm. across at the mouth; *petals* 2 × 1 mm.; *stamens* 5–6 mm. long; *style* 5–6 mm. long.

This species strongly resembles the genus *Pteleopsis* in appearance, but I can find no trace of male flowers. The fruits are unfortunately unknown. The affinity with *C. Wakefieldii* Engl., which ranges from the Zanzibar Coast region to Nyasaland, is sufficiently

close to warrant its inclusion in Sect. *Lasiopetalæ*. The constriction of the upper receptacle is much more marked in *C. capitatum* and the leaves are nearly glabrous below, except on the nerves.

Sect. EUCOMBRETUM G. Don (Sect. MICROPETALÆ Engl. & Diels).

C. FRUTICOSUM (Loefl.) Stuntz in U.S. Dept. of Agric. Bur. Pl. Ind. Invent. Seeds and Pl. Import. No. 31, 86 (1914).

Heudelot 45, in the herbarium of the Paris Museum, is apparently identical with the South American species *C. fruticosum* (Loefl.) Stuntz (*C. Loeflingii* Eichl.). There is no evidence that there has been any confusion of ticket, the sheet bearing a label with the words "Herbarium Richard, Sénégal, Heudelot 45," and another blank ticket with printed heading "Herbier E. Drake," indicating that the specimen was originally in the herbarium of Drake del Castillo. I have seen no other specimen of this species from Africa, and there is no means of deciding, at present, whether we have a remarkable but by no means unparalleled instance of discontinuous distribution, whether the species was introduced into Senegal from South America, or whether there was an original error in attaching the tickets to the wrong specimen. Even if I prove to be wrong in identifying the plant as *C. fruticosum* (the specimen has no fruits), the geographical distribution would remain just as striking; for there can be no doubt of the very close affinity. No other African species is at all closely related.

Sect. CONNIVENTES Engl. & Diels.

C. HAULLEVILLEANUM De Wild. in Ann. Mus. Congo, ser. iv. 213 (1903). This species can be distinguished from *C. paniculatum* Vent. by its glandular pubescence, and with it I should place *C. Hockii* De Wild. (in Fedde, Rep. Spec. Nov. xi. 515 (1913)), *C. Sapinii* De Wild. (in Compagnie du Kasai, 373 (1910)), and *C. subscabrum* De Wild. (in Fedde, Rep. Spec. Nov. xiii. 197 (1914)), which do not seem to me to differ specifically from it.

C. PORPHYROBOTRYS Engl. & Diels in Mon. Afr. Pfl. iii., Combretaceæ, 73 (1899). The fruits of this species, not hitherto described, are rather small, up to about 1·8 × 1·5 cm., shiny, glabrous, of a chocolate-brown colour, 4-winged, with the rather thin wings typical of the section. The range of the species is extended to Gaboon:—

GABOON: without precise locality or number, *R. P. Klaine* (Herb. Paris).

Combretum Lemairei De Wild. & Exell, sp. nov. *Frutex* scandens, ramulis primo adpresse fulvo-pubescentibus mox glabrescentibus. *Folia* petiolata, petiolo sparse puberulo, ovata vel oblongo-ovata apice breviter acuminata basi cordata vel subcordata omnino glabra. *Flores* tetrameri brevissime pedicellati in racemos densos multifloros axillares et terminales conferti. *Receptaculum* inferiore sericeo-tomentellum, superiore infundibuliforme sparse sericeo-puberulum.

Discus cupuliformis glaber margine vix libero piloso. *Petala* suborbicularia margine ciliolata. *Stamina* biserialia. *Fructus* ignotus.

Hab. BELGIAN CONGO: "Grosse liane épineuse des marais," Musa, *De Giorgi* 1242 (holotype in Herb. Brussels); "Plante aquatique" (*sic*), Madungu, *Lemaire* 433 (Herb. Brussels).

Leaves 8–17 × 6–10 cm.; *petioles* 10–12 mm. long; *lower receptacle* 5–6 mm. long; *upper receptacle* 5–6 mm. long and 4 mm. across at the mouth; *petals* 4 × 3·5–4 mm.; *stamens* 11–12 mm. long; *style* 12 mm. long.

This species is closely allied to *C. paniculatum* Vent. and to a whole complex of forms which may eventually be reducible to this species. It seems, however, to be specifically distinct in having very much larger petals which are quite conspicuous and exserted for a length equal to half the length of the upper receptacle. The leaves are also larger than any I have seen in *C. paniculatum* and its allies, and are distinctly cordate at the base.

While taking the name *C. Lemairei*, originally proposed by Dr. De Wildeman for this species, I have made *De Giorgi* 1242 the type, as the material is in a much better state of preservation.

Combretum Goossensii De Wild. & Exell, sp. nov. *Frutex* scandens, ramulis fulvo-pilosis. *Folia* petiolata, petiolo piloso fere tomentoso, ovata vel ovale-ovata apice breviter acuminata basi cordata, supra glabra infra ad nervos pubescentia, costis lateralibus utrinque 6–7. *Flores* tetrameri in spicas elongatas axillares dispositi. *Bracteæ* filiformes fulvo-pilosæ. *Receptaculum* inferius dense fulvo-pilosum, superius campanulatum fulvo-pilosum. *Calycis segmenti* subulati. *Discus* glaber margine vix libero. *Petala* anguste ovata unguiculata glabra. *Stamina* 8, exserta. *Stylus* subulatus erectus exsertus.

Hab. BELGIAN CONGO: "Petite liane, peu abondant, forêt primitive," near Bikoro, Lake Tumba, *Goossens* 1509 (holotype in Herb. Brussels).

Leaves 7–9 × 3–5 cm.; *petioles* up to 5 mm. long; *bracts* 5–6 mm. long, soon caducous; *lower receptacle* 4 mm. long; *upper receptacle* 3·5 mm. long to the end of the calyx-teeth, the latter being nearly 1 mm. long, 3 mm. across at the mouth; *petals* 2·5 × 1·5 mm.; *stamens* 6–7 mm. long; *style* 6·5 mm. long.

This species is near to *C. porphyrobotrys* Engl. & Diels, but can at once be recognized by the densely tawny-pilose inflorescences.

Sect. FUSCÆ Engl. & Diels.

Combretum sordidum Exell, sp. nov. *Frutex*, ramulis fulvo- vel brunneo-tomentellis. *Folia* petiolata, petiolo fulvo-tomentello, elliptica anguste elliptica vel oblongo-elliptica omnino glabra vel fere glabra, costa media supra impressa subtus prominente, costis lateralibus utrinque 5–7 supra fere inconspicuis infra prominulis. *Flores* tetrameri in spicas elongatas paniculatas terminales at axillares dispositi. *Receptaculum* minute tomentellum, superius campanulatum

medio paullo constrictum minute fulvo-tomentellum. *Discus* campanulatus glaber margine libero densissime piloso. *Petala* cuneata glabra apice leviter emarginata basi breviter unguiculata. *Stamina* 8, antheris basin versus divergentibus. *Stylus* erectus glaber apicem versus haud incrassatus.

Hab. CAMEROONS: Mimfi Mt., near N'Buambe, Yaunde, *Zenker & Staudt* 3261 (holotype in Herb. Mus. Brit.); Bipinde, *Zenker* 3261 (in Herb. Mus. Brit., perhaps the same collection as the preceding number); Bipinde, *Zenker* 4048.

Leaves 8–12 × 3–5 cm.; *petioles* 5–8 mm. long; *spikes* up to about 7 cm. long; *lower receptacle* 1–1·2 mm. long; *upper receptacle* 4 × 2·5 mm.; *petals* 2 mm. long and nearly 1 mm. across at the apex; *stamens* 5 mm. long; *style* 4·5 mm. long.

This species is nearest to *C. bipindense* Engl. & Diels, but can be distinguished by the much smaller leaves and the upper receptacle, which appears slightly constricted in the middle at the point where the disc becomes free. The style is only very slightly thickened, and it is doubtful whether this is a good sectional character. The species is remarkable for the very well-developed free margin of the disc. The stamens are all attached at the same level at the point where the margin of the disc becomes free.

Combretum Batesii Exell, sp. nov. *Frutex* ?, ramulis primo glanduloso-puberulis mox glabrescentibus. *Folia* petiolata, petiolo glanduloso-puberulo, late ovata vel late ovalia apice paullo acuminata acuta basi rotundata supra glabra nitidula subtus in axillis nervorum barbulata cetera glabra, costis lateralibus utrinque 5–6 supra conspicuis sed vix prominentibus subtus prominentibus. *Flores* tetrameri in spicas glomeruliformes paniculatas ? congesti. *Receptaculum* inferius glanduloso-puberulum superius elongato-infundibuliforme sparse glanduloso-puberulum. *Discus* glaber margine haud libero breviter piloso. *Petala* parva cuneata glabra. *Stamina* uniserialia. *Stylus* apice parum incrassatus. *Fructus* ignotus.

Hab. CAMEROONS: Bitye, Yaunde, *G. L. Bates* 956 (holotype in Herb. Mus. Brit.).

Leaves 10–14 × 7–10 cm.; *petioles* 10–14 mm. long; *spikes* about 2 cm. in diam.; *lower receptacle* 2·5 mm. long; *upper receptacle* 5 × 3 mm.; *petals* 1·2 × 1 mm.; *stamens* 4–4·5 mm. long; *style* 5·5–6 mm. long.

This species is near to *C. bipindense* Engl. & Diels, from which it can be distinguished by the glomeruliform spikes with crowded flowers, the smaller petals, and the relatively broader, slightly shorter leaves. In spite of the considerable difference in the margin of the disc between this and the preceding species it seems best to include them both in this section at any rate until the fruits are known.

(To be continued.)

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

New Chinese Umbelliferæ.

By C. Norman, F.L.S.

Cryptotæniopsis decipiens Norman, sp. nov. Herba gracilis glabra, 10–20 cm. alta; *caule* erecto nudo, radice tenui; *foliis* omnino basilaribus, congestis, ambitu obtuse lanceolatis, pinnatim decompositis, eis *Œnanthis Thompsoni* sed minoribus simillimis; pinnulis ultimis brevissimis, obtusiusculis trifidis vel rarius bifidis vel integris; *petiolo* laminæ subæquali imo basi in vaginam brevem et amplam expanso; *umbellis* 12–20 radiatis, radiis inæquilongis apicem versus attenuatis; *involucro* nullo; *umbellulis* 2-floris, pedicellis valde inæquilongis, involucellis 2, minimis, pedicellis subtendentibus; *petalis* conspicuis albis, oblongis, basim versus attenuatis, apice leviter emarginatis, lobulo subnullo instructis; *calycis dentibus* angustis acutis persistentibus; *fructu* lævi glabroque, sub-globoso; stylopodio elongato-conoideo, stylis erectis breviusculis, ceterum omnino generis; *carpophoro* ad basim bi-partito.

Hab. Yunnan; *Forrest*, 17,998, 18,096 (type), 26,320.

Leaf 5–6 cm. long; ±2 cm. broad at base. Petiole 5–6 cm. Rays of umbel 1–2 cm. Fruit 1 mm. long.

This species belongs to the Section *Pteridophyllæ* Wolff. It bears much resemblance to *C. trichomanifolia* (Franch.) Wolff, but it can be at once distinguished by the 2-flowered partial umbels—in *C. trichomanifolia* they are 3-flowered.

In *C. decipiens* the fruit is sub-globose, 1 mm. long, in *C. trichomanifolia* it is narrow oblong, 3 mm. long; in the latter the rays are more numerous and reach a length of 4·5 cm., while in *C. decipiens* they do not exceed 2 cm. There are also differences in the leaves.

Cryptotæniopsis viridis Norman, sp. nov. Herba gracilis erecta glabra, circa 35 cm. alta; *caule* solitario simplice, supra medium solum folioso; *foliis basalibus* læto-viridibus, ambitu anguste lanceolatis, longe caudatis, tenuiter bipinnatisectis (pinnis imis sæpius tripinnatisectis) segmentis ultimis brevissimis linearibus, superioribus integris obtusis minute apiculatis, inferioribus sæpius trifidis; *petiolo* laminæ subæquali, imo basi in vaginam latam membranaceam expanso; *foliis caulinis* ternato-bipinnatisectis subsessilibus ceterum basalibus exacte conformibus; *umbellis* circa 20-radiatis, radiis inæquilongis; *involucro* nullo; *umbellulis* 3–4-floris congestis, pedicellis valde inæquilongis; *involucellis* 1–2 minutis acutis; *petalis* ignotis; *fructu* ambitu lenticulari parvo; calycis dentibus nullis (caducis?); stylopodio inconspicuo; stylis brevissimis; semine subterete; carpophoro ad basim bi-partito.

Hab. Western China: Mount Omi, *Wilson*, 4931.

Leaf-blade ±11 cm. × 3 cm. broad at base. Petiole ±11 cm. Rays 2–3 cm. Fruit ±2 mm. long.

This also belongs to the Section *Pteridophyllæ* Wolff, and is apparently allied to *C. leptophylla* Dunn. With this, however, it can hardly be confused, owing to the very different cutting and colour of the leaves. No other species of the genus that I have seen exhibits the bright green colour of the leaves of this species. Yet the type-specimen was collected in 1904.

Œnanthe caudata Norman, sp. nov. Herba ramosa glabra; *radice* fibrosa; *caule* striato folioso; *foliis* conformibus ambitu acute triangularibus, tenuiter tripinnatisectis, circa 5–7-jugatis, jugis ·5–1·5 cm. inter se remotis; segmentis ultimis brevissimis linearibus acutis integris vel trifidis, segmento terminali supremo et utriusque jugi producto vel breviter caudato; *petiolo* quam lamina multo breviore; *umbellis* breviuscule pedunculatis oppositifoliis sat validis, 6–10 radiatis, *involucris* tenuissimis 2–3, mox deciduis; *umbellulis* multipedicellatis; *pedicellis* filiformibus valde inæquilongis; *involucellis* tenuissimis; *floribus* polygamis; *petalis* albis minimis obcordatis, apice parum emarginatis lobulo subnullo instructis; *sepalis* acutis erectis; *stylis* elongatis patentibus; *fructu* globoso (nec a dorso nec a latere compresso); mericarpiis semi-orbicularibus, jugis dorsalibus filiformibus inconspicuis, lateralibus tumidis albo-suberosis; *semine* vix a dorso compresso, ovoideo, pericarpium ob juga lateralia suberosa haud complente.

Hab. China: Szechuan; *Henry*, 7152 (type), 7193; Hupeh; *Henry*, 6051 A; *Wilson*, 2251; Patung, *Henry*, 1709; 4874.

Leaf-blade (stem-leaf) up to 10 cm. long, 5–7 cm. broad. Petiole 1–2 cm. Peduncle 2–4 cm. Rays of umbel 1·5–2 cm. Fruit 1 mm. long and broad.

Belongs to the Section *Dasyloma* (DC.) Benth. & Hook. fil., and is close to *Œ. Thompsoni* C. B. Clarke, with which it is apparently generally confused. It is, however, different in foliage and especially in fruit. In *Œ. Thompsoni* the fruit is very obviously dorsally compressed; in *Œ. caudata* it is as nearly as possible orbicular and clearly smaller. *Œ. Thompsoni* occurs in Yunnan, but does not appear to reach Central China.

Torilis Henryi Norman, sp. nov. Herba alta primum pilis albis adpressis in partibus omnibus sparse obtecta, glabrescens; *caule* ramoso terete; *foliis* ambitu triangularibus, arcte bipinnatisectis basalibus et caulinis, ut videtur consimilibus, 3–4-jugatis (jugis inferioribus inter se plus minusve remotis); pinnis lanceolatis acutis, basi attenuatis profunde incisis, segmentis ultimis linearibus, terminali plus minusve producto; *petiolo* brevi, foliorum superiorum omnino vaginante; *umbellis* longiuscule pedunculatis, axillaribus, radiis inæquilongis, crassis patentibus 3–4, involucro monophyllo, parvo acuto vel nullo (caduco?); *umbellulis* 5–9-pedicellatis, pedicellis inæquilongis crassis patulis; involucellis 4–5 filiformibus conspicuis; *fructu* oblongo pro genere grandi, supremo apice vix attenuato, in sicco nigrescente, aculeis patulis minute glochidiatis obsito; mericarpiis omnino pro genere; stylis brevissimis erectis.

Hab. China: Hupeh; *Henry*, 1349 (type); Shanghai; *Schindler*, 273; *F. B. Forbes*, s. n. Corea: Quelpart Is.; *Faurie*, 1816. Japan: Yokohama, *Maximowicz* (May 1862).

Leaves (of stem) 5–10 × 5–9 cm. (across the base). Rays 2–4·5 cm. Pedicels 3–10 mm. Fruit 5–7 mm. long.

The leaves of this species are much like those of *T. nodosa*, but it is very distinct and can be distinguished from the other Asiatic species by the few thick rays, the long and thick pedicels and the large fruit.

Two South African Cyperaceæ.

Mariscus inflatus C. B. Clarke in Flor. Trop. Afric. viii. 384 (1901). This species is founded on a plant in the British Museum Herbarium, collected by the Rev. H. C. Day. It should, however, not be included in the Tropical African flora. Mr. Day was a Jesuit Missionary who left England with a view of proceeding to Nyasaland, and the small collection of plants which he sent home were presumed to have come from there. It subsequently transpired that, owing to a breakdown in health, he never reached Nyasaland, and that his plants were all collected in the Cape Province, chiefly about Graaff Reinet (in the Division of that name) and the Zuur Berg (in Steynsburg Division). *M. inflatus*, so called from the swollen bulb-like base, was placed next to *M. Schimperi* Hochst., but comparison with South African material shows it to be very closely allied to *M. albomarginatus* Clarke (Flor. Cap. vii. 187, 1897), and *M. binucifer* Clarke (Kew Bull. 1908, 13), and perhaps inseparable from the latter, which is recorded from Transvaal and Natal. As in *M. binucifer*, the spikelets of *M. inflatus* sometimes mature two nuts.—A. B. Rendle.

Kyllinga monocephala Rottb. in South Africa. This species is not included in the *Flora Capensis*. In the *Flora of Tropical Africa*, viii. 272 (1901), Mr. C. B. Clarke says of this widely distributed Old World plant, "frequent in the Mascarene Isles, but only known in Africa by the two examples above cited" (one from Princes Island collected by Welwitsch, the other from Portuguese East Africa by Stewart), "which may easily have been introduced." There is in the British Museum Herbarium a specimen collected by Oldenburg at the Cape in 1772. It belongs to a set of plants, all numbered, which were in Herb. Banks, but bore no indication as to the collector, though believed to be by Oldenburg. Their association with Oldenburg was subsequently determined by the late Mr. Britten by correlation with a manuscript list of Masson. The plant was not overlooked by Mr. Clarke when going through the material at the British Museum Herbarium, but at that time (1887) its association with Oldenburg had not been established. The number of the specimen is 1444.—A. B. Rendle.

Vepris Welwitschii Exell, comb. nov. (*Glycosmis Welwitschii* Hiern in Cat. Afr. Pl. Welw. i. 115 (1900); *Vepris Gossweileri* Verdoorn in Kew Bull. 1926, p. 399).

Tyôzaburô Tanaka, during a recent visit to the British Museum Herbarium, indicated that *Welwitsch*, 471, named *Glycosmis Welwitschii* by Hiern, does not belong to the *Aurantieæ*. It is identifiable as the recently-described *Vepris Gossweileri* Verdoorn.—A. W. Exell.

ANNOTATIONES SYSTEMATICÆ.

By A. J. Wilmott, B.A., F.L.S.

I. New Primulas from Spain.

These and other notes which will follow in due course embody the results of my work on the Spanish Flora in company with Mr. T. A. Lofthouse in 1926 and Mr. C. C. Lacaita in 1927 (see Journ. Bot. 1927, 64, 297). The specimens are in the Herbarium of the British Museum; the work was undertaken with the permission of the Trustees.

Primula hispanica, sp. nov.

P. intricatæ Gren. et Godr. (Fl. Franc. ii. 449) proxima, ab ea differt:—planta major ad 30 cm. alta; *foliis* magnis in plantis bene evolutis ad 20 cm. longis et 6 cm. latis, pedunculo plerumque subæquantibus vel excedentibus, laminis oblongo-ellipticis apice plerumque fere rotundatis in petiolum longum lamina duplo breviorem usque subæquantem anguste-alatum attenuatis; *calyce* adulto magno (12) 15–20 mm. long. et (in sicco) 6–7 mm. diam., paululum inflato, vix "tomentoso" tam etsi dense glanduloso-puberulo; *corolla* lutea nec sulphurea.

Habitat in Sierra Nevada (*P. intricata* Wk. et Lge. Prodr. Fl. Hisp. ii. 637 quoad specimina Nevadensia), prope "Minas de Beires," in "Barranco de Ohanes" et in "Barranco de la Fuente Cufria" (typus in Herb. Mus. Brit. 26 Jun., 1926, A. J. Wilmott). In "Sierra de Gredos," in rupibus supra lacum "El Laguna de Gredos," 2 Jul., 1927 (fructu immaturo et sine flore), A. J. Wilmott & C. C. Lacaita.

Mr. T. A. Lofthouse and I have had both this and the Pyrenean *P. intricata* flowering in our gardens, and although the differences between them might possibly be due to differing environment or individual variation (*e.g.*, flower-colour), such herbarium material as I have seen rather confirms their distinctness than otherwise. The following description is from a garden-specimen. The measurements given may be abnormal following the recent March drought, which kept the plant in a very reduced condition until the last week:—

Flos (e specimine e Sierra Nevada orto in horto culto descripta) mediocris (corollæ tubo c. 15 mm. longo, 2·5 mm. lato, limbo c. 7 mm. longo, 13 mm. diametro); *calyce* (12 mm. longo et 5 mm. lato) in totum dense glanduloso-puberulo, angulis viridibus acutis exceptis hyalino-translucente, venis secundariis numerosis porrectis in parte viridi restrictis, dentibus triangularibus brevibus (1·5 mm. long.); *corollæ* tubi parte superiore limbique basi sparse glanduloso-puberula; *limbo* infundibuliforme nec poculiforme, segmentis fere rectis angulo subrecto divergentibus vitta crocea mediana (antice evanescente basi in ore conspicua) excepta uniforme saturate luteo (tubo pallidiore luteo), ad $\frac{2}{5}$ in segmenta fisso, *segmentis* angustis nec contiguis, elliptico-oblongis, quam latis aliquantulum longioribus, apice leviter sed plane emarginatis; *antheris* (saltem formæ longistylæ) filamento

breve conico albo sedentibus, anguste ellipticis subplanis quam latis c. 3½ longioribus; stylo gracile filiforme et stigmate hemisphærico lucide viridibus.

It is clear that this section requires further study in Spain, for a specimen in the British Museum from the Sierra de Guadarrama (as *Primula elatior*; Herb. Graells) has leaves 23–30 cm. long and calyces (apparently inflated) 20 mm. long.

A single specimen collected in fruit near Riaño has peculiar leaves with cordate-ovate laminæ about as long as the narrow almost unwinged petiole. They are quite unlike those of any specimen of *Primula veris* or *P. elatior* I have ever seen, and resembling in a general way the summer leaves of an acaulescent *Viola*. Except at the apex they are only very slightly tomentose below, so it cannot be identified with *P. suaveolens*. The capsule is included in the inflated calyx, so it is either an aberrant form of *P. veris* or a new species. I therefore describe it as a new (at least, "taxonomic") species, since the inclusion of such aberrant plants in well-known species is to be deprecated. The continual inclusion and exclusion of doubtful plants makes the connotation of names so variable that taxonomic precision becomes almost impossible.

It is far better to describe a doubtful plant as a new (taxonomic) species than wrongly to alter and spoil the circumscription of a well-known species to include it. I therefore name this peculiar plant

Primula legionensis, nom. nov. *P. veri* affinis cum qua indumento et calycibus fructiferis plus minus congruit, sed ab ea foliorum laminis cordato-oblongis (circiter 7 cm. longis et 5 cm. latis), petiolis (c. 7 cm. longis) angustissime alatis solum 1·5–2 mm. latis.

Habitat in Prov. Legione, prope Riaño, 7 Jul. 1927; holotypus in Herb. Mus. Brit.

NOTES ON PAPERS OF INTEREST TO STUDENTS OF THE BRITISH FLORA.

Transactions of the Devonshire Association of Science, etc. lx. 81–92 (1928); Twentieth Botany Report, Edited by G. T. Harris, Recorder.—These twelve pages show that Devonshire has plenty of willing workers to investigate the botany of the County, the "Flora" of which we anxiously await. A large number of interesting records are here printed, and we extract the following, which are apparently new County or Vice-County records:—

Lamium mollucellifolium Fr. (*intermedium* Fr.). Goodleigh (v.c. 4). Miss E. Young. An astounding addition to the County for this northern species. We trust it is correct; Devonshire has some remarkable plants already.

Carex strigosa Huds. Woodbury (v.c. 3). Major R. Orme.

Vicia gracilis Lois. Littleham (v.c. 4). Major R. Orme.

Valerianella eriocarpa Desv. Budleigh Salterton (v.c. 3). Major R. Orme.

Festuca uniglumis Soland. Exmouth (v.c. 3). Major R. Orme. Interesting historical notes on *Geranium macrorhizum*, *Mertensia maritima*, *Omphalodes verna*, *Oxalis corniculata*, and *Aconitum Napellus* occupy two pages.—C. E. S.

Two New Varieties.—Dr. W. B. Turrill (Gard. Chron. 1929, 164) describes a new variety of *Malva silvestris*, found in Somerset by Mr. H. Whitley, as follows:—Var. *violascens* Turrill, var. nov. Planta perennis ad 1·2 m. alta. Rami petiolique pilosi, pilis et simplicibus et stellatis instructi. Folia numerosa, laminis usque ad 3–4 cm. longis et 4·5–6 cm. latis, lobis usque ad 1–1·5 cm. longis et 1·5–2·5 cm. latis. Calyx 9 mm. longus. Petala circiter 2 cm. longa, 1·4 cm. lata, violascentia. Carpella glabra.

A new variety of *Geranium Endressii* J. Gay, which Dr. Turrill has named var. *Armitageæ*, cultivated by Miss E. Armitage, Dadnor, Herefordshire, is also described (see Journ. Bot. 1928, 44, 88).

There is also an interesting note by him on Vivipary in *Dactylis glomerata* and a note upon *Listera cordata* which had been sent to Kew by Mr. R. Findlay, who found it near Brockenhurst, Hampshire. This appears to be a new record for v.c. 11, Hants south.—C. E. S.

Systematic Arrangement of the *Chenopodium* Species of America (Fedde, Repertorium Spec. Nov. xxvi (1929), 31–64).—Dr. Paul Aellen here gives a careful revision of the American species of *Chenopodium*, and as this includes several species found in this country it should be consulted by students of this genus.

Under *C. glaucum* L. he has a new subspecies, *eu-glaucum*, with the following diagnosis:—Leaves shortly petiolate, oblong or oblong-obovate, usually obtuse, sinuate-dentate (sinuses distant) cuneate-attenuate to the petiole. There is also a subspecies *salinum*, founded on *C. salinum* Standley, with a new variety, var. *pulchrum*, and a subspecies *ambiguum*, founded on *C. ambiguum* R. Br.

Under *C. rubrum* L. there is a forma *humile*, founded on *C. humile* Hook. *C. rubrum* L. in America has been much confused with *C. macrospermum* Hook. fil.

In all twenty-one species are enumerated, some of them, such as *C. Berlandieri* Moq., having numerous subspecies and varieties. It is to be regretted that the author does not give a key to the species.—E. G. B.

DURIÆI ITER ASTURICUM BOTANICUM.

By C. C. Lacaita, M.A., F.L.S.

(Continued from p. 113.)

8. Sideritis lurida Gay. [Dur. Pl. Astur. 248.]

S. suffruticosa, ramis adscendentibus, glabriusculis; foliis lanceolatis; in petiolum attenuatis, glaberrimis, remote dentatis, floralibus oblongo-ovatis rhombeisve, acuminatis, apice demum recurvis, rhombi lateribus 2 inferioribus nudis, 2 superioribus subulato-longè-multidentatis;

verticillis 6-floris, densè spicatis; calycis fauce glabriuscula, dentibus è basi angusta uninervi longè subulatis; corollæ versicoloris limbo brevissimo, subæqualiter quinquelobo.

Habitat in montium Asturicorum occidentalium regione alpina, inter solutos lapides, nominatim in Monte *pic d'Arvas*, ibi medio Augusto fructificans (*Durieu*).

Similis *S. scordioidis* varietatibus angustifoliis, a quibus tamen, me judice, non potest non specificè separari. An inter hispanicas jam nomine salutata? Descriptiones non dantur, et diagnoses sæpè justo breviores. Nulla tamen ita concinnata ut nostram plantam vel Cavanillesio vel Lagascæ vel Benthamo innotuisse crederes. Hinc illam novam censeo, et sequentibus notis ab affini *scordioide* distinguere studeo.

Rami pedales, sesquipedales, graciles, fragiles, pubescentes vel glabri, non crassiusculi, rigidi, solidi, plerumque villosi; pars inferior ramorum, inter petras latens, elongata, perinde tenuis et fragilis, quamvis indurata et ferè lignosa. *Folia caulina* 1½–2 pollices longa, 2–3 lin. lata, mollia!, lanceolata, præter petiolum pauciciliatum utrinque glaberrima!, serraturis utrinque 5–9. Verticilli densè spicati, spicis 1–2½ uncias longis, brevioribus ovato-oblongis, longioribus cylindraceis. *Folia floralia* glaberrima, plerumque viridia, nunquam cordato-latè ovata, sed oblongo-ovata; longiusculè acuminata, basi plus minus contracta (hinc quasi rhombea), acumine flores demum superante et in arcum recurvo. Dentes marginales utrinque 7–9, è basi angusta longè subulati, molles, virides, non è basi lata in spinulam flavam pungentem abeuntes. *Calycis* faux ferè nuda, non villis densissimis longis clausa; dentes è basi angusta uninervi longè subulati, innocui, non è basi lata trinervi breviter subulati et pungentes. *Corolla* ex Duriæi notis manuscriptis, *Nicotianæ Tabaci* ad instar, livido-purpurea, quandoque dilutè sulphurea vel sordidè alba. In exsiccatis purpurascunt et tubus totus corollinus et partim limbus; cujus rei nullum indicium in *scordioide* video, in quo, ni fallor, corolla perpetuò flavescit. Tubus corollinus præterea intus, in *S. lurida*, ad filamentorum originem multo minus villosus, pilis saltem multo brevioribus. Ultimam gravemque differentiam suppeditat limbus in *lurida* parvus, tubo triplò brevior, et subæqualiter quinquelobus, in *scordioide* admodum varians, semper tamen elongatus, longitudine tubi! et valde inæqualis, lobis nempè 2 mediis dimidio brevioribus et ferè triplò angustioribus.

9. Veronica scutellata δ. *latifolia*. [Dur. Pl. Astur. 252.]

Radicis repentis collum stoloniferum. *Caulis* adscendens, crassiusculus, semipedalis, supernè pilis glanduliferis patentibus densè pubescens. *Folia* internodiis dimidio longiora, ovato-lanceolata, acuta, distinctè serrulata, unciam longa, 2½–3 lin. lata, ad basin dorsalem glanduloso-pilosiuscula, margine etiam propè basin ciliolata, cæterum glaberrima. *Racemi* 5–7-flori, folium subæquantes, non superantes, floribus quasi corymbosis, pedicellis glanduloso-pilosiusculis. Cætera ut in vulgari *scutellata*. An hujus loci *V. scutellata* δ. *latifolia* Vahl, Enum. i. p. 70, cujus nec indumentum nec racemos descripsit auctor?

Habitat in paludosis ad lacum du *pic d'Arvas*, in alpibus asturicis occidentalibus, medio Augusto fructificandi initium faciens (*Durieu*).

10. Linaria delphinioides Gay & Dur. [Dur. Pl. Astur. 258.]

L. caulibus 1–2, erectis, gracilibus, ramosis in parte florifera viscido-pubescentibus, cæterum glaberrimis, infernè multifoliatis, supernè longè nudis; surculis 2–3 brevibus ad basin fertilium; foliis surculorum lineari-lanceolatis, quaternato- et quinato-verticillatis, caulinis confertis, elongatis, lineari-subulatis, imis quaternato- et quinato-verticillatis, reliquis alternis; floribus plus minus longè laxeque racemosis; pedicellis filiformibus, glanduloso-pubescentibus, erectis; segmentis calycinis lineari-lanceolatis, acutis; corollæ (violaceæ) labiis deflexis, superiore ferè bipartito, inferiore latè trilobo, palato obsoleto, albido; calcare corollam excedente, longè subulato, acuto; stylo indiviso, apice dilatato; capsula valvulis 6 dehiscente, glaberrima; seminibus tetragono-obversè-pyramidatis.

Habitat in Asturia inferiore, propè vicum Peñaflor (non longè a Grado oppido), ad rupes proximè suprà pontem flumini Nalon impositum, ibi in fluminis faucibus frequens; medio Junio florens et fructificans. Alibi in Asturia a cl. Durieu non visa.

Planta annua, habitu et floribus cœruleis longè calcaratis sylvestre *Delphinium Ajacis* non male referens, superne inter flores viscoso-pubescens, cæterum glaberrima. *Radix* exilis. *Caules* ex una radice 1–2, gracilis, maximum pedales, erecti teretes, infrà medium ramosi, ibique dense foliati, supernè longè nudi, ramis 3–5, erecto-patentibus, caule primario paulò brevioribus, basi remotè foliatis. Caulem basi ambiunt surculi steriles 2–3, unciales vel breviores, erecti apice foliati, foliis lineari-lanceolatis 2½–3½ lin. longis, omnibus verticillatis, verticillis 3–5, inferioribus 4- superioribus 5-phyllis. *Folia* caulina multo longiora et angustiora, lineari-subulata, vix ⅓ lin. lata, glaberrima, erecto-patentia, inferiora et media uncialia, sesquiuncialia, superiora semiuncialia ima quaternato- rarius quinato-verticillata (verticillis 1–2, nunquam 3), reliqua alterna. *Flores* speciosi, in ramis 4–8, in caule primario sæpè 20–30, ibique longi racemosi, laxiusculi, æquidistantes. *Rachis* cum pedicellis et calycibus dense viscido-pubescens, pilis mollibus, longiusculis, articulatis. *Pedicelli* floriferi patuli, capillares, 1½–2 lin. longi, fructiferi paulò longiores, filiformes, erecti. *Bractea* subulata, pedicello duplo et triplò brevior. *Calycina segmenta* æqualia, lineari-lanceolata, acuta, uninervia, membranaceo-marginata, viscido-pubescentia, fructifera distincta remotiuscula, nervo carinali viridi, prominente. *Corolla*, calcare supputato, unciam ferè longa; tubus cylindricus, pallidus, calyce dimidio longior, 1½ lin. longus; labia tubo longiora, deflexa, pulchrè violacea; superius 3 lin. longum, ultrà medium bifidum, laciniis latè linearibus, integerrimis, obtusis; inferius vix brevius, profundè trilobum, lobis obovatis, perindè obtusis, integerrimisque, calcare pallido, longissimo (7 lin. longo), florem excedente, subulato, acuto, apice plus minus falcato, in siccis albido, palato depresso, subtiliter pubescente, albido, non punctato. *Stylus* glaberrimus, indivisus, filiformis, apice in spathulam dilatatus. *Capsulæ* in racemum laxum, sæpè 5-uncialem dispositæ,

calyce non aut vix longiores, ellipsoideæ, emarginatæ, glaberrimæ, utroque loculamento valvulis tribus, brevibus, ovato-oblongis, erecto-patulis dehiscente. *Semina* nigra, minuta, obversè tetragono-pyramidata, apice truncata, lateribus inæqualibus, ruguloso-scrobiculata.

Obs. Habitus *LL. bipartitæ, lino-griseæ* et *sapphirinæ* à quibus foliis angustissimis, stylo indiviso et seminibus pyramidatis, non aut reniformi curvatis (sic in *bipartita*), aut ellipsoideis et annulatim transversè rugosis (sic in *lino-grisea* et *sapphirina* ex Link et Hoffmans., Fl. Port. tab. 41 et 42) satis superque differt. Locus ejus, in Chavannesii monographia, in *Linastrorum* § III. div. *b* (stylo apice incrassato, stigmate subemarginato, seminibus angulatis subprismaticis), antè *L. armeniacam* (p. 147), cui soli habitu accedere videtur. Reliquæ enim species in hac divisione descriptæ habitu à nostra *L. delphinioide* toto cœlo differunt.

(To be continued.)

OBITUARIES.

Rev. Ernest Ellman.

The Rev. Ernest Ellman died in Bath on Jan. 30 last, in his 75th year. Born and educated in the county of Sussex, where his father was Rector of Berwick for more than sixty years, and where his passion for wild flowers was kindled at an early age, Ellman went on to St. John's College, Oxford, was ordained, and did clerical work for some years in Cornwall, Kent, and Sussex. Those changes of residence helped him to become intimately acquainted with the more interesting plants of many areas and to note their soil preferences, environment, and ecological associations, a study that fascinated him and endured to the exclusion of species-definition and other problems of importance to field-botanists in general. At this period the poor health that had hampered him from boyhood became more serious, and thenceforward he passed much time in the Mediterranean region continually searching for plants that he had not seen before and which a remarkable memory enabled him instantly to recognize. It is probable that his note-books contain remarks on at least 4000 European species seen *in situ*. He himself never gathered anything, but on his annual tours he secured the service of a younger botanist who collected and pressed the plants to be preserved. Prior to the Great War his usual companion was M. Emile Jahandiez, the Var botanist and North African exploror. They visited the Balearic Islands, Tangier, Spain, and Portugal, and made two lengthy journeys in Corsica. Some results of the latter exploration are recorded by Dr. J. Briquet in his *Prodrome de la flore Corse*. In later years some young members of the staff at Kew had the privilege of an introduction to southern vegetation under generous and stimulating guidance, and by their activities the Herbarium was substantially

enriched *. Among the species new to science, *Teucrium Ellmanii* and *Juncus Ellmanii* fitly commemorate the discoverer.

In spite of his asthma, Ellman could walk long distances. His abounding energy on excursions and utter disregard of time-tables were often a little embarrassing to his friends. Yet the unselfish kindliness of the man, his goodness of heart and quiet humour were ever dominant. Wherever he travelled the picturesque figure and frank genial address were welcomed. It is regrettable that dislike of self-assertion in any form was so ingrained in his nature that he could not be persuaded to write anything for publication, and as he preserved no specimens the gifts of this enthusiastic botanist were less widely known than they deserved.—J. W. White.

Max Carl Ludwig Wittmack.

The death, on February 2, is announced of this veteran German botanist, formerly Professor at the Royal University and the Royal Agricultural College in Berlin. Wittmack elaborated the family Bromeliaceæ for Engler and Prantl's *Pflanzenfamilien*, and is commemorated in the genus *Wittmackia* Mez, of the same family. Wittmack's most important work was, however, on the economic side, His *Gras- und Klee-samen* (1893) is a useful descriptive account of common grass- and clover-seeds and also of the various weed-seeds occurring as impurities in seed-samples. From 1887–1905 he edited *Gartenflora*, the well-known horticultural Journal, founded by Eduard Regel. He was born September 26, 1839.

SHORT NOTES.

Cystopteris fragilis Bernh. near Goathland, North Yorks.—On the 10th September, 1928, Mr. Francis Druce, F.L.S., who was working on the flora of the Whitby district, discovered a fern growing on the masonry near Goathland, which he named *Cystopteris fragilis*, and he very kindly brought a specimen to me. The identification he confirmed at the Natural History Museum on his return to London. Baker in the *Flora of North Yorkshire* does not record *Cystopteris fragilis* as growing in No. 4, the Esk area, and it is interesting to find a lime-loving plant established here. The lime salts essential for the persistence of the plant will be derived from the mortar in the joints of the masonry, but how it became established here is somewhat of a mystery. This is the only station, so far as I know, for *Cystopteris fragilis* in No. 4 area, and as Baker makes no mention of it we must consider the record a new one.—R. J. Flintoff.

Polygonum calcatum and *Poa irrigata* in Britain.—Dr. G. C. Druce writes to point out that Mr. Wilmott's statement in his obituary notice of Carl Lindman (Journ. Bot. 1928, 301) that "as a member of the International Phytogeographical Excursion"

* See *New Plants from Spain*. By C. E. Hubbard and N. Y. Sandwith in Kew Bull. 1928, 150.

Lindman "introduced two new species to the British Floras" may mislead, as he did not collect them during the trip (see B. E. C. 1912, Report 179 & 181; Camb. Brit. Flora, 1914, 127). Mr. Wilmott admits that he should have said that "as a result of his visit the two new species were added." *Polygonum calcatum* was identified by Lindman from a specimen sent by Dr. Moss. Lindman also recognized in Dr. Druce's herbarium a hybrid of *P. calcatum* and *æquale*, where also he identified *Poa irrigata*, the plant having been collected by Dr. Druce who himself suspected the identity. In each case the addition of the plant to the British lists was the joint work of the British botanist and Prof. Lindmann, and the result shows the value of such cooperation.

REVIEWS.

Handbuch der biologischen Arbeitsmethoden, i. 5, Lief. 279. Edited by E. ABDERHALDEN. Abt. XI. *Chemische, physikalische und physikalisch-chemische Methoden zur Untersuchung des Bodens und der Pflanze.* 8vo, pp. 292, text-figs. 44. Urban and Schwarzenberg: Berlin, 1928. Price 16 Marks.

THIS number of the *Handbuch* deals with some of the methods and underlying theories of ecological studies. Many of the papers are particularly useful, since they deal with aspects of field-botany which are undergoing rapid development. In the first paper, Drude deals, under the heading of "Plant Geographical Ecology," with a variety of subjects which include "adaptiogeny," vegetation regions, life forms and their significance, and the physiognomy of vegetation-units. The methods and equipment required for ecological studies while travelling in wild countries is the subject of a paper by H. Handel-Mazzetti, while R. Scharfetter deals exhaustively with the cartographic representation of plant-communities. This is a comprehensive paper, which considers not only the ecological problems involved, but also the methods and principles arising in map-production. P. Jaccard contributes a full discussion of his statistical-floristic methods in plant sociology, a paper which is particularly welcome, as many of the original sources are not readily accessible. His concept of the "generic coefficient" receives particular attention. A second paper dealing with the graphical methods of analysing vegetation statistics treats more fully the empirical and theoretical relations between species and area, particularly according to the Scandinavian schools of thought. This paper (by A. Frey) also discusses the habitat variation-curves of Jenny, the presentation of rainfall and temperature data, and also the graphical representation of plant-succession and frequency in a given habitat. The last paper, by E. Rubel, considers the rôle of light and of light conditions in relation to vegetation. The treatment is in many respects excellent, and particularly useful in the original discussion of daily and seasonal light conditions in various

European stations. The review of methods might profitably, however, include a fuller discussion of the sensitive physical methods of measuring light, which have been recently employed in this country and in America. The only general criticism of this volume is, indeed, that the English and American literature receives somewhat less than its due share of attention.—W. H. PEARSALL.

The Motor Mechanism of Plants. By Sir JAGADIS CHUNDER BOSE, F.R.S. 8vo, pp. xxv, 429, with 242 figs. Longmans: London, 1928. Price 21*s*.

IN this new book Sir Jagadis Chunder Bose describes the results of his experiments on various types of plant-movement. Some of the experiments are new, some the author has recorded before. The new experiments are as ingenious as the earlier works of the author would lead us to expect. The descriptions of the experiments and the results are lucid and adequate to the interpretation which Sir Jagadis chooses to make. The whole probably makes good reading for those already converted to or born with the outlook of the author. Anyone searching for a different type of interpretation, or desiring to repeat the experiments, would find the details too scanty in many cases. With such an array of experiments described in about four hundred pages this lack of detail is inevitable.

That many physiologists will not agree with the author's interpretation of the results of the experiments is certain. Perhaps more would agree that he goes too far in stressing the similarity of plant and animal movements.

To consider the experiments in detail might make a review longer than the book. The following quotation of the *explanation* of the changes of weight of a plant-organ, as it is gradually heated whilst suspended in water, will serve as a type: "It should be remembered that it is the real weight *minus* the weight of the volume of water displaced by the organ. Now, a physiological expansion of the organ must obviously increase the volume of water displaced by it, and thus cause an apparent diminution in weight as recorded by the balance. Conversely, an abrupt contraction and diminution in volume of the organ involves a reduction of the volume of water displaced, which causes a sudden increase in its apparent weight. The increasing loss in weight up to the critical temperature is therefore due to the physiological expansion of the organ; the sudden increase in weight and inversion of the curve are, on the other hand, due to the spasmodic death-contraction of the organ as a whole."

It is to be hoped that most physiologists would wish to probe a little deeper. Sir Jagadis does not appear to be interested in the wherewithal for the expansion; and if it is water, what happens to it in the organ to account for its change of density.

References to the work and views of others are few. The non-botanical reader would, perhaps, gather that Strasburger's text-book was the authority on transpiration.—G. E. BRIGGS.

Recent Floristic Works.

1. *Flowering Plants of the Northern and Central Sudan.* By Grace M. Crowfoot. 8vo, pp. xxv, 163 full-page figs. from original drawings of the author, 1 map, and 8 photos. London: Wheldon and Wesley, 1928. Price 7*s.* 6*d.* net.

Northern Sudan implies the country between Halfa and Khartoum, Central that between Khartoum and Talodi, the southernmost place visited by the author during her journeys between the years 1915 and 1925. The plants from which the sketches were made were identified either at the Government Herbarium at Khartoum or at Kew, and the sketches were subsequently re-drawn at home after careful comparison with authoritative dried specimens, and in some cases magnifications of details have been added. A useful introductory note on the vegetation of the area is supplied by Mr. A. F. Broun, late Director of Woods and Forests, Soudan Government. The rainfall in the area increases from practically nothing in the north, which includes the Nubian and Libyan deserts, to 20 to 30 inches in the south near the Nuba Hills, south of Kordofan. To the north-east the boundary is formed by the Red Sea.

The order followed is that of Hutchinson's *Families of Flowering Plants*, and the plates will form a companion volume to the new *List of Sudan Flora*.

The illustrations are clear line-drawings which indicate the habit of the plant, or of a small branch, and also the characters of leaf, flower, fruit, &c. They will be of great help to the student of the Sudan flora in the determination of his plants. The area in question, though not exactly a botanist's paradise, is of special interest as exemplifying the struggle for existence against desert or semi-desert conditions.

A brief description and indication of locality is given below each drawing, in addition to the botanical and Arabic names.

2. *Flora of West Tropical Africa.* By J. Hutchinson and J. M. Dalziel. Vol. I. pt. 2. 8vo, pp. 247–523; with 69 text-figs. Crown Agents for the Colonies: London, 1928. Price 8*s.* 6*d.*

The present instalment of the *Flora* completes the account of the Dicotyledones Archichlamydeæ, and leaves for future parts the treatment of the Sympetalous Dicotyledones and the Monocotyledons. The form and arrangement follow that of Part 1, which was noticed in the *Journal* in 1927 (p. 290). By far the largest family is the Leguminosæ, which are segregated as distinct families in their three natural groups—Cæsalpiniaceæ, Mimosaceæ, and Papilionaceæ. This is also an important family economically, including many of the forest-trees, the elucidation of which will be materially helped by means of the descriptions and figures. Other important forest-families are Sterculiaceæ, Euphorbiaceæ, Moraceæ, Meliaceæ, and Sapindaceæ. Meliaceæ includes the various West African "Mahoganies," the determination of which will now be greatly facilitated.

Work on the *Flora* has revealed a good proportion of new species; these are cited as in Kew Bull. 1928 ined. (though the descriptions of some of the later ones did not appear until the present year).

The assistance of Miss M. B. Moss with the families Ulmaceæ and Hippocrateaceæ and of Dr. Schellenberg with the Connaraceæ is duly acknowledged.

It is hoped that the completion of this useful addition to the African Floras will not be delayed.

3. *Floræ Siamensis Enumeratio: a List of the Plants known from Siam, with Records of their Occurrence.* By W. G. Craib, M.A. Vol. I. pt. 3. Connaraceæ and Leguminosæ. 8vo, pp. 359–561. Published under the auspices of the Siam Society, Bangkok. 1928. Price 12*s.* 10*d.*

Parts 1 and 2 of Prof. Craib's book were noticed in the *Journal* in 1927 (p. 89). Part 3, except for the few pages occupied by Connaraceæ (where again Dr. Schellenberg's help is acknowledged), is occupied by the Leguminosæ, and represents therefore an important step towards the completion of the work.

The book is not a *Flora*—no descriptions are given and there are no keys. The species are arranged in alphabetical order under the genera, the sequence of which is that of Bentham and Hooker's *Genera Plantarum*. References under each species are given to germane floras and other systematic literature, specimens seen are cited, and the geographical distribution is indicated.

The late editor of the *Journal* would have "regretted" the lack of appreciation of the value of page-headings. "Leguminosæ" on both right and left page-head is not very helpful, whereas the indication of the name of the genus, represented in the text below merely by an initial, would be a distinct gain.

A few new varieties and combinations are included; new species have been described by the author in previous numbers of the *Kew Bulletin*.

BOOK-NOTES, NEWS, etc.

Linnean Society.—At the general meeting on April 4, 1929, the President announced that the Council had awarded the Linnean Gold Medal to Prof. Hugo de Vries, F.M.L.S. This will be a fitting recognition of Prof. de Vries's pioneer work in plant genetics.

At the meeting on April 18 Dr. G. C. Druce gave an account of the botany of Cyprus, which he had recently visited, illustrated by a large series of photographic lantern-slides, and a number of specimens of his own collecting. Dr. Druce climbed several of the mountains and also searched the salt-marshes and other areas. He was able to verify several records by Sibthorp, who explored the island in 1787, and other botanists. An interesting addition to the flora was *Lamprothamnium papulosum* J. Groves (Characeæ).

Popular Introduction to Mycology.—A recent addition to Benn's Sixpenny Library is a readable and useful little volume by J. Ramsbottom, entitled *Fungi, an Introduction to Mycology.*

Mr. Ramsbottom deals with his subject in seven short chapters as follows:—Introduction; Structure; Fungi and Man; Fungi and Plants, Plant Pathology; Fungi and Plants, Symbiosis (Mycorrhiza, Lichens); Fungi and Insects; and Ecology and Classification. There are also a short bibliography and two pages of figures explanatory of the structure.

NINTH INTERNATIONAL HORTICULTURAL CONGRESS, LONDON, 1930.—The Royal Horticultural Society will act as hosts on the occasion of the International Congress which will be held in London from August 7 to 15, 1930, immediately before the International Botanical Congress at Cambridge. The Society has appointed a representative Executive Committee to make the necessary arrangements for the Congress, and is issuing invitations to attend. The subscription, £1, should be paid to the Secretary of the Royal Horticultural Society, who is also acting as Secretary to the Committee. Three days will be devoted to excursions, and a Flower Show will be held on the last two days.

The main subject for discussion will be "Propagation, Vegetative and Seminal," and experts in Great Britain and America and on the Continent of Europe have already signified their intention of taking part. Other sections will be arranged and the Committee is prepared to receive suggestions for papers for consideration.

The Committees appointed at the Vienna Congress in 1927 will present their reports. These will include a report on Nomenclature, which it is hoped will introduce some order into the at present confused state of horticultural nomenclature, more especially as regards that of hybrids and garden varieties.

Communications and participation in discussion will be permissible in English, French, and German.

Correspondence should be addressed to the Secretary of the Royal Horticultural Society, London, S.W. 1.

SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES.—The Thirty-fourth Annual Congress of the Union will be held at the Royal Pavilion, Brighton, from June 5–8 inclusive, by invitation of the Brighton and Hove Natural History and Philosophical Society and the Mayor and Corporation of Brighton. Prof. Sir Arthur Keith, F.R.S., is the President-Elect in succession to Sir Martin Conway, M.P. Mr. A. D. Cotton, Keeper of the Kew Herbarium, succeeds Mr. C. E. Salmon as President of the Botanical Section.

POSTCARDS OF BRITISH TREES.—Seven more subjects have been added to this series now in course of issue at the Natural History Museum, namely, Smooth-leaved and Wych Elm (*Ulmus nitens* and *U. montana*), Pedunculate Oak (*Quercus Robur*), Hazel, and Scotch Fir. As in previous sets, four cards and a descriptive 3–4-page leaflet are included for each subject; the cards illustrate the tree in summer and winter habit (in monochrome) and details of winter twig, foliage, flower, and fruit (in colour). The price is sixpence per set.

NEW OR NOTEWORTHY BRITISH GALLS.

By A. A. DALLMAN, F.C.S.

As various galls of considerable interest have come under my notice in different parts of England and Wales during the last few years, and as information has also accrued from other sources, it seems desirable that some of this material should be placed on record. The present paper adheres to the plan of my previous contribution ("New or Noteworthy British Galls," Journ. Bot. 1925, 98–104) and forms a continuation. As before, the following examples are zoocecidia (*i.e.*, galls incited by animal agency), unless in any of the few instances where the causer is at present unknown bacteria or fungi should be found eventually responsible.

Mr. H. J. Burkill has kindly supplied specimens or reliable data in regard to some of his interesting discoveries, which I am glad to be able to include here. Acknowledgment is due to Professor C. Houard (Strasbourg) and to Prof. F. V. Theobald, the latter having reported upon various Aphid parasites, some of which have proved new to science. I have also to thank my friend Mr. H. Britten, F.E.S. (Manchester Museum), for ever-ready kindly aid in entomological matters, and my thanks are also due to others whose co-operation is indicated in the following pages. It should be noted that the term "parasite" is used throughout this paper to designate the actual agent concerned in gall-inducement.

I. NEW GALLS.

The following are unrecorded by Professor C. Houard (9, 10, 11, 12), E. W. Swanton (15, 16), and the writer (3, 4, 5):—

ON SISYMBRIUM THALIANUM Gay. Plant dwarfed, only a few centimetres in height, with marked cladomania and phyllomania. The rosette leaves were unusually numerous and there were upwards of twenty inflorescence axes in the single example seen. The main axis of the rosette was somewhat thickened, and microscopical examination showed the presence of numerous nematodes. At first I took these to be members of the family Anguillulinidæ (Eel-worms) and was disposed to regard them as the incitant. Through the kindness of Dr. A. B. Rendle, I was able to obtain the opinion of Dr. H. A. Baylis, the British Museum (Nat. Hist.) expert, who examined an excellent microscopical slide which my friend Mr. H. Britten (Manchester Museum) kindly prepared. Dr. Baylis considers the Nematodes to be "harmless free-living forms, belonging, I think, to the genus *Plectus* (near *P. granulosus* Bastian). They do not belong to the family Anguillulinidæ (=Tylenchidæ), which contains the forms that are true plant-parasites. *Plectus* is commonly found about the roots of plants, but probably does no damage to the plants themselves, having no special piercing apparatus like the Anguillulinidæ." It is to be hoped that further examples of this gall may be found in order to elucidate the nature and identity of the incitative.

Only one stunted plant was met with, but this had a curious aspect quite unlike the normal Thale Cress, so that at first it was thought to be some unfamiliar Crucifer. I am indebted to Mr. H. E. Green (Rock Ferry) for this example. It was found by him on a sandy bank near Irby, Cheshire (April 1928), but a subsequent search here revealed no further specimens of galled plants.

VINCA MAJOR L. Leaves, and especially the younger foliage, somewhat distorted. In some amount in several places in the vicinity of Abergele, Denbighshire, first noticed by Dr. F. P. D. Thomas, May 1921, June 1924, and subsequently; Meliden and Cwm, Flintshire, May 1921. In each case the plant was tenanted by abundance of aphids.

Specimens of the parasite were identified by Professor Theobald as *Myzus circumflexus* Buckton (**M. vincæ* Gillette), and it is probable that the galls may have been incited by this agent. As, however, there are at least two other aphids—*Myzus convolvuli* Kaltenbach (**Aphis vincæ* Walker) and *Rhopalosiphoninus latysiphon* Davidson—which frequent this host, and as I omitted to make detailed examination of the fauna of the plants, I cannot be sure that *Myzus circumflexus* was the only species present. As it is not unusual to find more than one species of aphid in company at times, the need for caution is evident. I think we may safely ascribe the present galling to aphid agency.

Professor Theobald found the American parasite *Rhopalosiphoninus latysiphon* (first described from California in 1912) in great abundance on both *Vinca major* and *V. minor* around his house at Wye, Kent, in 1923. He makes the interesting observation (Theobald, 16) that he noticed no leaf-distortion in the case of *V. major* even where this insect occurred in large numbers.

Houard notes a type of leaf-cecidium in *Vinca major* (originally recorded by Tavares) from Madeira and ascribed to a Psyllid.

VINCA MINOR L. Leaves, and especially those of the growing points, curled and distorted. Caused by the aphid *Rhopalosiphoninus latysiphon* Davidson. Professor Theobald first records this from Wye, Kent (Theobald, 16), where it occurred in April 1923, and notes that the insects collected in greatest numbers in sheltered situations. I met with the galls and parasites (the latter determined by Professor Theobald) on cultivated plants at Barnsley (May 1925) and also at Doncaster, Yorkshire. Here also the parasite's predilection for shelter was well shown. Professor Theobald has figured the distinctive galling (Theobald, 16, 19).

II. GALLS NEW TO BRITAIN.

The following are unrecorded for Britain by Houard (9, 10, 12), and are additional to the lists of Swanton (15, 16) and those noticed in my previous contributions (3, 4, 5):—

* *Fide* Theobald.

On CENTAUREA SCABIOSA L., Houard, 5980. Deformation of the capitulum. "A la base d'une paillette de l'involucre, renflement ovoïde, uniloculaire, de 3–6 mm. de long sur 2–3 mm. de diamètre." Due to the Cynipid *Aulax rogenhoferi* Wachtl. Recorded by Houard for Central Europe, France, and Italy. Mr. Burkill informs me that galls were first sent him by Mr. R. S. Bagnall some years ago from the north of England. Mr. Burkill then met them near Box Hill, Surrey, and near Harefield, Middlesex. In 1927 he found them on the South Downs, near Amberley, and subsequently in various places along the North Downs. He writes:—"Last February (1928) I went out one day to get some for a friend who did not know how to look for it. I failed to find it after two and a half hours searching, although I had met with it in that region in the autumn. On my return home (Leatherhead, Surrey) I went into the garden where I had two roots of the plant, and there I found some of the galls, and also others due to *Aulax scabiosæ* Giraud. It is rather interesting to consider how the insects had found these two plants, as the nearest spot where I had previously met with the galls is about two miles away." I am indebted to Mr. Burkill for specimens which he found in an old capitulum on Fetcham Downs, Surrey (Jan. 12, 1929).

The same insect also affects the achenes giving cecidia of another type (*Houard*, 5979), which may also be expected to occur and should be looked for. Both types are easily overlooked at first. Mr. Burkill writes that the galled capitula are not obvious by external inspection, the galling being within and at the base of the bracts. "They are disclosed by feeling round inside the old flower head after the florets have fallen, and one soon learns to detect the swelling with the thumb."

EPILOBIUM ANGUSTIFOLIUM L. Galling of leaf-margins well agreeing with No. 4348 of Houard (9):—"Pleurocécidie déformant la feuille. Enroulement marginal par en bas, peu serré, teinté de jaune ou de rouge pâle; la partie enroulée, à peine épaissie, se desséchant après la migration, à 10–30 mm. de long. Larve solitaire d'un blanc jaunâtre. Métamorphose dans la terre." Between Hexthorpe and Sprotborough, West Yorkshire, July 12, 1927. Although I unfortunately omitted to keep the larvæ and breed out the mature parasite from these specimens, yet the resemblance of galls and the contained larvæ to Houard's description is so close that I have little doubt that the cecidia were the work of *Perrisia kiefferiana* Rubs. Houard records this gall for Central Europe.

GENTIANA AMARELLA L. Chloranthy and marked floral modification. This mite-gall was met with by Mr. Burkill along the North Downs, near Dorking, Surrey, August 1927, and also in the autumn of 1928. As the galling is similar to that on the following species, there is good reason to suppose that the parasite concerned is *Eriophyes kerneri* Nal. Microscopical examination revealed the presence of gall-mites, and Houard has no record of any other species attacking the genus. Mr. Burkill remarks that the mite is a large type.

Its life-history would be worth studying. As the host is an annual the mite cannot hibernate in the plant, or leave eggs there, with a certainty of getting a good start the next year. This suggests considerable mortality. As the plant appears late in the season, it is possible that the mites lie dormant for some months waiting for the new growth.

GENTIANA CAMPESTRIS L., Houard, 4695. Chloranthy with cladomania and phyllomania. I first met with this in August 1910 above Bryn Llwyd, Gyffylliog, Denbighshire, and also at Rhos-y-domen, near Gwytherin, in the same county, in the autumn of 1912. In several instances (near Gyffylliog) a number of flowers were grouped in a capitulum-like manner and surrounded by an involucre. The individual florets were more or less imperfect and the androecium and gynœcium were suppressed in the majority. One plant showed considerable multiplication of the perianth members. Most of the floral leaves were green and showed all stages of transition from sepals to stamens and carpels.

Mr. Burkill informs me that he found instances in Yorkshire in 1917. Houard suggests that the galling is due to *Eriophyes kerneri* Nal.

HELIANTHEMUM CANUM Baumg. An acrocecidium formed by the thickly clustered leaves which show abnormal pilosity. Induced by gall-mites. This gall agrees with that recorded by Houard (4271): "Cécidie terminale formée de feuilles agglomérées et couvertes de poils anormaux." This is apparently ascribed to *Eriophyes rosalia* Nal., and is recorded for Central Europe. Gloddaeth, near Llandudno, Carnarvonshire, August 1925.

HIPPOCREPIS COMOSA L., Houard, 3683. Leaf-galling. "Folioles pliées en gousse; les deux moitiés hypertrophiées se relèvent vers le haut en tournant autour de la nervure médiane." Found by Mr. Burkill in plenty (1927) on the Downs near Dorking, Surrey. Also seen here in 1928. Houard records it for Central Europe. The gall is induced by the Cecidomyid *Macrolabis hippocrepidis* Kieff.

TANACETUM VULGARE L. Modification of the leaf, the lamina being somewhat crisped and curled. Probably induced by an aphid parasite. The galling appears to be identical with No. 5757 of Houard, recorded from Denmark and ascribed to an undetermined aphid. The Llanddulas plants were tenanted by a very distinctive aphid, which gave a strong reddish colour when bruised on white paper. This was identified by Professor Theobald as *Macrosiphum tanacetaria* Kalt. Llanddulas, Denbighshire, August 1924.

TRIGLOCHIN PALUSTRE L. Flowers and young fruits deformed. This type is probably that recorded by Houard (161) from Germany, no agent being specified. Dee Marshes, below Burton and Shotwick, Cheshire and Flintshire, August 1926. My friend Mr. H. Britten and I found an aphid on some of the plants, but, as the season was somewhat advanced, this parasite was only in somewhat diminished numbers. There was evidence that they had been here in some quantity before this date (August 21). Careful search amongst other plants elsewhere on the Cheshire coast—on a patch of salt-marsh at Hilbre Point, near Hoylake, some nine miles lower down the Dee Estuary—on September 10th revealed no living aphids, although there were indications of their previous presence. The flowers were practically over, and it seems that the associated Hemiptera are only in evidence during the period of active photosynthesis and anthesis when there is a relatively large supply of food-stuff available.

The same type of gall occurred at Marshside near Southport (S. Lancs) in August 1927, and again on the Dee Marshes in 1928. There was no indication of this type of galling in the associated *Triglochin maritimum*, which also occurs in abundance on the salt-marsh in both places. Several aphid parasites appear to be associated with the two species of *Triglochin*. One which I met with on *T. palustre* at Marshside proved to be a new species which was subsequently described and figured by Professor Theobald (Theobald, 20, 21) under the designation *Aphis palustris*. While examining the two plants here on this occasion, a very dissimilar type of aphid was obtained on *T. maritimum*. Curiously enough, this also proved to be a hitherto undescribed insect of which Professor Theobald has given an illustrated description recently (Theobald, 20, 21). There is no evidence, as yet, that the latter (*Macrosiphoniella triglochiniella* Theobald) is a gall-inducer. It is possible that the galling of *Triglochin palustre* may be due to aphid parasite of some kind, but evidence is desirable.

ULMUS CAMPESTRIS L. and U. MONTANA Stokes. Houard, 2047 and 2065. The galls on the leaves of the two species appear to be identical and are the work of the gall-mite *Eriophyes filiformis* Nal. Houard characterises them as follows:—"Pustules irrégulières d'abord vert clair, plus tard brunes, ne faisant pas saillie à la face supérieure et s'ouvrant par un ostiole à la face inférieure qu'elles dépassent à peine." It is recorded for Italy, Central Europe, and Denmark on the first-named species, and for Denmark and Central Europe in the case of *Ulmus montana*.

The addition of these to the British list is due to Messrs. J. Ross and Burkill. The latter writes: "I had seen these galls near Leatherhead, but had not thought they were such until J. Ross drew my attention to the spots and asked what they were. I then put them under the microscope and saw the mites, longish and narrow and having almost parallel sides. It is quite distinct in appearance from *Eriophyes ulmi* Nal., from which I had not identified it as separate before this (Sept. 1927). The gall is insignificant, pale green at first, then brown later, more like a fungus spot, and very slightly raised from the leaf." Mr. Burkill has met with galls, on both hosts, in two areas near Leatherhead and subsequently near Ranmore Church, Dorking. It should doubtless be met with elsewhere.

VIOLA LUTEA Huds., Houard, 4298. The work of a gall-mite which affects the foliage. The margins of the leaves become tightly curled, slightly thickened, and somewhat deformed, but there is no obvious abnormal pilosity which is so usually encountered with cecidia due to Eriophyidæ. Houard characterises it as follows :—"Enroulement marginal par en haut, très serré, sans pilosité anormale."

Recorded for Central and Western Europe, it is rather surprising that it has not been previously met with in Britain. Buxton neighbourhood, Mam Tor, Eyam Moor, Derbyshire, June 1926. Rhos-y-Domen near Gwytherin, Denbighshire, August 1926. The galls were observed in abundance in the above stations, and will doubtless be met with in other districts in Britain where the host occurs. They are somewhat inconspicuous and easily overlooked. If the cecidia are teased out, the gregarious parasites, an undetermined species of *Eriophyes*, are easily discernible on examination under the microscope.

III. NOTEWORTHY GALLS AND CECIDOLOGICAL NOTES.

The galls to which an asterisk is prefixed have been added to the British list during recent years, but the present records represent additional stations and extension of range, or other information. Observations upon certain other cecidia and additions to our knowledge of such are also noted here :—

ACHILLEA PTARMICA L., Houard, 5706. From galled capitula obtained at Askern Bog, West Yorkshire (June 11, 1927), mature specimens of the Cecidomyid *Rhopalomyia ptarmicæ* Vallot emerged between June 15th and 20th.

*BIDENS CERNUA L., Houard, 5647. Ditches on the mossland south-east of Ainsdale, S. Lancashire, August 1928. The causer, hitherto unknown, was detected on this occasion and found to be an aphid parasite. Professor Theobald, to whom I submitted specimens of the insects, informs me that they appear to be a new species of *Anuraphis*. I had met with the gall previously in Cheshire in 1919 (Dallman, 4, 5).

CORNUS SANGUINEA L., Houard, 4543. The distinctive galls induced by the Dipteron *Oligotrophus corni* Giraud, were observed near Cadeby, West Yorkshire, in September 1926. I am under the impression that the gall is more or less a south of England type, and this may represent a considerable northerly extension of its range.

DAUCUS CAROTA L., Houard, 4529. Many plants on the great Orme's Head, Llandudno, showed galling of the gynœcia and fruits by *Schizomyia pimpinellæ* F. Low at the time of my visit in August 1925. The Burnet Saxifrage, which is an alternative host for this parasite, and which is galled thereby in rather similar manner, was also here in quantity. It almost seems as if this gall-midge favours the Carrot, for I failed to find a single instance of galling in the many plants of *Pimpinella Saxifraga* which I examined.

*EUONYMUS EUROPÆUS L., Houard, 3960. Miss I. M. Roper met with this gall (due to *Eriophyes convolvens* Nal.) at Sea Mills, Bristol, W. Gloucester (May 1906), and I am indebted to her for specimens.

*GALIUM VERUM L., Houard, 5286 ? An acrocecidium, the terminal leaves somewhat abbreviated and a little swollen and grouped into a distinctive bunch. This agreed with the cecidium suggested above : "Cécidie terminale en artichaut, formée de 10–20 feuilles un peu raccourcies, élargies, vert blanchâtre ou un peu veinées de violet, brunissant après la dessication." This is induced by *Perrisia galiicola* F. Low. I have not identified the parasite in the case of the examples which were observed at Llysfaen Rocks, Denbighshire, August 1924.

*GERANIUM SANGUINEUM L., Houard, 3801 and 3802 (Dalman, 5). Miss Ida M. Roper, of Bristol, has sent me plants showing the distinctive galling which she collected at Kynance Cove, The Lizard, Cornwall, in August 1902.

HALIDRYS SILIQUOSA Lyngb. The curious cecidia which were found originally by E. T. Connold on this host on the Sussex coast in 1902 do not appear to have been met with since until November 1925, when I observed several examples on this Brown Seaweed which was obtained from the coast at Aberystwyth, N. Wales. As this type is not included in Houard's works, it may be well to quote Connold's original notice (Connold, 2). He records that the "stems" of the alga were affected : "Twenty of these remarkable swellings were found . . . . in a tangle of seaweed on the beach at St. Leonards in 1902. No more have been found. Sessile, glabrous, glossy, globular, ovoid, and irregular in shape and size. Colour same as the main stem. November to April, when rough seas cast a quantity of seaweed on the shore. Many efforts were made to determine the cause, but without success." Connold gives a figure (278).

The Aberystwyth examples, three in number, were undoubtedly the same type of cecidium. Two of these were globular and about the size of a pea, while the other was rather irregular and resembled the upper specimen of Connold's plate. I have no information as to the agent responsible.

Professor Houard wrote me :— ". . . . L'auteur (agent) en est encore inconnu. Cette déformation existe peut-être, en France, sur la côte de la Bretagne, à Roscoff ou aux environs."

*HYDROCOTYLE VULGARIS L. The aphid parasite responsible for the gall described in my earlier paper (Dallman, 5) has been described by Theobald (Theobald, 20) under the name *Myzus hydrocotylei* Theobald. This new species appeared under the designation *Myzus hydrocotylæ* when the description was originally published by its author (Theobald, 18), but the specific name was subsequently amended. The gall and parasite may be expected to occur elsewhere, but are so far only known from Flintshire.

*Ligustrum vulgare L. The galls previously described (Dallman, 5) were also found at Gloddaeth, Carnarvonshire, August 1925, on wild Privet on the limestone. Examples from Llanddulas (1924) were placed in soil under a bell-jar and kept under observation indoors at living-room temperature. From the seven galls four flies emerged between May 23 and 29 (1925), and three more had emerged by the following day. In view of the problem suggested in my previous notes (Dallman, 5) I submitted these to Mr. H. F. Barnes (Wye), our British authority on Cecidomyidæ. He reported that, after careful examination with the original description of *Schizomyia ligustri* Rubs., he could find no difference, either structural or colour. Before certain identification he suggested that he would like to be able to compare the insect with the midge bred from the gregarious larvæ of Privet galls. As I have so far failed to find this type of cecidium (Houard, 4679), I have been unable to carry the question further.

Phragmites communis Trin., Houard, 238. The mature fly, *Liparia lucens* Meigen, emerged from two specimens (from Hatfield Moor, S.E. Yorkshire) which were kept under observation at living-room temperature on April 4 and June 9, 1926. Although the conspicuous cigar-like galls are not uncommon in various places in East and South-East Yorkshire and Lincolnshire, it almost seems as if the parasite scarcely extends to the other side of the country or is very local on the West. Repeated search in Cheshire, Flint, and Denbigh, in stations where the host has been abundant, and in some cases in the same latitude as the Yorkshire and Lincolnshire haunts, have so far failed to reveal the cecidia. Mr. H. Bury has met with galls at Silverdale, N. Lancashire, and bred the fly from these (*Lancashire and Cheshire Naturalist*, xii. (1920) 302).

Plantago maritima L., Houard, 5148. In abundance in the salt-marsh at Marshside near Southport, South Lancashire, August 1927. A quantity of the galls were collected on August 27th and kept under a bell-jar, the imagines emerging in the course of the following fortnight. Specimens of the weevil were submitted to Mr. H. Britten, who vouches for the diagnosis (Dallman, 6).

I was pleased to meet with galls and insects once more on September 1st, 1928, on the occasion of a visit to Bromborough Pool, on the Cheshire side of the Mersey estuary. Many of the cecidia were occupied by larvæ or pupæ, and in several cases the recently-hatched imago was found. Some of the galls which were taken yielded imagines during the next week or two. Both galls and beetle were only seen in relatively small numbers in the Cheshire station, in contrast to their abundance at Marshside the previous year (Dallman, 7).

These occurrences represent a considerable extension of the range of the insect as previously known in Britain. Canon W. W. Fowler (*Coleoptera of British Islands*) states that this beetle "is very local, and, as a rule, rare." The same authority records it from three English counties (Kent, Hampshire, and Lincolnshire). It is also known to occur in Ireland (Wexford). Miss I. M. Roper (Roper, 13) found galls and insect on the Somerset coast in August 1906. Further examples were found on the saltings of the River Severn in West Gloucester in September 1910. The two latter records find notice in White's *Flora of Bristol*, 1912.

The occurrence of *Mecinus collaris* and its gall on our western coast is interesting. It may be added that the Marshside station represents its most northerly range in Britain according to our present knowledge of its distribution. Further search may possibly reveal gall and parasite as extending elsewhere along the western coast.

Salix fragilis L., Houard, S. 1. This interesting and conspicuous gall seems to be more abundant in South Yorkshire than when I first met with it in 1920, and it appears to be extending. Doncaster, Askern, Sprotborough, Barnby Dun (Dallman, 5, 8).

Salix herbacea L., Houard, 1013 or 6442?. Mr. J. J. Smith records (Smith, 14) that on the tops of the higher hills at New Cumnock, Ayrshire, the host "has two sets of leaves during the season, the first set loaded with galls, the second set entirely free from them. If it were not for the second, it would certainly cease to exist in a short time."

In the absence of further information, identification of the gall is hardly possible. Two of the most conspicuous types associated with this Willow are induced by the sawflies *Pontania proxima* Lepel (Houard, 1013) and apparently *Pontania salicis* Christ (Houard, 6442). The former gall is already known from Scotland and Cumberland, but the other is only recorded by Houard for Norway.

*Tamus communis L. Cecidia of the type previously recorded (Dallman, 5) were again seen in July 1926 at Wadworth, near Doncaster. So far as my observations went, the galls, as before, seemed to be restricted to the staminate plants of the host. A number of galls were collected in the previous July and placed in soil and kept under observation as in the case of the Privet cecidia. I failed to obtain a single fly from these even after 17 months (by the end of 1926). It is a reasonable surmise that the mature parasites might have been expected to emerge about May or June, when the flower-buds of the host are appreciably developed. The failure was probably due to the development of mould, a difficulty in rearing Cecidomyidæ of this type, to which Britten has recently called attention (Britten, 1). Possibly the substitution of coco-nut fibre might give better results.

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SPHAGNUM STRICTUM SULLIV. AND *SPHAGNUM AMERICANUM* WARNST. IN SCOTLAND.

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THE peat-moss *Sphagnum strictum* Sulliv. (also known as *Sph. domingense* C. Müll., *Sph. Garberi* Lesq. & James, *Sph. humile* Schimp., *Sph. mexicanum* Mitt., non *Sph. strictum* Lindb.) is distributed over America from Newfoundland in the north to Mexico and Ecuador in the south (2, p. 11, and 8, p. 143). In Europe it was first recorded by C. Jensen in 1902 (3, p. 119). The specimen referred to by Jensen was collected in West Norway by B. Kaalaas in 1889. Since then it has been discovered to be rather common in the west and south of Norway, where it was collected as long ago as 1827 by the Norwegian botanist S. C. Sommerfelt (Herb. Oslo, sub nom. *Sphagnum squarrosum*). It seemed natural to suppose that this moss would also be found in the British Isles, especially in Scotland, which resembles Norway in so many respects. This conjecture was first made by the above-mentioned Norwegian bryologist Baard Kaalaas (4, p. 44). That it has not been found before in the British Isles is certainly due to its being mistaken for other species which resemble it. There is every reason to expect that old samples of *Sph. strictum* will turn up in British herbaria under the name of *Sph. squarrosum* or *Sph. compactum*, as was the case with the Scandinavian herbaria.

During a visit to Scotland in the summer of 1925 I made a point of looking for this moss, which I had got to know and had become familiar with in Norway. I succeeded in finding it, first to the south of Tyndrum, then on the north side of Lochan Meall an t-Suidhe, near Ben Nevis, and lastly at Crianlarich, where it grew in greater abundance and displayed an altogether typical development.

Having once noticed this remarkable peat-moss, and the environment in which it grows, one can readily find it again in the kind of terrain where it occurs. Even at a distance it is recognizable by the bright bluish-green or bluish-white tufts. The colour may also be yellow with a tinge of green. A. LeRoy Andrews has given a good description of it (1, p. 23). In herbaria the specimens will in time lose their bluish-green tinge and assume a more or less whitish or darkish straw-colour. The coarse and open growth of *Sph. strictum*, with bristling leaves, reminds one more of *Sph. squarrosum* than of *Sph. compactum*, to which it is otherwise more akin. In colour, too, it is often very much like *Sph. squarrosum*. But the likeness is entirely confined to its external appearance. With the aid of a hand-lens one can easily distinguish them by the size of the stem-leaves. There is also a great difference in the places where these two mosses grow. Whereas *Sph. squarrosum* may best be described as a mesotroph moss which likes to grow where the soil is comparatively fertile, *Sph. strictum* is an oligotroph moss which grows in places where there is a minimum of nutriment. I have never seen these two mosses growing together.

In their anatomical characteristics *Sph. strictum* and *Sph. squarrosum* are, as I have said, quite different. On the other hand, there is a marked similarity in this respect between *Sph. strictum* and *Sph. compactum*. In *Sph. strictum*, however, the chlorophyllose cells of the branch leaves have a larger lumen, and are not situated in the middle of the leaf as in *Sph. compactum*, but a little nearer to the outer surface (see figure 1, *c* and *d*, where the upper part of the figures represents the inner surface of the leaf). In *Sph. strictum* the wall connecting two contiguous hyaline cells shows a decided thickness on the outer side of the chlorophyllose cell. The inner wall of the hyaline cell where it overlies the chlorophyllose cell is minutely papillose; in *Sph. compactum* the wall is absolutely smooth. The papillæ of *Sph. strictum* are much smaller than those of *Sph. papillosum*, the *Sphagnum* in which the papillæ are most striking, and they only become visible when highly magnified. The distance between the papillæ of *Sph. strictum* is less than 1 μ, whereas the distance in *Sph. papillosum* is usually nearer 2 μ. Warnstorf was the first to find the papillæ of *Sph. strictum*, but his figures (7, tab. 14, *n*, *m*; 8, p. 41, fig. 14 B) show no papillæ. My Scotch specimens are all of them decidedly papillose (fig. 1, *c*, *d*). The specimens from Tyndrum have mature capsules with a diameter of 2 mm. The spores are granular-roughened, with a diameter of 34 μ (fig. 1, *e*).

In order to compare the places where *Sph. strictum* is found in Great Britain and Norway, I made a careful study of the plant asso-

ciation in which *Sph. strictum* was found at Crianlarich. The habitat is an uneven slope of rather stony heather-covered ground about 300 metres south-west of Crianlarich Station (L.N.E.R.). In an association of *Calluna vulgaris* and *Scirpus germanicus*, *Sph. strictum* occurs here over a distance of some 50 metres. Immediately above there is a drier boulder-covered heathery hill with *Pteridium aquilinum*, and down below the heath merges into a small grassy marsh with *Juncus acutiflorus*. The situation is precisely the same as that I know so well in Norway. Even the grazing sheep are there. I noted all the plants on carefully demarcated test-areas of this

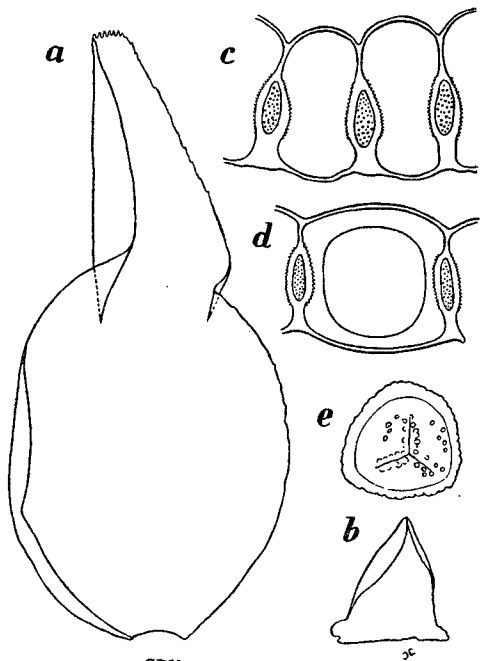

Fig. 1.—*Sphagnum strictum* Sulliv. Specimen from test-area 6. Crianlarich, July 3rd, 1925. *a*. Branch-leaf, × 24. *b*. Stem-leaf, × 24. *c* and *d*. Parts of transverse sections of branch-leaves, × 500. *e*. Spore (from Tyndrum, June 20th, 1925), × 500.

association, and then estimated the quantity of each kind of plant on the test-area. Ten of these test-areas, each one square metre in size, were examined. The results are given in the Table (p. 173). The quantity is indicated according to the five degrees of the Hult-Sernander scale, the numbers of which show how much of the ground is covered. Thus, 5 indicates that the plant in question covers half or more of the test-area; 4, that it covers a quarter or more (but less than half);

Crianlarich, July 3, 1925.

Ten test-areas, each 1 m.²	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Vascular Plants:										
Blechnum spicant (L.) With.	1	...	...	...	...	...	...	...	...	..
Calluna vulgaris (L.) Hull	4	4	5	2	4	4	3	5	5	4
Carex panicea L.	1	1	1	1	...	1	1	1	1	1
„ *stellulata* Good.	...	...	...	...	...	1	...	...	1	...
Drosera rotundifolia L.	...	...	...	...	...	...	...	...	...	1
Erica cinerea L.	1	...	...	1	1	...	...	...	1	1
„ *Tetralix* L.	2	2	2	2	1	1	2	1	1	2
Eriophorum angustifolium Roth.	...	...	...	1	...	1	1	1	1	1
Festuca ovina L.	1	...	...	...	...	...	...	1	1	...
Galium saxatile L.	1	...	...	...	...	...	...	...	...	...
Juncus acutiflorus Hoffm.	...	...	...	...	...	...	...	...	...	1
„ *squarrosus* L.	1	2	1	1	...	1	1	...	1	1
„ *supinus* Moench	...	1	...	...	...	1	1	...	1	1
Lycopodium Selago L.	...	...	...	...	...	...	...	1	...	...
Molinia cœrulea (L.) Moench	2	1	2	2	1	1	1	1	1	1
Nardus stricta L.	2	1	2	1	1	1	1	...	1	1
Narthecium ossifragum (L.) Huds.	1	1	1	1	1	1	1	1	1	1
Pedicularis silvatica L.	...	1	1	1	...	...	...	...	...	...
Polygala serpyllacea Weihe	1	...	1	...	...	...	...	...	1	...
Potentilla erecta (L.) Hampe	1	2	1	1	1	1	1	1	1	1
Scirpus germanicus (Palla) A. et G.	3	2	2	3	2	3	2	2	2	2
Sorbus Aucuparia L. (4 cm. high)	...	1	...	...	...	...	...	...	1	...
Bryophytes:										
Breutelia chrysocoma (Dicks.) Lindb.	...	...	...	...	...	1	1	...	...	...
Campylopus flexuosus (L.) Brid.	...	...	...	...	...	...	...	...	1	1
„ *Schimperi* Mild.	...	...	...	...	...	...	...	1	...	...
Cephalozia Lammersiana (Hüb.) Spruce	1	...	...	...	...	...	...	...	...	...
Dicranum spadiceum Zett.	...	...	1	1	1	...	1	...	...	...
Diplophyllum albicans (L.) Dum.	1	1	1	1	1	1	1	1	1	1
Hypnum cupressiforme L.	1	1	1	1	1	1	1	1	1	1
Leptoscyphus Taylori (Hook.) Mitt.	...	...	...	...	...	...	1	...	...	1
Leucobryum glaucum (L.) Schimp.	1	...	...	...	1	...	...	...	...	...
Odontoschisma Sphagni (Dicks.) Dum.	...	...	...	...	...	...	1	...	...	...
Pleurozia purpurea (Lightf.) Lindb.	2	1	1	1	1	1	1	...	...	...
Pleurozium Schreberi (Willd.) Mitt.	1	1	1	1	1	1	1	1	1	1
Rhacomitrium hypnoides (L.) Lindb.	1	3	2	2	2	2	2	1	1	2
Rhytidiadelphus calvescens (Wils.) Broth.	1	...	...	...	...	...	...	...	...	...
„ *loreus* (L.) Warnst.	1	...	...	...	1	1	1	1	...	1
Sphagnum acutifolium Ehrh.	2	2	1	1	1	...	1	...	1	...
„ *americanum* Warnst.	...	...	...	...	...	...	1	...	...	1
„ *auriculatum* Schimp.	...	1	1	1	...	1	1	1	1	1
„ *compactum* DC.	2	1	2	2	2	1	1	...	1	2
„ *cuspidatum* Ehrh.	...	...	...	...	...	1	...	...	...	...
„ *inundatum* Russ.	1	...	...	...	...	...	...	...	...	...
„ *molle* Sulliv.	...	1	1	...	1	...	...	...	...	...
„ *papillosum* Lindb.	1	1	...	...	...	1	1	1	1	1
„ *plumulosum* Röll	1	1	...	...	...	1	1	1	...	1
„ *rubellum* Wils.	1	1	1	1	...	...	1	2	1	...
„ *rufescens* Br. Germ.	1	...	...	...	...	...	...	...	...	...
„ *strictum* Sulliv.	2	2	3	1	2	3	3	3	2	2
„ *tenellum* Pers.	2	2	1	1	1	2	1	1	1	1
Lichens:										
Cetraria aculeata (Schreb.) Fr.	...	...	...	...	...	...	...	...	...	1
„ *crispa* (Ach.) Nyl.	...	...	...	...	...	...	...	...	...	1
Cladonia gracilis (L.) Willd.	...	1	1	1	1	1	1	...	...	1
„ *rangiferina* (L.) Web.	...	...	...	...	...	...	1	...	...	...
„ *silvatica* (L.) Rab.	1	1	1	1	1	1	1	1	1	1
„ *uncialis* (L.) Web.	1	1	1	1	1	1	1	...	1	1

3, that it covers one-eighth or more; 2, that it covers one-sixteenth or more; and 1, that it covers less than one-sixteenth. A large number of samples of moss and lichen were taken from the test-patches for subsequent examination.

I desire to express my gratitude to Mr. E. Jørgensen and Dr. B. Lynge for their assistance in identifying these specimens.

In going through the specimens of *Sphagna* which I brought home from Crianlarich, I have come across another interesting *Sphagnum*: viz., *Sphagnum americanum* Warnst. The moss, which is also known as *Sph. molle* Sulliv. var. *limbatum* Warnst. (8, p. 132), has, up to the present, been known exclusively as American. Quite recently, however, it has been discovered almost simultaneously in two widely separate places in Norway—by Hugo Osvald in Andøya, Nordland, 1925 (5, p. 23), and by myself at Granvin in Hardanger, 1923

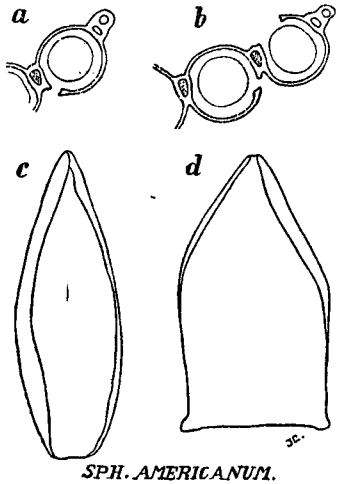

Fig. 2.—*Sphagnum americanum* Warnst. Specimen from test-area 10. Crianlarich, July 3rd, 1925. *a* and *b*. Parts of transverse sections of branch-leaves, × 300. *c*. Branch-leaf, × 30. *d*. Stem-leaf, × 30.

(leg. J. J. Havaas). At Crianlarich it occurred on test-areas 7 and 10, and was collected there on July 3rd, 1925.

Sphagnum americanum differs from *Sph. molle* in lacking entirely the re-absorption furrow at the margin of the branch-leaves. The border of the branch-leaves generally consists of a single row of hyaline cells. In the figures (fig. 2, *a* and *b*) there seem to be two rows of cells, but this is not really the case. Only the outermost cell is an ordinary hyaline cell; the next outermost is a reduced chlorophyllose cell. W. R. Sherrin observes (6, p. 18) of the branch-leaves of *Sph. molle* that they are "nearly always with re-absorption furrow." A. LeRoy Andrews says of the furrow (2, p. 31): "lacking, however, in some sections." As to this, it should be noted that if a considerable number of transverse cuttings of branch-leaves are made, some cuttings without the re-absorption furrow may be found even in *Sph. molle*. This applies more particularly to cuttings from the upper part of the leaf near the apex. Moreover, there is another noteworthy difference between *Sph. molle* and *Sph. americanum*. *Sph. molle* has in most cases stem-leaves of two kinds, large and small, on the same stem; but *Sph. americanum* has only one kind of stem-leaf, the smaller sort. The stem-leaves of *Sph. americanum* from Crianlarich are all 1·2 mm. in length (fig. 2, *d*), the hyaline cells being fibrillose only in the upper half of the leaf.

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(3) Jensen, C. 1902. "Fire for Norge nye *Sphagnum*-Arter." 'Nyt Magazin for Naturvidenskaberne,' xl.
(4) Kaalaas, B. 1911. "Untersuchungen über die Bryophyten in Romsdals Amt." 'Det kgl. norske Videnskabers Selskabs Skrifter,' 1910, No. 7.
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Note.—For the convenience of British botanists, Mr. Sherrin has kindly added the names used in Dixon's *Students' Handbook of British Mosses*, where these differ from those in the list, as follows:—

Breutelia chrysocoma=*B. arcuata* Schimp.
Dicranum spadiceum=*D. scoparium* var. *spadiceum* Boul.
Pleurozium Schreberi=*Hypnum Schreberi* Willd.
Rhacomitrium hypnoides=*R. lanuginosum* Brid.
Rhytidiadelphus calvescens=*Hylocomium squarrosum* var. *calvescens* Hobkirk.
Rhytidiadelphus loreus=*Hylocomium loreum* B. & S.

[Ed. Journ. Bot.]

Note by Mr. W. R. Sherrin.—Prompted by Dr. Johannes Lid's discovery in Scotland of two *Sphagna* new to Great Britain, I have examined the specimens of *Sph. compactum* var. *squarrosum* Russ. in my herbarium, and have had the satisfaction of finding *Sph. strictum* Sulliv. It had been collected in New Galloway by J. McAndrew, July 1885, and was presented by the Rev. C. H. Binstead. The identification has been confirmed by Dr. Lid, who also recognised as *Sph. americanum* specimens of "*Sph. molle*" collected on Wimbledon Common in 1900. A specimen of each has been placed in the British Museum Herbarium.—W. R. Sherrin.

NEW AND NOTEWORTHY SPECIES OF *COMBRETUM* FROM WESTERN TROPICAL AFRICA.

By A. W. Exell, M.A., F.L.S.

(Concluded from p. 145.)

Sect. Chionanthoideæ Engl. & Diels.

Combretum undulato-marginatum De Wild. & Exell, sp. nov. *Frutex* scandens, ramulis mox glabrescentibus teretibus albo-griseis. *Folia* petiolata, petiolo in sicco nigro primo fusco-pubescente, oblanceolata oblonga vel anguste elliptica omnino glabra subtus aureo-lepidota, lepidibus disciformibus distinctis vix congestis margine haud contiguis, costis lateralibus utrinque 13–16 subtus prominulis. *Flores* tetrameri in spicas glomeruliformes pedunculatas axillares et terminales dispositi. *Pedunculi* fulvo-pubescentes. *Rhachis* sparse fusco-pubescens. *Bracteæ* subulatæ curvatæ fusco-pubescentes. *Receptaculum* inferius fulvo-tomentosum albo-lepidotum, superius trombiforme* fulvo-pubescente albo-lepidotum, lepidibus parvis sub-densis. *Discus* tenuis glaber margine haud conspicuo. *Calycis segmenta* subulata. *Petala* anguste spathulata apice ciliolata. *Stamina* biseriale inserta. *Fructus* pyriformis vel anguste pyriformis glaber apice acuminatus acutus, 4-alatus, alis rigidis angustis.

Hab. Belgian Congo: "Liane à fl. blanches," in forest on the banks of the Ituri, Penghe, *Bequaert* 2113 (holotype in Herb. Brussels; Herb. Mus. Brit.); without locality, *Bequaert* 1683 (Herb. Brussels). The following specimen, which is rather immature, probably belongs to this species:—Sudan: along the Bahr el Jebel, between Nimule and Gondokoro, *E. A. Mearns* 3038 (Herb. Brussels).

Leaves 10–17 × 2·5–5 cm.; *petioles* 2–4 mm. long; *bracts* 4–5 mm. long; *spikes* about 2·5 cm. in diam.; *lower receptacle* 1·5 mm. long; *upper receptacle* 7 × 3 mm.; *petals* 2·5–3 mm. long; *stamens* 8–9 mm. long; *style* 8 mm. long; *fruit* 4·5–5 × 1·5–2 cm., with wings up to 5 mm. broad. (Fig. 1, C.)

This species is very near to *C. capituliflorum* Fenzl, but differs in having shorter less profusely branched inflorescences. The rhachis is more slender and only sparsely pubescent, while in *C. capituliflorum* it is covered with a thick tawny-yellow tomentum. The bracts in the latter species are shorter, stouter, and much more thickly hairy.

Combretum Robynsii Exell, sp. nov. *Frutex* scandens, ramulis primo fusco-pubescentibus demum glabrescentibus. *Folia* petiolata, petiolo fusco-pubescente, elliptica usque oblonga apice acuminata acuta basi obtusa vel rotundata supra costa media excepta pubescente glabra infra sparse pubescentia. *Flores* tetrameri in spicas elongatas paniculatas axillares et terminales dispositi. *Receptaculum* inferius fusco-pubescente, superiore campanulatum fusco-pubescente. *Discus* campanulatus glaber margine vix libero. *Petala* obovato-cuneata glabra. *Fructus* parvus glaber 4-alatus, alis angustis rigidis corrugatis.

Hab. Belgian Congo: in marshy forest, between Bantoie and Boyeka, on the left bank of the River Ruki near the water, *Robyns* 118 (holotype in Herb. Brussels); in marshes, Batoko, *Claessens* 607 (Herb. Brussels); Libinge-rive, Ubangi, *Mesdagh* 15 (Herb. Brussels); Bozoto, *Nannan* 83 (Herb. Mus. Brit.).

Leaves 10–18 × 5–8·5 cm.; *petioles* 8–12 mm. long; *spikes* up to about 6 cm. long; *lower receptacle* 1·2 mm. long; *upper receptacle* 3 mm. long and 1·5 mm. across at the mouth; *stamens* 4–4·5 mm. long; *style* 3·5 mm. long; *fruit* 11–12 × 5–6 mm. with wings 1·5–2 mm. in width. (Fig. 1, B.)

Dr. Robyns gives the following notes:—"Liane, fl. blanches, en épi; fruits à 4 côtés; très commun le long de la Ruki où elle forme des sortes de rideaux protègeant la forêt contre l'infiltration de la lumière." Native name "Lukuba" at Batoko (*fide* Claessens) and "Inkimo" at Bozoto (*fide* Nannan). Claessens states that the plant is used for cleaning iron.

This species is characterised by its very small, narrow-winged fruit with four rather rigid wrinkled wings. It appears to be nearest to Sect. *Chionanthoideæ* Engl. & Diels, but it may eventually require a separate section, as the fruit is quite peculiar, though perhaps to be related to the narrow-winged type characteristic of Sect. *Chionanthoideæ*.

Sect. Campylogyne (Hemsl.) Engl. & Diels.

C. Hensii Engl. & Diels in Mon. Afr. Pfl. iii. Combretaceæ, 85 (1899). I regard this as a synonym of *C. Poggei* Engl. & Diels, *loc. cit.*, as there seems to be no specific distinction between them. The species is apparently confined to the Congo.

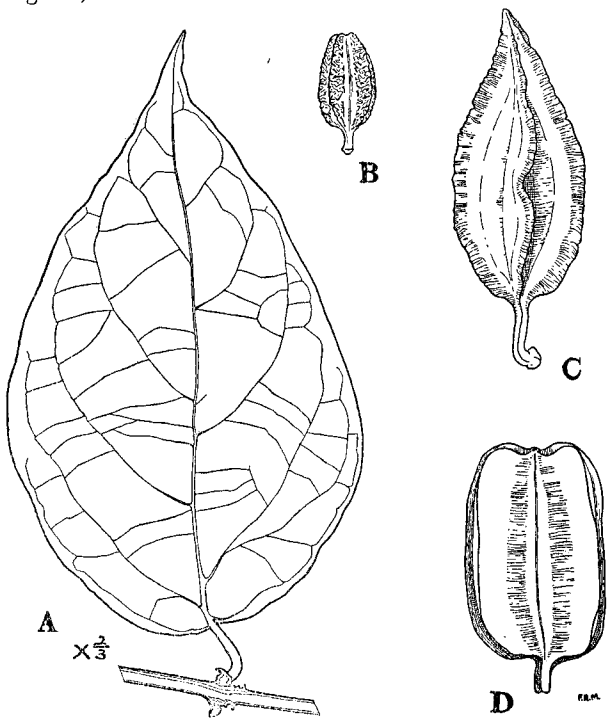
C. Hensii Engl. &. Diels var. **pyriforme**, comb. nov. (*C. pyriforme* De Wild. in Ann. Mus. Congo, v. i. 296 (1906)). Apart from the pyriform shape of the fruit, there seems to be no other character separating this from typical *C. Hensii*, so that it appears best to consider it as a variety of that species.

Combretum Pellegrinianum Exell, sp. nov. *Frutex* ?, ramulis primo purpureo-velutinis mox dense et minute pubescentibus demum glabrescentibus teretibus. *Folia* opposita petiolata, petiolo dense et minute pubescente, ovato-oblonga vel ovato-lanceolata apice paullo acuminata obtusa basi rotundata vel nonnunquam leviter cordata, supra glabra subtus ad nervos minute pubescentia cætera glabra, costa media supra parum impressa infra prominente, costis lateralibus utrinque 7–8 supra inconspicuis infra prominulis. *Flores* pentameri in spicas terminales bracteatas dispositi. *Bracteæ* anguste ellipticæ usque lanceolatæ basin inflorescentiæ versus longe et gracile petiolatæ. *Receptaculum* inferius elongato-fusiforme velutinum, superius tubuloso-cylindricum purpureo-velutinum. *Calycis segmenta* triangularia acuta. *Discus* nullus. *Petala* oblongo-ovata basi truncata vel

* *Trombiformis*—shaped like a modern trumpet, *i. e.*, infundibuliform, but curving outwards towards the mouth.

cordulata crassiuscula. *Stamina* 10, biserialia vix exserta. *Stylus* ad receptaculum adnatus triente superiore libero. *Fructus* oblongus glaber modice alatus, alis tenuibus.

Hab. GABOON: Osika, *Jacques de Brazza*, No. 3 on manuscript ticket, No. 83 on printed ticket, coll. June 1883 (holotype in Herb. Mus. Brit.; Herb. Paris). The printed ticket states "Mission P. Savorgnan de Brazza. Afrique Occidentale (Congo et Ogôoué. Plantes recueillies par M. Jacques de Brazza, 188 –188 ." Osika is the locality on the written ticket and is taken to be Ossiga, near the River Ogowé, in Gaboon.



A. Leaf of *C. landanaense*, × ⅔. B. Fruit of *C. Robynsii*, nat. size. C. Fruit of *C. undulato-marginatum*, nat. size. D. Fruit (somewhat immature) of *C. Pellegrinianum*, nat. size.

Leaves 5–8 × 2–3 cm.; the upper ones purplish in appearance when dried, and probably coloured and bract-like when alive, as in *C. racemosum* P. Beauv.; *petioles* 3–4 mm. long; *spikes* up to about 5 cm. long; *bracts* 1–3 cm. × 2–7 mm.; *lower receptacle* 3–4 mm. long; *upper receptacle* 2 cm. long and 2·5 mm. across at the mouth; *petals* 3–3·5 × 2 mm.; *filaments* 1 mm. long; *style* 2·2 cm. long; *fruit* 3 × 2 cm. (Fig. 1, D.)

I have much pleasure in naming this species after M. Pellegrin of the Paris Museum, in recognition of kind assistance given me whilst working through the African material of this genus in the Paris collection. *C. Pellegrinianum* belongs to Sect. *Campylogyne* (Hemsl.) Engl. & Diels, and is undoubtedly closely related to *C. latialatum* Engl., ex Engl. & Diels, and *C. littoreum* Engl. It may be distinguished quite easily from the former by the much longer upper receptacle and from the latter by the purple-velutinous flowers and the oblong fruits.

Sect. TRICHOPETALÆ Engl. & Diels.

Combretum landanaense De Wild. & Exell, sp. nov. *Frutex* scandens, ramulis primo castaneo-brunneis minutissime puberulis demum glabrescentibus griseis. *Folia* petiolata, petiolo minutissime pubescente nonnunquam spinoso, ovata apice acuta acuminata basi rotundata supra glabra infra minute puberula et punctulata, costis lateralibus utrinque 6–9 supra vix conspicuis subtus prominulis. *Flores* pentameri sessiles in spicas axillares conferti. *Receptaculum* superius campanulatum basin versus paullo constrictum glabrum, inferius elongato-fusiforme glabrum. *Discus* campanulatus, margine piloso. *Petala* elliptica unguiculata ciliata. *Stamina* 10, glabra. *Fructus* ignotus.

Hab. BELGIAN CONGO: "Lieux incultes, boisés," Landana, Shilongo, *Bequaert* 605 (holotype in Herb. Brussels; Herb. Mus. Brit.).

Leaves 9–12 × 4·5–7 cm.; *petioles* up to 14 mm. long; *spines* on older branchlets up to 6 mm. long; *spikes* more or less glomeruliform, 6–7 cm. in diam.; *lower receptacle* 6–7 mm. long; *upper receptacle* 8–10 × 5 mm.; *petals* 3 × 1 mm.; *stamens* 16–18 mm. long; *style* 21–22 mm. long.

This species is allied to *C. Holstii* Engl., *C. affine* De Wild., and *C. Pynaertii* De Wild., all of which have practically glabrous receptacles. *C. landanaense* is at once distinguishable by the very characteristic ovate leaves with rounded bases and long acute acumens. (Fig. 1, A.)

Sect. CACOUCIA (Aubl.) Engl. & Diels.

C. LAURENTII De Wild. in Ann. Mus. Congo, v. i. 197 (1904). This cannot be separated from *C. platypterum* (Welw.) Hutch. & Dalz., and must be considered as a synonym of that species.

C. NERVOSUM Engl. & Diels in Mon. Afr. Pfl. iii., Combretaceæ, 101 (1899). This is also indistinguishable from *C. platypterum*.

Combretum Mooreanum Exell, nom. nov. (*Cacoucia coccinea* Laws. in Fl. Trop. Afr. ii. 434 (1871) non Aubl. nec Lam.; *Cacoucia velutina* S. Moore in Journ. Bot. xviii. 2 (1880); *Combretum velutinum* Engl. & Diels in Mon. Afr. Pfl. iii., Combretaceæ, p. 100 et Pl. xxix. B (1899); Hutch. & Dalz. in Fl. W. Trop. Afr. i. 218 et 220 (1927); non *Combretum velutinum* DC. in Prod. iii. 20 (1828).

I am much indebted to the Directors of the Royal Gardens, Kew, of the Paris Museum, and of the Brussels Herbarium for the loan of

specimens, and to the Director of the Berlin Museum for material of many species hitherto unrepresented in the British Museum Herbarium. My thanks are also due to Dr. Mildbraed of Berlin, M. Pellegrin of Paris, and Dr. Robyns of Brussels for kind assistance.

I am grateful to the Trustees of the British Museum for facilities afforded me for visiting various continental herbaria. It is hoped to publish further results in due course.

NOTE.—Since the first parts of this paper were published, I have had an opportunity, through the kindness of Dr. Burtt Davy, of examining the West African Combretaceæ in the collections of the Imperial Forestry Institute, Oxford. Amongst this material are flowering specimens of what I take to be *Combretum lamprocarpum* Diels. If this be so, *C. crotonoides* Hutch. & Dalz. and *C. lamprocarpum* Diels are not synonymous, as I suggested (p. 140) they might be from the insufficient material at hand. In flower *C. lamprocarpum* is apparently distinguishable by its hairy peduncles, those of *C. crotonoides* being glabrous, except for scales. The leaves in this alliance of species change so much between the flowering and fruiting periods that careful collecting of material from the same tree, at different seasons, is essential before flowering and fruiting specimens in the herbaria can be associated with certitude.

THE ORIGIN OF A LAND FLORA *.

PROFESSOR F. O. BOWER seized the opportunity afforded by the Huxley Memorial Lecture, delivered in the theatre of the Royal College of Science on May 3, to review the position taken in his 'Origin of a Land Flora,' published in 1908. The hypothesis then suggested was that the Mosses and Ferns sprang from green aquatic forms inhabiting shallow fresh water or the higher levels between marine tide-marks. Certain forms, perhaps thereby escaping competition, established themselves on land where the sexual process could only be effected at times of rains or copious dews. Thus less dependence could be placed upon sexuality for propagation, and an alternative method of increase of individuals had to be substituted. This was done by the production from the fertilised egg of a new phase, the sporophyte, in which the fertilised egg might divide into a number of portions, or carpospores, each of which would serve as the starting-point for a new individual, and dry conditions would favour the dispersal of the powdery spores. Increase in the number of spores entails increased nourishment, hence the sporophyte itself assumed the function of nutrition developing increasing differentiation of parts culminating in the free-living plant with distinct members, roots, stem, leaf, and sporangium, which characterise all the higher land-plants.

* Huxley Memorial Lecture, 1929. 'The Origin of a Land Flora' (1908–1929). By F. O. Bower, F.R.S. 8vo, pp. 27. Macmillan & Co., London. Price 1*s*.

In 1919 Dr. Church, in his "Thalassiophyta and the Subaerial Transmigration," developed an alternative theory visualising large marine Algæ as the source of the land-flora. He assumed at the outset a uniform ocean-surface covering the earth, with flagellate organisms living in it. Algæ with a basal attachment were developed from the floating flagellates on the gradually rising sea-floor, and in the highly organised marine types which were evolved—the "Algæ of Transmigration"—he finds the origin of land-vegetation.

Prof. Bower contests the preconceptions embodied in Dr. Church's hypothesis: (i.) that there was a pre-existent unbroken ocean-surface, all dry land being secondary; (ii.) that the morphological advance of land-vegetation could not, or at least did not, in its early steps, arise along free and independent lines, parallel to, but distinct from, the advances in marine vegetation; and (iii.) that large marine Algæ are, or ever have been, open to a land-change, a point on which positive evidence is admittedly wholly wanting.

On the other hand, the work by Kidston and Lang on the early Devonian Flora has constituted a new class, Psilophytales, which helps to fill the gap between Seaweeds and Ferns. The genera *Rhynia* and *Hornea* have a basal region with nothing suggestive of the organisation of a root and a dichotomous aerial system of cylindrical branches without distinction of axes and leaves; large sporangia terminate the finer branches. *Asteroxylon* is a larger type with branched rhizomes, while the forked aerial stems bear in the upper part numerous simple leaves. Prof. Bower suggests that the possible lines of origin of axis and leaf in the higher plants are here foreshadowed. The Rhyniaceæ were clearly land-living plants, there is nothing that indicates a derivation from any well-developed stock of marine origin.

Prof. Fritsch, in his recent discussion on the Green Algæ and their relation to a land-flora, has suggested that there are no highly developed Green Algæ, because at about the evolutionary level of the differentiated filament the transition to terrestrial life took place.

In the re-colonisation of Krakatoa after the eruption in 1883, when it was covered by hot volcanic ash, blue-green Algæ were the first colonists, associated later with Diatoms and Bacteria. The gelatinous layer thus formed on rocks and in gullies gave a favourable *nidus* for the germination of Mosses and Ferns. Prof. Bower contemplates a similar *nidus* in the distant past serving a like purpose for the progenitors of the Archegoniatæ, which may well have been green filamentous Algæ, not unlike the protonema of mosses or the prothallus of some primitive Ferns—that is, evolution *in situ*, not transmigration.

The most stable feature in plants possessing sex is the alternate succession of correlated events known as "syngamy"—the fusion of two sexual cells or gametes in which the number of chromosomes in the nucleus becomes doubled and the resulting individual "diploid"—and "meiosis"—the reduction division in which the number of chromosomes in the nucleus becomes halved, and the resulting indivi-

dual "haploid." Though the two phases appear in regular succession in each normally completed cycle, both are not constantly present in highly organised Algæ, as witness the haplobiontic Green Algæ on the one hand, and on the other the Fucoids where the individual is diploid only. Hence it may be concluded that the vegetative phases appear as subordinate incidents superposed upon the events of the cytological cycle. These vegetative phases are: (i.) the gametophyte which intervenes between meiosis and syngamy and bears the sexual organs, and (ii.) the sporophyte which intervenes between syngamy and meiosis and bears carpospores. Provided the events of syngamy and meiosis have been constant throughout descent (as they are in any normally completed cycle), these phases will themselves have had a separate phyletic origin and cannot be strictly homogenetic, even though they are parts of the same life-cycle. In particular, the existence of haplobiontic Algæ offers the opportunity for the interpolation of a sporophyte as a new formation: the suggestion is that this is what has actually happened in the Archegoniatæ. By deferring the act of meiosis a diploid phase was interpolated, structurally suited to the sub-aerial conditions and bearing numerous spores. Three important biological advances would be achieved: (i.) a multiplication of possible combinations of hereditary characters, as suggested by Svedelius; (ii.) an opportunity of securing a wide spread on dry land by the dissemination of spores; and (iii.) relief from dependence on repeated syngamy for numerical increase on land where the necessary medium of external liquid water is not always available. The superiority thus gained by the early plant-amphibians will have favoured a rapid advance of the sporophyte. The haplobiontic ancestors would be left hopelessly behind, as are the present Green Algæ.

In passing to the comparative study of the archegoniate sporophyte, we are now acquainted with a sequence between two extremes. On the one hand the dependent spindle, without roots or branching, characteristic of the Bryophytes, on the other the independently-rooted and leafy plant characteristic of the Pteridophytes and of land-plants generally. Between these lie the Devonian fossils and their nearest recent allies, the Psilotaceæ. Hence can be traced with reasonable probability the general course of evolution of the root, stem, and leaf.

In discussing the origin of the root and leaf, Prof. Bower suggests that the root of the early Pteridophytes originated by specialisation of subterranean exogenous branches essentially like the leafless rhizomes. The *rationale* of leaf-formation appears to be the solution of a general problem that arises in any enlarging shoot whose nutrition is through its exposed surface. With increasing size the surface enlarges only as the square, while the bulk increases as the cube of the linear dimensions so long as the form is unchanged. Leaf-formation is a means of levelling up the diminishing proportion of surface to bulk by change of form. Why should it be assumed, says Prof. Bower, that all plants must solve the problem in the same way? Our

assumption should rather be that each phylum will solve its own problem in its own way. For instance, some appendages may owe their origin to "distal branching," which appears to have played a leading part in the origin of "megaphylls," such as the large leaves of Ferns which may thus be derived from the dichotomising axis of *Rhynia*-like fossils; others may originate by a process of "enation" from the smooth surface of a pre-existent axis—such as the "microphylls" of Lycopods which have exploited the type of *Asteroxylon* with microphylls borne as appendages that fork dichotomously.

The single spore-capsule of the Bryophytes has been linked comparatively with the numerous sporangia of the Pteridophyta by the discovery of the Rhynie fossils which bear a plurality of distal sporangia. And it has been shown comparatively in living Ferns that the marginal position is primitive for them (see *Ferns*, vol. i. pp. 216–225). The Schizæaceæ are an ancient family that still retain that position rigidly. The origin of the fertile parts of the microphyllous types is less straightforward, and we shall need to wait for new facts for its elucidation.

In conclusion, Prof. Bower emphasized the existence of the gap between any algal type and any Archegoniate plant, which is as wide now as it was in 1908. It is of little use to fill such a gap by theoretical types that have never been seen: a better course is perhaps that taken here, namely, to contemplate physiological probability, or, as it is called, "survival value," though this cannot give more than partial satisfaction. But the demonstration of the Psilophytales has had the effect of closing the gap between the Bryophytes and the Pteridophytes, so that a more coherent and probable picture of evolution on land can be preserved than was possible two decades ago.—A. B. R.

OBITUARIES.

Mrs. Gertrude Clarke Nuttall, B.Sc., who died at St. Albans on May 4, aged 61, was the author of various books and papers on natural history subjects. She wrote the descriptive text for the publication (1911–14) *Wild Flowers as they Grow*, illustrated by prints from colour-photographs by the late H. Essenhigh Corke. Other books of a similar character were *Trees and how they Grow*" (1913) and *Beautiful Flowering Shrubs* (1920). An edition of the 'Guide to Leicester and District' was edited by Mrs. Nuttall for the British Association Meeting in 1901. Mrs. Nuttall was the eldest daughter of J. St. Thomas Clarke, F.R.C.S., and the widow of Dr. Charles Nuttall, both of Leicester. A writer in the 'Times' of May 6 describes her "as an excellent organiser and fluent speaker. During the War she went to France under the British Red Cross, and was in charge of recreation huts, for which work she was mentioned in despatches. Her lectures on popular subjects at the camps were crowded."

Dr. Hermann Wolff.—We have received, from Berlin, news of the recent death of Dr. Wolff, who had devoted many years of study to the Umbelliferæ. The first part of his elaboration of the family for the *Pflanzenreich* appeared in 1910, and others were published in 1913 and 1927. Prof. Fedde has, we are informed, taken charge of his manuscript, and we trust that it may be possible to complete his systematic account of the Umbelliferæ.

Dr. Louis Trabut.—We learn from the *Gardeners' Chronicle* (June 1) that the Algerian botanist Dr. Trabut died on April 23. Dr. Trabut, who was born in 1853, is best known to botanists by his work with J. A. Battandier on the flora of Algeria—*La Flore de l'Algérie*, 1888–97, a Supplement to which was published in 1910. Dr. Trabut was appointed Professor of Natural History at the School of Medicine and Pharmacy in Algiers in 1880. He was instrumental in the introduction to the colony of many new forage-plants, cereals, fruits, and other plants of economic value. Dr. Trabut was a corresponding member of our Royal Horticultural Society.

We hear with much regret of the death of Mr. Arthur Bennett, on May 2, at the age of 85. Mr. Bennett was one of our leading authorities on British botany, and with Mr. C. E. Salmon and Mr. J. R. Matthews had just completed the Second Supplement to Watson's *Topographical Botany*, the first instalment of which appeared as a Supplement to the last issue of the *Journal*. He was also a recognised authority on the genus *Potamogeton*. We hope to publish an appreciation of his work in a later number.

REVIEWS.

Symbolæ Sinicæ: Botanische Ergebnisse der Expedition der Akademie der Wissenschaften in Wien nach südwest China, 1914–1918. Wien: J. Springer, 1929.

VI. Teil. Pteridophyta, von Heinrich Handel-Mazzetti. 8vo, pp. 1–53, 2 pls. Price R.M. 10.

The botanical results of the expedition which was sent out by the Academy of Sciences in Vienna to South-west China in 1914–18 are being worked out by experts in the various groups under the editorship of Heinrich Handel-Mazzetti, who led the expedition, and who has himself undertaken the account of the ferns collected. These comprise over 250 species and some varieties; they add thirty-six species to the fern-flora hitherto recorded for the district explored. Among them are descriptions of seventeen new species and a variety. The largest number of novelties is found in the genus *Selaginella*, twenty-five species of which are recorded; and as many as eighteen of these are additions to the local flora, seven being also new to science. It should be noted that two out of the four species of *Woodsia* are described as new. Fifty-eight genera are represented, and the genus with the largest number of species is *Nephrodium* with thirty-six, followed by *Polypodium* with twenty-seven, *Selaginella* with twenty-five, then *Polystichum* and *Asplenium* each with twelve. The plates form a valuable addition to the text and contain figures of eleven new species, which are shown mostly life-size or somewhat enlarged; the figures of *Selaginella* are especially helpful, giving an excellent idea of the general habit of these difficult plants.

Though the present part is issued without any introduction, and, indeed, without an explanation of the abbreviations employed in the text, the meaning of these may be gathered from the publishers' prospectus, where it is stated that over 13,000 plant-specimens were collected by the author in the provinces of Yunnan, S.W. Sze-chuen, Kwei-choo, and Hou-nan, and a further 500 were added from Hou-nan, Kiang-si, and Fo-kien by a native collector. Further, a number of collections made by various travellers in the region in recent years have been worked over in order to render the report as complete and correct as possible. A notice of the Musci follows; the other five parts of the work are expected to be all published by 1931.—A. G.

IV. Teil. Musci, von Viktor F. Brotherus. 8vo, pp. 147, 5 pls. Price R.M. 28.80.

In an article published on the last day of 1928 the present reviewer mentioned with regret that of the large number of mosses collected by Dr. Handel-Mazzetti in South-west China no record had appeared beyond descriptions, by Brotherus, of the new species. The work now under review must have been at the time in the press, and supplies the desideratum; it is the last work to appear—at least during his lifetime—from the pen of the late Dr. Brotherus, for many years *facile princeps* among bryologists.

It is one of seven parts to be issued on the botany of Dr. Handel-Mazzetti's expedition, and it makes a very important addition to our knowledge of the bryology of China. The fact that nine new genera are described, as well as a large number of new species unpublished in Brotherus' earlier work, indicates the richness of the collection and the importance of the publication.

Some remarkable instances of geographical distribution appear, for example, among many others, the appearance of the Mexican genera *Morinia* Card. and *Pringleella* Card. in Asia. Perhaps, however, the chief interest lies in the remarkable combination of elements of a subtropical flora with others of a palæarctic, almost boreal one. Thus species which with us are not, or rarely, found outside the Scottish highlands, such as *Hypnum callichroum*, *H. hamulosum*, *H. procerrimum*, *H. turgescens*, *Dicranella secunda*, *Plagiobryum demissum*, &c., are here side by side with subtropical genera, such as *Hyophila*, *Rhizogonium*, *Trachypus*, *Meteorium*, *Papillaria*, and numerous others.

It may be worth while to point out one or two slight errors that have crept in. On p. 5, l. 8, *Thuidium vestitum* Besch. should read *Th. vestitissimum* (not, as Paris, *Index*, has it, *vestissimum*). And

on p. 26, *Dicranum perfalcatum* Broth. is antedated by the South African *D. perfalcatum* C. M. (1899). Brotherus no doubt considered the name available, since the S. African plant is now considered not to be a true *Dicranum*; but it is nevertheless rather unfortunate, since the fruit of C. Mueller's species has not been found, and its true position is still somewhat uncertain—it has been placed under *Dicranodontium* and *Campylopus*.—H. N. D.

Werner Lüdi: Assoziationsbegriff in der Pflanzensoziologie erläutert am Beispiel der Pflanzengesellschaften des Tanzbodengebietes im Lauterbrunnental. Bibliotheca Botanica, Heft 96. 4to, pp. 93 with text-figs. and 20 tables. Schweizerbartsche Verlagsbuchhandlung, Stuttgart, 1928. Price 41 M.

During recent years the recognition, value, and limitation of the units of plant-sociology and the methods of investigating them have been very actively discussed. Owing to the largely independent development of several schools, there is a considerable scope for critical synthesis in the subject of synecology at the present time. The scheme of the paper reviewed here is happily conceived in that a summary of the modern conceptions and methods of study of plant-communities, with particular emphasis on the term "Assoziation," is followed by an account of intensive research work on a very small area, before general conclusions are reached.

The Tanzboden in the Lauterbrunnenthal, in central Switzerland, is a piece of ground one-quarter of a square kilometre in area, partly flat and partly with slopes. Petrologically it is formed of limestone of two facies. All the soil-types have a very high humus content and a low carbonate content, and their *p*H values range from 5·7 to 6·9. The climate is humid with a rainfall of about 2000 mm. The vegetation forms a topographical unit with special plant-communities. No less than eighteen main communities are described in detail, in addition to a number of subordinate ones. The descriptions are accompanied by tables of the species found in a varying number of samples of each community, and by figures indicating constancy and vitality. The plant-communities are classified into three association-complexes corresponding to three succession types—on the south slopes, on the shady slopes, and on the ridged parts.

The portion of this paper of most general interest is the author's discussion of some of the problems of plant-associations. To him the term "Assoziation" indicates an abstract unity, while he uses "Lokalbestand" or "Einzelbestand" for the concrete examples of an "Assoziation." The reviewer has failed to find a satisfactory translation of the word "Bestand," as used in this paper, in spite of expert assistance. The "Lokalbestand" is a concrete plant-community of uniform floristic, physiognomic, and ecologic character which floristically shows the peculiar characters of a "Bestandestypus (Assoziation)." Three types of constancy are recognized: that within

a local "Bestand," that within a "Lokalbestand" of a more or less extensive locality (local constancy), and the constancy over a wide area of divided "Lokalbestände" of an association (general or regional constancy). The higher grades of constancy are obtained by the combination of all relevant lower grades. By community-fidelity or exclusiveness ("Gesellschaftstreue") is understood the limitation of species to one association or, at least, their limitation as frequent constituents to one association. Three classes of community-fidelity are recognized. Within the area specially studied community-fidelity is not considered an essential attribute of an association, but this conclusion is not extended as a generalization. The vitality (prosperity) of the plant species and individuals in a community is of great importance in plant-sociology. The author rejects the introduction of succession principles into the definition of the association. Every association forms a more or less stable and durable phase in the successional series, but it is not necessarily limited to a successional series, and within the series its position is changeable.

Whatever success may have attended the author's laudable attempt to reconcile the methods, conceptions, and terminology of the Upsala and Zürich-Montpellier schools has been achieved by taking some ideas from the one, some from the other, rather than in putting forward new suggestions. The result is an interesting and useful patchwork which lacks the unity, and some of the faults, of the systems from which it is mainly derived.—W. B. Turrill.

A Laboratory Manual of General Botany. By Emma L. Fisk and Ruth M. Addoms. 8vo, pp. ix, 103. Macmillan: 1928, New York. Price 4*s.* 6*d.*

The book is designed to provide a guide to a first course in practical botany, covering about one hundred hours of laboratory work. The subject is introduced by a general study of the structure and functions of seed-plants, which forms the first part of the manual. The second part deals with the study of the usual series of plant-forms employed as materials for a survey of the plant-kingdom. As the book is described as the outgrowth of a series of laboratory manuals which have been in use at the University of Wisconsin, the system is presumably the result of many years' teaching experience. It would appear to be specially adapted to a large class, the members of which are expected to work without very much assistance from the demonstrator. The somewhat detailed instructions are designed to draw attention to the important features of the specimens under examination, and their significance, with the minimum wastage of mental effort on the part of the student. Teachers engaged in planning or revising an elementary course may find here fresh methods of presenting facts and stimulating observation. In particular, the suggestions for the selection and preparation of material

for the course will be found useful. The majority of the plants prescribed are available in this country, and it will not be difficult to make the necessary substitutions in the few exceptional cases.—B. J. R.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY.—At the General Meeting on May 2nd, the following Foreign Members were elected:—Dr. Theodor Mortensen, Superintendent, Zoological Museum, the University of Copenhagen; Prof. Carl Hansen Ostenfeld, Professor of Botany, the University of Copenhagen; and Prof. Bohumil Němec, Professor of Plant Anatomy and Physiology, Charles University, Prague.

Mr. H. H. Haines gave a paper on "Some Aspects of the New Forest, with special reference to the Changes wrought by Direct or Indirect Human Agency" (illustrated with lantern-slides).

Brief reference was made to the changes in ordinary grassland, heath, and commons if grazing, browsing, and fires are excluded. Exclusion in most cases leads to tree-growth, though the second-growth forest resulting may at first differ from what may be taken as the original forest. In a climate like that of Hampshire the land was probably covered with forest except where, possibly, wild animals, especially rodents on chalky or sandy soil, may have been sufficient to keep it in the condition of downland, and where hard pans occur close to the surface. In the New Forest the poverty of the reproduction of trees and the poor aspect of the young growth, where it exists in the open forest, is due chiefly to the grazing, browsing, and trampling of domestic animals, as also is the entire composition of parts of the vegetation. The first evident results of excessive browsing, as is even better seen in some other parts of the world, is the gradual reduction of the underwood to thorny, prickly, or otherwise distasteful species. In forest consisting purely of shade-bearing species reproduction and undergrowth may be altogether absent. As the trees die off, other forms of vegetation (differing according to soil, according to the intensity of the grazing, and according to whether the land is burnt or not) take possession in place of the original forest; and this is what has happened over a large area of the New Forest. Where fires are excluded, however, and the trees are species relatively distasteful, as with Pine, Yew, and perhaps Holly, woods of these species on suitable land might survive for very long periods. All these trees are eaten to some extent.

The herbaceous flora and fauna are also seriously affected by large numbers of grazing animals, though, in the New Forest, also very largely from collectors and from the direct action of man in clearing and draining. The impoverishment of the fauna and flora of the open heaths is partly accounted for by too much and too severe burning. In the latter case the soil itself gets burned away and the

salts washed out by subsequent rains. The author believes, however, that without some burning and browsing the heathlands in Hampshire would mostly give place to Furze and ultimately to woodland.

Even though it may be now impossible to reverse previous legislation by which the Crown and the public ceded to the commoners much more than (in the author's opinion) they could rightfully claim, a corporate expression of opinion may prevent further hurtful legislation, and by representations in the right quarter prevent large increases in grazing and browsing animals, extension of the pannage system, drainage at Government expense, and the straightening of streams, removal of gates of enclosures, and other works incompatible with the existence of the natural forest.

Dr. F. S. Russell gave a general account of the Great Barrier Reef Expedition and its aims. The expedition is based on Low Island, forty miles north of Cairns, N. Queensland, and situated eight miles from the mainland and midway between the coast and the great barrier itself. Lantern-slides were shown illustrating the main features of the island and the lines of research being followed up.

The work is split into two main sections, taken charge of respectively by the shore party and the boat party. The work of the shore party is concerned with an ecological survey of the island and adjacent barrier reef, studies in the growth of coral, and life-histories of economic products, such as pearl oyster, trochus, and bêche-de-mer. Experimental work on the feeding-habits of corals are being carried out in the laboratory. The sea work entails a complete seasonal survey of the chemical constituents of sea water and of the plant and animal plankton, together with physical observations such as temperature and transparency.

The expedition arrived on the island in July 1928, and will leave in July 1929, having completed a full year's observations—biological, physical, and chemical—on the life in a tropical coral-reef area.

Mr. G. Tandy gave a preliminary account of the Vegetation, illustrated with lantern-slides. Low Isles present a very interesting set of problems for the botanist. As one comes from the southward they are the first of the "low and wooded" islands of the early navigators to be encountered. The arrangement of a mangrove swamp to windward (with *Rhizophora mucronata* the dominant) and a more or less variegated cay of coral sand to leeward is found in considerable numbers northwards from here. To understand the formation, the behaviour of the S.E. Trade Wind (pretty constant here from April to November) must be considered. In early morning it will be at S.S.E. and light, but as the day goes on it will shift to E.S.E. or even E. and freshen. This means that the heaviest seas will commonly be on the north side of the mangrove island. Here the drift of the coral shingle is driving the mangrove back. On the lee side of the swamp, however, they are extending in a westerly direction.

A paper by Mr. H. W. Pugsley, "A Revision of the British Euphrasias," was read in title.

ANNIVERSARY MEETING.—At the Anniversary Meeting on May 24, the President, Sir Sidney Harmer, K.B.E., F.R.S., presented the Linnean Gold Medal to Prof. Hugo De Vries. In reviewing Prof. De Vries's work, the President pointed out that his earlier contributions were to plant-physiology, beginning with a "Thesis" in 1870 on the influence of temperature on plants. His subsequent investigations were of a wide scope, comprising study of osmotic pressures and the general physiology of plant-growth. In 1890 he published the results of an ecological study of the animals and plants of the water-supply of Amsterdam. His work on the mechanism of heredity and the structure of the germ-plasm led on to the announcement of his Mutation theory of the origin of species, at the beginning of the present century. He was the first of the experimental evolutionists, and his output of work was enormous. Prof. De Vries was elected a Foreign Member of the Society in 1904, and more recently a Foreign Member of the Royal Society.

The Medal was received on Prof. De Vries's behalf by Dr. Hubrecht, son of the late Prof. Hubrecht, an eminent zoologist and a former Foreign Member of the Society. Dr. Hubrecht said that only his advanced age, eighty-one, prevented Prof. De Vries from attending to receive the medal in person.

The Assistant-Secretary reported the number of Fellows as 778, there were also 50 Foreign Members and 24 Associates. Including Fellows who had been elected but had not yet qualified, the number would approximate to the prescribed limit of 800.

The Fellows heard with much regret that Lt.-Col. A. T. Gage would resign his office of Assistant-Secretary and Librarian at the end of October. The President also announced that the Council had appointed Mr. Spencer Savage to succeed Lt.-Col. Gage. Fellows will welcome this appointment as a fitting recognition of Mr. Savage's devoted service to the Society as Clerk, both under the late Dr. Jackson and Lt.-Col. Gage. Mr. Savage has also some reputation for a knowledge of early botanical literature, which will be a useful asset in his new position.

The President's Address dealt with a group, the Polyzoa, to the study of which he has devoted the leisure of many years. Sir Sidney described concisely the evolution, economic uses, and taxonomy of the group.

In the election of the new Council, Dr. T. F. Chipp and Mr. Gerald Loder replaced the two retiring botanical Members of the Council, Mr. A. D. Cotton and Prof. J. Percival.

After the Meeting a number of the Fellows and their friends dined together at the Criterion Restaurant.

MR. W. J. BEAN.—The retirement on May 20 is announced of Mr. W. J. Bean, Curator of the Royal Botanic Gardens, Kew. Mr. Bean entered Kew as a young gardener in 1883, and succeeded

the late William Watson successively as Assistant Curator in 1900 and Curator in 1922. His special interest has been the study of hardy trees and shrubs, and his book *Trees and Shrubs Hardy in the British Isles* is a standard work. He is succeeded by Mr. T. W. Taylor, who joined the Staff of the Royal Gardens in 1902.

HANBURY MEDAL.—The Hanbury Medal of the Pharmaceutical Society "for high excellence in the prosecution or promotion of original research in the natural history and chemistry of drugs" has been awarded to Dr. Henry Hurd Rusby, Professor of Materia Medica in the College of Pharmacy of the Columbia University, New York. Professor Rusby's name is familiar to botanists from his work of exploration in various parts of equatorial America, undertaken especially with a view to the discovery of new plants of medicinal value. He is the author of numerous papers on pharmacognosy; and his "Enumeration of Plants collected in Bolivia by M. Bang" contains descriptions of numerous new genera and species.

NORTH-WESTERN NATURALISTS' UNION.—A proposal is on foot for the formation of a Union of Scientific, Natural History, and other Societies in the North-Western area of the country, and a committee, with Mr. H. Britten, of the Manchester Museum, as Chairman, and Mr. J. H. Danvers, Southport Society of Natural Science, as Acting Secretary, have issued a circular letter suggesting a tentative scheme. The aims and objects of the Union are to systematise and co-ordinate existing records of work done in the area and to stimulate and extend this for survey work, to create an exchange of lectures and lecturers with the Societies included, to co-ordinate and publish work amongst the Societies, and to assist in preserving the amenities of the district. The Union will consist of Societies regularly functioning in the area and ordinary members. An Annual General Meeting shall be held at such time and place as may be convenient, in the area covered by the Union. The publication of any reports or papers concerning the affairs or work of the Union shall be entrusted to a Publication Committee.

BANKS CORRESPONDENCE.—An interesting collection of letters and papers by Sir Joseph Banks or addressed to him was sold by Messrs. Sotheby on May 3. The greater part were bought for the Mitchell Library, Sydney, where they will find a very suitable home in view of their strong Australian interest. The letters &c. deal mainly with early work of exploration and settlement in Australasia, but names familiar to botanists are included, such as a series of letters "concerning botanical matters" by George Caley, who sent home large collections from Australia and was subsequently in charge of the Botanical Gardens at St. Vincent. Lot 2, labelled "Botanical and Agricultural," includes correspondence from Governor King on the growth of New Zealand Flax in Norfolk Island, also from Governor Philip and Lt.-Governor Wm. Paterson dealing with botanical matters.

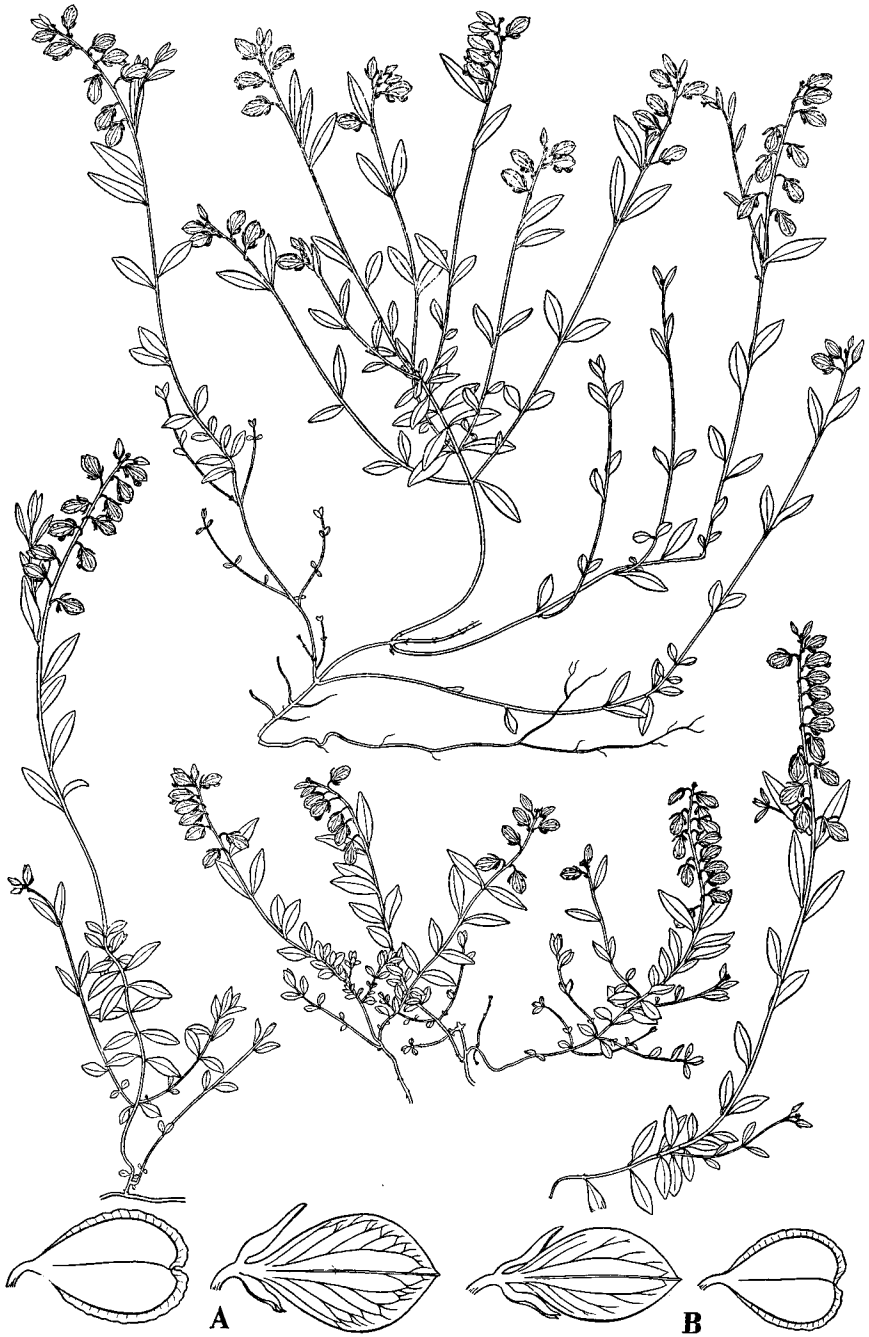
ROYAL HORTICULTURAL SOCIETY'S SPRING SHOW.—Glorious summer weather favoured the great flower-show at Chelsea, May 22–24. An unusual and attractive feature was an exhibit illustrating the flora and fauna of the deserts and redwood forests of California, shown by Mrs. Sherman Hoyt. The exhibit was originally designed by Mrs. Hoyt to interest those of her countrymen who are unable to travel, in the movements for the creation of National Parks for the preservation of the natural beauty of various types of country. Mrs. Hoyt generously offered to re-stage the exhibit at Chelsea. The most striking of the three scenes represented was the Death Valley in east central California. The remarkable "Creosote bush" *Larrea glutinosa*, a Cluster Cactus, *Echinocactus polycephalus*, and a Barrel Cactus, *Ferocactus* sp., were the most conspicuous objects of the sparse vegetation, a pair of coyotes, a tarantula, a scorpion, and a few birds represented the fauna. Another scene, the Desert Garden, included a considerable variety of Cacti, the tree Yucca (*Y. arborescens*), the Smoke Tree, *Dalea pubescens*, which is a cloud of rich purple when in blossom, and the Ocotello, *Fouquieria splendens*, notable for its brilliant carmine flowers.

The Science exhibition included contributions from the Society's Gardens at Wisley, Rothamsted, the research station at East Malling, and the Royal Botanic Gardens of Kew and Edinburgh.

THE LATE SIR WILLIAM SCHLICH.—A bronze portrait plaque of the late Professor of Forestry at Oxford was unveiled by the Vice-Chancellor of the University in the School of Forestry on May 22. It is also proposed to set apart an area of forest to be named the Schlich Forest, which will be available for experimental work, within easy reach of Oxford.

A CORRECTION.—In this *Journal* for May (p. 150) in a notice of the Twentieth Botany Report in the *Transactions of the Devonshire Association* (1928), two plants are noted therein as "apparently new County or Vice-County records." Of these, *Carex strigosa* Huds. was recorded by me from Bickington (v.c. 3) in the Eighteenth Botany Report (Trans. Dev. Ass. 1926, p. 128). *Vicia gracilis* Lois is a very old record for Torquay, repeated last year. For the parishes in which now they are recorded these plants are new: viz., Woodbury and Littleham respectively. But Littleham is alluded to as in "v.c. 4." The Littleham, near Exmouth, to which Major Orme's discovery refers is in v.c. 3. There is in Devon v.c. 4 also a Littleham near Bideford, with which latter place the writer of the note (C. E. S.) has probably confused the Littleham of Major Orme's *Vicia gracilis*.

In the Botany Reports of the Devon Association, when I was their Editor, plants new to any parish were inserted, the aim being to make a list as complete as possible of plants found in each of the Devon parishes. For one who does not possess the whole set of these Reports (1910–1928), it is, of course, almost impossible to determine whether a record is new, or has been already made therein.—C. E. LARTER.



POLYGALA SERPYLLIFOLIA J. A. C. HOSE VAR. DECORA VAR. NOV.

A NEW VARIETY OF *POLYGALA SERPYLLIFOLIA* J. A. C. HOSE (*SERPYLLACEA* WEIHE).

BY C. E. SALMON, F.L.S.

(PLATE 591.)

FOR some years past, during expeditions in the North, I had noted a conspicuous form of this *Polygala*, but it was not until the summer of 1922, when botanizing in Scotland, that the full force of this beautiful plant came home to me.

Here, on the mountains near Dalnaspidal, East Perthshire (v.c. 89), were vigorous plants bearing longish racemes of large, gloriously deep blue flowers, up to fourteen in a head, and forming fine patches of colour amongst the heather and sphagnum.

At first I thought my plants might come under Rouy and Foucaud's var. *majus*, described in Fl. France, iii. 75 (1896), and, with this in view, my friend Mr. C. C. Lacaita kindly submitted examples in November 1923 to the monographer of the genus, Dr. Chodat. He reported that my plant was neither var. *majus* Rouy & Foucaud nor var. *pyxophylla* Reichb., and advised that it should be published as a new variety, and as I am unable to identify it with any named form of *P. serpyllifolia*, I venture to describe it as such.

Var. **decora**, var. nov., a typo distat ob partium omnium magnitudinem, racemos longiores plurifloresque, flores 7 mm. longos, et sepala obtusiora nervis omnibus marginem versus dichotomis.

Plant large and robust. *Stems* lax and straggling, not forming compact plants. *Leaves* large, particularly on the flowering branches, up to 20 mm. long and 6 mm. broad, widely separated above, closer below, rather blunter than in type. *Racemes* longer and with more flowers than in type, 3–5 cm. long with 8–14 flowers. *Flowers* larger than in type, about 7 mm. long, always (?) deep blue; wing sepals rather more blunt than in type with marginal veins more anastomosing.

Distribution.—Carnarvonshire (v.c. 49); rocks, Cwm Glas !, 1890, *H. T. Mennell.* Perth east (v.c. 89); mountains near Dalnaspidal, 1922, *C. E. S.* Forfar (v.c. 90); Canlochen Glen !, 1916, *G. C. Druce.*

When characteristic, this variety might be passed over as *P. vulgaris* or *P. dubia*, but the opposite lower leaves at once distinguish it.

Through the kindness of Dr. E. De Wildeman, I have had the opportunity of seeing the type of Dumortier's *P. mutabilis* and also plants named "*P. serpyllacea*" by this author. His descriptions of these may be found in Bull. Soc. Bot. Belg. vii. 344 (1868), in an article entitled "Bouquet de littoral Belge," and I have come to the conclusion that the variety now called var. *decora* is the "*P. serpyllacea*" of Dumortier (non Weihe), whilst Dumortier's *P. mutabilis* is the common plant of Britain and Europe generally, known as *P. serpyllacea* (*serpyllifolia*).

I have been unable to obtain ripe capsules and seeds of the new variety, but the almost mature examples seen appear to differ only in size from those of the type. The variety appears to frequent more marshy spots than the type, and will probably be found to occur in many places in our islands, particularly in the north.

As regards the change of name from *P. serpyllacea* to *P. serpyllifolia*, this would appear to be inevitable. An interesting note upon this point, included in an article, "Die Polygalaceen der Rheinprovinz," by W. Freiberg (Verhandl. Naturhist. Ver. Preuss. Rheinl. u. Westf. lxvii. pt. 2, 421, 1911), seems worth translating:—"Here some remarks may be made on the first appearance of the plant [*serpyllifolia*] in literature as they are not lacking in general interest. I am indebted to the kindness of Herr F. Wirtgen, to whom I express my most grateful thanks for these observations, and also for the varied assistance which he has given me in this work. Until now Weihe and Wenderoth have been generally taken as the first authors, and the plant has been attributed to them. This is, however, not so. Indeed, considerable attention, especially that of the Rhine botanists, was earlier drawn to the plant; so that, in the more extensive herbaria of the years before 1820, there are found specimens on the labels of which the collector expresses the view that the plant was so far undescribed. Unfortunately, this was neglected through the reluctance of the collector to publish his opinion. I was all the more pleased, therefore, by Wirtgen's news that the plant had already, in 1797 (thus almost 20 years before Weihe and Wenderoth), been published by a certain J. A. C. Hose in the *Annalen der Botanik*, pt. 21, p. 39, as *P. serpyllifolia*. The author gives a distinctive Latin diagnosis, one and a half pages long, of our plant. As locality he gives 'ericeta circa Crefeld,' and as flowering time April–May, which, especially for Krefeld, is certainly better altered to May–June."

I have to thank Miss F. Strudwick for her care in preparing the excellent drawing and dissections. Specimens of the plant are being deposited at the British Museum and Kew.

EXPLANATION OF PLATE 591.

Polygala serpyllifolia J. A. C. Hose, var. *decora* var. nov., from Dalnaspidal. Half natural size. A. Capsule and wing sepal of same (almost mature), × 4 times. B. Capsule and wing sepal of *P. serpyllifolia*, from Ranmore Common, Surrey.

NEW SPECIES OF LEGUMINOSÆ FROM TROPICAL AFRICA.

BY E. G. BAKER, F.L.S.

Cassia (*Cathartocarpus*) **Kassneri** Bak. fil., sp. nov.

Arbor? ramis cortice nigrescente tectis, demum glabris. *Folia* 5–6-juga; foliolis parviusculis, subcoriaceis, glabris, ovatis vel ovato-subrotundatis, apice rotundatis vel leviter emarginatis, basi rotundatis, 20–26 mm. longis, 15–20 mm. latis. *Flores* parviusculi.

Racemi subcorymbosi, pedicellis longis, leviter puberulis, 7–8 cm. longis; bracteis parvis, lineari-lanceolatis, 3–4 mm. longis. *Calyx* sepalis oblongis apice rotundatis, adpresse cinereo-pubescentibus, +1 cm. longis. *Petala* 15–18 mm. longa, subsessilia vel breviter unguiculata. *Stamina* 3 longiora filamentis prope basin dilatatis, antheris 4–5 mm. longis. *Ovarium* cinereo-tomentosum, lineare, multi-ovulatum. *Legumen* ignotum.

Hab. KENYA COLONY: Makindi R., *Kassner* 598 (type in Herb. Mus. Brit.).

An ally of *C. abbreviata* Oliv., but the flowers and leaves are both small for this section. The filaments of the three longer stamens are dilated near the base.

Dialium orientale Bak. fil., sp. nov.

Frutex. *Folia* 1–2-juga cum impari; foliolis parviusculis, subcoriaceis, glabris, ellipticis vel elliptico-lanceolatis, 2–4 cm. longis, 1–2 cm. latis, apice acutis vel subobtusis; petiolulis ±2 mm. longis. *Alabastra* incano-pubescentia. *Flores* numerosi in paniculas divergentes dispositi; pedicellis brevibus, 1–2 mm. longis. *Calyx* disco lato, sepalis 5, ovali-oblongis, ±3 mm. longis. *Petala* 0. *Stamina* 2. *Ovarium* sessile vel brevissime stipitatum, rotundatum, brunneo-pubescens, stylo pubescente. *Fructus* ignotus.

Hab. KENYA COLONY: Coast District, *Webber* 613 (type in Herb. Kew.).

A shrub with small glabrous leaflets and flowers in a divergent panicle. Buds incano-pubescent.

Brachystegia Kassneri, sp. nov.

Arbor? ramulis pubescentibus. *Folia* sæpe 4-juga, paribus remotis, rhachide pubescente, foliolis oppositis, distalibus majoribus, inæquilateraliter ovalibus, superne glabris, subtus sparse pubescentibus, 8·5–10 cm. longis, 5–5·5 cm. latis, proximalibus 4–6 cm. longis, ±3 cm. latis, apice obtusis vel perbreviter obtuse acuminatis. *Stipulæ* basi reniformes, nonnunquam ±lobatæ, appendiculo falcato-lineari, ±2 cm. longo. *Flores* in racemos laxiusculos dispositi, pedunculis pedicellisque pubescentibus; bracteolæ pubescentes, ±14 mm. longæ, una oblonga, altera obovata. *Sepala* 5, angusta, usque ad ±8 mm. longa, margine fimbriata. *Petala* 5, sepalis subsimilia. *Stamina* 15–16. *Ovarium* breviter stipitatum, ferrugineo-hirsutum, 7–8-ovulatum. *Legumen* (*Ritschard* spec.) oblongum, molliter ferrugineo-velutinum, 6·5–8 cm. × 2·5–3 cm.

Hab. BELGIAN CONGO: Matumbi, *Kassner* 2506 (type in Herb. Mus. Brit.); Mukulakulu, *F. Ritschard* 1454 is the same.

Noticeable on account of the four pairs of large and rather remote leaflets and rather large flowers with 15–16 stamens.

Loesenera Talbotii Bak. fil., sp. nov.

Arbor? *Folia* paripinnata, foliolis sæpissime 3-jugis, leviter falcatis, ellipticis vel elliptico-oblongis, apice acuminatis, basi rotundatis vel late cuneatis, 8–10 cm. longis, 30–35 mm. latis, utrinque

glabris, subcoriaceis, petiolulis glabris, incrassatis, 2–3 mm. longis. *Flores* in paniculas racemosas dispositi, rhachide ferrugineo-tomentosa; bracteæ ferrugineo-tomentosæ, caducæ; bracteolæ ±5 mm. longæ, ovatæ. *Calyx* extus ferrugineo-tomentosus, receptaculo ±4 mm. longo, sepalis 4, ±concavis. *Petala* 5, 3 majora ±ovata, breviter unguiculata, 7–8 mm. × 4·5 mm., 2 minuta. *Stamina* 10, libera. *Ovarium* dense aureo-brunneo-villosum, ±4-ovulatum, stylo gracile leviter pubescente. *Legumen* ignotum.

Hab. S. NIGERIA: Oban, *Talbot* 1459 (type in Herb. Mus. Brit.).

Differs from *L. kalantha* Harms in having a racemose-paniculate inflorescence and smaller flowers. The leaflets are also somewhat more acuminate.

Cynometra Webberi Bak. fil., sp. nov.

Arbor ramulis griseis. *Folia* 3–4-juga, foliolis rhomboideo-oblongis, apice obtusis, 20–25 mm. longis, 8–10 mm. latis, reticulatis, glabris, subcoriaceis. *Flores* in paniculas ±8 cm. longas dispositi; pedicellis pubescentibus 8–10 mm. longis, erecto-patentibus. *Calycis tubus* brevis, ±1 mm. longus, pubescens; sepalis 4 rotundatis, concavis, 2–2·5 mm. longis. *Petala* 5, æqualia, lineari-oblanceolata, ±3 mm. longa. *Stamina* 10, filamentis longis, contortis. *Ovarium* applanatum ovatum, stipitatum, hirsutum, 2-ovulatum; stylo glabro. *Legumen* compressum, coriaceum glabrum, 4–4·5 cm. longum, 2–2·5 cm. latum, reticulatum, late oblongum vel ovali-oblongum, apice apiculatum, marginatum.

Hab. KENYA COLONY: Coast Forests, *Webber* 603 (type in Herb. Kew.); *W. B. Jackson* 414. A timber tree.

Noticeable on account of the numerous small flowers, the leaflets in 3–4 pairs, and the flat pod. It is allied in some respects to *C. Fischeri*, differing in having more numerous smaller leaflets and a smaller pod with no marked wing on the dorsal suture. Also allied to *C. Alexandri* C. H. Wright.

Hymenostegia Talbotii Bak. fil., sp. nov.

Arbor? *Folia* sæpissimæ 3–4-juga, foliolis subcoriaceis (junioribus membranaceis) oblique oblongis, apice acuminatis, apice ipso obtusis, 8–15 cm. longis, 3·5–5 cm. latis. *Stipulæ* magnæ, lineari-lanceolatæ, foliaceæ, caducæ, 4–5 cm. longæ. *Flores* in racemos dispositi; racemis basi bracteatis; pedicellis 1–2 cm. longis, glabris. *Bracteæ* ad basin pedicellorum elongatæ, apice præcipue pubescentes; bracteolæ petaloideæ, lineari-oblongæ, ±2 cm. longæ, ±acutæ. *Calyx* in toto 9–10 mm. longus, tubo cylindrico vel turbinato ±5 mm. longo, dentibus 4, latis, cucullatis, valde imbricatis. *Petala* 0? *Stamina* sæpissime ±20. *Ovarium* stipitatum, tomentosum, ±2-ovulatum; stylo stigmate capitato, obtuso.

Hab. S. NIGERIA: Eket District. *Talbot* 3141 (type in Herb. Mus. Brit.).

Closely allied to *H. Bakeriana* Hutch. & Dalz., differing chiefly in the fewer, larger leaflets with longer internodes (4–6 cm.) and the more elongate, glabrous inflorescence. The petals are either absent or very minute.

I have placed this in *Hymenostegia* on account of its resemblance to *H. Bakeriana*, but in some respects it approaches the genus *Talbotiella*, having narrow bracteoles, a funnel-shaped receptacle, and no petals.

Talbotiella Batesii Bak. fil., sp. nov.

Arbor vel frutex? ramulis lignosis cortice griseo-brunneo tectis. *Folia* paripinnata, rhachide leviter pubescente, foliolis ±12-jugis, oppositis, oblique oblongis, apice obtusis, basi obliquis, unilateraliter auriculatis, subcoriaceis, utrinque glabris vel subglabris, ±15 mm. longis, 5–6 mm. latis. *Stipulæ* caducæ. *Bracteolæ* lineares, acutæ, membranaceæ, ±5 mm. longæ. *Flores* in racemos laxos, breves (2–3 cm. longos) ad basin bracteatos dispositi, rhachide villoso, pedicellis gracilibus, 6–8 mm. longis, leviter hirtis. *Calyx* receptaculo breviter infundibuliforme, sepalis 4, ±4 mm. longis, subæqualibus, latis, subglabris vel leviter puberulis. *Petala* 0. *Stamina* 10. *Ovarium* villosum, subsessile, 2-ovulatum, stylo curvato, glabro. *Legumen* applanatum, oblongo-oblanceolatum, apice truncatum et uno latere apiculatum, sutura superiore brevissime alatum, glabrum, coriaceum, leviter rugosum, ±6·5 × 2·5–3 cm.

Hab. CAMEROONS: Bitye, Yaunde, *G. L. Bates* 1596 (type in Herb. Mus. Brit.).

Differs from the other two members of the genus in the size and number of the leaflets, length of pedicels, and size of flowers. It is noticeable on account of the very abruptly truncate pod.

Eurypetalum Batesii Bak. fil., sp. nov.

Arbor sec. cl. detect. 50–75 pedalis, caulibus fasciculatis, ramulis cinereo-corticatis. *Folia* 1–2-juga, jugis proximalibus foliolis suboppositis, distalibus oppositis, foliolis petiolulatis (petiolulis 4–5 mm. longis) inæquilateraliter ovato-oblongis vel oblongis, subcoriaceis, utrinque glabris, apice acuminatis, basi cuneatis 7–11 cm. × 40–45 mm.; petiolo pubescente 10–12 mm. longo. *Stipulæ* deciduæ. *Flores* albi paniculati; pedicellis fusco-puberulis; bracteolis minutis alabastris multoties brevioribus. *Calyx* in toto 4–5 mm. longus lobis 4, concavis, glabris. *Petala* 5, uno calyce majore ±5 mm. longo, 7–8 mm. lato, reliquis minimis, 0·5 mm. longis. *Stamina* 10, exserta, filamentis filiformibus. *Ovarium* hirtum, 2-ovulatum, stylo brevi incurvo, stigmate parviusculo. *Legumen* ignotum.

Hab. GABOON: Angoni, 70 miles E. of Gaboon, *G. L. Bates* 558 (type in Herb. Mus. Brit.).

"Tree 50–75 ft. high with several stems in a cluster. An inferior red-wood of commerce."

Differs from *E. unijugum* Harms by the smaller 1–2-jugate leaflets and puberulous rhachis of the inflorescence, and from *E. Tessmanni* Harms by the smaller petals and more acuminate leaflets.

Cylicodiscus Battiscombei Bak. fil., sp. nov.

Arbor elata usque ad 90–100-pedalis alta, cortice lævi pallide griseo. *Folia* pinnis sæpissime 2-jugis, glandulis interjugis conspicuis; foliolis ±3-jugis, oppositis, glandulis interjugis, obovatis vel rhomboideo-obovatis, basi cuneatis apice sæpissime obtusis, glabris, distalibus sæpe inæqualibus, quam proximalibus majoribus, 3·5–5 cm. longis, 2–3 cm. latis, proximalibus 1·5–2·5 cm. longis, 10–15 mm. latis. *Flores* parvi in spicas multifloras paniculatas dispositi. *Calyx* campanulatus, vix 1 mm. longus, dentibus minutissimis, sparse puberulus. *Petala* pubescentia, lineari-lanceolata, ±2·5 mm. longa. *Stamina* 10, antheris rotundatis, glandulis sessilibus. *Ovarium* hirsutum, basi disco cinctum, multi-ovulatum. *Legumen* valde elongatum, glabrum, coriaceum, marginatum, ±60 cm. longum, ±28 mm. latum, venosum, seminibus oblongis, alatis, applanatis, tenuibus, ±75 mm. longis, 20 mm. latis, funiculo ad extremitatem affixo.

Hab. KENYA COLONY: *Battiscombe* 93 (type in Herb. Kew.); *Webber* 607.

"Tall tree; coast forests."

This species differs from *C. gabunensis* Harms in having smaller obtuse, opposite leaflets and pinnæ in two pairs, both pinnæ and leaflets with conspicuous glands between the pairs. The pod of both species is like a very large *Piptadenia* pod. *P. Elliotii* Harms (*Scott Elliot* 4792) may, when fruit is available, prove to be congeneric; the foliage is similar to *C. Battiscombei*.

Acacia Hermannii Bak. fil., sp. nov.

Arbuscula ±5 m. alta, ramis anfractis, cortice albido-cinereo vel griseo-brunneo tectis. *Folia* elongata, curvata, pinnis numerosis 30–40-jugis, ±3 cm. longis, rhachide glabro vel sparsissime puberulo; foliolis parvis, ±30-jugis, 2·5–5 mm. longis, ±1 mm. latis acutis, obliquis, glabris. *Stipulæ* spinosæ, rectæ, fuliginæ, 2–4 cm. longæ, divergentes. *Flores* pallide rosei in capitula dispositi, pedunculo brevi, pubescente, 10–15 mm. longo, involucro ad medium vel infra medium disposito. *Calyx* brevis, dentibus parvis pubescentibus, in toto vix 1 mm. longus. *Petala* lineari-elliptica, ±3·5 mm. longa, glabra. *Stamina* longe exserta, ±6 mm. longa. *Legumen* valde elongatum, angustum, multispermum, breviter stipitatum, 20–22 cm. longum, ±5–7 mm. latum, glabrum, extus atro-brunneum, intus stramineum.

Hab. TANGANYIKA TERRITORY: Singida District, nr. Manyugi, ±4500 ft., *B. D. Burtt* 1379 (type in Herb. Mus. Brit.). Native name "mkese." The following are conspecific:—Kondoa, Irangi, *B. D. Burtt* 1463; Tabora, *Holtz* 1498 (Herb. Berol.).

"Very thorny small tree approx. 15 ft. high; flowers pale pink; fruit long and slender. Growing in *Commiphora-Grewia* thicket."

This species is named in honour of Dr. H. Harms, who has kindly assisted in the determination of many East African Acacias. It is noticeable on account of the zigzag branches, the numerous pairs of short pinnæ and the very elongate narrow pods. It is allied in some respects to *A. Seyal* Del.

Albizzia tanganyicensis Bak. fil., sp. nov.

Arbor alta teste cl. detect. cortice membranaceo ochraceo. *Folia* pinnis 3–5-jugis; foliolis 5–10-jugis, sessilibus, maturis late oblongo-ovatis, leviter inæqualibus, basi truncatis vel levissime subcordatis apice obtusis mucronatis, glabris, 25–35 mm. longis, 20–28 mm. latis; junioribus parvioribus, apice acutis, ±22 mm. × 10 mm. *Flores* numerosi, capitati, pedunculo 25–30 mm. longo. *Calyx* infundibuliformis, puberulis, ±4 mm. longus, dentibus parvis triangularibus, vix 1 mm. longis. *Petala* paulo ultra medium connata, lanceolata, extus ad apicem pubescentia, 8–9 mm. longa. *Stamina* numerosa, ad basin ±5 mm. connata, longe exserta. *Ovarium* parvum, glabrum, stylo elongato. *Legumen* (No. 1946) oblongum, glabrum, applanatum, marginatum, 5–12-spermum, 12–25 cm. longum, 3·5–4 cm. latum.

TANGANYIKA TERR.: Kondoa Dist., Simbo Hills, alt. 5000 ft. and over, *B. D. Burtt* 716 (type in Herb. Mus. Brit.); native name "mapi" (Sandawi); Kondoa Dist., Hundwe, *B. D. Burtt* 1946 is conspecific.

"A tall tree in *Brachystegia* forest." This belongs to Section *Eualbizzia*, and is remarkable on account of its rather large glabrous leaflets in 5–10 pairs. It is allied in some respects to *A. Lebbek* Benth. (*Eualbizzia* § *Obtusifoliæ*), and differs chiefly by the broader leaflets.

THREE GENISTAS OF THE LINNEAN HERBARIUM.

BY C. C. LACAITA, M.A., F.L.S.

1. *Genista anglica*; it is surprising to find that the plant on the only sheet where Linnæus has written this name, No. 18 in Dr. Jackson's order, is not that species at all, but a Portuguese specimen of *G. triacanthos* Brot., sent by Alstroemer with a label in his hand, "Porto, rarius cum *Ulice vulgari*." Smith long ago pencilled "?" against the *G. anglica* written by Linnæus. *Genista triacanthos* is very plentiful in the heathy pine-woods north of Oporto.

Pinned to this sheet are two others. The middle sheet bears no writing by Linnæus. It shows a scrap, *sine loco*, of what obviously is *G. anglica*. On the lowest sheet he has written "*purgans* L. 231 *b*," implying that he had received the specimen from Loefling from Spain under that number. Smith has annotated "*Spartium scorpius*? *Genista purgans*, Sp. Pl. ed. 2, nec *Sp. purgans*, Syst. Nat. ed. 12, 2, 474." I do not understand Smith's note, nor dare I attempt to determine so scrappy a specimen. It has no resemblance to *G. anglica*, and, whatever it be, should never have been pinned to either of the other two sheets.

2. *Genista lusitanica*; the solitary specimen, No. 27 in Dr. Jackson's order, is not a *Genista* at all, but *Ulex aphyllus* from Setubal, in Portugal. This also came from Alstroemer with his label: "*Ulex aphylla, spinis ramosis, floribus terminalibus*, No. 26. St. Ybes in collibus copiose."

3. *Genista tridentata*; of this there are two examples. No. 8 of Jackson's order was sent by Alstroemer as "*Ulex*? Carqueja in Lusitanis australioribus." This is one of the narrow-winged forms—either *Genista stenoptera* Spach or *G. scolopendrina* Spach. The other, no. 9, marked A. 160, and therefore probably also sent by Alstroemer, is *sine loco*, and has no label. It is a broader-winged form—I think the one called by Spach *G. tridentata* as typically representing the Linnean species.

These specimens, like many others in the Herbarium, show that father Linné was not only occasionally—*quandoque*, as Horace says of Homer—but often overcome by somnolence when handling his *hortus siccus*. No wonder; it is a dry-as-dust occupation. None of those mentioned can by any possibility be regarded as type-specimens, for reasons stated below. None but those of *G. tridentata* either add to or detract from the words of Linnæus's writings; still less do they afford any ground for rejecting these species of his as "*nomina confusa*."

With regard to *Genista anglica*; no specimen from Alstroemer, who travelled in Spain between 1760 and 1764, can have any bearing on a species mentioned, as this one is, in the Sp. Plant. of 1753. This consideration puts no. 78, the Oporto plant, out of court. The reason why the sheet labelled "*purgans*" must also be excluded is a different one, though coming from Loefling it might have formed the type of a 1753 species as far as date is concerned.

But it is quite irreconcilable with the diagnosis of *G. anglica*, which is a mere repetition of the phrase in Hort. Cliff. 355, where the fuller quotation of synonyms, as well as the habitat, conclusively prove that the English plant is meant. We may safely conclude that the *purgans* specimen became accidentally attached to the other two, and that Linnæus mistook, on hasty inspection, the Portuguese specimen for his own species, to which it bears a slight resemblance.

As to *Genista lusitanica*, there is the same chronological impossibility that Alstroemer's *Ulex* can be the type, as this name also dates from 1753. I have failed to discover why Linnæus called his species "*lusitanica*," for it is based entirely on Clusius's "Scorpius II," first figured in Rar. Stirp. Hisp. (1576) 212, which the author says that he had never seen except on the hills near Granada on the road to Cordoba, where it was called "Molino." The Bauhin synonyms add nothing to this. I strongly suspect that Linnæus never saw the plant, and that his diagnosis "*Genista caule aphyllo, spinis decussatis*" was drawn up from Clusius's figure alone.

This suspicion is encouraged by the fact that the name *lusitanica*, though published in 1753, was not underscored by Linnæus as existing in his herbarium till the 12th ed. of the *Systema Naturæ* (1767). Probably that underscore did relate to Alstroemer's *Ulex* and is a mere misidentification. We have therefore no clue to the meaning of *G. lusitanica* except the words and figure of Clusius.

Unfortunately, doubts have been expressed by Willkomm, Prodr. Fl. Hisp. iii. 422, as to the identity of the Clusius plant itself. I agree with Boissier, Voy. p. 725, and am convinced in my own mind

that it is *G. Boissieri* (called by Boissier *G. horrida*), as it should be *ex loco citato*, in spite of Willkomm's objection that *Boissieri*—as known to him—is a plant of high mountains, for I have myself seen it plentifully near Cazoria and Huelma in the province of Jaen at altitudes very little greater than that of Granada itself. In favour of the identification with *Boissieri* is the figure itself, which shows a less rigid plant than "*lusitanica*," and especially, indeed conclusively, the first words of Clusius, "pedis altitudinem raro superat," "*lusitanica*" being a much larger bush.

If this be admitted, *G. Boissieri* would be replaced by *G. lusitanica* L., excl. loco "Lusitania," and *G. lusitanica* auct., non L., would presumably become *G. Barnadesii* Graells var. *lusitanica*; for *G. Barnadesii*, as already pointed out by Pau, cannot really be specifically separated from *G. lusitanica* auct.

Yet, unless and until Spanish botanists accept these conclusions and confirm them, as they easily can, by careful exploration of the hills to be crossed, in Clusius's time, on the way from Granada to Cordoba, it may be better not to disturb the customary nomenclature.

In the case of *Genista tridentata* again, neither of the two Alstroemer sheets can be a type, for the same reason as before, though they are quite rightly so named. Linnæus tells us that Loefling sent him the plant from Portugal, and the name is underscored in his own copy of Sp. Pl. 1753, proving that he already possessed a specimen, as explained by Dr. Daydon Jackson in his *Index to the Linnean Herbarium*, p. 8. What has become of the Loefling specimen that he had at that time? Can the writing A. 160 on sheet no. 9 have been a slip of the pen L. 160? But such a slip could not have been made till a good many years after any specimen from Loefling was already in the collection.

FUSIDOMUS

(PSEUDOGENUS NOVUM, E NECTRIOIDEIS).

BY W. B. GROVE, M.A.*

PYCNIDIA cyaneo-violacea, mollia, laxe cellulosa, subglobosa. Sporulæ fusoideæ, lunulatæ (an semper?), acutiusculæ, septatæ, ±hyalinæ v. coacervatæ roseæ, pedicellis ramosis hyalinis turgidis suffultæ.

The spores resemble, or are even identical with, the *Fusarium* spores generally associated with *Gibberella*, but differ from them in being contained in a complete all-round pycnidium like a perithecium in shape.

This form-genus is, strictly speaking, an unnecessary one, since it is admittedly merely a stage in the development of *Gibberella*. The object in giving it a name is to focus attention upon a state of things still obscure, and probably by no means of common occurrence. The facts are referred to in a few words, buried in a mass of text in Saccardo's *Sylloge* and hardly noticeable, in still fewer words in

* Other references discovered since this article was printed will appear in a subsequent number.—W. B. G.

Rabenhorst's *Kryptogamen-Flora*, and hardly anywhere else. But they deserve more explicit treatment; one may find *Fusidomus* without a sign or a hint of any ascophore.

Six form-species are known or implied :—

(1) *Fusidomus pulicaris*, on *Sambucus*.

This corresponds to the "macrostylospores (?)," which Saccardo reports in his *Sylloge*, ii. 552, under *Gibberella pulicaris*. Spores oblong-fusiform, curved, 3-septate, constricted at the septa, hyaline, $26 \times 6\ \mu$.

(2) *Fusidomus Arcus*, on *Arctium*, described below. Probably belonging to *G. Saubinetii*.

(3) *Fusidomus Euonymi*, on *Euonymus*. This is the "status pycnidicus" described, under *G. Euonymi*, by Fuckel (Symb. Myc. p. 167), and as a *Hendersonia* by Saccardo (Syll. ii. 556). It is again recorded, under the inappropriate name of *Stagonospora Euonymi*, by Saccardo (Syll. iii. 447), by Diedicke (Krypt. Brandenb. p. 555), and by Migula (Thome's Krypt. Flor. 3, i. 346). Spores oblong, 1–4-septate, $20–24 \times 6\ \mu$, reddish in mass.

(4) *Fusidomus ficinus*, on *Ficus*. This is hinted at by Saccardo (*ibid.* p. 556), under *G. ficina* :—"Stylospores (?) lanceolate, obtuse, somewhat curved, 3-septate, hyaline, $30 \times 8\ \mu$." These words are quoted from Cooke and Harkness (Grevill. ix. 87), where they say under *Gibbera ficini* : "Asci and sporidia not seen. Stylospores evidently different from those of *G. pulicaris*."

(5) *Fusidomus moricola*, on *Morus*. See Saccardo (*ibid.* pp. 553–4), under *G. moricola*.

(6) *Fusidomus cyanogenus*, on *Brassica*. Winter says (Kr. Flora, p. 102) : "Stylospores like the ascospores, 3-septate, but smaller, narrower, and more pointed."

Fusidomus Arcus, sp. nov.

Pycnidia subglobosa, superficialia, interdum subaggregata, usque ad $600\ \mu$ diam., atra ; contextu crassiusculo, e cellulis magnis cyaneo-violaceis conflato. Sporulæ copiosæ, fusiformes, hyalinæ, triseptatæ, $25–35 \times 4\ \mu$, pedicellis fasciculatis ramosis suffultæ.

Hab. In caulibus emortuis *Arctii Lappæ*, Himbleton, Worcs (Rhodes), April.

The lunulate spores have the acute ends bent slightly to the inside of the curve so as not to form a continuation of its outer boundary. The cells of the branchlets of the pedicels, just below the spores, are more or less ampulliform or oblong-turgid, and wider than the spores. This species differs from *F. pulicaris*, which I have found on thin dead stems of *Sambucus* at Walmley, near Sutton Coldfield, in having narrower spores and less cæspitose, scarcely crowded, pycnidia. There were no ascophorous conceptacles accompanying either of these pycnidia.

Since *Gibberella Saubinetii* occurs on all sorts of herbaceous stems and upon thin stems of *Buxus* etc., it seems likely that the species here described is the same as was called *Hendersonia Arcus* by Berkeley and Broome (in Ann. Nat. Hist. 1850, 2, v. 373) as occurring on box twigs (see Cooke, Handb. p. 435). I have examined Berkeley's specimen of *H. Arcus* (*Stagonospora Arcus* Sacc. Syll. iii. 449) in the Kew Herbarium ; there is very little of it, but some of the pycnidia agreed in having *Fusidomus* spores, measuring $20–25 \times 3–4\ \mu$, in blue-celled conceptacles. Most of the pycnidia, however, belonged to *Phomopsis stictica*. It must be remembered that in Berkeley's day *Stagonospora* was not distinguished from *Hendersonia*—in fact, the genus *Hendersonia* was instituted by Berkeley in honour of his friend, Mr. J. Henderson, on what is now called *Stagonospora elegans* Sacc. & Trav. (*H. elegans* Berk.).

The explanation of these occurrences seems to be that the mycelium, which ordinarily produces the *Fusarium* spores, is here growing and producing them within a peridium that under other circumstances would have borne only asci and ascospores. The references to this event in literature have hitherto been curiously scattered or mistaken.

ECONOMIC MYCOLOGY IN THE EMPIRE OVERSEAS.

Dr. E. J. Butler, in his Presidential Address to the Mycological Society, recently published in the Society's *Transactions* (xiv. pts. i. & ii., March 1929), took as his subject the rise and development of economic mycology in the more distant parts of the Empire.

The first detailed study of a fungal disease of a tropical plantation crop was Marshall Ward's investigation of the coffee-leaf disease of Ceylon, begun in 1880, a date which marks the beginning of economic mycology in the Empire overseas. His was the first of a number of tours made by men specially sent out to deal with a particular problem. The first step in the establishment of a Government mycological service was made by Australia when, in 1890, two whole-time appointments to permanent posts in phytopathology were made under the State Departments of Agriculture of Victoria and New South Wales. But the development of economic mycology, which is measured to-day by the number, about one hundred, of mycologists and plant-pathologists in Government service in the Dominions, Colonies, and Protectorates, has come about almost entirely since the beginning of the present century. It has resulted from the tremendous increase during that time in the demand for the agricultural produce of these countries. It is not entirely on the efforts of Government workers that the advance has been dependent. In Australia and Canada, workers in the Universities have made important contributions, while such bodies as the Ceylon Planters' Association and the Rubber Growers' Association of Malaya have played a large part in the organization of research. In the Federated Malay States, indeed, the extraordinary wave of prosperity that swept over the country as a result of the huge growth in the demand for rubber led to a fierce competition between the industry and the Government Departments

for the services of scientific men. This competition reacted unfavourably on the Government Departments concerned, and seriously affected the organization of the mycological work. The situation has had a marked effect on the development of economic mycology in Malaya. The attention of individual workers was, as a rule, focussed on single problems, and the bulk of the work done has been the monographic study of individual diseases and their control. The lack of co-operation between the Government Department and the various workers in private employment led to much overlapping and waste of effort; the recent foundation of the Rubber Research Institute of Malaya jointly by the Government and the planters themselves can be directly traced to this cause.

Mycological developments in India, South Africa, and the West Indies date from the establishment of Government posts in the agricultural or botanical services at the beginning of the century. In India the tea industry also early recognized the value of a scientific department, and several of the early mycological investigations were concerned with the diseases of the tea-plant. India was, incidentally, the first of the tropical dependencies to take up seriously the study of the diseases of crops grown by the people themselves, as distinct from the plantation crops grown under white supervision mainly for export.

In British tropical Africa, as might be expected, mycological research has been dependent on Government enterprise. The work in these colonies has been naturally determined mainly by the nature of the local agriculture. Though no longer a part of the Empire, Egypt deserves mention on account of the pioneering work on cotton diseases carried out by Mr. Lawrence Balls.

For various reasons, outbreaks of plant-disease in newly-developing countries are of a much more severe type than are usually encountered at home. Furthermore, the economic mycologist overseas is fortunate when he has to deal with a known parasite with the means of control already worked out. Failure to cope with an epidemic in time to prevent serious consequences is still all too frequent, owing to the obscurity of the disease or want of time for working it out. Such cases make the observer feel that no increase in the number of men engaged in the struggle against plant-disease can be too rapid, and that no field of mycology better repays cultivation than that worked by the mycological and plant pathological departments overseas.

B. J. Rendle.

SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES.

The thirty-fourth Annual Congress of the Union was held at Brighton from June 5–8 under the Presidency of Sir Arthur Keith, F.R.S., who gave a very interesting address on "Southern Englishmen of the Pre-Roman and Roman Period." The meetings were held in the Royal Pavilion. Mr. A. D. Cotton, F.L.S., Keeper of the Kew Herbarium, succeeded Mr. C. E. Salmon as President of the Botanical Section, which met on Thursday morning.

Mr. Cotton's address was entitled "The Importance of the Study of Systematic Botany." He emphasized the necessity and fundamental nature of this branch of science, and alluded to the fact that the value of a training in taxonomy was not always appreciated. Taxonomy was not encouraged at the Universities, and systematic theses were not as a rule accepted for University degrees. While fully admitting the value of other branches of botany and the fact that some of these were more suited for revealing the skill and reasoning powers of the graduate student, it was unfortunate that, at the present time, when activity was so great with regard to systematic and economic botany within the Empire, as a result of lack of encouragement there was a dearth of properly trained men. The nature, scope, and importance of the various departments of systematic work were then treated under the following headings:—(*a*) historical and bibliographical, (*b*) nomenclatural, (*c*) monographic, (*d*) geographical and floristic, and (*e*) phylogenetical.

In the case of floras of new countries or those which are very imperfectly known, it was pointed out that nothing can equal the time-honoured method of ordinary herbarium research, but in the case of well-known floras, such as those of most countries of Europe, the matter was different. Present-day work in these countries usually consisted in the search for new records, or intensive studies of limited areas, the result of which was seen in the publication of revised Floras or new Local Floras. Useful as this work is, Mr. Cotton held that an even more valuable field for research was to endeavour to acquire by observation and experiment a more precise knowledge of the status of the innumerable doubtful units in the supposedly well-known flora. To assist in the elucidation of these problems, it was suggested that the aid of ecology, biology, and genetics (including cytology) should, if necessary, be invoked. The manner in which these branches of botany could assist was outlined, and attention was drawn to the proposed Biological Flora of Britain to be published by the British Ecological Society, for which Dr. E. J. Salisbury was collecting data. Special emphasis was placed on the assistance that controlled breeding experiments would be likely to yield in showing whether those numerous forms which occur in certain genera and to which names had been given were not merely transient segregates or back crosses.

In conclusion, the value of specialization and co-operative effort amongst members of Field Clubs and Natural History Societies in this country was emphasized in the direction of both monographic and floristic studies. In the Colonies and abroad there was still ample opportunity for travellers to assist science by sending home well-dried collections. Such collections added to the stock of material in National Herbaria, and this would in time be worked up and the records incorporated in published Floras.

A final appeal was made to students and professional botanists. The need and opportunities for sound systematic work were never

greater than they are to-day, whether it be in intensive critical work on small groups often in association with the geneticist, or in floristic and monograph work on the floras of the vast territories of the Empire or other countries of the world.

Mr. George Morgan, F.R.C.S., read a paper on "The Etiology of Sphæroblasts or Wood-nodules," the isolated nodules of very varying size that are found in the cortex of many trees, such as beech, holly, and others. Mr. Morgan maintained, contrary to the generally-accepted view, that the nodules had no connection with the wood-cylinder, but were the result of the development of minute portions of the plerome which had become detached from the central cylinder. They were comparable with tumours in the animal world, which resulted from an invagination of the epithelial tissue and reproduced epithelial characteristics in unusual places in the body.

Dr. Rendle reported the progress that had been made towards the collection of material for the Survey of the Flora of Sussex, and emphasized the importance of careful collecting and checking of previous records.

At the business meeting of the section Lt.-Col. A. H. Wolley-Dod was unanimously elected President for the year 1930–1.

On Thursday afternoon a party of botanical members visited Major F. Stern's garden at Highdown, near Goring. This garden is interesting as being at the foot of the chalk Downs, and a large part of it is on the site of an old chalk-pit. It contains a very large collection of choice trees and shrubs, and also herbaceous plants and alpines, the owner having specialized on Chinese and New Zealand plants. Amongst the former are many plants raised from seed sent home by well-known collectors such as R. Farrer and G. Forrest. Major Stern's method is not the usual one of putting plants in pockets of soil made in the chalk, but rather to fork up the chalk to a depth of 1–3 ft. as desired, place his plants in the thin layer of soil on the top, and let them root down into the pure chalk. In the case of many trees and shrubs unexpected success had been obtained, and the vigorous growth of the collection of rare plants he has got together shows what can be down, even under such unpromising conditions.

Of particular interest was a small collection of Rhododendrons from the Lichiang Range, Yunnan. The genus, as is well known, is very intolerant of lime, but in a shady corner of the garden, where a certain amount of leaf-soil has been incorporated with the chalky loam, species from the Lichiang Range, which consists of a form of limestone, will grow and thrive.

On Friday, June 7, a ramble to Shoreham beach was conducted by Miss A. J. Cottis and Mr. H. J. Smart, supported by Mr. A. D. Cotton, President, and Mr. C. E. Salmon, the retiring President.

It was considered advisable to concentrate attention on the plants of the sea-shore. The beach is a more or less dry shingle on the eastern side, with small patches of vegetation and many interesting plants pushing up among the stones. The whole beach was under the influence of the salt spray, and little distinction could be drawn between the plants near or far from the sea. Among the plants noted

were *Arenaria serpyllifolia* var. *viscidula* Roth, *Trifolium scabrum* L., an abundance of *Anthyllis Vulneraria* L. on the shingle, very stunted in growth and forming a marked contrast to the tall cliff form. Grasses of interest were *Festuca Rottboellioides* Kunth, the shore form of *Bromus hordeaceus* L., with its short, clustered panicle and glabrous spikelets, and the rare *Glyceria Borreri* Bab., which grew in some brackish water at the edge of the beach.

On the western part of the shore, which was separated from the eastern by a wide channel, there was a marked change of soil-conditions; the shingle was less in evidence, its place being taken by mud-flats with the accompanying vegetation; the dominant plant *Armeria maritima* Willd. was in full flower and added a pleasing colour to the scene. Among the rarer plants seen were *Medicago falcata* L. and *Frankenia lævis* L.

DURIÆI ITER ASTURICUM BOTANICUM.

By C. C. Lacaita, M.A., F.L.S.

[Continued from p. 154.]

11. Linaria Perezii Gay & Dur. [Dur. Pl. Astur. 260.]

L. pilis brevissimis, inarticulatis, glanduliferis tota pubescens, caule solitario, erectiusculo, multiramoso, ramisque patulis ferè ad apicem usque foliatis; surculis nonnullis brevibus ad basin fertilium; foliis surculorum lineari-lanceolatis, 4–5-verticillatis, caulinis multò longioribus latioribusque, lanceolatis, inferioribus 5-verticillatis, reliquis alternis, rameis remotè sparsis; floribus paucis, demum breviter denseque racemosis; pedicellis brevissimis, erectis; segmentis calycinis lineari-lanceolatis; corollæ (luteæ) labio superiore erecto, ovato, emarginato, inferiore latè trilobo, palato (aurantiaco) convexo, hirsuto, calcare corollam excedente, conico-subulato, acuto; stylo indiviso, apice parum dilatato; capsula asperula, valvulis 6 dehiscente; seminibus transversè ellipticis, compressis, latè marginatis, disco tuberculato.

Habitat in Asturiæ pedemontanæ petrosis et rupibus apricis, singulatim ad *S. Annam*, propè oppidum Cangas de Tineo, quo loco illam, præeunte Perezio, florentem et fructiferam, 4ª Jul. 1835, legit cl. Durieu. Don Perea is est quem in cathedra botanica Matritensi obtinenda, antè annum 1778 competitorem habuit Ortega. Eidem viro, ni fallor, dicatum *Perezia*, Compositarum genus, ann. 1811 a Lagasca constitutum et à Lessingio (Synops. Gen. Compositi, p. 408) nuper receptum. Nunc senex octogenarius, sed vivax et rei herbariæ amore adhucdum fragrans, Asturiæque eximium decus. Hunc, in Asturiam appulsus, mox patronum ardentissimum expertus est Durieus. Furebat civile in finitima Cantabria bellum et suspiciones, omnem quemque advenam prementes, circum circà movebat. Perezius verò gallum nostrum domo sua excepit et sui nominis auctoritate, suo indefesso patrocinio, contrà omnes et ipsum diffidentem provinciæ præfectum, in summos usque Asturiæ montes prosecutus est. Plantam

asturicam habeat cognominem vir doctus et optimus, cui itineris sui qualescunque fructus se debere gratus fatetur noster Durieus.

Planta annua, pilis brevissimis, inarticulatis, glanduliferis tota pubescens. *Caulis* in suppetente specimine unicus, 9½ uncias longus, crassiusculus, teres, a basi ad apicem foliatus, basi inclinatus, cæterum erectus, alternè ramosus, ramis 16, laxè foliatis, inæqualibus, inferioribus longioribus, plus minus patentibus, 2–3 superioribus erectis, caulem primarium æquantibus. Hunc basi ambiunt surculi steriles 4, 1–2 uncias longi, erecti, apice foliati, foliis lanceolatis, 2½–3 lin. longis, omnibus verticillatis, verticillis (4–6 numero) 4–5-phyllis. *Folia* caulina inferiora quinato-verticillata (verticillis in specimine suppetente 7), reliqua alterna, ima ut in sterilibus surculis brevia et angusta, deinde sensim sensimque majora, media angustè lanceolata, plana, 6½–9 lin. longa, unam lineam ferè lata, superiora et ramea sparsa, dimidio breviora et angustiora. *Flores* in summo caule et ramis 10–18, conferti, demum racemosi, racemis fructiferis maximum uncialibus. *Pedicelli* erecti, brevissimi, fructiferi vix ultra dimidiam lineam longi. *Bractea* lineari-lanceolata, acuta pedicello longior, demum sæpè deflexa. *Calyx* longitudine pedicelli fructiferi, segmentis lineari-lanceolatis, acutis, viridibus, margine non aut vix membranaceis, primò inæqualibus, superiore proximis ¼–⅓ breviore, demum subæqualibus et distinctis, non imbricatis. *Corolla*, calcare addito, 5 lin. longa; tubus longitudine calycis, cylindraceus; labium superius erectum, replicatum, luteum, ovato-oblongum, profundè emarginatum (in tertiam partem fissum), lobis divergentibus, ovatis; labium inferius paulò longius, trilobum, aurantiacum, palato convexo, hirsuto, in siccis non punctato, lobis integerrimis, elliptico-subrotundis, intermedio lateralibus paulò longiore et latiore, calcare 2½ lin. longo, conico, acuto, rectiusculo. Antheræ glaberrimæ, albidæ. *Stylus* compressus, filiformis, glaberrimus, indivisus, apice parum dilatatus. *Capsula* calyce demum ⅓ longior, globosa, apice non emarginata, pilis brevissimis, rigidulis, non glanduliferis tota asperula, utroque loculamento valvulis tribus, brevibus, erectis, latè ovatis dehiscente, placenta in singulo loculamento alato-tricostata. *Semina* (ut in *Spergula vulgari* Bönningh.) compressissima, latè marginata, transversè elliptica, disco tuberculato.

Obs. Novæ speciei locus in Chavannesii monographia in *Linastrorum* § V. divis. *d* (seminibus discoideis, orbiculatis, margine brevi cinctis, disco tuberculato), in qua species euumerantur septem, præter *glaucam* omnes à nostra diversissimas. Ipsa verò *glauca*, secundum specimina nostra, aliaque multa in herb. Juss. Desf. et Deless. examinata, differt radice multicauli, caulibus brevioribus, verè adscendentibus, foliis caulinis plus dimidio angustioribus, pilis (ejusdem naturæ, undè precipua affinitas) paucissimis, sparsis, in parte inferiore et media sæpius omnino desideratis, floribus in summitate caulis et ramorum paucissimis, maximum 4, et tubo corollino duplum calycem æquante. Aliqua etiam nostræ cum *L. saxatili*, agmen antecedentis divisionis claudente (Chav. Monogr. p. 167), præsertim ob folia caulina verè lanceolata et pilos in speciminibus quibusdam glanduliferos, intercedit affinitas. *L. saxatilis* verò radice gaudet perenni et multicauli, pilis is tota superficie densissimis elongatis et septiferis, capsula ovata, non globosa, seminibus denique minus distinctè marginatis, fortè omninò immarginatis, quamvis compressis, undè locus ei tribuitur in alia generis divisione. Est itaque a *L. Perezii* nostra distinctissima.

12. Scrophularia scorodonia L. [Not in Dur. Pl. Astur.]

Quoad geographicam distributionem hucusque pessimà cognita, quam, certis documentis, maximè occidentalem et quasi oceanicam esse comperi. Habitat enim in Cornubia, Angliæ australis, auctoribus Lloyd et Hudson; in Cæsarea insula frequentissimè, me, post Sherardum, anno 1832 observante. Mirum quod in proxime Sarnia deficere videtur, ibi certo, anno 1832, frustrà quæsita. In Neustriæ inferioris loco plus uno, Cherbourg, Heugeville, Granville etc. quibus ipse eam legi; in Armoracia circà Corisopitum, ex Bonnemaison; in tota inferiore Asturia, ex nostro Durieo; in Gallecia hispanica, ex ore Lagascæ; denique in Lusitania tota (testibus Hoffmans. et Link in flor. Portug. i. p. 173), ultrà quam, austrum versus, non progredi videtur.

Plus quam dubii mihi sunt et confusione in *S. Scorodoniæ* historiam introducti videntur loci omnes extrà hanc angustissimam ulterioris Europæ occidentalis zonam citati, ager Tunetanus, Sicilia, Nicæa, Galicia austriaca, Sibiria (conf. Wydl. Monogr. p. 29) et Byzantium (Smith Fl. Græc. Prodr. i. p. 436). Sibirica stirps verisimiliter ad *S. altaicam* Mürr., Galicica ad *S. Scopolii* Hopp., Byzantina ad *S. Castagneanum* Wydl., Nicæensis ad *S. alpestrem* referenda. Sicula ad Tenorii *S. grandidentatam* pertinet, et tum ab *alpestri*, tum a *Scopolii*, aliter sentiente Gussone (Pl. rar. p. 255), pilis eximiè septiferis aliisque notis certo differt. Eadem fortè erit Tunetana *S. Scorodonia*, a Fontanesio in Flor. Atl. descripta.

Veram *S. Scorodoniam* alio loco fusius describam. Meminisse nunc sufficiat illam a sequente *alpestri* diversissimam esse, ob caulem longè ramosum, folia bullato-rugosa, pilos densiores et septiferos, pedicellos ad apicem usque glanduloso-pubescentes, calycis segmenta pubescentia, margine eroso-dentata et corollam (recentem) foris purpureo-fuscam, lobis 2 superioribus concoloribus, duobus intermediis utrinque partim purpureo-fuscis, partim lutescentibus, inferiore utrinque luteolo. In horto Luxemburgo parisino, *alpestri* integro ferè mense præcocior.

13. Scrophularia alpestris Gay. [Dur. Pl. Astur. 262.]

S. perennis, pilis non septiferis brevibus, ad nodos et in utraque foliorum pagina longioribus, in superiore plantæ parte glanduliferis, tota laxè pubescens; caule simplici; foliis cordato-ovatis vel ovato-oblongis, crenatis serratisve, impunctatis; panicula terminali, demum elongata, basi foliata, cymis 3–10-floris, pedicellis fructiferis elongatis, teretiusculis, apice glaberrimis; calycis perindè glaberrimi segmentis latè ovatis, integerrimis, obtusissimis, sordidè albo-marginatis; anthera sterili transversè oblonga, retusa vel submarginata; capsula ovata, acuminata.

Scrophularia major hirsuta Tournef. Inst. (1700) p. 161.

S. Scopolii Lois. Notic. (1810) p. 95; Lapeyr. Abr. Pyr. (1813) p. 356; Decand. Fl. Fr., Suppl. (1815) p. 46; Bertol. Amœn. Ital. (1819) p. 382; Benth. Cat. Pyr. (1826) p. 120; Duby, Bot. Gall. i. (1828) p. 347; Lois. Fl. Gall. edit. 2*a* (1828) ii. p. 36; Wydl. Monogr. (1818) p. 31, partim (confundit enim iconem veram *S. Scopolii* cum nostra, et insuper varietatem enumerat glabram, quam ego a Moulinsio acceptam pro *S. nodosa* agnovi) non Hopp. Pers., Koch.

Habitat in alpibus Europeæ australis occidentalis, inter Liguriam orientalem et Asturiam. In alpibus Apuanis (*Bertol.*). In Cebennarum monte Aubrac (*Prost*). In toto Pyrenæorum jugo inter 400 et 1000 hexapodas (*nostra propria experientia*). In Asturiæ occidentalis montibus frequenter, nominatim ad rivum ex lacu montis *pic d'Arvas* in vallem Trecastro defluentem (*Durieu*). Floret Julio ineunte in Pyrenæis, et Junio ineunte in horto Luxemburgo parisino.

Verioris *S. Scopolii* carpatica specimina mihi sunt, a Sadlero et Pauero suppeditata, quibus comparatis non potui non nostram pyrenaicam et asturicam pro diversissima specie habere. Statura enim hisce carpaticis dimidio minor; caulis multò tenuior; folia plus dimidio breviora, exsiccata distinctissimè pellucido-punctata, dentibus brevius densiusque ciliolatis; panicula, cymæ, pedicelli fructiferi longè breviores; pedicelli ad summum usque glandulosi, non apice nudi; glandulæ pedicellorum plures, breviusque stipitatæ; segmenta calycina ferrugineo non albo-marginata; filamenta parcius glandulosa; discus hypogynus minus crassus, et ovarium laxè cingens, non arctissimè amplexans; capsula denique ovato-subrotunda, abruptè mucronata, non ovato-acuminata. Hoc tandem magni momenti est, quod *S. Scopolii* in horto Erlangensi biennem! expertus est Kochius (Deutschl. Fl. iv. p. 407), quum stirps pyrenaica, anno 1824 in horto Luxemburgensi sata, ad hanc usque diem (anno 1836) duravit et quam maximè perennem se declaravit. Distributio geographica etiam, quamvis consideratis solis latitudinis gradibus non multum diversa, tamen omnino alia est. Species enim nostra Europæ maximè occidentalem affectat. *Scroph.* verò *Scopolii*, ex Caucaso per Hungariam in Carniam et Silesiam migravit, et est evidenter originis orientalis, quales sunt *Xeranth. annuum*, *Astragalus vesicarius* et *alopecuroides*, aliæque occidentem versus plus minus progressæ.

Quam ex loco natali et diagnosi eamdem ferè cum nostra crederes, *S. Herminii* Hoffmans. et Link Fl. Port. i. (1809) p. 266, tab. 53, ex descriptione et icone longè differt caule ramoso ramisque elongatis longius pubescentibus, foliis tenuioribus profundius crenatis dentatisque, cymis paucifloris, pedicellis ad apicem usque pubescentibns, antheræ sterilis forma prorsùs alia, nempè (ex icone) cuneate et bifida.

S. nepetifolia Smith in Rees Cyclop. xxxii. (1819) No. 7, procul dubio ex duabus speciebus conflata, quarum neutra in nostram cadit; nempè è *S. auriculata* Scop. (*S. Scopolii* Hopp.) cujus non nisi descriptionem et iconem Scopolianam vidit auctor, et ex alia planta, cujus specimen Tingidi à Broussonetio lectum vidit Smithius. Lobi calycini in utrinque stirpe ferrugineo-marginati, qua nota facilis nostræ albo-marginatæ distinctio.

Radix in nostra non nodosa. *Caulis* simplex, 2–3-pedalis, in apricis firmus, in umbrosis plus minus flaccidus. *Folia* opposita, 3–4-uncialia, inferiora obtusiora, superiora acutiora, omnia nunc crenata, nunc dentata, crenis dentibusque nunc simplicibus nunc dente minore auctis. *Pili* plus minus laxi, diaphragmatibus carentes, in foliorum utraque pagina et ad nodos caulinos longiusculi et quasi subulati, in reliquis partibus brevissimi, in sola paniculæ rachi cum ejus pedunculis et pedicellis distinctè glanduliferi. Pedicellorum tamen pars superior semper glaberrima. *Corolla* (ex viva) foris sordidè fusca, intus sordidè virens, labii inferioris solo lobo medio utrinque viridi. *Antheræ* sterilis rudimentum viride, transversè oblongum; plus minus distinctè emarginatum, dorso glandulis fuscis inspersum.

[To be continued.]

SHORT NOTES.

Colpomenia sinuosa (Roth) Derb. et Sol. in Britain.—This alga, widely distributed in warm temperate and tropical waters, first appeared in this country in 1906, as recorded in the *Kew Bulletin* for 1908, p. 73. The previous year it had attracted attention in France, for the reason that the plants were doing a great deal of damage to the oyster-beds at Vannes by acting as floats to the young oysters, which were being carried away in considerable quantities. During the three years following its appearance as an alien in British waters, it spread rapidly between Land's End and the Isle of Purbeck, but there were no reports of its occurrence east of Dorset.

In view of the fact that an observer failed to notice *Colpomenia* at Swanage in 1926, it had been suggested that the alga had possibly died out as a result of cold winters. It is therefore interesting to record that during a recent visit to Plymouth (April 23rd to 30th) I found it in plenty, despite the even severer conditions of the winter of 1928–29. It was frequently met with both at Wembury Bay on the east of Plymouth Sound, and Cawsand Bay on the west. It was not in evidence on the more exposed shores of Whitsand Bay, also to the west. Specimens varied in size from about 2–10 cm. in diameter, and were mostly growing on *Corallina officinalis*, which is one of the dominant red algæ in the rock-pools near Plymouth.

From an ecological point of view *Colpomenia sinuosa* is an interesting plant. The circumstances which limit its distribution eastwards are not very clear. No doubt the loose nature of the substratum, with its consequent lack of footholds, is a contributing factor, but it hardly seems sufficient to account for the fact that it has apparently never found its way to any of the sheltered rocky parts which occur at intervals on the Isle of Wight and along the shores of Hampshire, Sussex, and Kent.

The strong currents and the unusual tidal conditions in the Solent might be taken into consideration. It seems, however, more probable that the limiting factor is one of temperature.—C. I. Dickinson (Kew).

Asarum europæum L. in Dorset.—Nancy Holloway, aged 13 years, of the Elementary School at Corscombe, Dorset, has found *Asarum europæum* L. on Merrilands Farm in that parish. This is the first time it has been found in Dorset. The discovery has been confirmed by the Rev. A. N. Storrs, Rector of the parish, and the Rev. F. L. Blathwayt, of Melbury Osmund. Its position in a secluded copse proved undoubtedly that it is growing wild. *Asarum europæum*, which Watson regarded as a denizen, is recorded from copses in Wiltshire, Hereford, and other counties.

It should be pointed out that E. F. Linton's record for Dorset (*Flora of Bournemouth*, Appendix ii. p. 319: "1 (*a*). Redlynch, still abundant in the old locality, *Salter*") is an error. This locality is in Wiltshire (see Preston, Flow. Pl. Wilts. 262), and is not in Linton's division 1 (*a*). Confusion has apparently already arisen owing to the existence of a Redlynch in Somerset (see Murray, Fl. Somerset, 291).—A. J. W.

Festschrift Hans Schinz.—A very substantial volume has been issued by the Naturforschender Gesellschaft* of Zurich to celebrate the attainment of seventy years of age by Professor Hans Schinz. The frontispiece is an admirable photograph, and the contributions, twenty-eight in number, by his pupils and colleagues cover a wide range of botanical interest. Some of the papers are of local interest, such as a contribution to the biology and phytogeography of some phanerogams of the Jura of Neuchâtel, by H. Spinner (in French); on the spring violet-flora of Lugano, by A. Thellung (in German); the flora of the Maloja, by G. Hegi (German); the vegetation of the Monte di Caslano, by M. Jäggli (Italian); and alterations in the Zürich flora in the last century, by O. Naegeli (German). M. Rikli and E. Rübel discuss the flora and vegetation of the Libyan Desert, J. Braun-Blanquet the vegetation of the Great Atlas, C. Schröter and C. A. Backer describe excursions in East Java, Ed. Fischer investigations on Phalloidæ from Surinam, and J. Briquet discusses the floral structure of the so-called monadelphous Cynaroideæ. Other contributions deal with genetics, plant-physiology, ecology, and anatomy.

A discussion on the origin of carcinoma by mutation is contributed by Hans R. Schinz. There is also a classified list of Prof. Schinz's published works by the late A. Thellung, completed by the editor, Ernst Furrer—these extend from 1885 to 1928; and a list of the dissertations prepared under his supervision. Useful maps and good photographic illustrations are included in many of the communications.

Ceratodon chloropus Brid. in Britain.—In March last I had the pleasure of finding this moss, a new record for Britain, but unfortunately without fruit, at Walton, Clevedon, Somerset. It

* *Beiblatt zur Vierteljahrsschrift der Naturforschende Gesellschaft von Zürich*, Jahrg. 73, No. 15. Edited by Ernst Furrer. 8vo, pp. 786 with 22 plates and text-figures. Zürich, Dec. 6, 1928.

grows thinly scattered upon a small area of loose, light soil about outcrops of limestone rock on a rather steep slope of an open hillside, and is associated with *Trichostomum crispulum* and *Encalypta vulgaris*. Nothing would be easier than to overlook this moss as found at Clevedon, as it bears a superficial resemblance to several common species, e. g., *Barbula fallax*, which one would expect to find on the kind of ground referred to. It is only when viewed with a lens that its hardness and rigidity show it to be so very distinct. The species is recorded for France.—C. H. Binstead.

Veronica serpyllifolia L. var. nov. *obscura*.—In the autumn of 1925 a Veronica was found in abundance on freshly-turned soil at Freshwater, Isle of Wight. The plant differs so strikingly from ordinary *V. serpyllifolia* that it has been kept under constant observation in culture at Reigate and Freshwater until the present time (May 1929). During the dry summer of 1928 the growth was less luxuriant, but after the rain the plants grew vigorously and assumed their characteristic size.

We have been unable to find any named specimens with which our plant agrees. Indeed, the only specimen at all resembling it is one in Herb. Mus. Brit. from Austria. Its relationship to *V. serpyllifolia* seems to be beyond question, and we regard it as a variety—though a very well-marked one—of that species. It differs markedly from the common humifuse state of *serpyllifolia*.

Veronica serpyllifolia L. var. *obscura* var. nov.—Herba prostrata ramis longissimis profuse radicantibus, foliis late ovatis pagine opacis.

Stem branching freely without pronounced upright main axis; branches prostrate, long, up to 24 cm. or more, rooting profusely at the nodes, densely covered with short hairs. Leaves matt, slightly rough, laminæ broadly ovate 1·5 × 1·0 to 1·3 cm., mostly with petiole 0·5 to 0·7 mm. long, those of the lower part of the inflorescence-axis sessile or subsessile; margin of leaf shallowly crenate or crenate serrate. Inflorescence up to 15 cm. long, curved, at the ends of branches ascending from widely divaricate or prostrate bases. Flowers very numerous; flowers and fruits similar to those of ordinary *serpyllifolia*.—E. Drabble; C. E. Salmon.

REVIEWS.

Scientific Papers of William Bateson. Edited by R. C. Punnett, M.A., F.R.S. Large 8vo. Vol. I. pp. viii, 452, 7 pls; Vol. II. pp. viii, 503, 29 pls. University Press, Cambridge, 1928. Price 42*s.* each volume.

These two volumes contain practically all Bateson's contributions to purely scientific journals, together with portions from two of his earlier books, the Introduction to the *Materials for the Study of Variation* (1894) and *Mendel's Principles of Heredity—a Defence* (1902). In the former Bateson broke away from "the common methods of morphological argument and interpretation," and declared

that the first duty of the naturalist is to collect and codify the facts of Variation; this eminently suggestive chapter, which occupies nearly one hundred pages of Vol. I., merits careful perusal by every thoughtful biologist. The latter is aptly described by the Editor as the earliest reasoned statement of Mendel's work in English, and marks the beginning of Bateson's genetical work, for which it supplied the reason and the stimulus.

Volume I. contains the papers concerned chiefly with problems of Variation, Volume II. those dealing mainly with Heredity.

The lengthy series of Reports to the Evolution Committee of the Royal Society, 1902–7, are included only in the form of the summaries.

The arrangement of the papers is generally chronological—without doubt the fairest method of presentation, as it enables the reader to follow the development of the theme in the mind of the author.

From the point of view of the botanist the important item in the first volume is the Introduction to the "Materials," to which we have already referred. The great majority of the papers deal with the description and discussion of cases of variation in different groups of the animal kingdom—fishes, insects, mollusca, and others. There is, however, the paper "On the Variations in Floral Symmetry of certain Plants having irregular Corollas," in which his sister Anna Bateson co-operated, published by the Linnean Society in 1891. From the study of the numerous variations in the flowers of *Veronica Buxbaumii*, *Streptocarpus*, *Gladiolus*, and others the authors were led seriously to discount the value of comparative morphology as a guide to the origin of existing forms, and to insist on the evidence that perfect forms may occur as sudden variations. A short communication with Miss D. Pertz (1900) indicated that the variation in the corolla of *V. Buxbaumii* was not inherited. There are also three communications to *Nature* (1895) of a more controversial character, presenting Bateson's arguments as to the origin of the cultivated *Cineraria*, arising from his attack on a suggestion by Thiselton Dyer that they had originated from the Canary Island species, *C. cruenta* "by the gradual accumulation of small variations." Sporting after hybridisation was the origin suggested by Bateson.

There is a larger proportion of botanical interest in the volume dealing with matters of heredity, Bateson's active study of which originated in the rediscovering of Mendel's observations of 1865. These occupy the period between 1901 and 1926, and many of them were in collaboration with pupils or colleagues at Cambridge or the John Innes Institution who drew their inspiration from his own work—Miss E. R. Saunders, the late R. P. Gregory, and Miss Caroline Pellew. The nature and origin of Plant-Chimæras form the subject of several communications. The controversial attitude is represented by communications to *Nature* on Dr. Kammerer's testimony to the inheritance of acquired characters. Bateson strongly discredited the instance of *Alytes*, in which horny pads on the "hands" were claimed to have been produced in response to a change to an aquatic environment and to have been transmitted to offspring.

The last paper, "Segregation," appeared in the *Journal of Genetics* (1926), and is based on the Leidy Memorial Lecture delivered at Philadelphia in 1922.

At the end of the second volume are reprinted several reviews from *Nature* and *Science*. These make interesting reading and are of value as critical examinations of the subject in question; they also show a sympathetic appreciation by the reviewer of the author's position. Of special interest to botanists is the review of the much-discussed book by Dr. J. C. Willis, *Area of Distribution as a Measure of Evolutionary Age*, to determine the value of which the reviewer found "not easy." Appended is a Bibliography the items in which date from 1884 to 1926.

These two substantial volumes, which are produced by the Cambridge press in a manner worthy of their contents, together with the volume of "Essays and Addresses," edited by Mrs. Bateson, which appeal to a wider audience, form a fitting memorial of the work of one of our greatest biologists.—A. B. R.

The Vegetation of New Zealand. By Dr. L. Cockayne, F.R.S. 2nd edition. 8vo, pp. xxvi, 456, 3 maps and 106 figs. on 87 plates. Engelmann, Leipzig, 1928. Price (unbound) 42 M.

The first edition of Dr. Cockayne's book, of which a review appeared in this *Journal* in 1923 (p. 204), was delayed in publication. The manuscript was sent to Berlin in 1914, and although the book was not published until 1921, the author had not the opportunity of bringing the text as a whole up to date. In the interval Dr. Cockayne had not only extended his own knowledge of the plant-life of New Zealand, but could also draw upon the results of the work of other botanists, no doubt largely inspired by his own work. Hence the second edition is "practically a new book, by far the larger part having been rewritten and the remainder thoroughly revised." The text occupies 426 as compared with 335 pages in the first edition, and the number of illustrations is also increased. Moreover, the original edition appeared at a time of national stress, which is reflected in the inferior quality of the paper and the poor reproduction of the figures as text-blocks. The new edition is a striking contrast in its clear print and shining white paper, and the plates, photographic reproductions mostly from the author's originals, form a separate picture gallery at the end of the volume.

Perusal of the exhaustive and very helpful Table of Contents indicates that the arrangement of the text-matter is practically the same as that adopted in 1921, though indications of up-to-date-ness are evident, "biology" in edit. 1 becoming "autecology" in edit. 2, while "growth-forms" and "plant-formations" become "life-forms" and "plant-communities."

The Bibliography has also been brought up to date and considerably increased.

Dr. Cockayne subdivides his matter into five parts. The first, introductory, includes chapters on the history of botanical investigation from the voyages of Captain Cook to the end of 1927, and on the leading physiographical features of the region and the climate.

Part II., which occupies the greater part of the book, deals with the vegetation of primitive and semi-primitive New Zealand in four sections—the sea-coast, the lowlands and lower hills, the high mountains, and the outlying islands (the Kermadec, Chatham, and subantarctic islands). Part III. describes the effect of settlement upon the plant-covering—about 514 exotic species have become more or less firmly established, by far the greater part of which are European. Part IV. deals with the distribution and composition of the flora—the botanical subdivisions of the region and the various elements of which the flora is compounded. The author concludes that the flora has two very distinct floristic and ecological elements. The more primitive consists of a combination of the palæozelandic and subantarctic elements of the flora, now difficult to disentangle. A common property is the power to tolerate cold. The second element, also largely endemic, consists of descendants of an ancient palæotropic stock, the members of which have not generally become fitted to the present average climate, but are for the most part confined to the lowlands. The true Australian element does not play a conspicuous part in the vegetation. In Part V. these conclusions are developed in a brief "history of the flora."

It is a pleasure to be able to review Dr. Cockayne's admirable contribution to plant-geography in its new and more attractive form. —A. B. R.

BOOK-NOTES, NEWS, ETC.

IMPERIAL BOTANICAL CONFERENCE, 1930.—At a meeting of the Executive Committee of the Imperial Botanical Conference (1924), held in London on the 18th of January last, it was decided to arrange a short Imperial Botanical Conference to be held immediately before the International Botanical Congress in 1930.

The Imperial Botanical Conference, which it is intended should last only one day, will meet in London on Friday the 15th August, 1930, at the Imperial College of Science and Technology, South Kensington, S.W. 7.

The agenda before the Conference will be purely of a business nature. The proposal to hold a further Imperial Botanical Conference in 1935, on lines similar to that held in 1924, will be discussed; and, if necessary, the appropriate organisation for convening the Conference will be arranged. Reports of the Committees which have dealt with the Resolutions of the 1924 Conference will be received.

Any other business which it is desired to lay before the Conference should be communicated in due course to the Hon. Secretary, Professor W. Brown, Imperial College of Science and Technology, South Kensington, S.W. 7.

MR. ANTONY GEPP has kindly consented to receive matter for the *Journal* and to see through the press the numbers for August and September during my absence in South Africa, where I hope to attend the meetings of the British Association at Cape Town and Johannesburg. Communications should be sent as usual to the British Museum (Nat. Hist.), Cromwell Road, London, S.W. 7.—A. B. RENDLE.

ARTHUR BENNETT.

ARTHUR BENNETT

(1843–1929).

(With Portrait.)

Arthur Bennett was born at Croydon on June 19th, 1843, and there at Mr. Twentyman's Academy, at Fairfield House, he received his education. On leaving school, he at once went into his father's business, that of builder and house decorator, to which he eventually succeeded, and carried on with greater or less success until his death on May 2nd, 1929.

To this *Journal* he was a most prolific contributor, from his first note in 1878, where he reports an unsuccessful hunt for *Isnardia* in 1874 in its recorded station, till the May number of this year, when his additions to Topographical Botany appeared; in this latter work he had the assistance of Messrs. C. E. Salmon and J. R. Matthews. In these fifty-three years he only missed a single year without making some contribution, and no fewer than 243 notes, papers, and reviews have appeared in its pages. They cover a wide range of subjects. The topography of the Eastern Counties was a first love, and he did much to elucidate the Flora of East Anglia with conspicuous success, for not only were numerous new county records made, but he was fortunate enough to add *Naias marina* L. (*N. major* All.) from Hickling Broad on July 21, 1883 (Journ. Bot. 1883, 246, 353). (Independently Bolton King and myself found it early in August in the same year.)

Previously Bennett (1880, 319) reported as new to Britain *Chara stelligera*, a plant now known as *Nitellopsis obtusa* J. Groves, from Filby Broad, gathered on September 23rd, 1880. He also added to England, from Burwell Fen, Cambridgeshire, *Potamogeton lanceolatus* Sm., only certainly known previously from Anglesey. It is now admitted to be of hybrid origin, but whether the Anglesey, Cambridgeshire, and Co. Clare plants have the same parentage is a matter of discussion. There seems to be no reason to doubt the accuracy of Hagstrom's suggestion that *P. coloratus* is one of the parents of the Glen Cahir plant, since that species grows with it, there and at Burwell Fen. In 1882 (Journ. Bot. 86) he recorded the Irish *Chara tomentosa* from Potter Heigham, but it was an imperfect sterile specimen which has never been refound, so it is wisely ignored by Groves and Bullock Webster in the *British Charophyta* (p. 34). His success with the aquatics doubtless induced him to specialize on the Potamogetons, to which he devoted himself and on which he became our best British expert. His only competitor was Alfred Fryer, but they were of different schools of thought, and there was no jealous rivalry. Fryer excelled in his vivid descriptions of the life-history, and of their behaviour as living entities, but he had not the faculty nor the inclination for critical literary research. Their respective merits will be well seen in the *Pond-weeds of the British Isles*, hereafter to be referred to. Bennett's extraordinary fecundity in making notes led to an enormous accumulation of them,

and this is especially noticeable in his reviews, of which he wrote many for this *Journal*, especially of Scandinavian and Icelandic works, an area which was his special favourite. The object-matter was sometimes obscured by too many citations; and his style was not always lucid. His work on the pond-weeds was remarkable. When one hears complaints, as any member of an educational body cannot fail to hear, of the want of space or the insufficiency of work-room which it is urged are hindrances to success, one can the more appreciate how Bennett in his intervals from business with his sparse library could do such remarkably good work in such narrow circumstances and could arrive at such a critical eminence on such a difficult subject. Bennett had something else besides this critical gift, for he could stimulate others in the study of nature, and he had a very large circle of correspondents; he acted as an unpaid referee to scores of botanists scattered over Britain—as he once told me, he liked to put some interesting sentence into each of his letters. From time to time he was to some extent rewarded by having sent to him interesting plants, such as the pond-weed which J. G. Griffith, of Bangor, forwarded from Llyn yr Afon, and which he named *P. Griffithii* (Journ. Bot. 1883, 65). In this, its only British station, myself twice and A. Wilson more recently have searched in vain for *P. alpinus* or *P. prælongus*, of which two species Hagstrom and Graebner think it a hybrid, *i. e.*, the ×*nerviger*, of Hagstrom. Only *P. oblongus* has so far been observed. Griffith has sent *Nitella tenuissima* from Anglesey (Journ. Bot. 1882, 241). From Caithness J. Grant and W. F. Miller sent him many plants, including ×*Carex Grantii* (Journ. Bot. 1897, 259), *Calamagrostis stricta* (1882, iii.), and *Carex salina*. Beckwith sent him from Salop a *Carex*, which Bennett named *C. lævigata* var. *gracilis* (1889, 314); Macvicar *Carex Buxbaumii* from Arisaig (1895, 282). A *Carex* from Harris sent by Duncan was later identified as *C. spiculosa*, but the identification is by no means settled, since one of its assumed parents is unknown from the Hebrides, and I could see nothing of it or its assumed offspring when I visited the spot in 1928. *Potamogeton alpinus* var. *lacustris* Marss. was sent by A. Sturrock from the Lunan Burn (where he and I gathered it); *P. Zizii* by Charles Bailey from the Lake District (Journ. Bot. 1882, 370); *Carex elongata* (1885, 253) and *Rhynchospora fusca* (1887, 373) by J. McAndrew from Kircudbright; *Calamagrostis stricta* var. *Hookeri* by F. Robinson from Norfolk (1915, 236); *P. alpinus*×*lucens* by Mr. Green from Bindon, Dorset (1916, 306); *Zostera nana* by Mr. Searle from Cleethorp (1884, 301). These were the effects of casting one's bread upon the waters. But the drudgery he underwent and the thousands of specimens of common things which he had to examine few can realize.

His own specialised work on the pond-weeds is reflected in the pages of this *Journal*, for, in addition to those mentioned, he established many foreign species—we may add that the authorities at the Kew and British Museum Herbaria entrusted him to work up much of their rich material. Among the results of this work are *P. Cheesmannii* (Journ. Bot. 1883, 65), New Zealand; *P. mexicanus* (1887, 280); *P. sibiricus* (1890, 297); *P. javanicus* (1891, 121, 154); *P. Delavayi*, China; *P. tricarinatus* with F. Mueller (1892, 227); *P. Aschersonii*, S. America (1893, 294); *P. strictifolius*, Canada; *P. Morongii*, Japan; *P. similis*, Australia; *P. pseudo-rutilus* (1902, 393); *P. distinctus*, Japan; *P. sulcatus*; *P. Maackianus*, America; *P. Chamissoi*, Mauritius, etc. (1904, 169); *P. Fryeri* and *P. Franchetii*, Japan (1907, 371); *P. australiensis*, Australia; *P. semicoloratus*, Socotra; *P. dissimilis*, Argentina (1910, 149).

Valuable notes on British pond-weeds, in which are described many new varieties and hybrids, will be found in the pages of the *Journal*, notably 1891, 75; 1900, 125; 1909, 192; 1908, 160; 1915, 236; 1919, 10; 1922, 55; 1925, 149; 1926, 21; 1927, 113; and 1928, 102.

The genus *Carex* was also a favourite with him, the discovery of many new hybrids and varieties is due to his acuteness. He was not always so fortunate with these, since his *C. elytroides* (Journ. Bot. 1889, 117) is not the plant of Fries, nor is his *C. trinervis* (1884, 125) the plant of Degland, nor his *C. ligerica* (1897, 244) the plant of Gay. He, however, detected in Balfour's herbarium (1886, 149) the hybrid *helvola*, which Balfour had called *alpicola*. The Wensleydale *C. cæspitosa* (Journ. Bot. 1897, 259) is not the plant of Fries.

It may not be invidious, and it may save confusion, if it is stated that *Calamagrostis strigosa* (Journ. Bot. 1885, 253) is not the plant of Hartman. It is mostly my *C. scotica*; and the *P. rutilus* (1900, 65, t. 407) of Salmon's Sussex specimens and the Staffordshire plants are not *rutilus* of Wolfgang. His Surrey *Scirpus nanus* is *Eleocharis acicularis*, his *Utricularia Bremii* (1912, 316) is *U. minor*, and his earlier and perhaps his later *Atriplex calotheca* are not the plants of Fries. Neither is *Orobanche cruenta* correctly identified.

Bennett's comital notes on the counties of Norfolk and Suffolk, Isle of Man, etc., are valuable. His "Supplement to Watson's Topographical Botany," issued as a Supplement to this *Journal* (1905), was a voluminous addition to our knowledge of plant-distribution in Britain. Unfortunately, his citations were not consistent, nor always correct, and were sometimes duplicated and occasionally misleading—for instance, some hundreds were attributed to Newbould for counties he had never been in, *e.g.*, Wigtown and West Ross, which were due to my own work. But it and its more recent supplement are of great service.

To the *Scottish Naturalist*, the *Annals of Scottish Natural History*, and the short-lived *Scottish Botanical Review*, he was a profuse contributor, especially on Scottish comital Botany—the vice-counties of Caithness, Sutherland, and the Western Isles being his special favourites. He at one time kept the plants from the Ebudes separate from the rest of his herbarium.

Fryer's *Potamogetons of the British Isles* is in three parts. The first portion, written by Fryer, occupies 76 pages. It is characterised by a wealth of descriptive detail and will always be a classic. Unfortunately, poverty and difficulties made its issue a long-drawn-out

affair, and it was only my strong personal efforts that led him to go on with it. Dr. A. H. Evans undertook the editorship of parts 10–12 (pp. 57–76). Then Bennett described the eight grass-leaved species, from no. 30 downwards, pp. 77–91, and it must be said that he did not do himself justice. One felt that he might have made the description more vivid, the comital distribution more detailed, and the synonymy more complete—for instance, *P. rutilus*, here at last correctly identified and described, is only cited for Anglesey, and Orkney with a query; the locality Llyn Coron should have been inserted. It has since been found in Orkney and Shetland. His *P. vaginatus* is not the plant of Turczaninow, but a hybrid of *filiformis* and *pectinatus*, and is the ×*P. suecica* of Hagstrom. But it was a great advantage that the partly completed work of Fryer should have had one so competent as Bennett to write the concluding portion; one only regrets that he did not give us more details from his store of knowledge.

My own personal aquaintance with him began in 1876, when I gave him the locality for *Senecio paludosus* in Norfolk, where a non-botanical friend of mine (Mr. C. Jecks of Northampton) had pointed it out to me. From that time onwards to this last month we had been in close correspondence, as the large pile of letters before me testifies. We did not always see eye to eye, especially in nomenclatural matters, since he would have rejected the old Linnean names for others more precisely correct—for instance, he never could be induced to give up *P. heterophyllus* for the Linnean *gramineus*. It is curious that one of his last communications should be on the plant I had called ×*P. Palmeri* from Odiham, which my friend Miss Palmer and I gathered in the canal there. When fresh it has a distinct *prælongus* look, but we became convinced it was a well-marked variety of *alpinus*, and he suggested that I should name it var. *Palmeri*.

At one time he had some financial trouble, and it was a pleasure to send him from our members of the British Exchange Club a substantial sum, the more pleasing as it was so freely given, with very kindly feelings expressed by the donors. For many years he had been our valued "Expert," and as an Exchange Club we shall sadly miss him. He was one of our four corresponding members.

When I first knew him he was thin and energetic, with an intellectual face. He was perhaps a little dogmatic, and somewhat captious under criticism, but he really relished hunting up a difficult subject to aid a correspondent, and freely gave to others from his great store of knowledge. It was a great shock to me when I called to see him to find that a few hours before he had passed away from heart failure, after an attack of influenza. The Linnean Society made him an A.L.S. in 1910 (he had been a Fellow of the Society from 1881–1905), and Fryer named ×*Potamogeton Bennettii*, a rare hybrid pond-weed, in his honour. Professor Graebner availed himself of his assistance in compiling his account of the pond-weeds for the *Synopsis der Mittel-Europäisch. Flora*. He was responsible for the list of *Potamogeton* in two or three editions of the *London*

Catalogue. Sir Joseph Hooker, in the third edition of the *Students' Flora*, says that Bennett with "his unrivalled knowledge" of the genus had revised the pond-weeds in that work *. He was certainly one of the great amateur workers at field-botany of his time, and this *Journal* has rarely had so energetic and able a contributor. Most local Floras of recent years bear testimony to his assistance.—G. Claridge Druce.

It is now getting on for 40 years since my brother and I made the acquaintance of Arthur Bennett, and I shall always remember his kindness in those early days and his help in naming the many specimens with which we overloaded him! Although our visits then were irregular we never let them get too far apart, and during later years I was able, as a rule, to get to Croydon every few months and enjoy his reminiscences of the past. Bennett, in his later years, was reluctant to leave home on botanical expeditions; a red-letter year was 1900, when Mr. Cotton's house-boat on the Broads was placed at the disposal of Mr. and Mrs. Bennett. Here I joined them and spent some delightful days, visiting the spot where Arthur Bennett and his daughter had discovered *Naias marina* in 1883, and seeing it still in the old locality. This gave him great delight, and the finding of *Liparis* and *Lastrea cristata* were also memorable events.

Bennett had an excellent memory and a stock of amusing and interesting anecdotes of bygone botanists. He was fond of relating how he first took up the study of Potamogetons. In 1880 he gathered a Pond-weed in the Fens which he believed to be *P. lanceolatus*, at that time known only from Wales. Taking it to Kew for verification, he was told it was "only *heterophyllus*," but this did not satisfy Bennett. Asking to see the Director—Sir Joseph Hooker—he was courteously received, and, having explained the point in question, Sir Joseph showed great interest in the matter, and finally encouraged Bennett to take up seriously the study of the genus, promising any help that might be in his power to give. The hint was taken, and thus began the cordial relations which subsisted between Bennett and the Kew anthorities.

Not only has British botany and the investigation of *Potamogeton* throughout the world suffered a severe loss by his death, but many of us are feeling how much we miss an old and valued friend.—C. E. Salmon.

* In the *Flora of British India* (vi. 565) also Sir Joseph acknowledges the invaluable aid of Mr. Arthur Bennett in determining the Indian species of *Potamogeton*. Bennett was also entrusted with the elaboration of the Naidaceæ in the *Flora capensis* (vii. 1897) and the *Flora of Tropical Africa* (viii. 1901). I should like to add my tribute to Dr. Druce's appreciation of Mr. Bennett's work. It was our custom at the Museum to entrust him with the determination of unnamed pond-weeds from all parts of the world, and I have lively recollections of his generous help in this and other respects. His collection of British Potamogetons has been bequeathed to the Museum, his foreign collections of the genus to Kew, the remainder of his Herbarium to his friend Mr. C. E. Salmon.—A. B. R.

THREE NEW MICHELIAS FROM INDO-CHINA.

By J. E. Dandy, M.A., F.L.S.

The three new species described below are all natives of French Indo-China, and are additions to a group of species which already contains one Indo-Chinese representative in *Michelia Balansæ* (Aug. DC.) Dandy (known from Tongking and Hainan), together with two Chinese members in *M. Leveilleana* Dandy and *M. Martinii* (Léveillé) Dandy. This group is characterized by having the perianth dicyclic (normally comprising 6 tepals in two whorls of 3, but occasionally consisting of only 4 tepals in two whorls of 2), the stipules completely free from the petiole, and the connective distinctly—but sometimes very shortly—produced beyond the anther-loculi. The Indo-Chinese species of the group may be distinguished by means of the following key:—

Branchlets and petioles at first brown-tomentose; lamina of the leaves more or less densely brown-pubescent beneath, especially on the midrib and prominent lateral nerves; gynæcium brown-tomentose	*M. Balansæ.*
Branchlets and petioles glabrous or at first puberulous; lamina of the leaves glabrous or at first appressed-puberulous towards the midrib and along the margin; gynæcium appressed-tomentellous or puberulous at least on the stipe.	
Ovules about 11–12 in each carpel; lamina with lateral nerves prominent beneath; carpels about 12–18	*M. masticata.*
Ovules 4–8 in each carpel; lamina with lateral nerves inconspicuous or not very prominent beneath; carpels numerous.	
Gynæcium appressed-tomentellous; ovules 6–8	*M. chapensis.*
Gynæcium minutely puberulous on the stipe and towards the base of the carpels; ovules 4	*M. constricta.*

Michelia masticata Dandy, sp. nov.

Arbor 10–18 m. alta; indumentum griseum, appressum; ramuli glabri. *Foliorum* lamina elliptica vel oblongo- vel obovato-elliptica vel obovato-oblonga, basi obtusa vel cuneata, apice breviter acuminata vel rotundata, usque ad c. 20 cm. longa et 9·5 cm. lata, plus minusve coriacea, supra glabra vel primo ad costam marginemque puberula, subtus glabra vel primo secus marginem puberula in sicco laxe reticulata, nervis lateralibus utrinsecus c. 10–16 subtus prominentibus; petiolus ecicatrisatus, usque ad c. 2 cm. longus, glaber vel juvenilis ad canaliculi margines puberulus; stipulæ a petiolo liberæ, extus tomentosæ vel tomentellæ. *Alabastrum* primo in bracteis spathoideis 3–4 extus tomentosis deinceps deciduis inclusum; pedunculus florifer tomentosus, fructifer crassus c. 1–2 cm. longus. *Perianthium* dicyclicum, 3-merum, tepalis 6 subsimilibus glabris. *Gynæcium* tomentellum; carpella c. 12–18, libera; ovula c. 11–12. *Fructus* apocarpus, stipite incluso c. 7–8 cm. longus, carpellis maturis in axi sessilibus dehiscentibus usque ad c. 3 cm. longis.

Hab. Annam: prov. Quang-tri, in montibus Dong-cho, alt. 500–600 m., 4. viii. 1924, *Poilane* (Inst. Sci. Indoch.), 11,253 (typus in Herb. Paris.; Herb. Kew.). Laos: prov. Sam-neua, Muong-pun, alt. c. 1000–1200 m., 17. ix. 1920, *Poilane*, in *Chevalier*, P 1881 (Herb. Kew.; Herb. Paris.).

Vern. Cay-doi, cu-dui (Annam); ko-ham (Laos).

Poilane notes that in Annam the ripe fruit is chewed with the betel (*Areca catechu* L.).

Michelia chapensis Dandy, sp. nov.

Arbor 20 m. alta; indumentum fulvum vel griseum, appressum; ramuli glabri vel juniores puberuli. *Foliorum* lamina plus minusve obovato- vel elliptico-oblonga, basi cuneata vel late cuneata, apice acuminata vel subacuminata, usque ad c. 15 cm. longa et 6·5 cm. lata, coriacea vel tenuiter coriacea, utrinque glabra, subtus in sicco laxe sed vix conspicue reticulata, nervis lateralibus utrinsecus c. 10–15, subtus vix prominentibus; petiolus ecicatrisatus, gracilis, usque ad c. 2 cm. longus, glaber vel juvenilis basin versus minute puberulus; stipulæ a petiolo liberæ, extus saltem juniores tomentellæ vel puberulæ. *Flores* in foliorum superiorum axillis dispositi; alabastrum primo in bracteis spathoideis 3–4 extus tomentellis vel puberulis deinceps deciduis inclusum; pedunculus mediocriter crassus, c. 0·5–0·8 cm. longus, tomentellus sed interdum basin versus glabrescens. *Perianthium* dicyclicum, 3-merum, tepalis 6 subsimilibus flavescentibus glabris vel extus ima basi puberulis, 3 exterioribus oblanceolato-oblongis c. 3–3·5 cm. longis. *Stamina* c. 14–22 mm. longa; connectivum ultra antheræ loculos in appendicem brevem acutam productum. *Gynæcium* tomentellum, stipite excluso anguste cylindricum; carpella numerosissima, libera; ovula 6–8.

Hab. Tongking: prov. Lao-kay, Cha-pa, alt. 1500 m., ii. 1929, *Pételot*, 3379 (typus in Herb. Univ. Californiæ; Herb. Mus. Brit.).

Michelia constricta Dandy, sp. nov.

Ramuli glabri. *Foliorum* lamina elliptica vel oblongo-elliptica, basi obtusa vel cuneata, apice plus minusve acuminata, usque ad c. 11 cm. longa et 5·5 cm. lata, chartacea, utrinque glabra in sicco laxe reticulata, nervis lateralibus utrinsecus c. 12–14 inconspicuis; petiolus ecicatrisatus, gracilis, usque ad c. 2 cm. longus, glaber vel juvenilis basin versus puberulus; stipulæ a petiolo liberæ, glabræ vel extus minute appresso-rufo-pubescentes. *Alabastrum* ellipsoideum, primo in bracteis spathoideis 3 deinceps deciduis inclusum; bracteæ glabræ vel extus minute appresso-rufo-pubescentes, 2 exteriores basi manifeste constrictæ; pedunculus modice gracilis, c. 1 cm. longus, glaber vel rufo-pubescens. *Perianthium* dicyclicum, 3-merum, tepalis 6 subsimilibus glabris. *Staminum* connectivum ultra antheræ loculos in appendicem brevem acutam productum. *Gynæcium* in stipite et ad carpellorum basin minute brunneo-puberulum; carpella numerosa, libera; ovula 4.

Hab. Annam: prov. Phan-rang, in montibus Lang-biang, Dalat, alt. 1400 m., 12. ii. 1914, *Chevalier*, 30,744 (typus in Herb. Paris.).

My thanks are due to the authorities at the herbaria of the British Museum, the Royal Botanic Gardens, Kew, the Muséum d'Histoire Naturelle, Paris, and the University of California for the opportunity of studying the specimens concerned.

NEW BRITISH SPECIES OF *EUPHRASIA*.

By H. W. Pugsley, B.A., F.L.S.

At the General Meeting of the Linnean Society on the 2nd May, 1929, a paper, "A Revision of the British Euphrasias," was read in title. A revised arrangement of the British forms, and of the groups under which they fall, is proposed in this paper, but as some time must necessarily elapse before its publication, it is thought that it will be found convenient for abridged diagnoses of the new species which it includes (six in number) to be printed in the *Journal of Botany*. They are as follows:—

Euphrasia rotundifolia, sp. nov. *E. latifolia* auct. angl. (ex parte) non aliorum.

Caulis robustus, 5–10 cm. altus, internodis breviusculis simplex vel parce ramosus. *Folia* latissima, plus minusve orbicularia, crenata, dense hirsuta. *Corolla* parva, albida. *Capsula* majuscula, oblongo-elliptica, retusa.

Hab. Melvich in Sutherland. *Exsicc.* Marshall no. 1850 (partim).

This plant has been collected at Melvich by Marshall and others in mixture with the following species.

Euphrasia Marshallii, sp. nov. *E. latifolia* auct. angl. (ex parte) non aliorum.

Caulis robustus, 5–15 cm. altus, internodis breviusculis et ramis longis erecto-patentibus præditus. *Folia* plus minusve magna, ovalia ad late ovata, dentata, dense hirsuta. *Corolla* mediocris, albida. *Capsula* majuscula, oblongo-elliptica, retusa.

Hab. West Sutherland, Caithness, Orkney. *Exsicc.* Marshall nos. 1845, 1850 (partim).

Most of the British material hitherto identified with *E. latifolia* Pursh belongs here.

Euphrasia cambrica, sp. nov.

Planta nana. *Caulis* adscendens, 1–2·5 cm. altus, internodis brevissimis ramisque gracilibus præditus. *Folia* relative haud parva, plus minusve ovata, serrata, parce hirsuta. *Corolla* minima, albida. *Capsula* relative magna, elliptica, emarginata.

Hab. Mountains of North Wales. *Exsicc.* Pugsley no. 430.

This diminutive plant has not hitherto been distinguished.

Euphrasia Pseudo-Kerneri, sp. nov. *E. Kerneri* auct. angl. non Wettstein.

Caulis erectus, robustus, 5–25 cm. altus, internodis brevibus valde ramosus. *Folia* parva, ovalia ad ovata, argute serrata, glabriuscula. *Corolla* magna, alba, labio inferiore deflexo quam superiore multo longiore. *Capsula* parva, oblonga, subtruncata.

Hab. Chalk Hills, South of England. *Exsicc.* Pugsley no. 447; Salmon, Reigate Hill, 1896, in Herb. Mus. Brit.

This is the British plant identified with *E. Kerneri* Wettst. of Central Europe.

Euphrasia rivularis, sp. nov.

Caulis erectus, gracillimus, 5–15 cm. altus, internodis longis subsimplex. *Folia* minima, ovata, obtusiuscule dentata, pilis glanduliferis vestita. *Corolla* magna, pallide lilacina. *Capsula* parva, elliptica, retusa.

Hab. Mountains of North Wales. *Exsicc.* Pugsley no. 438.

This elegant little plant appears to have been hitherto overlooked.

Euphrasia anglica, sp. nov. *E. Rostkoviana* auct. angl. (pro maj. parte), non Hayne nec Wettstein.

Caulis adscendens, flexuosus, 10–40 cm. altus, internodis brevibus et inferne ramis longis flexuosis præditus. *Folia* majuscula, ovata, obtusiuscule dentata, pilis glanduliferis dense vestita. *Corolla* magna, albida plus minusve lilacino-tincta. *Capsula* mediocris, elliptica, emarginata.

Hab. England, south of Yorkshire, Wales, Ireland. *Exsicc.* Pugsley no. 440; Marshall no. 1826.

This is the widely distributed glandular English Eyebright that has been named *E. Rostkoviana* Hayne.

ALABASTRA DIVERSA.—Part XXXVI.*

By S. Moore.

(Continued from Journ. Bot. 1926, p. 43.)

1. Some New or Rare African Acanthaceæ.

Monachochlamys.

This is the generic name given by J. G. Baker (Journ. Linn. Soc. (Bot.) xx. 217, pl. 26 (1883)) to a Madagascar plant with affinities with *Mendoncia* and *Thunbergia*, the subsequent discovery of its drupaceous and not capsular fruit pointing to its closer relation to the former. Its chief characters are: flowers in axillary fascicles, each flower within two large bracteoles; calyx a shallow almost entire cup; subregular corolla with lobes contorted in æstivation; 4 stamens

* Types in the British Museum Herbarium.

with two cells opening each by a terminal pore and a one-celled ovary with two collateral ovules.

Ten years afterwards Gilg (Engl. Bot. Jahrb. xvii. 111) published descriptions of two tropical African species, for the reception of which he proposed the genus *Afromendoncia*, which Lindau (Engl. & Prantl, Nat. Pflanzenfam. iv. t. 3) differentiates from *Monachochlamys* mainly on its one-celled ovary, the Madagascar plant (*M. flagellaris* Bak.) according to him having, at least in its earliest stage, a two-celled ovary with two ovules in each cell. This is a mistake, for the ovary in question at all stages is one-celled with two ovules, as stated by Baker. But the figure in Journ. Linn. Soc. showing this is incorrect: the true structure is as shown by Lindau (*l. c.* 290, f. 115 *k*) for his *Afromendoncia Gilgiana*, where the one-celled ovary is seen to contain a couple of collateral ovules.

Baker does not mention, neither does his figure give any indication of, a staminode. Lindau, in characterising his group Mendoncioideæ, in which he includes the two genera in question (*l. c.* 289), says the flowers of both are without a staminode; but on p. 291 he credits *Monachochlamys* with one ("Staminod vorhanden"), while nothing is said about a staminode for the other. In Hook. Ic. Plant. pls. 2426 and 2427 two species of *Afromendoncia* (*A. Lindaviana* Gilg and *A. phytocrenoides* Gilg) are figured, the flower in each case being represented with a staminode. Moreover, a careful examination of all *Afromendoncia* material available at the Museum has revealed the presence of this organ and the same is the case with *M. flagellaris* * and *M. Boivini* Baill., though the staminode must be carefully looked for in the former of these two. *M. Boivini*, it may be added, is represented at the Museum by Hildebrandt, 3278, from Nossi Bé, which answers Baillon's incomplete description in Bull. Soc. Linn. Paris, ii. 826, having acute (not rotundate) leaves, flowers solitary (not fascicled), larger bracteoles than the other, each with two very prominent gibbosities, and the flowers markedly larger in all respects.

The fruit of both genera is now known to be drupaceous, and seeing that every other character of generic importance, including the pollen, is similar in both, there is no reason for retaining *Afromendoncia* as distinct.

The species may be arranged as follows:—

§Lissochlamys; bracteoles glabrous.	
Flowers solitary in the leaf-axils	1. M. Boivini Baill.
Flowers fascicled.	
Leaves membranaceous, rotundate at apex...	2. M. flagellaris Bak.
Leaves coriaceous, acuminate	3. M. Lindaviana, comb. nov. (*A. Lindaviana* Gilg.)
Flowers in racemes	4. M. floribunda, comb. nov. (*A. floribunda* Burkill.)
§Dasychlamys; bracteoles hairy.	
Flowers solitary in the leaf-axils.....	5. M. Cowani, comb. nov. (*A. Cowani* S. Moore.)

* It is mentioned by Radlkofer in Bremen Abhandl. viii. 467.

Flowers often or always fascicled.	
Calyx glabrous.	
Leaves oblong-ovate, membranaceous	6. M. Gilgiana, comb. nov. (*A. gilgiana* Lindau.)
Leaves broadly ovate, coriaceous or pergamaceous.	
Bracteoles acuminate, 2·5 cm. long.....	7. M. phytocrenoides, comb. nov. (*A. phytocrenoides* Gilg.)
Bracteoles obtuse, 1·5 cm. long ...	8. M. iodioides, comb. nov. (*A. iodioides* S. Moore.)
Calyx densely hairy	9. M. madagascariensis, comb. nov. (*A. madagascariensis* S. Moore.)

Thunbergia (§Eu-Thunbergia) **Jayii**, sp. nov. *Herbacea, caule* decumbente gracili scabriusculo; *foliis* (summis solummodo visis) parvulis brevipetiolatis ovatis obtusis basi rotundatis 5-nervibus scabriusculis margine scabriuscule ciliolatis; *pedunculis* solitariis foliis longioribus scabriusculis; *bracteolis* oblongo-ovatis obtusis basi 5-nervibus subprominenter reticulato-nervosis membranaceis præsertim in nervibus scabriusculo-puberulis; *calycis* dentibus circa 12 linearilanceolatis pubescentibus; *corollæ* verisimiliter luteæ tubo ex bracteolis eminente juxta basin subito dilatato inde infundibulari-cylindrico lobis tubo brevioribus obovatis retusis; *antherarum* connectivo obtuso loculis cristato-barbatis loc. uno incurvo-calcarato; *ovario* (uti stylus) glabro; *stigmatis* labio antico subreniformi labio postico obovato.

Hab. Nyasaland Protectorate, Dedza, alt. abt. 4000 ft.; *T. Jay.*

Leaves only at most 2 cm. × 12 mm., and usually still smaller; petioles 2–3 mm. long. Peduncles up to nearly 3 mm. long, slender. Bracteoles 18 × 7 mm. Teeth of hairy calyx 2·5 mm. long. Corolla-tube 2·5 mm. wide at the base, quickly enlarged and 8 mm. wide at the throat; lobes 12 mm. long. Filaments stout; longer pair 7 mm., shorter pair 5·5 mm. long. Anthers barely 4 mm. long. Style 5 mm. long; lower lip of stigma 2 mm., upper lip 1·25 mm. across.

A very distinct species apparently not closely related to any other. The very small leaves are peculiar. The colour of the flowers would seem to be pale yellow, but may perhaps be white.

Thunbergia (§Thunbergiopsis) **trinervis**, sp. nov. *Herbacea,* fere glabra, *caule* erecto circa 8 dm. alt. inferne simplici tetragono pluristriato pallide viridi ramos umbellatos emittente; *foliis* sessilibus linearibus acutis margine angustissime cartilagineis perspicue trinervibus; *floribus* mediocribus in axillis solitariis vel binis pedunculis bracteolas fere æquantibus insidentibus; *bracteolis* ovatis obtuse acutis sparsim albo-lepidotis trinervibus; *calyce* breviter denticulato; *corollæ* tubo bracteolas superante paullulum supra basin contracto superne late cylindrico lobis quam tubus multo brevioribus inter se subæqualibus; *antherarum* connectivo incurvo-mucronato loculis staminum anticorum oblongis loc. uno perspicue incurvo-calcarato; *stigmate* infundibulari.

Hab. Belgian Congo, Elisabethville; *F. A. Rogers*, 10,364.

Leaves mostly 7–9 cm. long, 4–5 mm. wide, bright green when dry. Peduncles 2–2·3 cm. long, glabrous. Bracteoles 2·5 × 1·3 cm. Disk very prominent. Calyx 1·25 mm. long. Corolla-tube yellow, with conspicuous nervation, 3·7 cm. long; at the bottom 8 mm. broad, suddenly contracted to 3 mm., in the upper part 14 mm. broad; lobes purple, 1 cm. long. Anthers of the anticous stamens about 3 mm. long on thick filaments 12 mm. long. Styles glabrous, 18 mm. long. Stigma slightly pilose outside, the mouth ·5 mm. across.

Allied to several species, such as *stellarioides, graminifolia, stenophylla,* &c. Besides floral peculiarities, the plant is at once recognisable by the long and narrow very conspicuously 3-nerved leaves.

Var. **angustifolia** a typo discrepans ob ramos oppositos pubescentes foliaque angustiora (5–6 cm. × 2–2·5 mm.) pariter vestita.

Hab. Belgian Congo, Kambwe Mine; *Burtt-Davy*, 18,029.

Staurogyne congoensis, sp. nov. *Herba* ascendens ramosa, *ramis* quadrangularibus subdistanter foliosis glanduloso-pubescentibus; *foliis* petiolatis oblongo-ovatis obtusis vel obtusissimis basi cuneatis firme membranaceis utrinque scabriusculis costisque pubescentibus; *floribus* in spicas axillares vel terminales foliis subæquilongas glandulosas digestis; *bracteis* anguste oblongis obtusis uti bracteolæ paullo angustiores calycisque segmenta glanduloso-hispidulis; *calycis* segmentis linearibus acuminatis excluso segmento postico longiore lineari-oblongo obtuso; *corollæ* calyce paullo brevioris tubo extus minute glanduloso lobis rotundatis tubo brevioribus; *staminibus* subinclusis filamentis sursum puberulis; *capsula* calyce breviore ovoideo-oblonga obtusa glabra.

Hab. Portuguese Congo, Lufo, Maiombe in a forest-cleared situation at M'Bulu hill, R. N'zanza, *Gossweiler*, 7869.

Apparently a somewhat straggling plant with longish internodes.

Leaves mostly 6–8 × 3–4·5 cm., drying grey-green; petioles glandular pubescent, ±1·5 cm. long. Spikes about 6 × 1·2 cm., drying dark brown. Bracts 5 × 2 mm.; bracteoles 7·5 × 1·5 mm.; hinder calyx-segment about 1 cm. long and nearly 2 mm. broad; other segments 5–7 mm. long. Corolla whitish; tube somewhat wrinkled outside, enlarged in the upper half, nearly 5 mm. long; lobes about 2 mm. long. Pollen normal. Capsule pale brown, 3 mm. long, with many minute seeds.

Till a few years back this genus was not supposed to occur in Africa. In 1903, however, Hallier (Bull. Herb. Boiss. 1903, 201) referred to *Staurogyne* the Cameroons plant considered by Engler to belong to Scrophulariaceæ, and described by him as *Zenkerina kamerunensis*. Although Clarke is said (Fl. Trop. Afr. iv. sect. 2, 262) to have considered this as belonging to an undescribed genus of Acanthaceæ near *Hemigraphis*, there seems to be no reason to doubt the correctness of Hallier's view, for, besides the structural details, the pollen, on which Clarke seems to have founded his opinion, while not in any way resembling that of *Hemigraphis*, agrees with that of *Staurogyne*. Worthy of notice is the fact that, whereas *S. kamerunensis* has crowded spikes with broadish bracts and bracteoles, this, with its laxer and narrower spikes, has the narrow bracts and bracteoles characteristic of Indian and Malayan species.

HYGROPHILA SUBQUADRANGULARIS Lindau in Engl. Bot. Jahrb. xxiv. 314 was removed by Clarke (Fl. Trop. Afr. v. 79) to *Dyschoriste* as *D. subquadrangularis* Clarke. Lindau founded the species on Buchwald 94 from Usambara. A specimen of Buchwald's 94 is in the British Museum, communicated from Berlin, and examination shows it to be almost certainly one of the forms of *D. depressa* Nees.

Another of Lindau's species, viz. *Hygrophila kyimbalensis* (Engl. Bot. Jahrb. lvii. 20) is a *Dyschoriste* as understood in this country, and becomes D. KYIMBALENSIS, comb. nov. On the other hand, *Hygrophila sessilifolia* Lindau and *H. affinis* Lindau (in Baum Kun-Zamb. Exped. 375 and 376) have all the characters of *Disperma* Clarke and become respectively D. SESSILIFOLIUM, comb. nov., and D. AFFINE, comb. nov.

MELLERA PARVIFOLIA Lindau in Engl. Bot. Jahrb. xxiv. 314 was not seen by Clarke. He says of it (Fl. Trop. Afr. v. 52): "Lindau says capsule unknown and does not mention the ovules, but says he has no doubt about the genus of this plant. The corolla appears small for *Mellera*." He would have had more grounds for doubting the genus to which the plant belongs had he given due weight to Lindau's statements (*l. c.*) that the calyx-segments are united up to the middle, a condition never met with in *Mellera*, and that the ovary is only 2 mm. long. Among Mr. Migeod's Tanganyika Territory plants there is a specimen (no. 261 *b*) with small flowers, calyx as of *M. parvifolia*, corolla except for its size extraordinarily like that of a *Mellera* to the point of having the strong deflexed hairs on the lower lip of that genus, and ovary with only one ovule in each of its cells, the ovary being so small that there is no room for more. This answers Lindau's description of *M. parvifolia* thoroughly, and leaves no room for doubt that the plant is a *Disperma*. A second Migeod specimen (no. 263) has leaves much larger than those of the other, but is identical with it in all other respects. These leaves are about the same size as those of *Disperma dentatum* Clarke, which there seems no reason to doubt is conspecific with *M. parvifolia*. There being already a *Disperma parvifolium* Clarke founded on the earlier *Hygrophila parvifolia* Lindau, Lindau's trivial must yield to that of Clarke.

Crossandra angolensis, sp. nov. *Fruticulus* parvus; *caulibus* abbreviatis sursum foliosis ex rhizomate toruloso copiose radicigeno enatis; *foliis* paucis approximatis sessilibus oblongo-obovatis obtusis vel obtusissimis basi gradatim attenuatis firme membranaceis pag.

utraque scabriusculis; *spicis* terminalibus foliis subæquilongis inter folia sessilibus vel subsessilibus cylindricis; *bracteis* arcte imbricatis oblongo-obovatis apice breviter spinuloso-acuminatis margine dimidio abaxiali spinuloso-dentatis dorso prominenter 5-nervosis membranaceis subtiliter pubescentibus viridibus; *bracteolis* lanceolatis acuminatis quam calyx longioribus pubescentibus; *calycis* segmento postico 2-nervi ovato apice bidenticulato ciliolatoque segmentis reliquis paullo angustioribus apice acutis; *corollæ* albæ tubo bracteas excedente vel subæquante sursum pubescente stamina prope apicem gerente; *ovario* oblongo sursum attenuato glabro.

Hab. Angola, in shady situations in mixed woods between the rivulet Cuanza and R. Cului; *Gossweiler*, 2937.

Plant when in flower only 10 cm. high. Stem bearing the marks of fallen leaves almost to its base. Leaves up to 8 × 3 cm., but often smaller, *e.g.*, 5 × 2 cm. or even less. Spikes up to 7 cm. long and 1·5 to nearly 2 cm. wide. Bracts up to 2·8 × 1·2 cm. Bracteoles 14 mm., calyx-segments 6–7 mm. long. Corolla-tube 2–2·7 cm. long, slightly narrowed in the upper half; limb 12 mm. long. Anthers obtuse or slightly apiculate, puberulous, 1·5 mm. long. Ovary 3·5 mm. long.

Differs from *C. Greenstockii* S. Moore in the sessile spikes with narrower less prominently toothed bracts, the hinder segment of the calyx not ending in 2 spinulose teeth and the other segments not spinulose-acuminate and the white, not red, corollas. Apparently the western representative of *C. Greenstockii*.

Mr. Gossweiler notes this as "a striking plant on account of the brilliant large white flowers."

Crossandra crocea, sp. nov. *Herba* perennis bispithamea; *caule* erecto subsimplici distanter folioso tereti minute pubescente; *foliis* in petiolum gradatim angustatis membranaceis in nervis puberulis paginaque sup. pilis brevibus appressis subsparsim obsitis; *spicis* axillaribus cylindricis pedunculis minute pubescentibus folia sæpe excedentibus fultis; *bracteis* late oblongis apice sæpissime breviter spinuloso-tridentatis dente intermedio lateralibus majori membranaceis dorso glanduloso-pubescentibus margine conspicue ciliatis; *bracteolis* bracteæ circa æquilongis linearibus pubescentibus; *calycis* segmento postico binervi oblongo-ovato apice bidentato segmentis ceteris lanceolatis acuminatis omnibus ciliatis; *corollæ* croceæ ex bracteis eminentis tubo pubescenti quam limbus longiore; *ovario* oblongo apice pubescente exempto glabro.

Hab. Angola, in the shade of trees near Sanga, R. Cuve, Amboim; *Gossweiler*, 4468.

Leaves from 6 to nearly 10 cm. long and 2–3 cm. broad (uppermost much smaller) running down into the 2–6 cm. long petiole. Peduncles 10–12 cm. long (of the uppermost spike only 4 cm.). Spikes up to 5 × 1·3 cm. Bracts 14 × 4 mm.; bracteoles 13–14 mm. long. Hinder segment of calyx 10 mm. long, its narrowly triangular teeth 2·5 mm. long; front segments 10·5 mm., lateral 8·5 mm. long. Corolla-tube 22 mm., limb 15 mm. long. Ovary 3 mm. long.

Apparently nearest *C. nilotica* Oliv., but, besides the long-stalked leaves, the more slender spikes with narrower usually 3-dentate bracts, the short teeth of the posticous calyx-segment and the saffron corolla yield further points of difference.

(To be continued.)

MARINE ALGÆ OF THE COAST OF WALES.

By T. Kenneth Rees, M.Sc.
(University College of Swansea).

From time to time during the last two hundred and fifty years there have been, either resident in Wales or visiting its shores, a number of Naturalists and Botanists who have paid attention to its marine flora. This list of marine algæ is compiled from their published records, with some additions of my own (see Journ. Linnean Society (Bot.) xlvii. 293–4, 1926).

It is hoped that it will prove useful in three directions. In the first place exact localities are given, where possible, in place of mere county records. It should, therefore, not be difficult to check the records of the past, the accuracy of which, owing to frequent changes in algological nomenclature during the past 100 years, must be called into question. In the second place, in view of specialisation in recent times, the list may be helpful to algologists as showing the occurrence and distribution of species along the coast of Wales. Thirdly, it is hoped that this list may form a basis upon which, by periodic revision and correction by competent algologists, a complete classified list may be drawn up.

This list follows the classification adopted by Batters in his *Catalogue of the British Marine Algæ*, 1902, and contains 108 additional records, 31 of which (chiefly in the Phæophyceæ) are from my own observation, made whilst studying the ecology of the group; these include six new Welsh records.

The following abbreviations are used for the more well-known collectors, details of whose visits to Wales were given in the paper mentioned above:—

B. = Batters. Br. = Brewer. D. = Dillenius. Dav. = Davies. Dill. = Dillwyn. G. = Griffith. M. = Morgan. P. = Phillips. R. = Ralfs. N.U.T. = List in Souvenir of Aberystwyth, compiled by C. L. Walton, H. J. Fleure, and F. S. Wright, for Nat. Union of Teachers' Conference, 1911. H. G. = Harvey Gibson.

Cyanophyceæ.

Glœocapsa crepidinum Thur. Puffin Island (H. G.); Rhyl, Point of Ayr (B.).

Dermocarpa Schousboei Born. Puffin Island (H. G.).

D. prasina Born. Puffin Island (H. G.).
Pleurocapsa amethystea Rosenv. Puffin Island (B.).
Hyella cæspitosa Born. & Flah. f. *nitida* Batt. Coast of Wales (B.).
Spirulina major Kütz. Point of Ayr (B.).
S. subsalsa Oersted. Dolgellau (R.); Menai Bridge (H. G.).
Phormidium fragile Gom. Point of Ayr (B.).
P. tenue Gom. Point of Ayr (B.).
P. papyraceum Gom. Bangor (D.); Anglesey (H. G.); Anglesey Point of Ayr (B.).
Lyngbya æstuarii Leibm. Holyhead (R.).
f. *limicola* Gom. Point of Ayr (B.).
f. *natans* Gom. Point of Ayr (B.).
f. *symplocoidea* Gom. Point of Ayr (B.).
f. *æruginea* Gom. Point of Ayr (B.).
f. *spectabilis* Gom. Point of Ayr (B.).
L. majuscula Harv. Menai Bridge (R.); Puffin Island (H. G.).
L. semiplena J. Ag. Puffin Island (H. G.); Point of Ayr (B.).
L. lutea Gom. Puffin Island (B.).
Symploca hydnoides Kütz. Puffin Island (H. G.); Puffin Island (B.).
S. atlantica Gom. Ferryside (Nordstedt).
Microcoleus chthonoplastes Thur. Wales (R.); Cadnant (Holmes); Dolgellau, Point of Ayr (B.); Menai Bridge (G.).
Calothrix confervicola Ag. Anglesey (Dav.); Anglesey, Puffin Island (H. G.).
C. scopulorum Ag. Puffin Island (H. G.); Penmon, Menai Bridge (G.).
C. pulvinata Ag. Puffin Island (H. G.); Cadnant, Beaumaris (G.).
C. æruginea Thur. Llanfaethly (D.).
C. crustacea Thur. Menai Bridge, Penmon (G.).
Dichothrix gypsophila Born. & Flah. Bangor (D.).
Rivularia Biasolettiana Menegh. Cadnant, Menai Bridge (G.); Point of Ayr (B.).
R. atra Roth. Anglesey (Dav.); Anglesey (H. G.); Llangwyfan Griffith's-Crossing (G.).
R. nitida Ag. Barmouth (R.); Cadnant, Menai Bridge (G.).
Anabæna variabilis Kütz. Dolgellau (R.).
A. torulosa Lagerh. Menai Bridge, Barmouth, Dolgellau (R.); Anglesey (H. G.); Point of Ayr (B.).
Nodularia Harveyana Thur. Point of Ayr (B.); Anglesey (H. G.).
N. spumigena Mert. f. *litorea* Born. & Flah. Dolgellau (R.); Barmouth (Salwey).

CHLOROPHYCEÆ.

Chlorochytrium inclusum Kjellm. Wales (B.).
C. Cohnii Wright. Bangor (B.).
C. dermatocolax Rke. Bangor (B.).
Sykidion Dyeri Wright. Point of Ayr (B.).
Prasiola stipitata Suhr. Anglesey (Dav.); Puffin Island (H. G.).
Monostroma fuscum Wittr. Anglesey (Dav.).
M. Grevillei Wittr. Anglesey (Dav.).
Percursaria percursa Rosenv. Bangor, Point of Ayr (B.).
Enteromorpha clathrata J. Ag. Puffin Island (H. G.); recorded by Dillwyn, but no locality specified.
E. Ralfsii Harv. Bangor (R.); Bangor (H. G.).
E. torta Reinb. Penmon, Llanddwyn, Griffith's Crossing (G.); Point of Ayr (B.).
E. ramulosa Hook. Griffith's Crossing (G.).
E. compressa Grev. Anglesey, Penrhyn (D.); Anglesey (Dav.); Aberystwyth (N.U.T.); Anglesey, Puffin Island (H. G.); Menai Straits (G.); Bracelet Bay (Gutch).
f. *complanata* J. Ag. Llanfaelog (Holmes).
E. Linza J. Ag. Anglesey (D.); Anglesey (Dav.); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Aberystwyth (N.U.T.); Mumbles (Gütch).
E. intestinalis Link. Anglesey (Dav.); Anglesey, Puffin Island (H. G.); Griffith's Crossing (G.); Aberystwyth (N.U.T.).
f. *bullosa* Le Jol. Anglesey (Dav.).
Ulva lactuca L. f. *latissima* DC. Anglesey (Dav.); Mumbles (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Anglesey and Carnarvonshire (G.); Aberystwyth (N.U.T.); St. Davids (Evans).
Ulothrix implexa Kütz. Point of Ayr (B.).
U. flacca Thur. Swansea (Dill.); Penmon, Llangwyfan, Bangor (G.).
U. speciosa Kütz. Bangor, Llangwyfan (G.).
Endoderma Wittrockii Wille. Puffin Island (H. G.).
E. Flustræ Batt. Puffin Island (H. G.).
f. *Phillipsii* Batt. Bangor (P.).
Urospora isogona Batt. Dunraven Castle (Young); Swansea (Dill.); Anglesey (Dav.); Swansea, Anglesey (R.); Anglesey, Puffin Island (H. G.); Cemlyn Bay (G.).
U. bangioides Holm. & Batt. Anglesey, Puffin Island (H. G.).
Chætomorpha tortuosa Kütz. Anglesey (D.); Swansea (Dill.); Anglesey (Dav.); Anglesey (H. G.); Aberystwyth (N.U.T.); Puffin Island (B.); Gower (Gutch).
C. litorea Cook. Anglesey (D. & Br.); Anglesey (R.).

C. linum Kütz. Anglesey (D.); Puffin Island (H. G.); Cemlyn Bay, Valley (G.).

C. crassa Kütz. Anglesey (Dav.).

C. aerea Kütz. Anglesey (D. & Br.); Laugharne, Ishmael's Ferry, Carmarthenshire coast (Young); Puffin Island (H. G.); Llangwyfan, Griffith's Crossing, Gorad Goch (G.).

C. Melagonium Kütz. Bracelet Bay, Mumbles (Gutch); Puffin Island (H. G.); Holyhead, Menai Straits (G.); Aberystwyth (N.U.T.).

Rhizoclonium riparium Harv. Puffin Island (H. G.); Penmon, Gorad Gooch, Beaumaris (G.).

R. implexum Kütz. Mumbles (Gutch).

Cladophora pellucida Kütz. Anglesey (Dav.); Aberffraw (R.); Caswell Bay (Gutch); Puffin Island (H. G.); Llangwyfan (G.); Aberystwyth (N.U.T.).

C. Hutchinsiæ Harv. Griffith's Crossing, Llangwyfan (G.); Anglesey (H. G.).

f. *distans* Kütz. Swansea (Dill.); Anglesey (Dav.); Aberffraw (R.).

C. rupestris Kütz. Anglesey (D.); Anglesey (Dav.); Mumbles (Gutch); Aberystwyth (M.); Puffin Island (H. G.); Anglesey and Carnarvonshire (G.).

C. utriculosa Kütz. Swansea (Dill.); Anglesey (Dav.); Anglesey, Puffin Island (H. G.); Aberffraw, Menai Straits, S.W. Anglesey (G.).

C. sericea Kütz. Swansea (Dill.).

C. glaucescens Harv. Puffin Island (H. G.); Newton Nottage (Young).

C. flexuosa Harv. Anglesey, Puffin Island (H. G.); Llanfairisgaer (G.).

C. albida Kütz. Puffin Island (H. G.); Aberystwyth (N.U.T.).

f. *refracta* Thur. Puffin Island (H. G.).

C. arcta Kütz. Aberystwyth (M.); Puffin Island (H. G.); Aberffraw, Rhosneigr (G.).

C. fracta Kütz. Harlech (Evans); Anglesey (Dav.); Anglesey, Puffin Island (H. G.).

C. uncialis Kütz. Aberystwyth (R.); Puffin Island (H. G.).

C. lanosa Kütz. Anglesey (Dav.); Anglesey (D.); Mumbles (Gutch); Anglesey, Puffin Island (H. G.); Port Dinorwic, Gorad Goch (G.).

Bryopsis hypnoides Lamour. Puffin Island (H. G.); Aberystwyth (N.U.T.).

B. plumosa Ag. Swansea (Dill.); Mumbles, Bracelet Bay (Gutch); Anglesey, Puffin Island (H. G.); Anglesey and Carnarvonshire (G.).

Laucheria Thuretii Woron. Holyhead (R.); Holyhead (G.).

L. litorea Bang & Ag. Barmouth Ferry (Nordstedt); Ferryside, Carm. (B.). The latter record is doubtful, for I can find no trace of a visit paid to South Wales by Batters; it is, however, included in his list of 1902.

Codium tomentosum Stackh. Bangor (D.); Port Eynon (Rees); recorded by Dillwyn as appearing amongst "rejectamenta" left on the beach as the tide recedes.

(To be continued.)

OBITUARIES.

GIACOMO BRESADOLA
(1847–1929).

THE eminent mycologist G. Bresadola died at Trento on June 9th last. Born at Ortise on February 14th, 1847, he began training for engineering at the age of 12, but after four years he broke away from this in chagrin at being only second in his class examination and took up study for the church, soon afterwards entering the episcopal seminary at Trento. He reached high ecclesiastical office, being Administrator of the Metropolitan capital from 1887 to 1910.

The Abbé Bresadola was a true naturalist, and beginning with the study of flowering-plants was soon persuaded to turn his attention to cryptogams. According to his own story when on one of his natural history excursions about Magras, where he was priest from 1878 to 1883, he met some Capuchin monks gathering fungi for the kitchen. They welcomed him when he wished to join them on learning that they were interested in fungi, apart from their edible qualities. Soon he outstripped his teachers, for their identifications were somewhat casual and did not agree with the descriptions given in the mycological works which he acquired. Presumably one of these was Quelet's *Flore Micologique*, for he became a correspondent of that famous French mycologist. After three years of active study he began the publication of his *Fungi Tridentini*, which appeared in fourteen fascicles from 1881 to 1900. This, which contains 217 plates and Latin text, is one of the classics of mycology. He also wrote a popular illustrated work *I Funghi mangerecci e velenosi* (1899), which had a good sale and reached a second edition in 1906. From 1890 he studied exotic fungi, beginning with a collection from the Cameroons and put out a steady stream of papers until his death.

Bresadola's reputation was built up on careful work. It is, perhaps, not going too far to say that he and Patouillard had the greatest influence on the study of the larger fungi in post-Friesian days, revolutionising our ideas by their grasp of the essentials of microscopic details. It is astonishing to realise that Bresadola's work was accomplished away from facilities, but he was helped by the loan of specimens from many of the principal European herbaria. He was thus enabled to gain a clear idea of many old species, and his

work was such that although he described about a thousand new species he sank about a thousand others, and in doing so managed to clear up many difficulties of determination. His main service to mycology has been with the larger species, but he had a sound knowledge of microfungi.

In 1925 I had the great pleasure of visiting Bresadola at Varenna in the hills above Trento, where he had gone for the summer. Our time together was unfortunately short, but I was very much attracted by his personality, and when I left was as much an admirer of him as a man as I already was of him as a mycologist. The table in his small bed-sitting room was covered with fungi he had just gathered; these were mostly common species of the neighbourhood which it pleased him to examine again.

On the approach of his 80th birthday Italian botanists, desiring to pay tribute to the man and his work, arranged for the publication of his original drawings, which number about a thousand. The *Iconographia Micologica*, of which nine fascicles of fifty plates have already appeared, will be completed in his memory.—J. RAMSBOTTOM.

VERY REV. DAVID PAUL (1845–1929).

THE Very Rev. Dr. David Paul, whose death occurred on July 12, was a man of great distinction both in the ecclesiastical and the botanical world. He was born in Aberdeenshire in 1845, and had nearly attained the ripe age of 84 years. After a distinguished University career, he was ordained in 1869 to a church in Roxburghshire, subsequently being called to the Robertson Memorial Parish, Edinburgh. He was appointed Principal Clerk of the General Assembly of the Church of Scotland 1912–26 and Moderator in 1915. He received the degrees of LL.D. (Aberdeen) 1894 and D.D. (Edinburgh) 1915. He took a great interest in botany, and served for some years as Foreign Secretary of the Botanical Society of Edinburgh and as President in 1899–1901; he was also President of the Scottish Alpine Botanical Club, 1923. He joined the Linnean Society in 1926. His chief interest lay in the study of fungi, and he served as President of the British Mycological Society in 1918 and of the Cryptogamic Society of Scotland in 1922. His botanical papers were mostly contributed to the Berwickshire Naturalists' Club and to the Botanical Society of Edinburgh. His presidential address to the Mycological Society (Trans. Mycol. Soc. vi. 1920) deals with the "Earlier Study of Fungi in Britain," and not only shows his practical knowledge of the Hymenomycetes, but also reveals the power and charm of his highly cultured and scholastic mind.

SHORT NOTES.

COMMON NAMES OF BRITISH PLANT DISEASES.—The last issue of the *Transactions of the British Mycological Society*, xiv. pts. i. & ii. pp. 140–77, contains a list which has been compiled by the Plant Pathology Sub-Committee of the Society with a view to standardizing the popular nomenclature of the various diseases that affect cultivated plants in the British Isles. The list is arranged in two parallel columns under the name of the host; on the left the common name recommended for the disease, on the right the scientific name of the parasite. As many of the diseases are also prevalent in foreign countries, the common names applied to them in certain of those countries have been indicated. The host-plants are arranged in groups—Cereals, Pasture and Forage Crops &c. An index of hosts facilitates reference.

RANGE OF EFFECTIVE SPORE-DISPERSAL.—For the past nine years I have had a number of plants of *Sempervivum* growing on the roof of a shed in a garden at Richmond, Surrey. Amongst these are three clumps of *S. tectorum* and one of *S.* "*fimbriatum*." In a couple of pots on the shed during the same period there have been plants of these species heavily infected with the rust *Endophyllum Sempervivi*, which each spring has produced millions of spores. The plants have not been interfered with in any way except that occasionally a hose has been turned on to the shed. This year two rosettes of *S. tectorum* in one of the clumps have shown infection on all their leaves. The infection must have occurred last year, and it thus took eight years for the fungus to spread about two feet to the nearest uninfected host; the top of the pot is an inch or two above the level of the infected rosettes. (The distance between the infected and healthy *S.* "*fimbriatum*" is about a foot.) When the great distances over which rust-spores are known to travel are considered, the above facts seem worthy of record without attempting to give any explanation of the surprising failure attending such a terrific bombardment of spores.—J. RAMSBOTTOM.

RUBUS GLAREOSUS Rog. & Marsh.—This form was one which I distributed last Christmas to the Botanical Exchange Club. In a note which accompanied the specimens, I said that Dr. Druce, in the last edition of the *List of British Plants*, identifies *R. glareosus* with *R. monachus* G. Jensen, but I did not know his authority for doing so. Since then I have discovered in my herbarium a sheet of *R. monachus*, sent to Rogers from the original (? only known) locality in Slesvig by Friderichsen; but this occurred too late (as Dr. Druce told me in conversation) for the Report. It is necessary, therefore, to point out that *R. monachus* G. Jensen and *R. glareosus* Rog. & Marsh. are two distinct forms. The former is much more like *R. fuscus* Weihe & Nees, and, indeed, was compared by Gelert with Rogers's *nutans*, though not identical with it. *R. glareosus* is, as Rogers pointed out, a species belonging to the *rosaceus* group. It is a great pity that the false identification of *monachus* and *glareosus* has got into print.—H. J. RIDDELSDELL.

REVIEWS.

The Plant-Life of the Balkan Peninsula: a Phytogeographical Study. By W. B. Turrill. Pp. xxiii, 490; 20 half-page photographs, 11 maps. Clarendon Press: Oxford, 1929. Price 30*s*.

This volume is the first of a series of "Oxford Memoirs of Plant Geography," to be issued under the editorship of Prof. A. G. Tansley, "the object . . . . of which . . . . is to provide a framework for the publication of considerable monographs or studies of vegetation and plant-distribution as they become available." It is hoped that the right material will be forthcoming to enable the series to remove the existing deficiency in this branch of our knowledge of the varied vegetation of the British Empire as well as of foreign lands.

The present work embodies not only results of the author's visits to the Balkan Peninsula during and since the war, but also of a perusal of the considerable though scattered and many-tongued literature, checked from the material preserved in many large herbaria. The greater part of the work is occupied with the statement of the facts thus compiled, and statistical tables are numerous. It is good to have such a very scattered literature thus brought together, and the compilation alone represents a great labour, while, as the author remarks in his Preface, "an enormous amount of taxonomic work had to be undertaken before sufficient data of a satisfactory nature were available." At the same time, we are inclined to think that statistics are apt to be misleading when, as in the case of species, the units summated are diverse. As the author remarks (p. 351): "The detailed investigations on which the present work is based have indicated very clearly that every species has a distribution not exactly like and, with few exceptions, apparently quite independent of, that of any other species. Each has had in details a unique history." The individual cases examined (pp. 467–470) in relation to the "age and area" theory appear to emphasize this limitation of the statistical method; some restricted species are ancient relicts, some are of recent origin. Can one usefully summate them in statistics? But this aside, the work is a mine of fact which will be valuable to very diverse students, and the author is careful in drawing conclusions from the statistics.

Some account of the contents may be useful:—

Chapter I. (1–18) deals with the boundaries, subdivisions, and physiography. The northern boundary is drawn at the Danube and Sava, and includes the Karst country.

Chapter II. (19–39), "Geology and Soils," includes an attempt to determine the probable topographic history of the area and former land-connections with neighbouring areas. The Rodope mountain-core has probably been continental since (possibly long) before Tertiary times.

Chapter III. (40–76), "Climate." The author concludes that through Tertiary to Lower Pliocene the climate was not markedly different from what it is now. During the Glacial Period glaciation was purely local and absent from the south. The area appears to

have been a land of refuge for numerous species, and the very high proportion of endemics is no doubt connected with this, since there is no strong evidence of post-glacial climatic changes.

Chapter IV. (77–98), "Duration and Life-forms," contains tables (number of species in each family) based on Raunkiaer's and the author's extended classifications. The "spectra" of various districts are compared and the categories are analysed.

Chapter V. (99–103), "Flowering Periods," is based on very meagre data. Cultivation at Kew indicates that species grown there come into flower a few weeks later, but remain in flower longer than at home.

Chapter VI. (104–109), "Habitat Classification," contains similar tables for sixteen types of habitat. Analysis shows that 2127 species inhabit stony and dry places, 1691 grassy places, 1140 dry rocks and walls, 1051 brushwood, and only 844 the woods and forests which have now been much destroyed by man.

Chapter VII. (111–117), "Altitudinal Zonation," contains tables for seven subdivisions. "In Greece there are . . . . many small groups of two or three . . . . closely allied species, of which one at least is endemic to a limited area within the district. Very frequently the species composing such a group occur at different altitudes, and the evidence is clear that the altitude, by modifying the complex of environmental factors, has been one cause of their origin as distinct species—the modified environments would select favourable variations."

Chapter VIII. (118–172), "Plant Communities," contains a general account (in the practical absence of modern detailed ecological studies) of the distribution and general composition of the various communities. The differences between the types of brushwood (Phrygana, Macchia, Pseudomacchia, and Shiblyak) are well tabulated. The photographic illustrations are good.

Chapter IX. (173–187), "Plant Succession," is a short account of the relations between the climax communities of the area, which are considered to be probably older as such than any others in Europe.

Chapter X. (188–239), "The Influence of Man," deals primarily with the gradual destruction of the former vast forests, from the time of the Venetian ship-builders. Once destroyed, grazing prevents rejuvenation, and the humus and soil are often soon blown away. There is some evidence that even the bare Karst lands could be re-afforested. An account of the weeds and ruderal plants is added, and Chapter XI. deals with the cultivated crops.

Chapter XII. (247–305) summarises (with tables) many of the preceding data. For each family we are given the genera and number of species, the number of species of each duration, life-form, habitat, altitude, &c.

Chapter XIII. (306–309), "Plant-dispersal and Animal Migration."

Chapter XIV. (310–352), "Floristic and Vegetational Distribution," tables and a short floristic account of each district, with an attempt to make natural subdivisions of the area.

Chapter XV. (353–426) is an account of the distribution of the

Balkan species outside the area. Many species (listed) are absent from Italy and Sicily, although occurring farther west, and there are many pairs of species (Spanish and Balkan) which "very probably represent examples either of hamagenesis or, at least, of fractionisation of some common ancestral type. They must, however, be considered as examples of pseudovicarism." (If this cannot be expressed in ordinary language a glossary should be given. There exists the abuse as well as the use of technical language.) Details are given of connexions with the floras of Italy, Asia Minor, Central Europe, the Alps, Carpathians, Southern Russia, and others; and there is a list of Swiss alpine species absent from the Peninsula.

Chapter XVI. (427–472) deals with the Endemic and Relict species, including a discussion of the "Age and Area" hypothesis. There are 1754 endemics, of which 901 occur in one only of the districts. The last chapter, "General Conclusions," contains a sketch of the author's views on the history and development of the flora of the area.

Altogether it is a valuable if, for the most part, not a very readable book. The paper and print are of the usual high standard of the University Presses, while it is a pleasure to use a book so bound that it will lie flat at any page. The index of 5¼ pages is meagre, but it might be difficult to draw a line if more were included.—A. J. WILMOTT.

Systematische Anatomie der Monokotyledonen. By (the late) Dr. HANS SOLEREDER and Dr. FRITZ JÜRGEN MEYER. Heft iv. 8vo, pp. 176, text-figs. 65. Berlin: Borntraeger, 1929. Price 16.50 Marks.

IN the *Journal* for 1928 (p. 308) we welcomed the first issue of this completion of Solereder's text-book on the *Systematic Anatomy of the Flowering Plants*. The first of the seven parts to be published was Heft iii., dealing with the Palms, Cyclanthaceæ, and Aroids. The present portion, Heft iv., contains the account of the order Farinosæ, comprising the families Flagellariaceæ, Restionaceæ, Centrolepidaceæ, Mayacaceæ, Xyridaceæ, Eriocaulaceæ, Thurniaceæ (restricted to an examination of *Thurnia sphærocephala* Hook.), Rapateaceæ, Bromeliaceæ, Commelinaceæ, Pontederiaceæ, and Philydraceæ. Thus, though the order is a pre-eminently herbaceous one, the families represent widely differing developments of that habit, and interesting cases of adaptation to very various environments, ranging between the extremes of xerophily on the one hand to the aquatic on the other. They also include a number of less generally known but very interesting groups of Monocotyledons, including monotypic families such as Mayacaceæ and Thurniaceæ. We are glad to welcome a second instalment of this useful work, and, as we remarked on the occasion of our former notice, shall look forward to its completion.

BOOK-NOTES, NEWS, ETC.

WE hear with regret of the death of Prof. R. J. Harvey-Gibson on 3rd June, and hope to give some account of his work in a later number.

A MEMBER OF THE FUCACEÆ FROM THE DOVEY SALT-MARSHES.

BY MISS P. M. SKRINE.

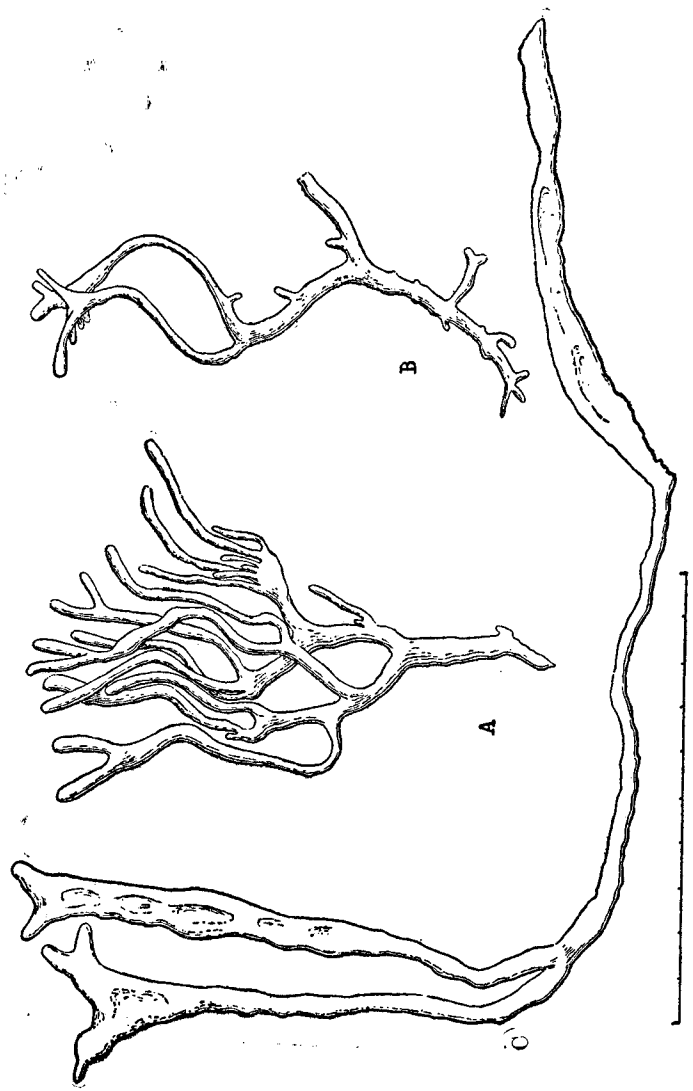
IN this *Journal* for 1928 (p. 152) I communicated a note on the occurrence of *Fucus vesiculosus*, ecad *muscoides* (Cotton) on the Dovey salt-marshes. Further investigation at subsequent visits to the salt-marshes has revealed characters in the plant which must be taken as separating it from the ecad *muscoides* of *Fucus vesiculosus* and indicating it to be a form of *Pelvetia*.

On the salt-marshes at Mochras (Carnarvon) there occur ecads *muscoides* (Cotton), *cæspitosus* (Baker), and *volubilis* (Turner) (Baker) of *Fucus vesiculosus*, an account of which is being prepared for publication. Of these, *Fucus vesiculosus*, ecad *muscoides* forms a close turf as an undergrowth in the *Juncus maritimus* association. The plant which was described in the 1928 note forms part of a similar association on the Dovey salt-marshes. The Dovey and Mochras plants correspond closely, not only in their habitat on the salt-marsh, but also in their appearance, the former, however, being smaller in size. The plants are generally cylindrical in both localities, but in wetter regions of these some larger plants are found having a different appearance. At Mochras these larger plants are flattened, they bear occasional hair-pits along the margin of the thallus, and resemble in habit the ecad *cæspitosus* occurring in another region of these salt-marshes. On the Dovey salt-marshes hair-pits do not occur on any of the specimens, and on the larger plants there is a suggestion of a channel (fig. C), indicating that the plant is not a form of *Fucus* but of *Pelvetia canaliculata*. The majority of the plants do not show the channel, which, even in the largest specimens, is not very distinct.

The figure shows the range of size and habit of the plants occurring on the Dovey salt-marshes. The typically profuse dichotomous branching is seen in the plant shown in fig. A. The majority of the plants show only this mode of branching, but on some individuals adventitious branches may arise, as in fig. B. A and B are two of the small cylindrical plants of most frequent occurrence. C is one of the occasional larger plants found generally in wetter regions of the *Juncus maritimus* zone of the Dovey salt-marshes. These larger specimens are more sparsely branched than are the smaller plants. The thallus is somewhat flattened, and along the broader parts an indistinct channel can be observed.

Two salt-marsh forms of *Pelvetia canaliculata* have been described by Baker*, both of them occurring at Blakeney, Norfolk. *Pelvetia canaliculata*, ecad *libera* (Baker) grows embedded and unattached, attaining the same size as it does on stones, while ecad *coralloides* (Baker) is embedded in the soil, and its appearance is also similar to that of a normal attached *Pelvetia*. Both forms occur with *Salicornia europæa*.

* Baker, S. M., "The Brown Seaweeds of the Salt-marsh," Journ. Linn. Soc. (Bot.) xl. p. 277, 1912.



Pelvetia canaliculata, ecad *muscoides*.

A. Typical plant with cylindrical thallus and profuse dichotomous branches. B. Plant with adventitious branches. C. Larger plant, sparsely branched, showing the indistinct channelling.

Baker's diagnosis of *Pelvetia canaliculata*, ecad *coralloides* is as follows:—

"Plant embedded in mud, from 1–4 cms. in length, producing adventitious buds from the lower parts of thallus. Frond channelled, branching sparse, thallus somewhat curled. Receptacles unknown."

The length of the smaller form, i. e. *coralloides*, corresponds to that attained by the Dovey plant, but the narrow cylindrical thallus of the latter, which only on exceptionally large plants shows any sign of a channel, bears little resemblance to the channelled thallus of ecad *coralloides*. From its close similarity in form and habitat to ecad *muscoides* of *Fucus vesiculosus*, it is proposed that the plant occurring on the Dovey salt-marshes be named *Pelvetia canaliculata*, ecad *muscoides*.

Diagnosis. Habit turfy. Plants profusely branched, very minute and densely crowded together. Branching dichotomous with occasional adventitious branches. 0·5–1 cm., rarely 3 cm. in length. Thallus cylindrical, or with an indistinct channelling on larger plants; ·2–1 mm. in width. Receptacles unknown,

Hab. The upper levels of the Dovey salt-marshes (Cardiganshire).

GLYCERIA DISTANS AND *G. RETROFLEXA* IN BRITAIN.

By C. E. Salmon, F.L.S.

Last year Dr. Harry Smith, Professor at Uppsala, was good enough to examine a number of critical British plants and to give his determinations thereon. Amongst them were examples of forms of *Glyceria distans*, looking rather distinct, and I was delighted to find, upon the return of the parcel, that I had both *Puccinellia distans* Parl. and *P. retroflexa* O. R. Holmb. (for Scandinavian botanists use the name *Puccinella* for this group) from England.

Dr. Otto R. Holmberg, in his *Skandinaviens Flora* (Häfte 2, pp. 216–219, 1926), fully treats of the two species and gives references as follows:—

Puccinellia distans (L.) Parl. Fl. Ital. i. (1850) 370 (p. p.). *Poa distans* L. Mant. i. (1767) 32. *Poa salina* Pollich, Hist. pl. Palat. i. (1776) 89. *Hydrochloa dist.* Hartm. Gram. Scand. (1819) 8. *Molinia dist.* Hartm. Handb. ed. 1 (1820) 56. *Glyceria dist.* Wahl. Fl. Ups. (1820) 36; Hartm. Handb. ed. 11 (p. p.). *Festuca dist.* Kunth, Gram. i. (1829) 129. *Heleochloa dist.* Fr. Fl. Scan. (1835) 202. *Atropis dist.* Griseb. ap. Ledeb. Fl. Ross. iv. (1853) 388. *Exs.* Fr. Herb. norm. 6: 87. Pl. Finl. 483. Dörfl 4988.

P. retroflexa (Curt.) Holmb. ap Lindm. Sv. Fanerogamfl. (1918) 97. *Poa retroflexa* Curt. Fl. Lond. vi. (1797) tab. i. *Festuca capillaris* Liljebl. Sv. Fl. ed. 2 (1798) 48. *Poa maritima* Oeder, Fl. Dan. v. (1766) tab. 251 (?); auctt. mult. non Huds.

Glyceria distans auctt. plur. p. p. *Glyc. capillaris* Wahl. Fl. Gothob. (1820) 17. *Glyc. dist.* β *arenaria* Wahl. Fl. Suec. (1824) 60. *Glyc. intermedia* Klinggr. Fl. v. Preuss. (1848) 491. *Glyc. distans* × *maritima* f. *kattegatensis* Neum. Sv. Fl. (1901) 749 (sec. specc. orig.). *Fig.* Fl. Danica, 2222. *Exs.* Pl. Finl. 72, 484.

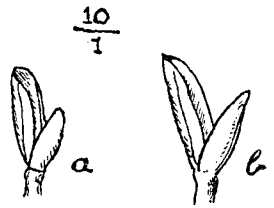
C. A. M. Lindman (*Svensk Fanerogamflora*, 1918, 96, ed. 2, 1926, p. 103) gives good descriptions of the two plants, with figures showing the special points of difference, and this should be consulted.

Dr. Jens Holmboe, of Oslo, Norway, to whom I wrote for information, has very kindly translated the Swedish text from Lindman into Latin, and as the majority of British botanists will readily prefer this to the original, I give it here:—

P. distans. Glumæ superiores latæ, subtruncatæ. Glumæ inferiores latæ, 0·7–1 mm. longæ. Spiculæ densifloræ.

P. retroflexa. Glumæ superiores angustæ, acutæ. Glumæ inferiores angustæ, 1–2 mm. longæ. Spiculæ sat laxifloræ.

P. DISTANS Parl. *Culmi* plerumque adscendentes, debiles, 15 cm.–7 dm. alti, cæspitosi, surculis curtis. *Folia* plana, glauca, subito in



P. distans. *P. retroflexa.*

Upper and lower glumes of (*a*) *P. distans* and (*b*) *P. retroflexa*.

apicem cucullatam contracta, sicca ±involuta, in plantis depauperatis arenicolis fere setiformia. *Panicula* plerumque 4–10 cm. longa, ramis gracilibus, post anthesin squarrosis, interdum deflexis. *Spiculæ* oblongæ vel oblongo-lineares. *Glumæ* inferiores ad 1·5 mm. longæ; superiores 2 mm. longæ, pallide glaucescentes vel plerumque cinereo-violaceæ, macula fulva munitæ, marginibus albidis, membranaceis. *Nervi* palearum non nisi apicem versus scabri. *Antheræ* 0·7–1 mm. longæ.

P. RETROFLEXA Holmberg. *Culmi* 2–4 dm. alti, pauci in cæspitibus uniti, crassi sed satis debiles, erecti vel adscendentes. *Folia* plana, sensim apicem versus attenuata, glauca vel cinereo-viridia, flavescentia. *Panicula* 5–15 cm. longa, ramis patentibus vel valde reflexis. *Spiculæ* lanceolatæ, pallide virides vel cinereo-virides vel flavescentes. *Glumæ* inferiores ad 3 mm. longæ; superiores 3 mm. longæ. *Antheræ* ad 0·7 longæ, plerumque albide luteæ. *Nervi* palearum fere ad basin setosi.

The most noticeable characters appear to be the longer and more acute glumes of *retroflexa*, the thicker branches of the panicle, which

are more patent and deflexed, and the more tapering spikelets. Undoubtedly *P. distans* is a more slender and graceful species.

In my own herbarium I find the following:—

P. distans Parl. *Glos. W. v. c. 34.* By the Severn Sea near Avonmouth Docks. June 19, 1911, *J. W. White* (*Watson Bot. Ex. Club*).

P. retroflexa Holmb. *Dorset, v. c. 9.* Near Ridge, 1928, *C. E. S. Sussex E., v. c. 14.* Near Lewes, 1845. *Herb. Rebecca Pryor.* Ditch near Frog Firle, Litlington, 1902, *C. E. S. Yorks, S.E. v. c. 61.* Waste ground, West Dock Reservation, Hull, 1901, *C. Waterfall* (*Watson Bot. Ex. Club*).

It is probable that *retroflexa* will prove to be our commoner species, but it will be very interesting to have the distribution of both plants fully worked out in our islands.

The text-figure is after Lindman's *Svensk Fanerogamflora.*

UMBELLIFERÆ FROM NEPAL.

By C. Norman.

THANKS to the kindness of Prof. W. Wright Smith, of the Royal Botanic Garden, Edinburgh, I have had the opportunity of working out the Umbelliferæ of a collection of plants recently made in Nepal by Mr. Lall Dhwoj. As it is a region from which collections rarely reach this country, it is hoped that the following enumeration may be of interest. All the specimens are incorporated in the Herbarium of the Royal Botanic Garden, Edinburgh.

BUPLEURUM FALCATUM Linn. Khading, 8000 ft., 172.

PIMPINELLA ACHELLEIFOLIUM (Wall.) C. B. Clarke. Nousing Pati, 13,500 ft., 173; Tir, 5–6000 ft., 252.

I have used C. B. Clarke's name for this plant, but its true position is uncertain. Some of the specimens at Kew seem to suggest *Carum* rather than *Pimpinella.*

SELINUM TENUIFOLIUM Wall. Barpak, 10–14,000 ft., 25; Sheolga, 13–14,000 ft., 36.

Var. FILICIFOLIUM C. B. Clarke. Sheolga, 13–14,000 ft., 37.

Cortia nepalensis Norman, sp. nov.

Herba humilis perennis pubescens (demum glabrescens), radice fusiformi. Folia glabra, omnia radicalia tenuiter bi-pinnatifida (spp. *Dauci* revocantia), ambitu sæpius anguste oblonga circa 6-jugata, segmentis minimis oblongis vel ovatis profunde incisis, petiolo elongato basi solum, vel abbreviato omnino, vaginante. Umbellæ sessiles, vel brevissime vel plus minusve longe pedunculatæ circa 10–15 radiatæ; radii prælongi valde inæquilongi, post anthesin validi; involucri phylla foliis minoribus exacte conformia; umbellulis multipedicellatis, pedicellis sub-æquilongis, involucellorum phylla foliacea

pinnatisecta pedicellis æquantia vel superantia. Petala obovata apice inflexa calycis dentes lineari acuti usque ad 2 mm. longi. Fructus oblongus, juga dorsalia (primaria) anguste, marginalia late alata. Stylopodium obtusum. Styli primum erecti demum arcte reflexi. Semen a dorso valde compressum.

Hab. Booshki, 13–14,000 ft., 31; (no locality) 39; Goshai Kand, 17,000 ft., 63 (type).

Leaf-blade up to 10 cm. long; *petiole* up to 9 cm.; *rays* 4–15 cm.; *pedicels* 5–7 mm.; *fruit* 10×6 mm.

This can be readily distinguished from the other two species of *Cortia* by the large fruit. It is about twice as long as in the older species and clearly oblong in shape, while in them the length and breadth are about the same.

PLEUROSPERMUM ANGELICOIDES (Klotzsch) Benth. Barpak, 10–14,000 ft., 36.

P. DENTATUM (Wall.) Benth. (No locality), 27; Pach Pokhui, 13–15,500 ft., 88; Shebal Joong, 18,500 ft., 109.

P. APIOLEUS C. B. Clarke. Barpak, 10–14,000 ft., 24; Michet (no altitude), 165.

Nos. 23, 34, 35 are all the same species of *Pleurospermum*, apparently an undescribed one; but the material hardly warrants a description, especially as the genus now comprises many species.

Archangelica cyclocarpa Norman, sp. nov.

Herba aromatica ut videtur grandis, primum dense fulvo-pubescens demum glabrescens. Folia basilaria et caulina inferiora ignota, caulina superiora ternato-pinnatisecta, segmentis lanceolatis longe acuminatis basi cuneatis nonnunquam lobatis, margine serratis, terminali quam lateralia paullo majore et rachide decurrente; petiolo omnino in vaginam tumidam et amplissimam expanso. Umbellæ maximæ radiis numerosissimis, eis in centro dispositis quam exteriores multo brevioribus; involucri phylla nulla; umbellulæ multi-pedicellatæ, pedicellis congestis tenuissimis; involucellorum phylla linearia pedicellis plus minusve æqualia. Flores sæpe polygami in sicco albo-viridi; petala minima oblonga apice inflexa; calycis dentes obsoleti. Fructus (vix maturus) ambitu sub-rotundus basi cordatus pro genere parvus; exocarpium subero-incrassatum; juga dorsalia prominentia parum elevata, lateralia in alas latiusculas tenues expansa. Vittæ semini adhærentes, commissurales minutæ (4?) per exocarpium incrassatum invisæ. Stylopodium prominens; styli elongati reflexi; semen valde compressum complanatum. Carpophorum ad basin bipartitum.

Hab. Barpak, 10–12,000 ft., 28.

Leaf-segments 5·5–8×1·5–3 cm.; *outer rays* up to 12 cm.; *inner rays* 4–7 cm.; *pedicels* up to 1·5 cm.; *fruit* 5×4 mm.

I have referred this plant to *Archangelica* rather than to *Angelica* on account of the very noticeable thickening of the outer wall of the fruit. In the true Angelicas I believe this character is never observed.

The plant is highly aromatic (also a character of *Archangelica*), but is quite unlike any other Himalayan umbellifer that I have seen.

HERACLEUM BRUNONIS (DC.) Benth. (No locality), 77.

H. CANDICANS Wall. Mailoong Pati, 11–12,500 ft., 47.

H. WALLICHII DC. (No locality), 29; 116.

H. NEPALENSE Don. Michet, 166; Tapchet, 167 (no altitudes given).

Heracleum Lallii Norman, sp. nov.

Herba perennis alta partibus omnibus pubescens, caule striato parce ramoso. Folia basilaria pinnata 3-jugata ambitu anguste oblonga longissime petiolata; petiolo quam lamina duplo longiore. Foliola lateralia (ima breviter petiolulata cetera sessilia) ovata acuta sæpius incisa vel leviter lobata, basi rotundata vel cordata margine irregulariter crenato-serratis crenaturis breviter apiculatis; terminalis quam lateralia paullo major obtusa vel acuta basi nonnunquam cuneata; folia caulina conformia, summa vaginantia non petiolata. Umbellæ circa 13-radiatæ, radiis demum valde inæquilongis; involucri phylla pauca (decidua?) linearia; involucellorum linearia inconspicua. Petala interiora anguste oblonga apice incurva, exteriora radiantia profunde lateque obcordata lobulo minimo instructo, basi paullo attenuata haud unguiculata. Calycis dentes brevissimi triangulares acuti. Fructus (vix maturus) oblongus, margine anguste alatus; vittæ dorsales haud clavatæ ad basim fructus descendentes, marginantes geminæ; commissurales 4 conspicuæ, externales subclavatæ ad basim fructus non descendentibus. Stylopodium parvum; styli tenues longiusculi. Carpophorum bipartitum.

Hab. Booshki, 13–14,500 ft., 30.

Leaf-blade up to 17 cm.; *petiole* ±33 cm.; *leaflets* up to 6×4 cm.; *rays* (mature) 4–8 cm.; *pedicels* 3–6 mm.; *fruit* 7×4 mm.

This seems to be quite a distinct species and unlike any other Himalayan *Heracleum*. Perhaps nearest to *H. Brunonis* on account of the pinnate leaves, but showing no trace of the remarkable bracts of that plant.

SOUTH AFRICAN MEETING OF THE BRITISH ASSOCIATION

(South Atlantic, July 16, 1929).

A GOOD number of the botanists, including the President and Recorder of the Section, are travelling on the 'Llandovery Castle,' which left Tilbury on June 27. Tenerife was reached on July 2, a warm sunny day with sea and sky full of colour. A few hours ashore gave time for a motor-drive from the port, Santa Cruz, through La Laguna, the old capital of the island, up to the Mercedes Forest, about 3000 ft. above sea-level. A fine Eucalyptus avenue

is passed en route, and the hill-tops are cultivated with banana, maize, and other crops; prickly-pear in flower and young fruit, grown for the cochineal, is very much in evidence. Flowering trees and shrubs make brilliant splashes of colour—the Cape Coral (*Erythrina caffra*), *Plumeria*, Oleander, and among climbers, *Bougainvillea* and *Ipomœa*. Higher, the road winds with sharp curves through woodland with dense undergrowth, and glimpses of the sea are obtained down the cultivated valleys between the huge brown cliffs, the slopes of which are dotted with the light green *Euphorbia canariensis*. The ridge is covered with a maquis-like growth of *Erica*, among which are small trees of *Pinus canariensis* and shrubs of Portugal laurel (*Cerasus lusitanica*). On the way back we visit a fine specimen of the Dragon-tree (*Dracæna Draco*) in the grounds of an old monastic institution.

Our next halt is Ascension, at which we gaze from the ship for three hours, not being allowed to land. The island is the remains of an originally much larger volcanic formation. Part only of the great crater is left, and subsequent eruptions have formed numerous secondary cones of various shapes and sizes, but all apparently devoid of vegetation. On the older slopes an Acacia shrub is growing, and on the higher ridges in the interior scattered trees—probably Eucalyptus—are seen. Below the main ridge is a farm with trees and some cultivation. This forms a sanatorium for the employees of the Eastern Telegraph Company, who, with the workers of a guano company, constitute the inhabitants.

Osbeck, when Chaplain in the Swedish Navy, visited the island in 1752 and sent to Linnæus four flowering plants, which are noted in the *Species Plantarum*, in 1753. Two commemorate the island in their trivial—a grass, *Aristida adscensionis*, and *Hedyotis adscensionis*; the others were *Euphorbia origanoides* and *Portulaca oleracea*. These, with two widespread species of *Cyperus*, two grasses, *Sporobolus* and *Polypogon*, and about a dozen ferns, constitute the flora of the island.

Fifty hours' run brings us to St. Helena, where we are lucky to have an evening and a morning on shore. St. Helena, when discovered by the Portuguese in 1501, was described as clothed with a luxuriant vegetation to the edge of the cliffs. But the introduction of goats caused terrible destruction to the trees, which were also recklessly felled for fuel by the earlier settlers. The extinction of the native flora was helped by the well-meant effort of Governor Beatson, of the Hon. East India Company (which used the island as a depot on the old sea-route to India), who introduced numerous species for use or ornament. At present very little of the original vegetation remains except on the higher ridges, where solitary specimens or small groups of a remarkable tree-composite (*Commidendron*) still persists. But unless steps are taken to preserve them, these, too, seem fated to disappear. Several fine specimens were seen partially smothered by our gorse. The valuable endemic ebony (*Melhania melanoxylon*) exists now only as manufactured articles, but a few specimens of the redwood (*M. erythroxylon*) still remain. The destruction of the

original flora is the more to be regretted as it was remarkably interesting, containing a large proportion of endemic genera not nearly related to any now existing. Sir Joseph Hooker, in his address to the British Association on Insular Floras in 1866, refers to it as a flora of great antiquity, strikingly different from any known at the present day. It included, besides the species of *Melhania* above-mentioned, several peculiar genera of the tree-composites characteristic of insular floras and the higher region of the African mountain-peaks. A list of the then known species is given by J. C. Mellis in his *St. Helena: a .... description of the island, including its Geology, Fauna, Flora, and Meteorology*, published in 1875. But many have probably disappeared since that time. The collections made in the several parts of the island visited by the botanists on the present trip consisted mainly of introduced species. I saw one good group and a number of isolated specimens of a fine arborescent composite, *Commidendron robustum*, reaching about 15 feet in height, on the ridge near Diana's Peak, the highest point of the island (2700 feet), and investigation of these very broken ridges and valleys would doubtless reveal other native and endemic species which still hold out in these less accessible areas; but nearly everything which meets the eye in the parts of the island visited were introductions. A light green plant, conspicuous from the sea dotting the slopes of the ravine in which the town, Jamestown, is situated, proved to be *Fourcroya gigantea*, said to have been introduced as a textile plant; it was in full flower, the laxly-branching panicle reaching 12 to 15 feet in height. Among these were a brilliant orange-red-flowered Aloe, patches of a Cactus (*Cereus triangularis*), and, of course, prickly-pear. The South African *Mesembryanthemum edule* spread over large areas by the two roads passing up into the interior on either side of the ravine, and a bright yellow Australian *Helichrysum* (*H. brachiatum*) was also conspicuous. Several species of *Eucalyptus* and *Acacia* were frequent, and the commonest tree at mid-altitudes was *Pinus Pinaster*. Fine specimens of Norfolk Island Pine (*Araucaria excelsa*) were also frequent. These, with a few Cypresses, stood sentinel round Napoleon's tomb, which lies in a little glen about half-a-mile from the house, Longwood, which he occupied from 1815 until his death in 1820. The Plantations, a large estate in which is the Governor's residence, contains a great variety of trees, including some fine specimens of the Cape Yew, *Podocarpus elongata*. The Governor's house was under repair, the original wood-work, floors, roof, doors, &c. having been destroyed by white ants. The plantations have also been neglected, but the recent appointment of Mr. Bruins-Lich, after a training at Kew, as gardener to the island gives hope of improvement. Mr. Bruins-Lich, who acted as our guide through the Plantations, is laying out a small experimental garden. The staple industry of the island is cultivation of the New Zealand Flax (*Phormium tenax*), and visitors can buy articles of lace of local manufacture. But the importance of the island has greatly diminished since the palmy days of the H. E. I. Co., and since the opening of the Suez Canal its isolation has increased.—A. B. R.

(To be continued.)

MARINE ALGÆ OF THE COAST OF WALES.

By T. Kenneth Rees, M.Sc.
(University College of Swansea).

(Continued from p. 235.)

PHÆOPHYCEÆ.

Desmarestia viridis Lamour. Mumbles (Gutch); Puffin Island (H. G.); Wales (J. E. Gray).

D. aculeata Lamour. Anglesey (Dav.); Aberystwyth (M.); Puffin Island (H. G.); Llanddwyn, Carnarvon, Port Dinorwic (G.); Puffin Island, Swillies, Llanfaelog (P.); Aberystwyth (N.U.T.).

D. ligulata Lamour. Caswell Bay (Dill.); Anglesea (Dav.); Caswell Bay, Mumbles (R.); Abergele (J. W. Griffith); Abergele (H. G.); Wales (J. E. Gray); Griffith's Crossing, Porth Dafarch (G.); Swillies, Llangwyfan, Llanfaelog (P.); Porthdinlleyn (Rees).

Dictyosiphon fœniculaceus Grev. Anglesey (D.); Anglesey (Dav.); Menai Straits (R.); Puffin Island (H. G.); Penmon, Gallows Point, Swillies (G.); Bangor, Llanfaelog (P.); Aberystwyth (N.U.T.).

D. hippuroides Kütz. Holyhead (G.).

Litosiphon pusillus Harv. Towyn-y-capel (P.); Bangor (H. G.); Porthdinlleyn (Rees).

L. Laminariæ Harv. Llanfaelog, Towyn-y-capel (P.); St. Davids, Whitesands Bay (Rees).

Stictyosiphon subarticulatus Hauck. Carnarvon (H. G.); Carnarvon, Menai Bridge, Llanfairisgaer (Holmes); Llanfairisgaer (G.).

Striaria attenuata Grev. Aberystwyth (N.U.T.).

Punctaria plantaginea Grev. Puffin Island (H. G.); Llangwyfan (G.); Llanfaelog, Llangwyfan (P.); Aberystwyth (N.U.T.).

**Punctaria latifolia* Grev. Aberystwyth, Borth (Rees).

P. undulata J. Ag. Llanfaelog (P.).

Phyllitis zosterifolia Rke. Puffin Island (H. G.).

P. Fascia Kütz. Aberystwyth (N.U.T.); Monks Cave, Clarach, Borth (Rees).

Scytosiphon lomentarius J. Ag. Puffin Island (H. G.); Llangwyfan, Menai Straits (G.); Llangwyfan (P.); Aberystwyth (N.U.T.); Gower Coast, Tenby, Milford Haven, St. Davids, Cardigan Bay, Port Ceiriad, Tydweiliog, Porthdinlleyn, Trearddur Bay Rees.

Asperococcus fistulosus Hook. Anglesey (Dav.); Aberystwyth (M.); Puffin Island (H. G.); Menai Bridge (G.); Bangor (P.); Aberystwyth (N.U.T.); Borth (Rees).

f. *vermicularis* Griff. Puffin Island (H. G.); Aberystwyth, Borth (Rees).

**A. bullosus* Lamour. Porthdinlleyn, Tonfanau (Rees).

Streblonema sphæricum Thur. Llangwyfan (P.).

S. tenuissimum Hauck. Langwyfan (P.).

S. fasciculatum Thur. Llangwyfan (P.); Aberystwyth (N.U.T.); on *Castagnea virescens*, Aberystwyth, Borth (Rees).

Ectocarpus minimus Näg. Bangor (B.).

E. tomentosoides Farlow. Towyn-y-capel, Menai Straits (P.); Bangor, Anglesey (B.); Aberystwyth (Rees).

E. velutinus Kütz. Towyn-y-capel (P.); Puffin Island (B.); Trearddur Bay (Rees).

E. terminalis Kütz. Puffin Island (H. G.).

E. Holmesii Batt. Beaumaris (Holmes); Anglesey (G.); Beaumaris (P.).

E. confervoides Le Jol. Menai Straits (P.); Aberystwyth (N.U.T.); Borth (Rees).

E. siliculosus Kütz. Aberystwyth (M.); Puffin Island (H. G.); Aberystwyth (N.U.T.); Menai Straits etc. (G.).

E. fasciculatus Harv. Puffin Island (H. G.); Aberystwyth (Rees).

E. tomentosus Lyngb. Anglesey (Dav.); Puffin Island (H. G.); Porth Sur, Porth Dafarch (G.); Menai Straits (P.); Aberystwyth (N.U.T.).

E. Hincksiæ Harv. Towyn-y-capel (P.); Porth Ceiriad, St. Davids (Rees).

E. granulosus Ag. Puffin Island (H. G.); Bangor (P.); Aberystwyth (Rees).

Pylaiella litoralis Kjellm. Anglesey (D.); Anglesey (Dav.); Swansea (Dill.); Puffin Island (H. G.); Bangor (P.); Aberystwyth (N.U.T.); Porth Trecastell, Porth Defarch, Menai Straits, Dulas Bay (G.).

Isthmoplea sphærophora Kjellm. Milford Haven, Menai Bridge (R.); Puffin Island (H. G.).

Myriotrichia clavæformis Harv. Llangwyfan (P.); Aberystwyth (N.U.T.); Borth (Rees).

M. filiformis Harv. Llangwyfan (P.); Aberystwyth (N.U.T.).

Arthrocladia villosa Duby. Swansea, Mumbles (Dill.); Anglesey (Dav.); Mumbles (Gutch); Anglesey (H. G.); Bangor (P.).

Elachistea stellaris Aresch. Wales (B.).

E. fucicola Fries. Anglesey (Dav.); Mumbles (Gutch); Anglesey, Puffin Island (H. G.); Bangor (P.); Aberystwyth (N.U.T.); Porth Sur, Porth Dafarch, Menai Straits, etc. (G.).

E. flaccida Aresch. Anglesey (Dav.); Wales (R.); Aberystwyth (N.U.T.); Penmon (H. G.); Swansea (Dill.).

E. scutulata Duby. Tony-y-capel (P.); Trearddur Bay (Rees).

Leptonema fasciculatum Rke. Bangor (P.); Aberystwyth (Rees).

Sphacelaria radicans Harv. Puffin Island (H. G.); Beaumaris (G.); Bangor (P.); Aberystwyth (Rees).

**S. olivacea* Pringsh. Aberystwyth (Rees).

S. cirrhosa Ag. f. *pennata* Hauck. Mumbles (Dill.); Anglesey (Dav.); Bracelet Bay (Gutch); Puffin Island (H. G.); Menai Straits (G.); Swillies (P.); Aberystwyth (N.U.T.); Borth (Rees).

f. *fusca* Holm. & Batt. Newton Nottage (Young); Worms Head (Dill.); Anglesey (Dav.); Anglesey, Puffin Island (H. G.); Llanddyn, Llangwyfan (G.); Aberystwyth (Rees).

S. cæspitula Lyngb. Bangor (B.).

S. plumigera Holmes. Barmouth, Beaumaris, Carnarvon (R.); Carnarvon (Holmes); Menai Straits, Port Dinorwic, Menai Bridge (G.); Menai Straits (P.); Aberystwyth (N.U.T.); Bangor (B.).

Chætopteris plumosa Kütz. Menai Bridge (Holmes); Anglesey, Puffin Island (H. G.); Penmon (G.).

Cladostephus spongiosus Ag. Swansea (Dill.); Anglesey (Dav.); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); S.W. Anglesey, Aberffraw, Carnarvon (G.); Menai Straits (B.); Aberystwyth (N.U.T.); Monks Cave, Borth (Rees).

C. verticillatus Ag. Anglesey (Dav.); Gower (Dill.); Anglesey, Puffin Island (H. G.); Aberffraw, Porth Dafarch, etc. (G.); Llangwyfan (P.); Aberystwyth (N.U.T); Porthdinlleyn (B.); Borth (Rees).

Halopteris filicina Kütz. Holyhead (R.); Bracelet Bay (Gutch); Anglesey (H. G.).

Stypocaulon scoparium Kütz. Puffin Island (D.); Anglesey (Dav.); Mumbles, Bracelet Bay (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Menai Straits (P.); Aberystwyth (N.U.T.); Llanddwyn, Penmon, Ty'n Llwyddn (G.).

Myrionema strangulans Grev. f. *typica* Batt. Puffin Island (H. G.); Bangor, Towyn-y-capel (P.); Aberystwyth (Rees).

Hecatonema reptans Sauv. Puffin Island (H. G.).

Chilionema reptans Sauv. Puffin Island (B.).

**Ascocyclus sphærophorus* Sauv. Aberystwyth, Borth, Port Eynon (Rees).

Ralfsia verrucosa Aresch. Puffin Island (H. G.); Llanfairisgaer (P.); Aberystwyth (N.U.T.).

Lithoderma fatiscens Aresch. Llanfairisgaer (P.).

Stilophora rhizoides J. Ag. Aberystwyth (N.U.T.).

Chordaria flagelliformis Ag. Anglesey (Dav.); Aberystwyth (M.); Puffin Island (H. G.); Towyn-y-capel (P.); Aberystwyth (N.U.T.); Aberffraw, Penman, Llandudno (G.)

Mesogloia vermiculata Le Jol. Puffin Island (H. G.); Towyn-y-capel (Aberystwyth) (N.U.T.).

M. Griffithsiana Grev. Aberystwyth (N.U.T.).

Castagnea virescens Thur. Aberystwyth, Bangor, Carnarvon (R.); Towyn-y-capel, Bangor, Llangwyfan (P.); Aberystwyth (N.U.T.); Llangwyfan (B.).

C. Zosteræ Thur. Towyn-y-capel (P.); Porthdinlleyn (Rees).

Petrosporangium Berkeleyi Näg. Towyn-y-capel (P.).

Leathesia difformis Aresch. Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Aberffraw, Porth Dafarch, Llangwyfan (G.); Llangwyfan, Llanfaelog (P.); Aberystwyth (N.U.T.).

Sporochnus pedunculatus Ag. Anglesey (Dav.); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Swillies (G.); Bangor (P.).

Chorda filum Stackh. Anglesey (Dav.); Swansea (Gutch); Aberystwyth (M.); Menai Straits (G.); Bangor, Towyn-y-capel (P.); Aberystwyth (N.U.T.); Puffin Island (H. G.); Tonfanau (Rees).

Laminaria saccharina Lamour. Anglesey (Dav.); Aberystwyth (M.); Puffin Island (H. G.); "Common" (G.); Bangor, Llanfaelog (P.); Aberystwyth (N.U.T.); Gower, Milford Haven (Rees).

f. *Phyllitis* Le Jol. Anglesey (Lhwyd); Anglesey (Dav.); Aberystwyth (M.); Puffin Island (H. G.); Holyhead (G.); Tenby (Stackhouse).

L. digitata Lamour. Anglesey (Ray); Anglesey (Lhwyd); Carnarvon (D.); Anglesey (Dav.); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Swillies (P.); Aberystwyth (N.U.T.); Borth, Gower (Rees).

L. Cloustoni Edm. Anglesey, Puffin Island (H. G.); "Common" (G.); Towyn-y-capel (P.); Milford Haven, Gower, Aberystwyth (Rees).

Saccorhiza polyschides Batt. Llanfeathly (Br.); Beaumaris (D.); Holyhead (Dav.); Llanfeathly (Green); Aberystwyth (M.); Llangwyfan, Porth Dafarch (G.); Towyn-y-capel (P.); Porthdinlleyn (Rees).

Alaria esculenta Grev. Holyhead (Lightfoot); Anglesey (Dav.); Anglesey (H. G.); Holyhead (G.); Towyn-y-capel (P.); St. Davids, Porthdinlleyn, Trearddur Bay (Rees).

Cutleria multifida Grev. Puffin Island (H. G.).

Aglaozonia reptans Crn. Swillies (P.).

Fucus ceranoides L. Menai Bridge (Br. & Green); Anglesey Dav.); Mumbles (Gutch); Aberystwyth (M.); Anglesey (H. G.); Griffith's Crossing, Holyhead, etc. (G.); Llangwyfan (P.); Three Cliffs Bay, Gower (Rees).

F. spiralis L. f. *platycarpus* Thur. Anglesey (Lhwyd); Anglesey

(H. G.); Anglesey (P.); Carnarvon (G.); Point of Ayr, Puffin Island (B.); Aberystwyth, Gower (Rees).

F. vesiculosus L. Anglesey (Dav.); Mumbles (Gutch); Aberystwyth (M.); "Common" (H. G., G., & P.); Aberystwyth (N.U.T.); Borth, Gower (Rees).

F. serratus L. Anglesey (Dav.); Mumbles (Gutch); Aberystwyth (M.); "Common" (H. G., G., & P.); Gower (Rees).

Ascophyllum nodosum Le Jol. Anglesey (Green); Llanrhyddlad (D.); Anglesey (Dav.); Aberystwyth (M.); Aberystwyth (N.U.T.); "Common" (H. G., G., & P.); Gower (Rees).

Pelvetia canaliculata Dene. & Thur. Anglesey (Dav.); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); "Common" (G. & P.); Gower (Rees).

**Bifurcaria tuberculata* Stackh. St. Davids, Whitesands Bay (Rees).

Himanthalia lorea Lyngb. Anglesey (Jones); Anglesey (Green; Anglesey (Davies); Mumbles (Gutch); Aberystwyth (M.); Anglesey (H. G.); Bardsey (G.); Towyn-y-capel (P.); Trearddur Bay (Rees).

Halidrys siliquosa Lyngb. Anglesey (Dav.); Mumbles (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Gorad Goch etc. (G.); "Common" (P.); Aberystwyth (N.U.T.); Gower (Rees).

Cystoseira ericoides Ag. Anglesey (Dav.); Llangwyfan, Gorad Goch (G.); Llanfaelog (P.); Port Eynon (Rees).

C. granulata Ag. Aberffraw (R.); Pwllheli (G.).

C. discors Ag. Anglesey (D.).

**C. fibrosa* Ag. Nefyn (Rees).

Dictyota dichotoma Lamour. Llanfaethly (Br.); Swansea (Dill.); Anglesey (Dav.); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Gorad Goch, Penmon, etc. (G.); Swillies (P.); Aberystwyth (N.U.T.); Swansea (Gutch); Gower (Rees).

f. *implexa* J. Ag. Puffin Island (H. G.); Beaumaris, Port Dinorwic, Porth Sur, etc. (G.); Criccieth (Lloyd Williams); Worms Head (Rees).

Taonia atomaria J. Ag. Worms Head (Dill.); Bracelet Bay (R.); Bracelet Bay (Gutch); Aberystwyth (M.); Anglesey (H. G.); Holyhead, Llanddwyn (Lloyd Williams); Tenby (Salwey).

Dictyopteris membranacea Batt. Aberystwyth (M.).

Padina pavonia Gaill. Anglesey (Ray); Anglesey (Dav.).

* N.B.—Plants marked with an asterisk are new records for the coast of Wales.

(To be continued.)

DURIÆI ITER ASTURICUM BOTANICUM.

By C. C. Lacaita, M.A., F.L.S.

(Continued from p. 211.)

14. Scrophuraria Balbisii Hornem. [Not in Durieu's published collection, but there is a Durieu specimen in herb. Gay at Kew.]

Species per Europam occidentalem et totum maris Mediterranei craterem diffusa, in Brittania, Gallia, Hispania, Barbaria, Græcia et Italia vulgatissima, quam verò et Rhenus et alpium prælongum jugum a reliqua Europa arcere videtur. Locum tamen in Kochii Fl. Germ. (iv. p. 405) obtinuit, quia Aquisgrani, in Borussia transrhenana, à cl. Hornung nuper inventa. Locus et in hisce tabellis ipsi perimittatur, utpotè a Duriaeo nostro circà *Cangas de Tineo*, ad radices alpium Asturicarum, lecta, quamvis in publicum ejus herbarium Asturicum non introducta. Hæc à floristis Europæ occidentalis et australis omnibus dicitur *S. aquatica*.

Aliam *S. aquaticam* (an Linnæanam?) habent helvetici et germanici floristi, a *S. Balbisii* diversam caule gracili, flexili, non rigido; foliis nunquam lyratis, basi vel subrotundatis vel in cuneum attenuatis, nunquam cordatis; panicula gracili, flexili, laxa, plus minus dilatata, non rigida et in linearem formam contracta; cymis magis elongatis, multoque laxioribus; pedunculis pedicellisque filiformibus, non incrassatis nec acutissimè tetragonis; bracteis herbaceis lineari-lanceolatis, non spathulatis et membranaceo-marginatis; corolla recente pellucido-punctata, posticè purpureo-brunnea, non atrosanguinea, anthera sterili, ut in *SS. nodosa*, *Scopolii* et *alpestri*, transversè oblonga et distinctè emarginata, non integerrima subrotunda; denique capsula minore, ovato-acuminata, non ovato-mucronata. Hanc (procul dubio distinctissima) in Helvetia occidentali, Neviduni et Urbæ, anno 1834, vivam observavi. In Germanis etiam vulgatissima, extrà ejus limites nondum visa. Merito dicetur *germanica*, si forte *S. Balbisii*, quod ferè suspicor, pro Linnæi *aquatica* recognita fuerit. Illam in præfecturis orientalibus quærant nostri. Hujus loci videntur esse *S. aquatica* β et γ, Wydl. Monogr. p. 37 (α ejusd. ad *S. Balbisii* spectante).

15. Myosotis stolonifera Gay. [Dur. Pl. Astur. 267.]

M. nana, perennis, stolonifera, tota adpressè setulosa; caule tereti; foliis caulinis oblongo-obovatis oblongisve, obtusis; stolonibus filiformibus microphyllis; racemis aphyllis; pedicellis fructiferis patentissimis; calyce ferè quinquepartito, fructifero campanulato, pedicelli longitudine; corollæ tubo longitudine calycis, limbi segmentis tubo longioribus, oblongo-obovatis, obtusis, integerrimis; stylo brevissimo; nucibus lævibus.

Habitat in montium Asturicorum occidentalium regione alpina, in paludosis, ad rivulos et scaturigines, nominatim ad lacum montis *pic d'Arvas*, ibi medio Angusto florens et fructificans (*Durieu*).

Radix verisimiliter transversa et repens. Caulis 2–3-pollicaris,

erectus, a basi ad medium usque et ultrà foliatus. *Folia* plus minus conferta, plus minus sparsa, ima elliptica, basi parum attenuata, media oblongo-obovata, subspathulata, superiora parva, ellipticooblonga, omnia viridia, quamvis adpressè pilosa. *Stolones* ex radicis collo foliorumque inferiorum axillis 2–5, humifusi, filiformes, remotè foliati, foliis parvis, spathulatis, lineam vix longis. *Caulis* pars superior dimidia vel plus dimidia florifera. *Racemi* aphylli, solitarii vel gemini, inæquales, longior 9–11-florus, pedicellis fructiferis 1 lin. longis, filiformibus, laxis, patentissimis, in arcum sæpè flexis. *Calyx* ultra medium quinquefidus, fructifer longitudine pedicelli, campanulatus, segmentis ovato-oblongis, acutis, ferè acuminatis, apicis setulis in penicillum collectis. *Corolla* mediocris, cœrulea, tubo campanulato. *Nuces* calyce triente ferè breviores. *Stigma* capitatum. *Stylus* nucibus triente et calyce dimidio brevior, ergò brevissimus. Pili patentes nullibi conspiciuntur. *Setæ* rigidulæ, omnes adpressæ, infrà medium caulem et in foliis sparsæ, in rachi, pedicellis et calycibus, vix tamen candicantibus, densiores.

Obs. Radice sua perenni, et pilis omnibus adpressis, nullisque hamatis, valdè affinis *M. palustri* et *cæspitosæ*. Differt tamen à priore, quæ aliquando stolonifera (et pilis quandoque gaudet omnibus adpressis) caule terete, non sulcato; calyce non quinquedentato, sed ferè quinquepartito, et stylo brevissimo, non calycem subæquante. A *cæspitosa* etiam satis differt radice repente, collo stolonifero, calyce ultrà medium fisso, lobis angustioribus, acutatis, non obtusiusculis. Nullam aliam novi descriptam speciem nostræ æquiparandam. Videtur itaque hæc pro nova sumi posse et debere.

16. Erica Mackaii Hook! Compan. to Bot. Mag. i. (1835) p. 158; Wats. *ibid.* p. 225. [Dur. Pl. Astur. 274.]

Habitat in Asturiæ inferioris monte *Sierra del Peral*, inter Gradum et Candamum, 27 Jun. florifera (*Durieu*), et in Hiberniæ occidentalis agro Cunnamarensi, non longè a pago *Roundstone* undè specimen mihi est, nuper ab Hookero missum. Miro casu in extremis ferè zonæ oceanicæ finibus, duobus locis eodemque anno detecta, hucusque prorsus incognita! Eam locis intermediis quærant et fortè invenient botanophili extremi occidentis.

Erica Mackaii Hook. (deleto nomine *E. Hookeri* Gay).

E. humilis, erecta; ramulis pedicellisque pubescentibus et hispidissimis; foliis 4, planiusculis, ovato-lanceolatis, dorso pruinoso-canis, bracteolis calycinisque segmentis utrinque glaberrimis, apice longè piliferis; margine longè-pauciciliatis; pilis ciliisque omnibus apice clavatis; floribus umbellatis; bracteolis suprà medium pedicellum ternis, duabus superioribus calyci approximatis, oppositis; corolla (violaceo-purpurea) segmentis calycinis triplo longiore, ellipsoidea, ore contracto; antheris anticè in gibbum mucronatum prominentibus, calcaribus subulatis, medio unidentatis; ovario glaberrimo; stylo tereti; stigmate convexo, hemisphærico.

Fruticulus pedalis, erectus, caulibus ex una radice pluribus, supernè ramosissimis, ramulis foliosissimis, pubescentibus et præterea hispidolongè pilosis, annotinis rufescentibus, tetragonis, lateribus bisulcatis. Folia conferta, quaternatim verticillata, internodiis paulò longiora, ovato-lanceolata, 1½–2-lin. longa, utrinque glaberrima, dorso ad dextram et lævam nervi medii pruinoso-cana, apice longè pilifera, margine incrassata, utrinque 4–5-ciliata, ciliis distantibus piloque terminali rigidis, elongatis, folii latitudinem æquantibus, subulatis, apice clavatis; petioli glaberrimi. Flores in summis ramis 10–26, umbellatim aggregati, longiusculè pedicellati, pedicellis filiformibus, 2–3 lin. longis, hispidissimis, atro-violaceis. Bracteolæ in pedicello unoquovis 3, lineari-lanceolatæ, basi attenuatæ, utrinque glaberrimæ, apice longè piliferæ, margine longè 2–3-ciliatæ, ciliis apice clavatim incrassis; inferior bracteola paulò suprà medium petiolum solitaria; duo superiores calyci (cujus 2 foliola simulant) contiguæ, oppositæ, ab inferiore solitaria plus minus remotæ. Segmenta calycina bracteolis similia, perindè longè pauci-ciliata et utrinque glaberrima, sed ovato-lanceolata, non basi attenuata, et (margine non aut vix revoluto) dorso sub apice duabus lineis pruinoso-canis notata, quæ lineæ in bracteolis obscuriores. Corolla calyce triplo longior, 3 lin. longa, ellipsoidea, violaceo-purpurea, oculo nudo glabra, sub lente asperula, ore contracto, dentibus brevibus, ovatis, reflexis. Filamenta glaberrima, angustè linearia, nervo longitudinali inscripta. Antheræ inclusæ, atrofuscæ, ovoideæ, læves, bicalcaratæ, bipartitæ, lobis erectis contiguis, basi antica in gibbum mucronulatum coalescentibus, poris oblongo-ellipticis, dimidia anthera paulò longioribus, calcaribus antheræ longitudine, vinoso-roseis, lamellato-subulatis, rectiusculis uncinatisve, medio ad latus exterius conspicuè uni-dentato-angulatis, cæterum integerrimis. Discus hypogynus annularis, octocrenatus. Ovarium glaberrimum, ellipsoideum, 8-sulcatum. Stylus longitudine corollæ, violaceus, ad apicem usque teres. Stigma subexsertum, styli diametro paulò latius, convexum, hemisphæricum. Capsula parva, fusco-brunnea, more gentis 4-locularis et loculicidè dehiscens. Semina non visa.

Obs. Species *ciliari* et *Tetralici* cognata, habitu, staturâ, ramulis pedicellisque hispidissimis, foliis, bracteolis segmentisque calycinis longè ciliatis simillima.

Alias etiam notas cum *E. Mackii* communes habet *E. ciliaris*, nempè foliorum formam, folia calycinaque segmenta dorso pruinoso-cana, et ovarium glaberrimum. At folia in *E. ciliari* terna, non quaterna; pili et cilia apice incrassata, non acutata; flores (oppositi vel ternati, rarius alterni) racemosi, non umbellati; pedicelli plus dimidio breviores, 2- non 3-bracteolati; corolla cylindracea, calyce plus quadruplò longior, ore hiante, non ellipsoidea, calyce triplò longior, ore contracto; antheræ muticæ et muricatæ, non læves et calcaratæ; stylus distinctè clavatus, corolla longior, non longitudine corollæ et a basi ad apicem teres, stigma longè exsertum, planum (in viva fortè plus minus excavatum), non convexum hemisphericum.

Multò affinior *E. Tetralix* cum nostra convenit foliorum in verticillis numero, floribus umbellatis, pedicellis tribracteolatis, corolla, antheris, stylo et stigmate, differt verò foliis angustis, linearilanceolatis, facie et sæpè ad nervum dorsalem (qui totum canaliculum occupat), cum petiolulo pubescentibus, non glaberrimis planiusculis

ovato-lanceolatis dorsoque ad latera nervi medii pruinoso-canis; pedicellis dimidio brevioribus bracteolisque tomentoso-lanatis, non inter longos quibus vestiunter pilos glabris; foliorum ciliis 6–8, non 4–5; umbellis 6–12- non 10–25-floris; pedicellorum bracteola inferiore basi non attenuata; segmentis calycinis dorso lanatis, non pruinoso-canis; corollâ roseâ, non violaceo-purpureâ; ovario denique toto villoso, non glaberrimo.

Utrum genuina sit species *E. Mackaii*, an *E. ciliaris* et *Tetralicis* hybrida progenies, ego non dicam. Quæstionis solutio, me judice, in fructu quærenda. Si fructus abortivus, erit mihi hybrida; si perfectis seminibus fœtus, species. Videant Hiberni, videat imprimis cl. Mackay qui et nostram stirpem primus in medium protulit, et plantis hibernicis acerrimè studere dicitur.

(To be continued.)

PROPOSED AMENDMENTS TO THE INTERNATIONAL RULES OF NOMENCLATURE.

By J. C. Arthur

(Purdue University, Lafayette, Indiana).

1. Art. 19. Amend to read:—

> Botanical nomenclature begins for all groups of plants (recent and fossil) at 1753 (Linnæus, *Species Plantarum*, ed. 1).
>
> It is agreed to associate genera, the names of which appear in Linnæus's *Species Plantarum*, ed. 1, with the descriptions given of them in the *Genera Plantarum*, ed. 5 (1754).

In the considerable number of replies to the circular letter distributed to many botanists early in March, and printed in *Mycologia*, vol. xxi. pp. 172–174, there was almost unanimous agreement to this proposal. The replies came from leading writers in systematic botany, mycology, algology, bacteriology, paleobotany, bryology, and other divisions of the subject.

2. Art. 49 bis. Amend by eliminating the words:—"starting from Fries, *Systema*, or Persoon, *Synopsis*"; for the words "teleutospore or its equivalent" substitute the words: "uredospore or teleutospore (sporophyte)."

> Also replace the first example by the following:—The names *Æcidium* Pers., *Roestelia* Reb., *Æcidiolum* Unger, and *Peridermium* Chev. designate different states of the gametophyte in the group *Uredinales*. The generic name *Æcidium* Pers. [in Gmel. Syst. Nat. ii. (1791)], belonging to a gametophytic state, cannot displace *Gymnosporangium* Hedw. f. [DC. Fl. Fr. ii. (1805)], based upon the sporphyte.

The amendment to this article, as previously suggested, met with decided opposition. As now worded, it has the effect to restore the original intention of the "Rule" as adopted at Brussels. It eliminates the æcidiospore, and thereby disposes of many recent

combinations, to which much objection has been made. It retains the Uredospore, for otherwise many familiar names would be rejected, such as *Coleosporium Ipomœæ* Burr., *Uromyces Fabæ* de Bary, *U. appendiculatus* Fries, *Puccinia glumarum* Erikss. & Henn., *P. Porri* Wint., and other generally accepted names. It also conserves such names as *Puccinia graminis*, *P. sessilis*, *P. coronata*, *P. Poarum*, *P. limosa*, etc.

3. Add the following genera to the list of Nomina Conservanda:—

> *Uromyces* (Link) Unger, 1833 (in place of *Nigredo* Rouss., 1806); *Cæomurus* (Link), S. F. Gray, 1821, or *Pucciniola* March., 1829); *Puccinia* Pers., 1794 (in place of *Puccinia* [Micheli] Adans., 1763, or *Puccinia* Willd., 1787); *Gymnosporangium* Hedw. f., 1805 (in place of *Puccinia* [Micheli] Adans., 1763); *Melampsora* Cast., 1843 (in place of *Uredo* Pers., 1794).

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

Oxypetalum Kingii S. Moore, sp. nov. (Asclepiadaceæ). Fruticulosum circa 10 cm. alt.; *caulibus* pluribus inferne lignosis superne subvolubilibus uti folia floresque minute farinaceo-pubescentibus; *foliis* brevipetiolatis lineari-lanceolatis mucronatis basi rotundatis nequaquam subhastatis marginibus revolutis; *pedunculis* exaxillaribus 1–3-floris; *pedicellis* pedunculos sæpe facile excedentibus; *bracteis* lineari-lanceolatis acutis; *calycis* segmentis ovatis acutiusculis corollæ tubo longioribus; *corollæ* lobis oblongis emarginatis tubo fere ter longioribus; *coronæ* phyllis corollæ tubo prope apicem insertis inter se brevissime connatis oblongis breviter bifidis corollæ lobos plus quam semiæquantibus intus nudis; *pollinioruм* caudiculis abbreviatis denteque minutissimo instructis; *stigmate* in rostrum sat longum bifidum producto.

Hab. Mendoza Province, Cordillera del Tigré, 2200 m. alt.; *Lieut.-Col. King*, 347.

Main stem short, stout, about 5 mm., older branches 2–3 mm. thick; young stems 1 mm. thick or a little over; internodes ±1 cm. long. Leaves 12–18 × 2–3 mm., drying light green, midrib very prominent beneath; petioles stout, 1·5–2 mm. long. Peduncles sometimes only 1–1·5 mm. long, sometimes 1 cm. or even more. Pedicels slender, usually 5–10 mm. long. Bracts about 3 mm. long. Calyx-segments eglandular within, 3·5 mm. long. Corolla apparently white or pale yellow; tube 2·5 mm., lobes 6 mm. long. Coronal leaves 4 mm. and fleshy stigma 4 mm. l.

According to the description in Bol. Acad. Nac. Ci. Argent. iv. 54, this differs from *O. Echegarayi* Hieron. in its longer leaves not auriculed at base, the much longer calyx-segments, corolla with longer differently-shaped lobes, longer coronal leaves, and stigma nearly three times the size.—S. Moore.

Meconopsis (? Robustæ) **regia** Taylor, sp. nov. *Herba* elata verisimiliter biennis, partibus plurimis pilis mollibus barbellatis plus minusve dense vestitis. *Radix* dauciformis. *Caulis* florifer ramosus,

altitudinis saltem 60 cm. attigens. *Folia* radicalia usque ad 40 cm. longa et 9 cm. lata, lamina anguste elliptica, ad basin apicemque æqualiter attenuata, margine serrata dentibus ab indumento denso aliquid obscuratis, firme chartacea, basi in petiolum latum decurrentia, utrinque præsertim in costa nervisque dense sericeo-tomentosa, caulina superiora radicalibus multo minora, ramos graciles floriferos subtendentia, lamina textura tenuiore, minus dense hirsuta, basi subamplexicaule. *Flores* numerosi, 5–7·5 cm. diametro, ramis axillaribus gracilibus usque ad 17·5 cm. longis in fructo lignoso-incrassatis suffulti, inferioribus plerumque 2-floris, superioribus plerumque simplicibus; bracteæ foliis caulinis superioribus similes sed minores; alabastra ovoideo-globosa. *Sepala* ovata, extus dense tomentosa. *Petala* plerumque 4, margine integra, lutea. *Stamina* numerosissima. *Ovarium* globosum vel ovoideum, in flore aperto 6–12 mm. longum, dense hirsutum, placentis lamelliformibus in loculum profunde intrusis; stylus crassus, 5–10 mm. longus; lobi stigmatis sinuati, non decurrentes. *Capsula* oblongo-ellipsoidea, stylo persistenti excluso 1·5–3·5 cm. longa, valvis 7–12. *Semina* ovoidea, circ. 1 mm. longa et 0·5 mm. lata, testa dense papillosa.

Hab. Alpine Himalaya. Western Nepal: Barpak, 12–15,000 ft., "velvet with lanceolate leaves, yellow," in flower and fruit, *Lall Dhwoj*, 18. (Type in Herb. Mus. Brit.); Michet, 14–15,000 ft., "yellow, with seed," in fruit, *Lall Dhwoj*, 195.

This handsome new species was first sent to this country in 1928, and the further arrival this year of ample flowering and fruiting specimens makes it possible to publish a complete description. Its introduction is due to Col. Sir Clive Wigram and Mr. T. Hay, Superintendent of Central Parks, London, to whom I am indebted for access to the excellent material on which this description is based. Since seeds accompanying the specimens have germinated readily, it is hoped that this fine plant will soon be established in our gardens. The affinity of the species is clearly with *Meconopsis superba* King ex Prain. In their ovarian characters the two species are practically identical, and they further resemble each other in the serration of the leaves and sericeous indumentum. *M. regia* has, however, yellow flowers borne on an openly-branched inflorescence.—G. Taylor.

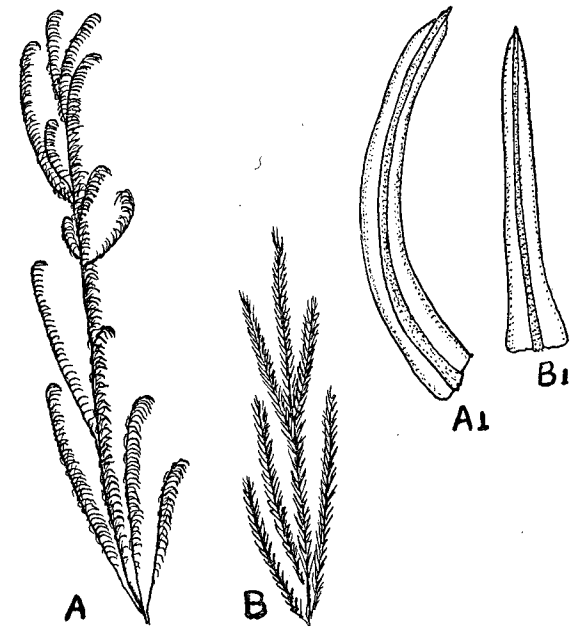
New Variety of *Cinclidotus aquaticus* (Jacq.) Br. Eur.

By W. R. Sherrin, A.L.S.

While examining a series of mosses collected in Albania by A. Baldacci, several plants of *Cinclidotus aquaticus* were noted, one of which, in particular, was so different in general appearance that only by microscopical examination could its affinities to *C. aquaticus* be determined.

The straight non-secund leaves give this plant a very distinct appearance in the field, though the microscopical details (especially in the absence of fruit) do not show sufficient variation from the species to warrant more than varietal status. I propose, therefore,

to name it *Cinclidotus aquaticus* var. *strictus*, var. nov. Planta brevis, ramulis paucis; folia erecta, stricta, non secunda (see fig.).



A. *Cinclidotus aquaticus*, ½ nat. size. A'. Leaf of do., ×10. B. *C. aquaticus*, var. nov. *strictus*, ½ nat. size. B'. Leaf of do., ×10.

OBITUARIES.

H. C. Robinson.

Herbert Christopher Robinson, born Nov. 4, 1874, who died May 30, 1929, was better known as a zoologist than a botanist. For some years he was Director of the Federated Malay States Museums. During the many expeditions he made in the Malay Peninsula between 1906 and his retirement in 1926 he not infrequently obtained valuable collections of plants, notably in the expedition to Gunong Tahan in 1906. Here he was accompanied by Mr. L. Wray, who, however, had to return from illness before this mountain, which had long defied all explorers, had been conquered by Robinson, who was the first man ever to reach it. His collections were described by me in the *Journal of the Linnean Society*, xxxviii. 301. I travelled with him and Mr. C. B. Kloss to the same mountain six years later, and also on several other collecting expeditions organized by him. His name is associated with many Malayan plants, e. g. *Paphiopedilum Robinsonii* Ridl., *Eugenia Robinsoniana* Ridl., and *Rhododendron Robinsonii* Ridl.—H. N. Ridley.

R. J. Harvey-Gibson
(1860–1929).

Robert John Harvey-Gibson, who died on June 3, was born in 1860 and educated at the Universities of Aberdeen, Edinburgh, and Strasburg. He organized the Hartley Botanical Laboratory at Liverpool, and held the Professorship of Botany from 1894 to 1921. His earlier published work was in invertebrate zoology, later (after 1887) on various aspects of botanical science. It included several reports on the marine algæ of the Liverpool Marine Biology Committee's district, a preliminary list of the marine algæ of the Oban district (1892), and, with Margery Knight, reports on the Marine Biology of the Sudanese Red Sea; also notes on the anatomy and reproductive organs of various seaweeds. His most important piece of work was on the anatomy of the genus *Selaginella*, published in the *Annals of Botany* (viii., x., xi., xvi.). His translation of Ludwig Jost's *Lectures on Plant Physiology* (1907) did not reach the standard of other translations of botanical works issued by the Oxford Press. He also wrote the *Outlines of the History of Botany* (1919). Harvey-Gibson was a good draughtsman, and the illustrations for his anatomical papers were by his own hand. He was awarded the C.B.E. in 1919, and was D.L. and J.P. for the County Palatine of Lancaster.—A. B. R.

SHORT NOTE.

Devonshire Records.—Miss C. Ethelinda Larter writes to point out that the record of "*Lamium mollucellifolium* Fr." for Goodleigh, N. Devon, cited in Journ. Bot. 1929, p. 150, as from Trans. Devon. Assoc. lx. 81–92 (1928), must be expunged; because Miss Young's living plant, when examined by Mr. A. W. Trethewy, was found to be *L. maculatum* L., and, when sought for again later, had entirely disappeared. As regards the finding of the alien, *Cynosurus echinatus* L., in S. Devon by Mrs. Cartwright, there is an earlier record in Mr. W. P. Hiern's *MS. Census of Devon Plants*, 1923, for districts 6 and 7. Miss Larter also strongly questions the authority for the finding of *Mertensia maritima* Gray.

REVIEWS.

New Editions of Text-books.

(1) *A Text-book of Botany for Medical and Pharmaceutical Students.* By James Small, D.Sc., Professor of Botany in the Queen's University of Belfast, late Lecturer in Botany to the Pharmaceutical Society of Great Britain. Second Edition. 8vo, pp. x, 686, 1350 figs. Churchill: London, 1929. Price 21*s.*

(2) *A Text-book of General Botany.* By Gilbert M. Smith, Stanford University; J. B. Overton, E. M. Gilbert, R. H. Denniston, G. S. Bryan, and C. E. Allen, University of Wisconsin. Revised Edition. 8vo, pp. x, 539, text-figs. 416. Macmillan & Co.: New York, 1928. Price 16*s.*

(3) *A Text-book of Botany.* By J. M. Lowson, M.A., B.Sc. Seventh Edition, revised in collaboration with the author by L. C. Fox, M.A. 8vo, pp. viii, 656, 389 text-figs. University Tutorial Press: London, 1929. Price 9*s.* 6*d.*

(1) The first edition of Prof. Small's text-book was noticed in this *Journal* in 1921 (p. 236) (some search was necessary as the author has omitted to date his preface). The new edition, which exceeds the original by five pages, differs in certain "alterations and additions that have been made in order to bring the presentation of various parts of the subject into line with recently acquired knowledge"; special reference is made to alterations in order to keep the summaries of carbon assimilation and geotropism up to date. Essentially the book is the same—a text-book of botany embodying a large amount of information in a condensed form profusely illustrated by text-blocks. The book, which is a development of Prof. Reynolds Green's *Manual of Botany*, which in turn replaced the original work of Professor Bentley, has been written for medical and pharmaceutical students, of whose needs the author has had considerable experience as lecturer and examiner to the Pharmaceutical Society of Great Britain. Apart from incidental reference to economic products in the section dealing with the families of plants, a few pages in the chapter of phytochemistry, and a short appendix giving the diagnostic characters of certain medicinal or poisonous plants which conforms to the syllabus of the Pharmaceutical Society's qualifying examination, there is no evidence that the needs of this type of student differ from those of other varieties.

(2) This attractive American text-book, at its first appearance in 1924, received an appreciative notice in this *Journal* (1925, p. 87). It has been reprinted four times, and the present revised edition is dated September 1928. The speedy call for a new edition suggests that it has been found useful by students, and there is evidence of considerable additions to and revision of the original text. The new edition exceeds the original by 130 pages, and there are nearly one hundred additional figures. The price, however, is unaltered. In the original notice, while commending the clear and well-selected figures, reference was made to the less satisfactory character of the portraits of eminent pioneers in various branches of the science, and we suggest that these should be replaced in future editions or omitted—the weak or criminal cast of countenance which is suggested for these eminent botanists will not enhance the respect in which their names should be held by the student.

Of the book as a whole, it may be remarked that the Wisconsin University Student is fortunate in possessing a presentation of the elements of botany which is readable rather than repellent.

(3) The repeated call for new editions indicates that Mr. Lowson's text-book is more or less widely used by students. In the present edition obsolete technical terms have been deleted and "the subject-

matter has been amplified along the broad lines of recent research." "*Sphærotheca* has been added as a type and a considerable number of new diagrams have been incorporated."

The book contains a vast amount of information which is arranged in numbered paragraphs in each section, and is admittedly designed to enable students to prepare for certain examinations. To what extent it is likely to produce botanists or to engender a love for the science is another matter. An omission which seems a serious one is that of any reference to botanical works from which the student might obtain further information on, or a fuller explanation of, any point in which he was interested. And, unless we are mistaken, he may read, mark, and learn . . . . the contents of the volume without becoming familiar with the name of a single botanist to whose work the growth and development of the science is due.

Untersuchungen über die Abhangigkeit des pflanzlichen Wachstumverlaufes und der erreichten Endlänge von konstanten Temperaturgraden. Von KARL SILBERSCHMIDT. *Bibliotheca Botanica.* Heft 97, 4to, pp. ii, 95, 3 tabs. and 20 text-figs. Stuttgart, 1928. Price 36 M.

IT is well known that temperature has a marked effect on the rate of growth, producing in general an increased rate, but at higher temperatures a reduced one. This fall in the rate used to be ascribed to an injurious factor which was supposed to make its appearance at such temperatures. The more modern view is that the temperature coefficient for growth shows a continuous change from infinity at low temperatures to zero at high temperatures. Such a change cannot be explained by the sudden introduction of a retarding factor.

Most of the earlier observations on the temperature relations of growth were markedly incomplete, since they were made over a very restricted portion of the growth-period of the organ concerned. The work of Vogt and Sierp on the coleoptile of oat showed that temperature not only affected the rate of growth, but determined the period during which growth lasted and also the length of the coleoptile finally attained. The object of the author of this memoir was to study further the effect of temperature on the course of the growth-curve and its effect on the size attained when growth ceases at the end of the Sachs "grand period."

The author amplifies the investigations of Vogt and Sierp by numerous experiments on the growth of roots and shoots of various plants. He characterises the growth-curve of an organ by (i.) the growth-rate, which he calculates from the equation for Robertson's autocatalytic growth-curve, (ii.) the period during which growth lasts, and (iii.) the final length of the organ. He shows that the shape of the curve is affected by other factors, such as light, soil-moisture, etc. He finds that the greatest rate of growth is shown at an intermediate temperature, and this applies also to the length of growing period and the length of organ attained. The final length attained, however, reaches its maximum at a lower temperature than do the growth-rate and length of growth-period.—V. H. B.

SOUTH AFRICAN MEETING OF THE BRITISH ASSOCIATION.

(Continued from p. 249.)

MEMBERS travelling on the 'Llandovery Castle' were fortunate in reaching Cape Town several days before the meeting began. Professors Adamson and Compton had arranged botanical excursions for each day, and under their guidance the botanists were introduced to the wonderful flora of the Cape Province. Excursions were made to Kalk Bay, where the shore-cliffs were examined, across the Cape Flats, a stretch of 20 miles, which are being rapidly covered with the Port Jackson Willow (*Acacia saligna*), to Sir Lowry Pass in the Hottentot-Holland range and the hill-country beyond, and on the Cape Peninsula. Though we were reminded that it was winter in South Africa, and that we were six weeks too early to see the flora at its best, it was possible to form an idea of the general character of the vegetation and the remarkable development of some of the genera. The Proteaceæ were much in evidence, many species of *Protea*, *Leucadendron*, and *Leucospermum* were in flower; and quite sufficient species of *Erica* to tax the memory of the newcomer. Numerous Composites, shrubby and herbaceous, representing genera unfamiliar to the northern botanist, were also a prominent feature. Species of Restiaceæ on the flats were characteristic of damper areas. We were too early for the wealth of bulbous plants, a few only being in flower.

A trip to the Cape of Good Hope under the expert guidance of Mr. N. S. Pillans was of special interest; one or two possibly new species were found, and it was interesting to hear our guide express the opinion that much still remained to be done in the botanical examination of the various ranges of mountains in the Cape Province, where in the deep wooded kloofs the original flora still flourished untouched by the felling and burning which has affected the more exposed areas. Table Mountain is threatened by the completion of an aerial railway (not yet working) to the summit, which will render accessible an area of great botanical interest. Fortunately, the Kirstenbosch Garden, planned on the slope of the mountain, has acquired the area extending to and beyond the summit, which will thus form a Nature reserve. One afternoon was spent in this wonderful garden under the guidance of the Curator, Prof. Compton; the beautiful Silver-tree (*Leucadendron argenteum*) is represented by some fine examples, and there are good collections of Proteaceæ, Cycads, Succulents, and other groups or genera characteristic of the South African flora. An interesting feature of the introduced flora was our own Oak, avenues of which were planted by the early Dutch settlers; these were already struggling into leaf in mid-July; we learnt that the wood was useless as timber, the climatic conditions and the short resting period of winter inducing the formation of a soft wood. During our stay in the Cape Province we were favoured with warm bright sunny days recalling an English June, though the temperature fell rapidly at sunset.

I was privileged to join a select party of the Forestry section for several days in the beautiful George and Knysna district, on the coast east of the Cape Province. This contrasts with the more arid vegetation of the Cape Province in the wealth of forest which clothes the numerous broad deep valleys running towards the coast. Mr. C. Legat, Chief Conservator of Forests of the Union, was in charge of the party, and we were met and conducted by the local Forestry officers. Visits were paid to various areas of indigenous forest where the botanists became acquainted with a bewildering variety of trees, the subject of study by the local foresters with a view to their conservation. Of special interest were some magnificent specimens of the giant Podocarp (*Podocarpus elongata*).

The great mixture of species in the native forests that remain and their slow growth renders difficult an adequate supply of timber. To meet the demand many thousands of acres have been planted by the Forestry Department with species of Pines, chiefly *Pinus insignis* and *P. Pinaster*; *P. palustris*, *P. canariensis*, and *P. caribæa* were also grown.

The scenery in this district is remarkably varied and beautiful, the densely wooded valleys contrasting with the comparatively bare high-lying veld and the rugged upper levels of the mountain-ranges.

The business of the Association was opened at Cape Town by a speech of welcome from the Governor-General, the Earl of Athlone, followed by the installation, as President, of Sir Thomas Holland, K.C.S.I. The first meeting was a joint one of the British and South African Associations for the Advancement of Science. The President of the latter, Mr. Jan H. Hofmeyr, read his address, "Africa and Science," a review of the progress in science in South Africa since the visit of the British Association in 1905, and an eloquent exposition of the part which South Africa might play in the development of science in the Southern Hemisphere in the future. Sir Thomas Holland's address, "The International Relationship of Minerals" was given later at Johannesburg, where the second week of meetings was held.

The sectional meetings at Cape Town were held in the new University buildings at Rondebosch, some miles from the city, on the other side of Table Mountain. The position is remarkably beautiful, on the slope of the mountain overlooking the Cape Flats which stretch towards the Hottentot-Holland Range in the far distance. The buildings are unpretentious and scarcely worthy of the site. Just above is the fine Rhodes Memorial, commanding an even more extensive view, and below is Groote Schuur, the old Dutch homestead which Rhodes owned and occupied and which is now the official residence of the Premier of the Union.

Several papers of local interest were read before the Botanical Section. Prof. R. S. Adamson gave a concise account of the vegetation of the Cape Peninsula which contains 3000 species of flowering plants, including many endemics. The greater portion is xerophytic bushland characterized by absence of social and herbaceous plants. This includes a very large number of species with no special dominant.

In the full stage of development Silver-tree and other small trees occur on the softer granitic rocks, while on the harder granite are large shrubby Proteas; but these communities are very limited in area; the general vegetation comprises a small shrubby greatly mixed growth. The patchwork distribution noticeable is due to burning. After a fire geophytes appear, often a remarkable development of Monocotyledons such as *Watsonia*, *Bobartia*, and others. On sandy soils communities of Restiaceæ follow the fires, and give way in time to xerophytic bush. The prevalent candelabra form of bush is due to the destruction of the lower branches by fire.

Forests are now confined to the most sheltered spots. The trees support woody climbing plants and epiphytes, including many ferns; the undergrowth is not very abundant. Bryophytes and lichens are common. The destruction of the forests is due partly to fire and partly to felling by the early settlers. Regeneration may occur in burnt portions of the forest.

Prof. R. H. Compton described some features of botanical interest in the National Botanic Garden preparatory to the visit by the members; and Mrs. M. R. Levyns discussed the problem of the Rhenoster bush—*Elytropappus rhinocerotis*,—a shrubby composite with heath-like leaves and small flower-heads which spreads after a veld fire.

A discussion was held on the origin and evolution of the South African Flora. Dr. Marloth referred to various views as to the limitation of the Cape flora proper. Prof. J. W. Bews, speaking for Natal and Zululand, stated that all the various elements of the South African flora are well represented. The hygrophilous bush of the coast-belt is more or less an outlier of the tropical flora. The trees composing it are relatively primitive types, and this view is confirmed by the fact that the wood of one of the commonest, *Eugenia* (*Syzygium*) *cordata*, has been described from the Cretaceous beds of the coast. They are also relatively inefficient and unspecialised physiologically; they carry out their various functional activities at a relatively slow and uniform rate throughout the year. Numerous lianes, a smaller number of epiphytes, and a few forest-herbs are more advanced in response to the effects of the living environment. All have close tropical affinities.

The temperate South African flora in Natal is best represented on the mountain ranges, but isolated species have penetrated through the tropical and sub-tropical elements. On the whole, evidence points to this southern temperate flora being more ancient, in many respects, than the northern. The South African temperate flora connects with that of the Mediterranean region, and that in turn with the North temperate flora of Europe and Asia.

Response to a dry (winter) resting season has been responsible for the maximum amount of differentiation in the sub-tropical flora of the whole eastern side of South Africa, as well as the central, northern, and north-western regions. Natal is peculiarly well situated for studying all the steps in the process. In the dry river valleys conditions are found approaching very closely to central Karroo

conditions, and the flora is similar. This xerophytic flora is from every standpoint the most highly evolved in South Africa. Probably in future the most fruitful line of research will be in the study of the details of its physiological behaviour.

Prof. R. H. Compton dealt with the Karoo, which is bounded north and east by a "northern" or Central African flora, south and west by a "southern" or circum-antarctic flora. The flora is highly derivative, a miscellaneous assortment of northern and southern types selected through adaptability to aridity and grazing. Both factors act by destroying subaerial growths, and the flora accordingly shows features of storage, unpalatableness, and regeneration.

Characteristic southern families (Proteaceæ, Ericaceæ, &c.), typically "hard-wooded" shrubs lacking regenerative powers, though in close contact with the Karoo, do not enter it. Some families, mainly southern in South Africa, can, however, penetrate the Karoo by reason of tendencies to geophily and succulence (Crassulaceæ, Geraniaceæ, Iridaceæ).

The woody flora is largely derived from families with a wide northern and southern distribution (Compositæ, Leguminosæ, Solanaceæ, Sterculiaceæ, Anacardiaceæ, Rubiaceæ, &c.). Most species are both distasteful to animals and drought-resistant through chemical means, the few edible species having great regenerative powers. The opportunist ephemerals belong to widely distributed genera; other herbaceous elements (Gramineæ) being outliers of northern or southern genera.

Geophily, exemplifying storage and grazing survival, is most conspicuous in bulbous monocotyledons, and Liliaceæ and Amaryllidaceæ are well represented; but many dicotyledonous genera have also taken advantage of geophilous tendencies to colonise Karoo areas. Succulents, combining storage with distastefulness, are the most distinctive Karoo elements. Stem-succulent Euphorbiaceæ and Asclepiadaceæ are mainly northern, leaf-succulent Aizoaceæ and Crassulaceæ have strong southern affinities, other groups being more general geographically. Karoo stream-beds contain arboreal extensions of northern tree-veld.

Dr. I. B. Pole Evans, discussing the country north of the Orange River, as far as latitude 22°, and west of the Drakensberg escarpment, referred to six types of vegetation—desert, semi-desert, desert-grassland transition, steppe, savannah, and temperate rain-forests.

Although only part of this area lies within the tropics, tropical African forms are to be found over the whole; in fact, the outstanding point about the area as a whole is the very marked invasion of the South African flora by the tropical African flora.

The flora of this area shows affinities also with the floras of tropical America, tropical Asia, and Madagascar.

Prof. Marie-Victorin spoke on some evidences of evolution in the flora of North-Eastern America. Floras, as well as faunas, are dynamic entities undergoing constant transformation. Their apparent static condition is a delusion, relevant to the brevity of human life and of human scientific experience as a whole.

Even in recent floras can be detected and measured, under certain favourable circumstances, a dynamism acting both on the whole and on the component parts. The latter is properly an evolution process, and was the subject of the present paper.

Traces of discontinuous and of continuous evolution in the flora of North-Eastern America were discussed. *Senecio* and *Cratægus* afford examples of discontinuous evolution—that is, mutation.

Continuous evolution was considered as generally induced by isolation, either geographical or physiological. As examples of the effects of geographical isolation, the following cases were reviewed:—

(*a*) The evolution of two parallel series of Gymnosperms by the splitting lengthwise of North America into two distinct land-masses at the end of Cretaceous times.

(*b*) The evolution of two parallel series of species and varieties by the destruction, during Tertiary times, of the North Atlantic land-bridge uniting Europe and America.

(*c*) The evolution, in certain areas about the Gulf of St. Lawrence, of numerous species and varieties, through isolation on *nunataks* (unglaciated spots) during the last Wisconsin glacial period.

The evolution of species and varieties through physiological isolation is exemplified by the peculiar behaviour of plants growing on the tidal muds of the estuary of the St. Lawrence and other rivers. The daily rhythm of tidal emersion and immersion represents a high frequency of seasonal changes, and seems to act as an accelerator of evolution.

Mr. R. D'O. Good discussed the geography of the genus *Coriaria*, a monotypic family of polypetalous Dicotyledons of very uncertain affinity.

The genus is, geographically, most unique, since it is found in no less than four widely separated parts of the world—*i. e.*, Western Mediterranean; continental and insular Eastern Asia, New Zealand, New Guinea, and parts of Polynesia; Western South America; and Central America.

It can be divided into three quite distinct subgenera, of which two (one monotypic) are confined to the two northern generic areas and one is confined to the southern areas.

A number of leaf-fossils have been doubtfully ascribed to *Coriaria*; but of particular interest is a complete fossil branch with leaves and fruits from the Oligocene of Southern France, indistinguishable from a species now living in the Himalayas.

The present discontinuity within the northern and southern hemispheres can be attributed largely to the immediate or subsequent effects of the climatic changes culminating in the Pleistocene glaciation. The discontinuity between the two hemispheres presents a difficult problem, involving the question of the point of origin of the genus and the directions in which extension of area has taken place especially across the tropics. Several theories can be made to explain the facts, but it is suggested that a modified theory of continental movement involves as little hypothesis as any other.

Miss E. S. Saunders gave an account of her work on the morphology of the carpel, and Prof. F. E. Lloyd described the mechanism of the trap in *Utricularia*.

Prof. J. H. Priestley (on the Movement of Water and Solutes in the Tree) claimed that a study of the seasonal activity of the cambium in the tree throws quite a new light upon the processes by which water is moved, in the early part of the growing season, from the trunk into the young shoots, and upon the manner in which organic solutes are transferred downwards in the tree towards the close of the growing season.

Dr. Winifred E. Brenchley, in describing the influence of traces of various elements upon plant-growth, stated that the importance of traces of the rarer elements found in plants is gradually becoming apparent, as it is demonstrated that in certain cases they have a definite physiological function in relation to metabolism. Many elements are known to improve growth if presented in sufficiently small amounts, but it is now evident that minute traces of boron, manganese, zinc, &c., are as essential to the development of some plants as the major nutrients, phosphorus, potash, and nitrogen. There is some evidence to indicate that the discrepant results obtained by various investigators may be due, partly at least, to environmental conditions such as variations in light intensity.

The exact physiological function of these essential traces of elements has not yet been fully determined.

During the meeting Dr. I. Pole Evans exhibited a beautiful series of colour photographic views of South African vegetation prepared by himself and Mrs. Pole Evans.—A. B. R.

(To be continued.)

ALABASTRA DIVERSA.—Part XXXVI.

By S. Moore.

(Concluded from p. 231.)

Crossandra Gossweileri, sp. nov. *Suffrutex* erectus circa metralis caulibus erectis sursum simplicibus lignosis fistulosis juxta apicem solummodo foliosis alibi cicatricibus foliorum demortuorum signatis primo fulvo-pubescentibus deinde glabris; *foliis* paucis obovatis vel obovato-oblongis obtuse acuminatis basi in petiolum brevem angustatis membranaceis glabris costis utrinque 10 puberulis exemptis glabris; *spicis* brevipedunculatis foliis multo brevioribus late cylindricis; *bracteis* ovatis vel ovato-oblongis obtusis subpapyraceis costa unica brunnea percursis dorso minute brunneo-punctatis; *bracteolis* parvulis ovatis debiliter spinuloso-acuminatis; *calycis* segmentis bracteolis similibus nisi paullo longioribus angustioribusque omnibus 5-nervibus; *corollæ* albæ tubo glabro bracteas superante; *ovario* oblongo glabro.

Hab. Portuguese Congo, Pôtigami forest, Maiombe, in shady situations along rivulets on the R. N'Zanza; *Gossweiler*, 7728.

Stem somewhat anfractuous, in the specimens leafless or with only 2 or 4 leaves. Leaves up to 18 × 7·5 cm., the smallest 12 × 4·5 cm.; petioles of the largest leaves 3 cm., of the smallest only some 6 mm. long, puberulous. Spikes 3–5·5 × 2–3 cm.; on peduncles of 1 cm. or less. Bracts 15–20 × 6–10 mm. Bracteoles only 3·5 mm. long. Calyx-segments 4–4·5 mm. long. Corolla-tube 33 × 1·5 mm.; limb 10 mm. long. Anthers linear, with a slightly curved caudate appendix, barbellate at base, elsewhere puberulous, 3 mm. long. Ovary 3 mm. long.

Affinity with *C. guineensis* Nees and its allies; known from them on sight by the wide spikes.

It is usual for the calyx of *Crossandra* to have a posticous calyx traversed by 2 nerves and ending in 2 teeth. Several exceptions to this are known; in these cases the segment is similar to the others and like them is entire. The plant under notice makes the eighth exception to the rule, the others being *C. Boivini* and *longipes* (Madagascar), *Warneckii* (E. Tropical Africa), *pinguior* (S. Central Africa), and *Buntingii*, *elatior*, and *Talbotii* (W. Africa).

Justicia (§*Rostellularia*) **Woodsiæ**, sp. nov. *Herba* dumosa circa semipedalis; *ramis* tenuibus tetragonis sursum foliosis appresse pubescentibus; *foliis* subsessilibus lanceolatis apice basique obtusis in nervis strigose pilosis utrinque lenticellis linearibus copiose indutis; *floribus* in spicam substrobilinam foliis paullo breviorem digestis; *foliis floralibus* oblanceolatis obtusissimis uti bractea bracteolæque quam se angustiores et breviores longe ciliatis; *calycis* segmentis 5 inter se subæqualibus linearibus acuminatis ciliatis; *corollæ* tubo calyci circa æquilongo labio antico late ovato lobis rotundatis palato valde aspectabili labio postico antico paullo breviore quadrato lobis ovatis; *antherarum* loculo inf. breviter obtuseque calcarato; *ovarii* loculis 2-ovulatis; *capsula* oblongo-ovoidea acuta basi breviter stipitato sparsim pubescente; *seminibus* tuberculatis.

Hab. North Rhodesia, Mazabuka, 4000 ft.; *Mrs. Woods*, 23.

Branches straight, barely 2 mm. across. Leaves 8–10 × 1·5–3 cm., drying dark green; petioles hairy, 3 mm. long. Spike densely flowered, rather less so below and probably farther up when fully grown, 7 × 2 cm. Floral leaves green, about 1 cm. long. Bract and bracteoles 5–7 mm. long. Calyx-segments 4 mm. long. Corolla blue-grey with yellow throat; lower lip 7 mm. wide, the lobes 1·5 × 2 mm.; upper lip 4 × 3 mm. Capsule pale, 5–6 mm. long, apparently 4-seeded. Seeds rounded, covered with large brown tubercles, nearly 2 mm. across.

Affinity with *J. flava* Vahl and allies; different in flower and capsule.

Siphonoglossa Migeodii, sp. nov. *Herbacea*, 4 ped. alt., ramis tetragonis gracilibus appresse pubescentibus in nodis strigillosis dein glabrescentibus; *foliis* sessilibus lineari-lanceolatis obtusiusculis basi

rotundatis in costis paginæ utriusque (et alibi sparsim) pilis strigillosis appressis instructis; *floribus* albis in spicam pedunculatam terminalem quam folia breviorem dispositis; *foliis floralibus* linearilanceolatis acutis uti bractea linearis strigilloso-pubescentibus; *bracteolis* anguste linearibus puberulis bractea brevioribus; *calycis* segmentis 5 inter se subæqualibus; *corollæ* tubo angusto sursum levissime ampliato labio antico late obovato segmentis ovatis rotundatis labio postico antico breviore oblongo-ovato breviter bifido; *antherarum* loculo inf. perspicue calcarato; *capsula* obovoidea sursum angustata pubescente; *seminibus* 4 tuberculato-rugosis.

Hab. Tanganyika Territory, Tendaguru; *F. W. H. Migeod*, 137, 473.

Leaves 8–15 cm. long, in the lower part 9–20 mm. wide, drying dark green but paler below; cystoliths on the upper face numerous and easily seen. Spike up to 8·5 cm. long and 7 mm. broad on a peduncle somewhat shorter; hairy axis slightly exposed at the base of the spike. Floral leaves, bracts and bracteoles green, the first ±10 mm. long, bracts about 7 mm. and bracteoles 6 mm. Calyx-segments 4 mm. long. Corolla-tube glandular-puberulous, 13 mm. long, in the dry state not above 2 mm. wide; lower lip 8 mm., upper lip 5 mm. long. Capsule 1 cm. long, including the nearly 3 mm. long stipe. Seeds round, black when ripe, about 1 mm. across.

This is the third tropical African species of the genus, its other Old World representatives being endemic in South Africa. In habit the present plant resembles *S. linifolia* Clarke, but in other respects it is quite different. The genus differs from *Justicia* only in the long slender tube of the corolla: it is the *Aulojusticia* of Lindau.

Dicliptera cubangensis, sp. nov. *Herba* perennis; *caulibus* ascendentibus a basi ramosis e rhizomate brevi copiose radicifero oriundis subsparsim foliosis puberulis; *foliis* parvulis brevipetiolatis ovatis vel ovato-oblongis basi apiceque obtusis utrinque glabris cystolithigerisque; *spiculis* 2-floris (flore secundo subeffeto) in spicam angustam terminalem vel axillarem digestis; *foliis floralibus* abbreviatis subulatis puberulis; *bracteis* exterioribus oblongis obtusis pubescentibus quam interiores lineari-lanceolatæ longioribus; *calycis* segmentis bracteis interioribus similibus nisi minoribus; *corollæ* extus puberulæ tubo sursum leviter ampliato bracteis ext. circa æquilongo limbo tubum æquante; *staminibus* breviter exsertis; *ovario* uti stylus glabro.

Hab. Rather rare in moist situations near R. Cubango at Forte Princeza Amelia, Angola; *Gossweiler*, 1998.

Plant about a span high. Leaves ±1 cm. long, 4–5 mm. broad; petioles 1·5 mm. long. Spikes up to 2×1 cm., but usually shorter. Floral leaves 1·5–2 mm. long. Outer bracts 6–7 mm., interior 5 mm. long. Calyx-segments 3 mm. long. Corolla barely 10 mm. long. Ovary 1 mm., style 9 mm. long.

Close to the South African *D. minor* Clarke. The leaves are smaller and relatively broader, the bracts are obtuse, and the flowers smaller.

2. Notes on African Compositæ.

Psiadia Hendersoniæ, sp. nov. *Frutex* ramosus, crebro foliosus, leviter resinosus; *ramis* subteretibus striatis scabriusculo-puberulis; *foliis* sessilibus oblongis mucronatis basi leviter amplexicaulibus apicem versus paucidenticulatis alibi sæpius integris margine revolutis subcoriaceis utrinque (præsertim vero pag. sup.) scabridis; *capitulis* mediocribus multiflosculosis corymbum brevem ramulos coronantem efficientibus; *involucri* campanulati minute pubescentis phyllis 3–4-serialibus oblongis acutis membranaceis; *ligulis* pluribus exsertis lineari-oblongis emarginatis flavis; *florum* ♀ corollis anguste infundibularibus extus puberulis; *achæniis* oblongis setulosis quam pappi setæ scabriusculæ fulvæ brevioribus.

Hab. British Central Africa, Nyika Plateau; *Miss M. S. Henderson.*

Leaves mostly 1·5–2·5 (barely 3) cm. long, 3–5 mm. broad, paler below and prominently reticulate. Corymbs about 2·5×3·5 cm., the branches slender and minutely pubescent; ultimate peduncles at most 5 mm. long. Expanded heads 5×8 mm. Outer involucral leaves 3 mm., inner 4 mm. long. Lamina of ligule 2 mm. long, hermaphrodite corolla 4 mm. Achenes 1·25, setæ of pappus 3·5–4 mm. long.

A very distinct species with its oblong leaves; conspecific with it is a plant in the Kew Herbarium collected by Thomson on "Higher Plateau north of Lake Nyassa."

Sphæranthus Taylorii mihi in Trans. Linn. Soc. (Bot.) xxxv. 330, was overlooked by Robyns when preparing his monograph of the genus published in Kew Bull. 1924, 177–199. At that time Robyns had not seen a specimen of *S. gomphrenoides* O. Hoffm., founded on Fischer 335, but one has since been sent to Kew from Berlin, and this shows that *S. Taylorii* must be cited as a synonym for the other. At the Museum is another specimen of this collected by Swynnerton (no. 877) at Makara in Tanganyika Territory.

Ondetia Benth. in Hook. Ic. Pl. 1112 (1872) and Eremothamnus O. Hoffm. in Engl. Bot. Jahrb. x. 278, tab. ix. *b* (1888), South-West African genera, have many points of external resemblance. Thus the involucre in either of broad scales in many rows, spiny (*Eremothamnus*) or spinulose (*Ondetia*) is strikingly similar on a first view. The heads of each are heterogamous with female outer and hermaphrodite inner florets; each has tailed anthers and nearly the same style-arms; also a hairy ovary crowned by a pappus of stiff setæ, short in Bentham's genus but long in Hoffmann's. The only important difference between the two is found in the presence of paleæ on the receptacle of the former and their absence from that of the other. Bentham puts his genus in Inuloideæ subtribe Buphthalmeæ, of which the chief characteristic is a paleaceous receptacle; Hoffmann his in Senecionideæ subtribe Liabeæ. But the Liabeæ except for *Gongrothamnus*, perhaps better included in Vernonieæ, are New World plants and entirely different in habit from *Eremothamnus*. On the other hand, there is nothing to exclude the latter from Inuloideæ, though it cannot be admitted among the Buphthalmeæ.

It is submitted that the proper place for *Eremothamnus* is among the Eu-inuleæ next to *Homochæte*.

GYNURA MINIATA Welw., Apont. 586, is an Angolan plant. A Tanganyika Territory variety was described by O. Hoffmann more than thirty years ago. A specimen of this species recently brought by Mr. F. W. H. Migeod (no. 481) from Bamenda in Cameroons would seem to be intermediate between type and variety. This marks a considerable extension in the range of the species.

DICOMA SESSILIFOLIA Harv. var. MIGEODII var. nov., a typo abhorrens foliis papyraceis necnon capitulis minoribus.

Hab. Tanganyika Territory, Tendaguru; *F. W. H. Migeod*, 223.

Lower leaves obovate-oblong, acute to very obtuse; midrib very broad; drying grey-green above, silvery tomentose below, up to 10 × 4·5 cm. Capitula numerous, sessile along the branches, 15 × 10 mm.

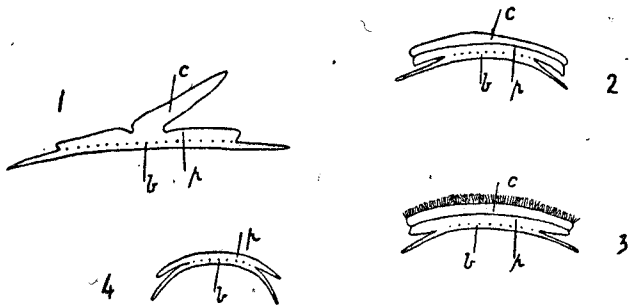
THE GENUS *LOPHOLÆNA* DC.

This was proposed in 1837 by A. P. De Candolle (Prod. vi. 335) for a South African plant of Drège's finding (*L. Dregeana*) which has been collected of recent years by others in Natal. Its chief characteristic, and the one giving rise to the name, is a plate-like outgrowth running down the back of each involucral leaf and lying in a plane at right angles to that of the leaf. Other points are the involucre of five broad leaves, the capitula with tubular hermaphrodite florets and the long linear flattish style-arms hairy on the back, and thus different from those of *Vernonia*, *Senecio*, and *Othonna* with one or other of which genera some of the species have been confused. The genus remained monotypic until Bentham, notwithstanding the absence of a dorsal plate from its involucral leaves, with rare sagacity described (Hook. Ic. Pl. 1113, 1872), as *L. platyphylla*, a Natal plant differing from *L. Dregeana*, besides the point just mentioned, in having a 7-leaved involucre *. To these two species I added in 1904 (Bull. Herb. Boiss. sér. 2, iv. 1021) five more, all but one of them removed from *Othonna*, *Senecio*, or *Othonnopsis*. But before this Hiern (Cat. Welw. Pl. i. 525) in 1898 had described as *Vernonia phyllodes* an Angolan *Lopholæna* with points of similarity to *L. platyphylla*.

The species just mentioned (*L. phyllodes*, comb. nov.) has a broad tomentose band running down the back of each involucral leaf, and transverse sections of a leaf showed it to be composed of three parts, a thin basal cellular foundation (the "base"), a thicker portion ("pad") with vascular bundles, and superimposed on the latter a broad hairy "crest" also vascular (fig. 3, *b*, *p*, *c*). This structure is similar to that of *L. Dregeana* (fig. 1), except that the cushion-like crest replaces the flat plate of the other. *L. platyphylla* resembles the

* Bentham speaks of involucral "bracteæ exteriores," but these are really uppermost foliage-leaves closely investing the heads, the involucre being uniseriate as in *Senecio* and *Othonna*. Similarly, Hiern describes the uppermost leaves of his *V. phyllodes* as leaves of the involucre.

former of these two except for its glabrous crest (fig. 2). The other species are without a crest, but with base and pad as before (fig. 4). This difference in the involucres is made use of in the accompanying clavis.



Sections of involucral leaf of *Lopholæna* spp.

§PLATYLOPHA. Appendage to involucral leaf an erect lamina ..... 1. L. Dregeana.

§PACHYLOPHA. Involucral appendage cushion-like.
- Cushion glabrous ..... 2. L. platyphylla.
- Cushion villous-tomentose ..... 3. L. phyllodes, comb. nov. (*Vernonia phyllodes* Hiern.)

§ALOPHA. No involucral appendage.

Leaves distichous.
- Heads few or solitary, 1 cm. diam.... 4. L. disticha. (*Othonna disticha* N. E. Br.)
- Heads panicled, up to ·5 cm. diam.... 5. L. segmentata. (*Senecio segmentatus* Oliv.)

Leaves scattered.

Heads few together or solitary.
- Leaves ovate, up to 7 cm. long. Heads 25–30-flowered..... 6. L. ussanguensis, comb. nov. (*Senecio ussanguensis* O. Hoffm.)
- Leaves oblong-lanceolate, up to 2·5 cm. long. Heads 13–18-flowered..... 7. L. Randii.
- Leaves oblong-lanceolate, up to 5 cm. long. Heads 5-flowered..... 8. L. Bainesii, comb. nov. (*Othonna Bainesii* Oliv. & Hiern.)
- Leaves linear or linear-oblanceolate, up to 4 cm. long. Heads 5–6-flowered..... 9. L. dolichopappa. (*Senecio dolichopappus* O. Hoffm.)
- Leaves linear, up to 10 cm. long ..... 10. L. cneorifolia. (*Doria cneorifolia* DC., *Othonnopsis* Benth.)
- Heads in panicles..... 11. L. brickellioides.

Specimens of all these except *L. ussanguensis* are in the British Museum Herbarium.

The following variety is here added to the genus:—

LOPHOLÆNA RANDII S. Moore var. BRACHYCEPHALA, var. nov., a typo abhorrens involucris brevioribus (vix 1 cm. long.) flosculisque paucioribus (13).

Hab. Rhodesia, Makoni, on exposed summit of mountain; *F. Eyles*, 741, in Herb. Mus. Brit.

A low shrub, 2–3 ft. Leaves subfleshy; florets pink-tinted.

The genus extends from Natal through the Transvaal and Rhodesia to the southern part of Tanganyika Territory; there are also three Western species (S.W. Africa to Angola), and one in the western part of the Cape Province.

MARINE ALGÆ OF THE COAST OF WALES.

By T. Kenneth Rees, M.Sc.
(University College of Swansea).

(Concluded from p. 254.)

Rhodophyceæ.

Goniotrichium elegans Le Jol. Menai Straits (B.).

Erythrotrichia carnea J. Ag. Loughor (Young).

Bangia fusco-purpurea Lyngb. Mumbles (Dill.); Dunraven Castle (Young); Anglesey (Dav.); Anglesey, Puffin Island (H. G.); Gorad Goch (G.); Aberystwyth (N.U.T.).

Porphyra linearis Grev. Anglesey (D.); Anglesey (Dav.); Puffin Island (H. G.); Aberystwyth (N.U.T.).

P. umbilicalis Kütz. f. *laciniata* J. Ag. Appears in Gutch's list without locality. Anglesey (Dav.); St. David's (Evans); Menai Straits, Penmon etc. (G.); Newport, Pemb. (Cotton).

Acrochætium virgatulum J. Ag. Afon Alau (Br.); Puffin Island (H. G.).

A. secundatum Näg. Puffin Island (H. G.).

A. Daviesii Näg. Anglesey (Dav.); Anglesey, Puffin Island (H. G.); Holyhead (G.).

Nemalion sp. Cotton records an association of which this is the dominant at Dinas Bay (Pemb.).

Helminthora divaricata J. Ag. Anglesey (D.); Aberffraw (R.).

Scinaia furcellata Bivona. Menai Bridge (Dav.); Aberystwyth (M.); recorded by Gutch, but not locally specified.

Gelidium crinale J. Ag. f. *genuinum* Hauck. Llangwyfan (G.).

G. pusillum Le Jol. Penmon, Carnarvon (G.).

G. corneum Lamour. Worms Head (Dill.); Worms Head, Bracelet Bay (Gutch); Puffin Island (H. G.); Aberffraw, Llanddwyn etc. (G.).

G. latifolium Born. Ynys-y-moch (Br.); Penmon (G.).

Chondrus crispus Stackh. Anglesey (Dav.); Bracelet Bay (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); "Common" (G.); Aberystwyth (N.U.T.).

C. crispus f. *stellatus* Turn. Conway (Br.).

Gigartina Teedii Lamour. Aberystwyth (N.U.T.).

G. stellata Batt. Anglesey (Dav.); Bracelet Bay (Gutch); Anglesey, Puffin Island (H. G.); Carnarvon, Port Dinorwic, Aberffraw (G.).

Phyllophora epiphylla Batt. Anglesey (D.); Mumbles, Worms Head (Gutch); Puffin Island (H. G.); Penmon, Swillies, S.W. Anglesey, etc. (G.).

P. Brodiæi J. Ag. Llanddwyn (Dav.); Penmon (Holmes); Swillies, Penmon, Aberffraw, Carnarvon (G.).

P. Traillii Holm. & Batt. Puffin Island (H. G.).

P. membranifolia J. Ag. Menai Bridge (Br. & Green); Anglesey (Dav.); Anglesey, Puffin Island (H. G.); Menai Straits, Llanfaelog (G.); Aberystwyth (N.U.T.).

Gymnogongrus Griffithsiæ Martius. Aberystwyth (M.); Griffith's Crossing, Beaumaris (G.).

G. norvegicus J. Ag. Swansea, Mumbles (Dill.); Aberystwyth (M.); Rhyl (H. G.); Penmon (G.).

Ahnfeltia plicata Fries. Llanfaethly (Br. & Green); Anglesey (D.); Aberystwyth (Brown); Anglesey (Dav.); Bracelet Bay (Gutch); Puffin Island (H. G.); Llangwyfan etc. (G.); Aberystwyth (N.U.T.).

Actinococcus subcutaneus Rosenv. Anglesey (B.).

Colacolepis inscrutans Schm. Wales (B.).

Callophyllis laciniata Kütz. Anglesey (Dav.); Anglesey, Puffin Island (H. G.); Penmon, S.W. Anglesey (G.).

Callymenia microphylla J. Ag. Bangor (B.).

Cystoclonium purpureum Batt. Carnarvonshire (Br.); Ynysfadoc-goch (D.); Anglesey (Foulkes); Anglesey (Dav.); Anglesey, Puffin Island (H. G.); Bangor, Aberffraw (G.); Aberystwyth (N.U.T.).

Catenella repens Batt. Puffin Island (D.); Anglesey (Dav.); Tenby (Stackhouse); Puffin Island (H. G.); Menai Bridge, Carnarvon (G.).

Euthora cristata Kütz. Aberystwyth (M.).

Rhodophyllis bifida Kütz. Anglesey (Dav.); Puffin Island (H. G.); Holyhead (G.).

Sphærococcus coronopifolius Grev. Llanfaethly (D.); Aberystwyth (M.).

Gracilaria confervoides Grev. Anglesey (Dav.); Bracelet Bay (Gutch); Aberystwyth (M.); Wales (H. G.); Llangwyfan, Menai Straits, etc. (G.); Aberystwyth (N.U.T.).

f. *procerrima* Turn. Holyhead (B.).

Calliblepharis ciliata Kütz. Anglesey (Dav.); Mumbles (Gutch); Anglesey, Puffin Island (H. G.); Penmon, Carnarvon, Port Dinorwic (G.).

C. lanceolata Batt. Llanfaethly (Br.); Bangor, Abercegin (G.).

Rhodymenia Palmetta Grev. Bracelet Bay (Gutch); Anglesey, Puffin Island (H. G.); Menai Straits (G.).

f. *Elisiæ* Chauv. Beaumaris (G.).

R. palmata Grev. Ynys-y-Moch (D.); Anglesey (Dav.); Mumbles (Gutch); Aberystwyth (M.); Puffin Island (H. G.); Swillies, Menai Straits etc. (G.); Aberystwyth (N.U.T.).

f. *sarniensis* Grev. Anglesey (Dav.).

f. *sobolifera* J. Ag. Aberystwyth (M.).

Cordylecladia erecta J. Ag. Beaumaris, Penmon (G.).

Lomentaria articulata Lyngb. Anglesey (Dav.); Bracelet Bay (Gutch); Aberystwyth (N.U.T.); Puffin Island (H. G.); Swillies (G.).

L. clavellosa Gaill. Ynys-y-Moch (Br.); Anglesey (Dav.); Aberystwyth (M.); Griffith's Crossing to Port Dinorwic, Penmon (G.).

Champia parvula Harv. Friars to Penmon (G.).

Chylocladia kaliformis Hook. Swansea (Dill.); Anglesey (Dav.); Aberystwyth (M.); Anglesey (H. G.); Carnarvon to Port Dinorwic, Aberffraw (G.).

C. ovatus Batt. Anglesey (Jones); Anglesey (Br.); Caswell, Worms Head (Gutch); Worms Head (Dill.); Aberystwyth (M.); Llangwyfan, Aberffraw (G.).

Plocamium coccineum Lyngb. Anglesey (Jones); Anglesey (Dav.); Mumbles, Langland Bay (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Menai Straits etc. (G.).

f. *uncinatum* Ag. S.W. Anglesey, Penmon (G.).

Nitophyllum punctatum Grev. Llanfaethly (Br.); Swansea (Dill.).

N. Gmelini Grev. Bracelet Bay (R.). Mumbles, Bracelet Bay (Gutch).

N. ramosum Batt. Ynys-y-Moch (Br. & D.); Trefadoc (Dav.); Bracelet Bay (Gutch); Aberystwyth (M.); Puffin Island (H. G.); Llangwyfan, Gorad Goch, Menai Bridge, etc. (G.).

Phycodrys rubens Batt. Swillies (Br.); Worms Head (Dill.); Anglesey (Dav.); Mumbles (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Swillies, Penmon etc. (G.).

Delesseria sanguinea Lamour. Anglesey (Dav.); Bracelet Bay (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Aberffraw, Rhosneigr, Holyhead, Gorad Goch, Menai Straits (G.).

D. alata Lamour. Anglesey (Jones); Anglesey (Br. & Green); Anglesey (Dav.); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Gorad Goch, Aberffraw, Penmon (G.).

D. hypoglossum Lamour. Bangor (Br.); Worms Head (Dill.); Anglesey (Dav.); Bracelet Bay (Gutch); Puffin Island (H. G.); Langwyfan, Griffith's Crossing, Penmon etc. (G.).

Bostrychia scorpioides Mont. Anglesey (Dav.); Dolgellau, Menai Bridge, Barmouth (R.); Anglesey; Puffin Island (H. G.); Menai Bridge, Holyhead (G.); Point of Ayr (B.); Llanmadoc Salt Marsh (Rees).

Rhodomela subfusca Ag. Llanfaethly, Ynysfadocgoch (Br.); Anglesey (Dav.); Bracelet Bay (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Carnarvon, Aberffraw, Penmon (G.).

R. lycopodioides Ag. Puffin Island (H. G.); Holyhead, Aberffraw (G.).

Odonthalia dentata Lyngb. Puffin Island (H. G.).

Laurencia obtusa Lamour. Worms Head (Dill.); Menai Straits, Pwllheli (G.).

L. cæspitosa Lamour. Llanfaethly (Br.); Puffin Island (H. G.); Aberystwyth (N.U.T.); Llangwyfan, Carnarvon, Pwllheli (G.).

L. pinnatifida Lamour. Llanfaethly (D.); Anglesey (Dav.); Puffin Island (H. G.); Llangwyfan, Gorad Goch (G.).

Chondria tenuissima Ag. Anglesey (Dav.).

C. dasyphylla Ag. Mumbles (Dill.); Penmon, Gallows Point (G.).

Polysiphonia macrocarpa Harv. Puffin Island (H. G.).

P. fibrata Harv. Puffin Island (H. G.); Bangor (G.).

P. urceolata Grev. Puffin Island (H. G.); Garth Ferry, Menai Bridge, Pwllheli (G.); Aberystwyth (N.U.T.).

f. *patens* J. Ag. Bracelet Bay (Gutch); Puffin Island (H. G.); Holyhead (G.); Aberystwyth (N.U.T.).

f. *formosa* J. Ag. Puffin Island (H. G.); Carnarvon to Griffith's Crossing, Tubular Bridge (G.).

f. *comosa* J. Ag. Swansea (Dill.); Anglesey (Dav.).

P. elongella Harv. Anglesey, Puffin Island (H. G.); Bangor (G.).

P. elongata Grev. Ynys-y-Moch (Br.); Anglesey (Dav.); Bracelet Bay (Gutch); Aberystwyth (M.); Puffin Island (H. G.); Aberystwyth (N.U.T.).

P. violacea Grev. Anglesey (Dav.); Carnarvon (R.); Carnarvon (H. G.); Friars to Penmon, Carnarvon to Port Dinorwic (G.); Aberystwyth (N.U.T.).

P. fibrillosa Grev. Anglesey (H. G.).

P. variegata Zan. Puffin Island (H. G.); Beaumaris (G.).

P. fastigiata Grev. Anglesey (Dav.); Anglesey (D.); Bracelet Bay (Gutch); Menai Straits (G.); Anglesey (H. G.); Aberystwyth (Rees).

P. nigra Batt. Gower (Dill.); Carnarvon to Port Dinorwic, Beaumaris (G.).

P. nigrescens Grev. Ynys-y-Moch (Br.); Anglesey (D.); Anglesey (Dav.); Bracelet Bay (Gutch); Anglesey, Puffin Island (H. G.); Aberystwyth (N.U.T.); "Common" (G.).

P. Brodiæi Grev. Puffin Island (H. G.).

P. fruticulosa Spreng. Anglesey (Dav.); Puffin Island (H. G.); Llangwyfan to Aberffraw (G.).

Pterosiphonia parasitica Schm. Mumbles (Dill.); Anglesey (Dav.); Holyhead (R.).

P. thuyoides Schm. Puffin Island (H. G.).

Brongniartella byssoides Bory. Puffin Island (Br.); Anglesey (D.); Anglesey (Dav.); Wales (R.); Penmon, Port Sur, Gallows Point (G.).

Heterosiphonia plumosa Batt. Anglesey (Br.); Anglesey (Dav.); Bracelet Bay (Gutch); Anglesey, Puffin Island (H. G.); Carnarvon to Port Dinorwic, Bangor, S.W. Anglesey (G.).

Spermothamnion Turneri Aresch. Anglesey (Dav.); Bracelet Bay (Gutch); Puffin Island (H. G.); Llangwyfan, Carnarvon, Penmon (G.).

f. *monoica* Schm. Anglesey (B.).

Griffithsia corallinoides Batt. Ynys-y-Moch (D.); Anglesey (Dav.); Carnarvon (R.); Griffith's Crossing, Beaumaris (G.).

G. flosculosa Batt. Anglesey (D.); Anglesey (Dav.); Bracelet, Gower (Gutch); Puffin Island (H. G.); Menai Straits, S.W. Anglesey (G.).

G. devoniensis Harv. Beaumaris (G.).

G. globifer J. Ag. Milford Haven (Holmes).

Halurus equisetifolius Kütz. Llanfaethly (D.); Anglesey (Dav.); Wales (R.); North Wales (H. G.); Aberffraw, Llangwyfan, Menai Straits (G.); also mentioned by Gutch, but without locality.

Monospora pedicellata Sol. Anglesey (Dav.); Carnarvon, Milford Haven (R.); Puffin Island (H. G.).

Pleonosporium Borreri Näg. Swansea (R.).

Rhodochorton membranaceum Magn. Puffin Island (H. G.).

R. Seiriolanum Harv.-Gib. Puffin Island (H. G.).

R. Rothii Näg. Swansea (Dill.); Dunraven Castle (Young); Anglesey (Dav.); Bracelet Bay (Gutch); Anglesey, Puffin Island (H. G.); Gorad Gyt-Siliwen, Bangor (G.).

R. floridulum Näg. Anglesey, Puffin Island (H. G.); Bangor (G.).

Callithamnion byssoides Crn. Carnarvon, Milford Haven (R.).

C. polyspermum Ag. Gower (Gutch); Anglesey, Puffin Island (H. G.).

C. roseum Harv. Llanfaethly (D.); Gower (P.); Anglesey (Dav.); Menai Straits, Milford Haven, Barmouth (R.); Menai Straits etc. (G.).

C. Dudresnayi Crn. Mumbles (Dill).

C. Hookeri Ag. Holyhead (Dav.); Milford Haven (R.); Puffin Island (H. G.).

C. arbuscula Lyngb. Anglesey (D.).

C. tetragonum Ag. Caswell, Langland, Swansea (Dill.); Caswell, Langland (Gutch); Puffin Island (H. G.).

C. tetricum Ag. Mumbles, Gower (Dill.); Mumbles, Bracelet Bay (Gutch); Llangwyfan (G.).

C. corymbosum Lyngb. Puffin Island (H. G.); Trecastell, Beaumaris, Holyhead (G.).

C. granulatum Ag. Holyhead (R.); Puffin Island (H. G.).

Seirospora Griffithsiana Harv. Beaumaris (G.).

Compsothamnion thuyoides Schm. Bracelet Bay (R.); Bracelet Bay (Gutch).

C. gracillimum Schm. Milford Haven (R.); Beaumaris (H. G.).

Plumaria elegans Schm. Llanfaethly (Br. & Green); Anglesey, Puffin Island (H. G.); Menai Straits etc. (G.); Aberystwyth (N.U.T.).

Ptilota plumosa Ag. "Abundant" (Dill.); Anglesey (Dav.); Holyhead (R.); Holyhead, Puffin Island (H. G.); Holyhead (G.).

Antithamnion cruciatum Näg. Milford Haven (R.); Beaumaris (G.).

A. Plumula Thur. Caswell Bay (Dill.); Bracelet Bay (Gutch); Aberystwyth (M.); Beaumaris (G.).

f. *crispum* J. Ag. Beaumaris (G.).

Spyridia filamentosa Harv. Holyhead, Aberffraw (R.); Holyhead (H. G.); Beaumaris, Llangwyfan, etc. (G.).

Ceramium tenuissimum J. Ag. Anglesey, Puffin Island (H. G.); Griffith's Crossing, Carnarvon (G.).

C. strictum Harv. Garth Ferry, Bangor (G.); Aberystwyth (N.U.T.).

f. *zostericola* De Jol. Aberystwyth (N.U.T.).

C. diaphanum Roth. Anglesey (D.); Anglesey (Dav.); Aberystwyth (M.); Worms Head (Gutch); Puffin Island (H. G.); Aberystwyth (N.U.T.).

C. Deslongschampsii Chauv. Anglesey (D.); Swansea (R.); Puffin Island (H. G.); Menai Straits (G.); Llandudno (B.).

C. circinatum J. Ag. Ynys-y-Moch (Br.); Anglesey (D.); Puffin Island (H. G.); Beaumaris (G.).

C. tenue J. Ag. Anglesey (D.).

C. rubrum Ag. Ynys-y-Moch (Br.); Anglesey (D.); Anglesey (Foulkes); Anglesey (Dav.); Swansea (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); "Common" (G.); Aberystwyth (N.U.T.).

C. flabelligerum Batt. Puffin Island (H. G.).

C. echionotum J. Ag. Puffin Island (H. G.).

C. ciliatum Ducluz. Anglesey (Dav.); Worms Head (Gutch); Puffin Island (H. G.); Aberystwyth (N.U.T.).

C. acanthonotum Carn. Puffin Island (H. G.); Aberffraw (N.U.T.); Aberystwyth (N.U.T.).

Gloiosiphonia capillaris Carm. Llangwyfan (Dav.); Anglesey, (H. G.); Trefadoc (G.).

Grateloupia filicina Ag. Aberystwyth (R.); Aberystwyth (M.); Menai Straits (G.).

Dumontia incrassata Lamour. Ynys-y-Moch (Br.); Swansea (Dill.); Bracelet Bay, Mumbles (Gutch); Anglesey, Puffin Island (H. G.); Aberystwyth (N.U.T.); Aberffraw, Carnarvon to Port Dinorwic (G.).

Dilsea edulis Stackh. Wales (Lhwyd); Anglesey (Br.); Anglesey (Dav.); Abergele, Denbighshire (J. W. Griffith); Mumbles (Gutch); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Swillies, Porth Dafarch (G.).

Halarachnion ligulatum Kütz. Anglesey (Dav.); Aberffraw (R.); Anglesey (H. G.).

Furcellaria fastigiata Lamour. Anglesey (Dav.); Worms Head, Swansea (Gutch); Aberystwyth (M.); Llangwyfan, etc., Menai Straits (G.); Aberystwyth (N.U.T.).

Polyides rotundus Grev. Carnarvon (D.); Anglesey (Dav.); Mumbles, Bracelet Bay (Gutch); Aberystwyth (M.); Anglesey (H. G.); Penmon, North Dafarch (G.); Aberystwyth (N.U.T.).

Petrocelis cruenta J. Ag. Puffin Island (H. G.); Llanfairisgaer, Aberffraw (G.).

Hildenbrandtia prototypus Nardo. Aberystwyth (N.U.T.).

f. *rosea* Kütz. Port Dinorwic, Carnarvon (G.); Puffin Island (H. G.); Aberystwyth (N.U.T.).

Schmitziella endophlœa Born. & Batt. Puffin Island (H. G.); Bangor, Anglesey (B.).

Melobesia farinosa Lam. Puffin Island (H. G.).

Dermatolithon pustulatum Fosl. Puffin Island (H. G.).

Lithothamnion lichenoides Fosl. Llangwyfan (Holmes); Aberystwyth (N.U.T.).

L. Lenormandi Fosl. Puffin Island (H. G.); Llangwyfan (G.).

L. corticiforme Fosl. Llangwyfan (G.).

Phymatolithon polymorphum Fosl. Llangwyfan (G.).

Corallina officinalis L. Bangor (Br.); Anglesey (D.); Carnarvon (R.); Aberystwyth (M.); Anglesey, Puffin Island (H. G.); Aberystwyth (N.U.T.); Gorad Goch, Penmon, Llangwyfan, etc. (G.).

C. rubens Ellis & Soland. Llanfaethly (Br.); Puffin Island (H. G.); Llangwyfan, Penmon, Porth Dafarch, etc. (G.).

f. *corniculata* Hauck. Llanfaelog (P.).

SHORT NOTES.

Rubus nemoralis P. J. Muell. var. *silurum* Ley (*Oxyanchus* Sudre var. *silurum* Ley).—A great quantity of this Western bramble occurs on a hill near Banbury; I only discovered it the other day. It has with it other forms frequent about here, *thyrsoideus* Wimm. (in our usual Oxfordshire form, *candicans*), *radula* Weihe, *echinatus* Lindl., &c. Hitherto, it has never been recorded east of the Forest of Dean, but occurs in N. Som., Heref., Lancs, and eight Welsh counties. The case is similar to that of another hill in this neighbourhood, which has true *clivicola* Ley (not the hybrid which is often mistaken for it) and the other N. Oxon. species above mentioned. A similar isolated occurrence of a local Western bramble is that of *R. ericetorum* Lefv. var. *cuneatus* Rogers & Ley on the top of the Cotteswolds, E. Glos.—N. C. R. for *silurum*, Oxon., v.c. 23.—H. J. Riddelsdell.

Seaside Species in Warwickshire.—In the garden gravel of Weston Park, Shipston-on-Stour, are large quantities of *Polypogon monspeliensis*, with several Atriplexes and much *Spergularia salina* Presl. The gravel has not been renewed for very many years, and the gardener complained of these weeds because he found that salt was useless in dealing with them. They require weed-killer. I told him the reason why. No doubt, they were originally introduced with gravel, and the gardener's attempt to kill with salt has contributed to their present flourishing condition. The grass was found many years ago in the county, but I do not see any record of the *Spergularia* in the past.—H. J. Riddelsdell.

Carum verticillatum in Mid-Perth.—I notice in the successive Supplements to Topographical Botany, published in 1905 and now running in the *Journal*, that *Carum verticillatum* is not recorded for Mid-Perth, v.c. 88. In the Appendix to Buchanan-White's *Flora of Perthshire* this plant is mentioned as occurring in Glen Falloch, near Crianlarich, in 1887. On a recent visit to that locality by the British Bryological Society the plant was seen in some quantity.—Ida M. Roper.

Mistletoe on *Morus alba*.—I have lately observed a small bough of Mistletoe growing on a tall upstanding tree of White Mulberry in a garden near Ross, Herefordshire. I have not been able to find any record of the occurrence of Mistletoe on any species of Mulberry, and shall be glad if your readers can supply any information.—Eleonora Armitage.

REVIEWS.

Die natürlichen Pflanzenfamilien. Edit. 2, by A. Engler. Band 6. *Hemibasidii* by P. Dietel. *Hymenomyceteæ* by S. Killermann. 8vo, pp. vii, 290, 157 text-figs, 5 plates (photographs). W. Engelmann: Leipzig, 1928. Price, unbound 28 M., bound in half-leather 34 M.

Because of the vast amount of investigation that has been carried out on fungi during the last three decades, mycologists were probably

the most interested of all in the announcement of the second edition of the *Pflanzenfamilien*.

It perhaps hardly needs to be said that every systematist must have access to the work. The old edition has been extremely useful to mycologists in general and the new edition will take its place as the most complete and trustworthy account of the classification of fungi. The authors of the part under review deserve the thanks of mycologists for the skill with which they have condensed their matter and given an invaluable synopsis, which on that account will find its way to the many remote places where the study of fungi is carried on.

The announcement of the fact that a volume has appeared suffices for most purposes, but a few somewhat general remarks seem necessary.

The present volume deals with Hemibasidii (Ustilaginales and Uredinales) and part of the Eubasidii (Hymenomycetæ). The remainder of the Basidiomycetes (together with Fungi Imperfecti) will comprise another volume, the treatment to be completed in three volumes, numbered 5, 6, and 7, in place of two volumes of the first edition with their inconvenient Teil and Abteilung.

The veteran P. Dietel has again written up the rusts and smuts, but Lindau and P. Hennings, who were responsible for the Auriculariales etc. and Hymenomycetes etc., respectively, of the first edition have died in the thirty years or so which have elapsed, and their portion has been undertaken by S. Killermann.

The first thing that strikes one in comparing the two editions is that Dietel's portion occupies only 98 pages in place of 81 (+8) in spite of there being 80 figures instead of 55; and Killermann succeeds in compressing the 195 (+2) pages of the first edition into 185 pages with 77 figures in place of 70. This has been possible owing to the use of a slightly lower fount and by shortening the parts in small type.

Most of the illustrations of the first edition are repeated and much excel in every way the majority of the additional ones, many of which look like very inferior wood-cuts, being poor in draughtmanship and in execution; some of the figures of agarics—e. g., *Tubaria furfuracea*—are unrecognisable. The five plates showing ten habitat photographs of different Hymenomycetes (a new feature) for the most part are excellent.

A praiseworthy innovation is the addition of references to the original generic descriptions; another is the absence of Appendixes which made the first edition difficult to use. The general method of presentation has not been altered and requires no comment beyond saying that the attempt has been made to bring the introductory portions up to date.

The treatment of the Ustilaginales with the two families Ustilaginaceæ and Tilletiaceæ is now much more satisfactory than in the first edition, where about a third of the genera were in an appendix.

The treatment of the Uredinales was generally considered one of the best of all, though it was frequently overlooked that they are reclassified in an appendix. There have been great changes here, and in place of 37 genera we have 102. A large number of these additions

are due to following the generic concepts of the American uredinologist Arthur. There are two families, Melampsoraceæ with 19 genera in 5 subfamilies and Pucciniaceæ with 83 genera in 15 subfamilies. It is not possible here to consider the changes critically; on general grounds it does not appear advantageous to multiply genera and subfamilies to this extent in a work intended for botanical classes, though it must be admitted that it necessitates a more careful analysis than served formerly, and consequently may have a good influence. Until recently Arthur has had few followers in Europe, though Sydow since the war has somewhat overrun him. That Dietel has been somewhat conservative appears from the fact that twelve synonyms are given for *Uromyces* and eighteen for *Puccinia* "weil die Ansichten über ihre Aufteilung in kleinere Genera noch zu wenig geklärt sind."

The treatment of the Hymenomycetes seems very much better than it was formerly. In a "Vorbemerkung" Killermann pays a high tribute to Bresadola, who gave him the benefit of his wide experience, particularly with Thelephoraceæ and Polyporaceæ. Here one has the feeling that conservatism is too pronounced, and possibly Bresadola's influence may be seen in this; at eighty years of age and situated as he was, it is hardly credible that he could keep abreast with mycological results, even though his pioneer work and his continued eminence were universally recognised. The Hymenomycetes are divided into Tremellineæ and Hymenomycetineæ with further division into Auriculariaceæ, Tremellaceæ, and Dacryomycetaceæ and Exobasidiaceæ, Hypochnaceæ, Thelephoraceæ, Clavariaceæ, Hydnaceæ, Polyporaceæ, and Agaricaceæ respectively. There is thus a more even division than Lindau and Hennings adopted. The details of the classification call for little comment, though, as will be readily understood, there are numerous changes in the Tremellineæ and the resupinate Hymenomycetaceæ. The Thelephoraceæ are subdivided into seven tribes, four of which have new names. There are also new names for subfamilies, tribes, and generic sections in the Polyporaceæ. For the rest there is little change. The Agaricaceæ have two main sections, Chromosporæ and Leucosporæ, the first being further split into Ochrosporeæ, Melanosporeæ, Rhodosporeæ, and Chlorosporeæ, which is merely a slight shuffling of the older grouping and places no importance on structure and development.

Following Weese, Phleogeneæ replaces Pilacraceæ, *Phleogena* being adopted instead of *Pilacre*.

One or two points have been noticed which call for comment, leaving out of account several minor matters chiefly concerning geographical distribution: a few errors are unavoidable in a work of this magnitude.

After many of the sections there is a list of "Zweifelhafte Gattungen," which sometimes is a peculiar medley. That *Eocronartium* should appear in one of these lists is surprising, for its life-history is well known through Fitzpatrick's investigations.

The difficulty of a specialist keeping abreast with work on all groups shows itself here and there, but particularly in the treatment of Exobasidiaceæ. No mention is made of the discussions of the

systematic position of *Microstroma*, which have continued from 1847—for papers appeared in 1927 and 1928, the one assigning it to Hyphomycetes, the other to Basidiomycetes. *Urobasidium* might well have been placed amongst doubtful genera; in my opinion it is not a Basidiomycete but a Hyphomycete, which has been known as *Zygosporium*, *Pimina*, and *Urophiala*, and, moreover, is the type of Vuillemin's Prophialidés. In the doubtful genera we find *Protocoronospora*. Wolfe has shown this also to be a Hyphomycete, and Karakulin considers it synonymous with *Kabatiella*, *Pachybasidiella*, and *Exobasidiopsis*, and this list might be added to.

Other Hyphomycetes which find a place are *Cladosterigma*, though in a doubtful list—incidentally 1907 is spoken of as "neuerdings"; *Aureobasidium* (*Dematium* auct.), as shown by Arnaud, and *Hirsutella*, which still finds a home in Clavariaceæ in spite of recent work. *Sparassis* is also retained in this family, though, as Cotton showed, it is allied to *Stereum*.

Petch's work on *Matula* likewise has been overlooked—*Michenera*, *Artocreas*, and *Matula* are not all conidial stages of *Corticium subgiganteum* as Killermann states, but only the first; the other two are synonyms for the conidial stage of *Peniophora Habgallæ*.—J. Ramsbottom.

Stephen Hales, D.D., F.R.S.: an Eighteenth Century Biography. By A. E. Clark-Kennedy, M.D. 8vo, pp. xii, 256, pls. xiv. University Press, Cambridge, 1929. Price 15*s*.

The name of Stephen Hales is familiar to the botanist as the author of 'Vegetable Statics' and the pioneer in the experimental study of transpiration and the gaseous exchanges between the leaves of plants and the atmosphere. Few know him as the man of wide and diverse interests—country rector, philanthropist, pioneer of ventilation in prisons and on ship-board, prohibitionist, trustee of a New-World colony, and friend of royalty—who is revealed in Dr. Clark-Kennedy's eminently readable biography.

In 1927 the Master and Fellows of Corpus Christi College, Cambridge, decided to celebrate the two hundred and fiftieth anniversary of the birth of Stephen Hales, and it fell to the lot of Dr. Clark-Kennedy to give a short account of his life and work. This has developed into the volume now before us.

Hales, who came of an ancient Kentish family, entered Bene't College, as Corpus Christi was then called, in 1696. He made direct measurements of blood-pressure by numerous experiments on living animals, and studied the mechanics of circulation and the action of the heart. In 1718 he was elected a Fellow of the Royal Society, and was admitted by Sir Hans Sloane (Vice-President) on Nov. 20. In the same year he communicated his first paper upon the effect of the sun's warmth in raising the sap in trees. In his second paper, read Jan. 1725, he demonstrated clearly the importance of three factors in the upward flow of sap—transpiration, capillarity, and root-pressure, though he was unable to explain the last. In his *History of Botany* Sachs pays tribute to the soundness of Hales's work in his

efforts to trace the phenomena of vegetation to mechanico-physical laws as then understood.

Hales's work on respiration and the gaseous metabolism of plants was hampered by the lack of knowledge as to the constitution of air. The discovery of oxygen by Priestley and the work of Lavoisier came some years after the death of Hales. But he was able to conclude that the leaves of plants played a part comparable with that of the lungs of animals, and suggested that light also, by freely entering the expanded surfaces of leaves and flowers, may contribute much to the ennobling of the principles of vegetables.

He was admitted Fellow of Corpus in 1703, and in the same year took his M.A. and was ordained Deacon. Hales had studied physical science, but now became friendly with Francis Stukeley whose interests were on the biological side. Together they dissected frogs and other animals and went simpling with Ray's 'Catalogus plantarum circa Cantabrigiam nascentium' in their pockets. It had been suggested that Stukeley should bring out a new edition of that work, but he left Cambridge in 1709 and the idea was dropped. In the same year Hales also "went down," having been appointed "Perpetual Curate" of the Parish of Teddington, Middlesex. Here he spent the rest of his days, except for long summer visits to Farringdon near Winchester, of which he was appointed Rector in 1722, holding this in addition to the living at Teddington. Here he was a neighbour of Gilbert White of Selborne, who writes of him as "my most valuable friend." Hales was a conscientious parson, and the notes in the registers indicate that he had an eye to the morals of his parishioners. His sermons, moral dissertations based on gospel teaching and "supported by arguments drawn from natural science," appealed to his people, and within five years it became necessary to enlarge the church.

In this country parsonage Hales pursued the various scientific investigations of which Dr. Clark-Kennedy gives some account in the successive chapters of his book.

The 'Vegetable Statics,' embodying an account of his experiments, as read at several meetings of the Royal Society, was published in 1727. In the same year he was elected a member of the Council of the Royal Society. In 1723 his 'Hæmastatics,' embodying the results of his twenty-year old experiments on blood-pressure, was published, and the University of Oxford conferred upon him the degree of D.D.

Hales was now becoming known in the outside world. He became interested in missionary work in the New World, was appointed one of the Trustees for the colony of Georgia, and played an active part in promoting the Gin Act of 1736. Later we find him engaged in experiments upon the ventilation of ships, prisons, and mines. In 1754 he played an active part in the foundation of the Royal Society of Arts. On the death of Sir Hans Sloane, President of the Royal Society in 1755, Dr. Hales was elected in his place as British representative and one of the eight Foreign Members of the Royal Academy of Sciences in Paris. In 1751 he had been appointed Clerk of the Closet and Chaplain to the Princess Dowager, and frequently

visited Kew to advise the Princess in the management of her garden. His last book, 'A Treatise on Ventilators,' was published in 1758. He died at Teddington on January 4th, 1761, after a short illness, at the age of eighty-four. He had been married in 1720, but his wife died in the following year, leaving him childless. His contemporary, Peter Collinson, writing of his character in the *Gentleman's Magazine* (1764), says "He was remarkable for social virtue and sweetness of temper; his life was not only blameless, but exemplary to a high degree; he was happy in himself and beneficial to others."

The value of the book is enhanced by good production; the fourteen plates, beautiful photogravure reproductions from old prints, illustrate, in part, Hales's various experiments, and include portraits of Hales at the age of eighty-one (frontispiece) and of his friend William Stukeley, M.D.—A. B. R.

BOOK-NOTES, NEWS, ETC.

IMPERIAL MYCOLOGICAL CONFERENCE.—The second Conference, under the auspices of the Imperial Bureau of Mycology, was held in the Imperial College of Science and Technology, South Kensington, from September 23 to 28. The Conference was opened by the Rt. Hon. the Earl Buxton, Chairman of the Managing Committee, after which Dr. E. J. Butler, the Director of the Bureau, reviewed the activities of the Bureau during the last five years. Subjects for discussion included Root-diseases of Orchards and permanent Plantation-crops, the existing organization of plant-pathological (plant protection) services in various parts of the Empire, Virus Diseases, Seed-borne Diseases, Epidemiology of common diseases in Cereals, Diseases developed in Fruit shipped Overseas, Soil-borne and Soil-induced Diseases, and the Control of Insect-pests by Entomogenous Fungi. Visits at the close of the Conference were arranged to the Research Stations at East Malling, Rothamsted, Long Ashton, and Cambridge.

LT.-COL. GEORGE HENDERSON, M.D., F.L.S.—The death, on June 23 last, at the advanced age of 92, is announced of Dr. George Henderson, late I.M.S. In 1870 he joined, as Medical Officer and Scientific Collector, Sir Douglas Forsyth's mission to Yarkand, and with the late A. O. Hume, published an account of the expedition—*Lahore to Yarkhand*—illustrated by his own photos and drawings of birds and plants. In 1872 he was appointed Director of the Royal Botanic Gardens, Calcutta, and introduced Ipecacuanha to the Cinchona plantations at Darjeeling. He designed or improved numerous public gardens at Lahore and elsewhere in Northern India and introduced the *Eucalyptus*, as a shade tree, with success. He was elected F.L.S. in 1872.

THE EDITOR returns grateful thanks to Mr. Gepp for his assistance in producing the August and September numbers of the *Journal*. Some delay in the issue of the October number is due to the fact that the Editor did not return from Africa till towards the end of September.

SOUTH AFRICAN MEETING OF THE BRITISH ASSOCIATION.

(Continued from p. 270.)

PRESIDENTIAL ADDRESS (BOTANY SECTION).

THE subject of Professor Seward's Presidential Address, delivered during the second week of the meetings, at Johannesburg, was "Botanical Records of the Rocks: with special reference to the Early *Glossopteris* Flora." "Twenty-six years ago," Prof. Seward remarked, "as President of the Section, I chose an ambitious text and discoursed on 'Floras of the Past: their Composition and Distribution,' a theme which, if adequately treated, would occupy more than the whole time allotted to a British Association Meeting. To-day, as befits my years, the programme is more modest: it includes a brief consideration of the age of the late Palæozoic Ice Age in South Africa and other parts of the great continent of Gondwanaland; the lack of data relating to a critical stage in the evolution of the plant-world, represented in the table of contents of earth-history by the passage from the Palæozoic to the Mesozoic era; a brief reference to the difficult and attractive problem of fossil plants as tests of climate; and the importance of extinct plants as aids to the understanding of the distribution of living plants over the earth's surface."

A tribute was paid to South African friends to whom he was personally indebted: "Dr. Rogers, an old friend of Cambridge days, has for many years submitted to me specimens for identification; Mr. Du Toit, who has fortunately fallen a victim to the fascination of ancient floras; and Mr. Leslie of Vereeniging, whose kindness and infectious enthusiasm stimulated me many years ago to turn my attention to the records preserved in the older beds of the Karroo System. This country is rich in documents written 'in the ghostly language of the ancient earth,' and there is still a rich harvest to be gathered. The important contributions made by Mr. Du Toit in recent years may be quoted as an admirable illustration of the kind of research which is needed.

"THE EARLIER CHAPTERS OF THE HISTORY OF THE PLANT WORLD.

"It is important to remember, when we are trying to follow the course of evolution in the organic world, that the rocks which have furnished the earliest-known remains of plants are separated from the oldest-known part of the earth's crust by thousands of feet of strata and by some hundreds of millions of years.

"The crystalline rocks classed by geologists as Archæan represent inconceivably ancient land-surfaces on which were accumulated vast piles of detrital material furnished by agents of erosion, and from time to time products of volcanic activity. Plants may have lived on the Archæan, or pre-Cambrian, continents; they probably did, but as yet we have no certain knowledge of them. We may think of an azoic world, or of a primeval ocean pregnant with the first germs of plant-life which in later ages developed into the ancestors of

terrestrial vegetation, or our imagination may enable us to picture a pre-Cambrian land occupied by colonies of primitive plants simpler than any so far discovered in the older Palæozoic strata. Passing higher in the geological series to the marine sediments and associated lavas and volcanic ash included in the Cambrian, Ordovician, and Silurian systems we find clear evidence of the existence of lime-secreting Algæ, the precursors of some of the modern reef-forming seaweeds, and, in Silurian strata, a few traces of plants which probably lived on dry land. It is true to say that as yet we know practically nothing of the terrestrial vegetation of the world before the beginning of the Devonian period. The lapse of time represented by that portion of the earth's crust comprised within the pre-Cambrian, Ordovician, and Silurian periods is much longer than the duration of all the other geological periods put together. What is the story of evolution hidden in the pre-Cambrian and in the earlier Palæozoic formations? This is a question which appeals with especial force to the imagination: though it is too much to expect that we shall ever discover the earliest links in the chain of life, we may with confidence expect to find remains of pre-Devonian terrestrial plants which, I venture to think, will surprise us by their relatively high level of organisation. The more we know of the older floras, the more difficult it becomes to form a clear conception of the course of evolution of the plant-world. We are prejudiced in favour of generalised types and primitive ancestral forms, but while among the earliest-known members of the plant-kingdom there are undoubted examples of structure which may be described as more primitive than any we know in the world to-day, we note a surprising resemblance in the general plan of construction between the inconceivably ancient and the most modern members of the plant-kingdom. Attention has been directed by many writers to the recently acquired knowledge of the floras that have left well-preserved samples in rocks of the Devonian period: we speak of Devonian plants as the oldest-known relics of terrestrial vegetation; but we cannot believe that in them we have the first of a succession of colonists which spread over the face of the earth. Whether they are regarded as the modified descendants of more ancient types, which evolved in the sea and subsequently accommodated themselves to existence above the tides; or whether we prefer to think of Devonian plants as descendants of Silurian or still older progenitors, the fact remains that their ancestry is shrouded in mystery. Stress has been laid on certain morphological features presented by members of the older Devonian floras; on the other hand, we must remember that the best-known of these extinct plants lived in swamps and under conditions that were favourable to their preservation as fossils. We know only in part: our knowledge is based largely on a particular kind of plant association, which from the nature of its habitat escaped destruction during recurrent geological convulsions; and it is reasonable to assume that there were contemporary associations occupying other situations of which we know nothing.

"A few plants have been recorded from Devonian rocks in South Africa, but the records so far obtained from beds below the Karroo system are very disappointing. It is almost entirely from Devonian rocks of the northern hemisphere that our information has been gained: Australia has furnished a few specimens, and a few fragmentary remains have been described from the Falkland Islands.

"Leaving the Devonian period we pass to the Carboniferous and Permian periods, and here there is much to discuss which has a special application to South Africa. In the northern hemisphere the rocks of the Carboniferous system tell a fairly clear story: during the first half of the period comparatively deep seas spread over wide areas in North America and Europe in which there slowly accumulated masses of calcareous material, derived mainly from shells of marine organisms and the framework of lime-secreting algæ.

"At many localities abundant *disjuncta membra* of plants have been found in sediments deposited in shallow water near the coast-lines, and in volcanic ash flung from craters over forest-clad regions beyond the reach of the sea. This Lower Carboniferous vegetation, though more varied than that of the latter part of the Devonian period, was its direct derivative. Identical genera and identical, or at least very closely allied, species have been found in North-eastern Greenland, in Spitsbergen, in Europe and North America, in South America and Australia. Many instances of the wide geographical range of early Carboniferous plants might be given: it is evident that during the first half of the period the vegetation of the world, so far as we can tell, was less diversified than it is at the present day. Here again we lack data from South Africa.

"Returning to the Northern hemisphere we pass from the Lower Carboniferous rocks, many of which are marine, to the thick series of Upper Carboniferous sedimentary beds and seams of coal rich in remains of still more varied and luxuriant floras. Over thousands of square miles a monotonous landscape of swamps, occasional sheets of open water, in places the sea near at hand, low hills and plateaux clothed with trees; forests on inundated marshes, jungles with no song of birds, and uninhabited by mammals. Groves of Calamites, their strong columns bare below, where branches had been cast off and the bark torn by the expansion of the growing wood within, the tapering upper parts of the stems hidden by closely set tiers of whorled branches bearing star-like clusters of leaves, might suggest to a visitor from the modern world comparison with enlarged *Equiseta*. Trees such as *Lepidodendron* with forked branches forming a crowded mass of needle-studded shoots would at a distance recall some familiar conifers. A greater contrast to the ordinary type of forest tree would be presented by the tall bare stems of *Sigillaria*, some unbranched, others with an occasional fork, the arms soaring upwards with an elongated cone encased in a tuft of Pine-like needles. The handsome *Cordaites*, with long strap-like leaves similar to those of a *Yucca*, would invite comparison with the Kauri Pine of New Zealand. Here and there among the Calamites and *Lepidodendra* would be found Tree-Ferns superficially indistinguishable from existing species. There were other Ferns much too small and inconspicuous to attract

attention on a general view. A member of Section K wandering through the forests of the Coal Age would be struck by the abundance and variety of plants which to him appeared to be Ferns; some with stems like miniature Tree-Ferns, others of lower growth with fronds borne on creeping rhizomes, and possibly some living as epiphytes, their green leaves standing out against the more sombre-coloured trunks of supporting trees. On closer inspection he would discover that most of the supposed ferns bore seeds—some small, others larger than hazel-nuts—and clusters of inconspicuous spore-capsules filled with pollen. The dominance of these seed-bearing Fern-like plants, the Pteridosperms, is one of the more arresting features of the later Palæozoic floras. During the latter part of the Carboniferous period and the first half of the Permian period the vegetation of North America and Europe was more uniform in comparison than the floras of the old and new world to-day. Prof. Halle, of Stockholm, in his scholarly volume on the late Palæozoic floras of Central Shansi, in China, has shown that some of the vegetation of the Far East agreed closely with that of North America and Europe. The coal-seams of China, though probably rather younger in age than the richest seams of Europe and America, consist of the altered débris of forests which had spread across the world.

"The *Glossopteris* Flora and the Late Palæozoic Ice Age.

"At the stage of geological history we are considering a broad expanse of water—the Tethys sea—formed a west-and-east boundary between the northern continent and Gondwanaland. In that part of Gondwanaland that is now South Africa no undoubted examples of Lower Carboniferous plants have been found: the lowest beds of the Karroo system, which rest on Devonian or pre-Devonian rocks, consist of glacial deposits similar to those which are spread over a wide area in South America, the Falkland Islands, India, and Australia. There is proof of a long-continued reign of ice-sheets and glaciers. The occurrence of well-preserved impressions of plants at the base of the old boulder-beds at Vereeniging shows that some members of the *Glossopteris* flora co-existed with the ice. The problem which I now propose to discuss is this: at what period did the Ice Age begin, and what is the geological age of the first phase of the *Glossopteris* flora? As Prof. Suess said: following the events chronicled in the Coal Measures of the northern hemisphere, in the south, 'the outlines of a great continent become disclosed to us, and from the closing days of the Carboniferous this remains for a long period one the most prominent features of the earth, Gondwanaland.'"

The President dwelt in some detail with the arguments recently advanced by Prof. Schuchert, of Yale University, for placing the *Glossopteris* flora at a later date, namely, the Middle Permian period, but maintained that evidence from Australia, India, and South Africa was in favour of the Carboniferous age of the oldest phase of this flora.

"If we reconstruct in broad outline the closing scenes in the Palæozoic era on the continent of Gondwanaland, we see an enormous land-region comparable in its mantle of ice with Greenland at the present day: in some places glaciers piled up moraines, and their streams deposited seasonally banded mud and sand; in other places from the cliffs of an ice-barrier were detached icebergs carrying boulders that found a resting-place in the mud of a sea-floor. In the course of the latest phase of the Palæozoic era, ice-sheets and glaciers spread from the remote south beyond the equator: lands that are now tropical were then ice-bound. The world was divided into at least two sharply contrasted regions, a northern region where rank vegetation covered thousands of square miles of swamp and low hills, and a vast southern continent where another and less luxuriant vegetation flourished in proximity to retreating glaciers.

"Prof. Schuchert has stated his case clearly, though not convincingly, and has collected a mass of material for which many of us are grateful; he has rendered good service by directing attention to a problem which appeals both to geologists and to palæobotanists. We are not yet in a position to make positive statements on the age of the *Glossopteris* flora or on the precise correlation of the late Palæozoic plant-beds of Gondwanaland and those north of the Tethys Sea. More evidence is needed; and I venture to hope that Prof. Schuchert's contribution will stimulate South African geologists to obtain additional evidence which will bring us a stage nearer to an agreement upon this much-debated question. Meanwhile, I am not shaken in my opinion that if we could transport ourselves back through the ages into a forest of the northern hemisphere in the latter part of the Upper Carboniferous period, and thence travel by aeroplane to the land that is now South Africa, we should find retreating glaciers and a vegetation in which *Glossopteris* and *Gangamopteris* were prominent plants.

"A Critical Stage in the History of the Plant World.

"There is another exceptionally interesting problem on which more light is urgently needed, a problem too formidable to consider in the latter half of an address, but attractive enough to mention as a subject worthy of attention on the part of South African investigations. It is this: the closing stages of the Palæozoic era in the northern hemisphere were marked by widespread crustal displacements; a geological revolution brought into being chains of Palæozoic Alps; the scenes were shifted, the forests of the Coal period were replaced by a less luxuriant vegetation growing under a new set of climatic conditions. Crustal movements are a determining factor in the evolution of the plant kingdom: in other words, geological revolutions afford an impressive example of the co-ordination of the inorganic and organic worlds, a theme that has been elaborated by General Smuts in his fascinating book 'Holism and Evolution.' The vegetation of the early part of the Permian period, though generally similar to that of the latest stage of the Carboniferous period, was

relatively much poorer in genera and species. The later Permian Floras were still poorer, and the records of the early days of the Triassic period point to the further development of the arid conditions foreshadowed before the end of the Permian age. Later in the Triassic period the vegetation became richer as the environment improved, but it was a transformed vegetation in comparison with the forests of the Coal Age, a much more modern company dominated by a different set of plant communities. There were connecting links between the Palæozoic and the early Mesozoic Floras, but in the main the two floras differed widely from one another. The more orderly succession of plant-bearing strata in most parts of the southern hemisphere justifies the hope that an intensive and comparative study of the transitional stage between the earliest and the latest phase of the *Glossopteris* flora will furnish valuable data.

"Fossil Plants as Tests of Climate.

"Nearly forty years ago I wrote an essay on a prescribed text, 'Fossil Plants as Tests of Climate,' an essay which was mainly a compilation and not an original contribution. It is unnecessary to remind my audience that fossil plants of many different ages frequently occur in unexpected and, from some points of view, very inconvenient places where they raise problems which have so far baffled the ingenuity of students. The best examples are from Arctic regions, and there is also the rich Jurassic flora described some years ago by Prof. Halle from the edge of the Antarctic region. Prof. Nathorst demonstrated the occurrence on Ellesmere Land a few degrees south of lat. 80° N. of an Upper Devonian flora in which species of the fern-like fronds of *Archæopteris* are abundantly represented: it is noteworthy that these fronds—probably the foliage of a Pteridosperm—are in no way inferior in size to those of the same type discovered in Southern Ireland and Southern Russia. Farther south, but still well within the Arctic Circle, the rocks of the desolate and mist-shrouded Bear Island, in latitude 75° N., have yielded an unusually rich flora which is also Upper Devonian: here, too, well-developed fronds and thick stems of various plants bear eloquent testimony to climatic conditions entirely foreign to European Arctic regions at the present time. The Lower Carboniferous flora of Spitsbergen compares favourably in the dimensions of the *Lepidodendra* and other trees with floras of the same age in Central Europe. From lat. 80° N. on the north-eastern corner of Greenland, a few fragmentary remains of widely distributed species mark the most northerly outpost of the early Carboniferous floras. Turning to the Rhætic period, the work of Dr. Hartz, of Copenhagen, and the more recent and more extended labours of Mr. Harris have given us a thrilling picture of an estuary bordered by a luxuriant and varied vegetation, which can best be described as a detached arctic outlier of the well-known Rhætic forests of Southern Sweden. Farther east the New Siberian Islands (lat. 75° N.) have afforded samples of Triassic and later floras which give no sign of the stunting effects of Arctic

conditions. Many Jurassic plants are recorded from Franz Josef Land, Spitsbergen, and Northern Siberia which include leaves hardly distinguishable from those of the Maidenhair tree (*Ginkgo biloba*), the only surviving genus of a once prolific and cosmopolitan group; also twigs and cones of Conifers, some of which appear to be closely allied to the Californian Sequoias; some recall existing Araucarias and other genera, which long ago deserted their northern home for southern lands. The best-known Arctic Cretaceous flora is that from Western Greenland (lat. 70° N.), a flora especially rich in Ferns near of kin to species of *Gleichenia* that are now mainly tropical in range. Among other Greenland plants are species of *Ginkgo*; Conifers allied to *Sequoia*, *Cupressus*, and other genera; leaves and fruit differing but little from those of the living Bread-fruit tree, leaves believed to belong to a Leguminous plant closely allied to existing species of *Dalbergia*, species of *Magnolia*, many forms of Plane-tree (*Platanus*), and examples of other South temperate, sub-tropical, and tropical families.

"It is superfluous to quote more examples. An important point is that if we plot on a map of the Arctic regions the distribution of ancient floras, it becomes clear that no shifting of the earth's axis, even if this favourite device were admissible, would give a satisfactory explanation of the contrast between the past and the present. These facts are well known; but it is time we made a more serious effort to solve the problems which they raise. Discarding as inadequate, and as a method wholly displeasing to astronomers, an attempt to create geographical environment consistent with palæobotanical facts by altering the position of the North Pole, we turn to the alternative of rearranging, within the Arctic Circle, the distribution of land and sea and the consequential shifting of cold and warm oceanic streams. Assuming the permission of geologists to treat the earth's crust as a jig-saw puzzle, we appeal to meteorologists. Mr. Brooks, in his book on 'The Evolution of Climate,' suggests a possible rearrangement of land and water which, he believes, would go some way towards the provision of climatic conditions such as the fossil plants of the Tertiary period appear to demand; but it would seem from a more recent contribution by Dr. Simpson, the Head of the British Meteorological Department, that we cannot hope to obtain all we need, or nearly all we need, by any method of redistribution of land and sea on the assumption of a fixed pole and without recourse to Wegener's hypothesis of drifting land areas. We are left with two other alternatives: the adoption of Wegener's views or some modification of them, or the possibility that plants are less trustworthy as indices of climates than has generally been supposed. It may be that a combination of these two methods of attack is the clue to our problem. Let us take the second first: assuming that the ferns to which reference has been made flourished on the parallels of latitude where their remains have been found, and assuming such amelioration of the present Arctic conditions by a rearrangement of land and water as meteorologists permit, there must have been in the past, as there is to-day, a long and relatively dark period of sleep, and a summe

no longer than the growing season now available for the almost miraculous development of Arctic plants. Can we imagine, to take one instance, the Cretaceous flora of Greenland enduring a sunless Arctic night more than six months in duration? This raises a question to which no complete answer can be given: we lack experimental data. It would be worth while to take advantage of modern methods of research and devise means of reproducing on a small scale the Arctic summer season with continuous illumination followed by a longer period of darkness. In considering possibilities we must not forget the marked difference in the present position of the tree-limit: in some places it dips far below the Arctic Circle, while in others it invades much higher latitudes. In Western Greenland on latitude 70° N. the willows seldom reach a height of three feet; on the same latitude in Canada and Alaska the White Spruce (*Picea canadensis*) attains fifty feet in sheltered places.

"There is another, and to my mind an important and neglected consideration: we are too prone to speak of such a genus as *Gleichenia* as tropical because it happens to be one of the commoner ferns in tropical countries; but like many other genera characteristic of the warmer parts of the world it includes species which grow vigorously at an altitude of 10–12,000 ft., where the climate is by no means tropical. Is it not legitimate to suggest that the relation of genera and species to climate to which we are accustomed is merely a phase in the history of plants? A plant that is now confined to the tropics may at a much earlier stage of its career have been able to live under other conditions. In using plants as thermometers of the ages, we accept as an axiom the principle—what is now has always been. Our vision is limited by what we see and beyond the horizon we see only in imagination. Is it unscientific to express the opinion that we may think of plants not only as organisms which have changed in form and structure in the course of thousands or millions of years, but as organisms which have changed also in their susceptibility to external factors? There is another point, and an obvious one: instances are common enough of species of living genera which exist under conditions sharply contrasted with those characteristic of the majority of species of the same genus. The Cretaceous and other plants are practically all specifically distinct from their living descendants: we are not entitled to attribute to extinct and recent alike the same constitutional qualities.

"The proposal to regard the present land-surface as a portion of the earth's crust which has not only changed its form in the course of geological history, but as a collection of slabs slowly drifting from place to place is no new idea; but we are indebted to Wegener for the development and extension of a theory which in its present form has provided an incentive to speculative minds and, it may be, a valuable clue to the solution of diverse problems. Wegener speaks of the upper portion of the crust as travelling in an easterly and westerly direction; he also assumes a slight movement of the poles. If it is permissible to postulate a drifting of fractured slabs of the crust in a north and south direction, we can then think of the

disunited pieces, now occupying positions more or less remote from one another, as the severed portions of a formerly compact region. To take a concrete example: the Rhætic plant-beds of Eastern Greenland, now remote from those of Sweden, may formerly have been portions of one mass well to the south of the Arctic Circle. This may be merely a figment of the imagination: on the other hand, some such expedient is almost forced upon us if we are to find a solution to the problem presented by the records of the rocks. There are, we are told, serious objections to Wegener's hypothesis: it is, at any rate, true that the principle of drifting continents has still to be proved tenable. But such evidence of correspondence, both in the succession and nature of the stratified rocks and in the fossil contents, as Mr. Du Toit has obtained from a comparative study of the rocks of South America and South Africa, or as Mr. Harris is finding in his comparison of the Greenland and Swedish Rhætic Strata, is arresting enough to make us pause before abandoning the principle of continental drift.

"Palæobotany as a Key to the Present Distribution of Plants.

"If time allowed it would be tempting to deal with still another aspect of Palæobotany: the importance of a critical study of the floras which immediately preceded the Pleistocene Ice Age. Progress made in recent years in the improvement of methods of deciphering the relics of plants of other days increases the confidence with which it is possible to recommend, as a promising field of work, the investigation of Tertiary floras. It is only by following the varying fortunes of genera and species during the successive stages of the Tertiary period that we can hope to understand or to explain the present distribution of plants. Let me give one illustration: the work of Mrs. Clement Reid and Miss Chandler, as well as the results obtained by many other palæobotanists, has brought into relief the destructive effects of the conditions which culminated in the last Glacial period. We know that the floristic characters now distinguishing European floras from those of North America and China are in no small degree the direct consequence of the Ice Age: this caused the elimination from the European area of many plants which, had they survived, would give a greater uniformity to the vegetation of the northern hemisphere than there is at present. In North America and in Asia the way was open; the northern species were able to migrate far to the south and thus escaped the fate of their companions which were unable to cross the barrier of the Alps and the Mediterranean Sea.

"The Tertiary floras were more uniform than the floras of to-day. We cannot understand the present distribution of human races if we confine attention to the present, nor can we appreciate the significance of the geographical distribution of floras and their composition unless we consult the herbaria of the rocks."

In conclusion, the President said: "My desire is to see a wider

recognition on the part of geologists and botanists, whether professionals or amateurs, of the value of palæobotanical studies in relation to problems of general interest. The layman is often deterred from serious application to any branch of science by the length of the road he thinks it will be necessary to travel before becoming qualified for research. If it were essential to master a subject before attempting to contribute to its advancement by original work, none of us could hope to become more than industrious seekers after omniscience within a restricted field. Anyone of average intelligence, provided he or she has the driving force borne of enthusiasm and the faculty of taking pains, is capable of making valuable contributions to knowledge in some department of scientific enquiry. Amateurs have taken an honourable and productive part in advancing geological and botanical knowledge; they have an advantage over professional teachers in that they are free to concentrate their energies where preference leads them. Moreover, laymen are more fortunate than professional men of Science, who are expected to be able to answer all questions relating to the subject they profess, in not being expected to know more than they know. To-day the opportunities of making acquaintance with the Natural Sciences are much greater than they were a few years ago, but the number of men and women who become keen enough to cultivate any one subject as a hobby is relatively small. I may be accused of closing my address in words more appropriate to the pulpit, but none the less I venture to urge upon teachers of science the duty of doing their utmost to awaken the souls of their pupils, to introduce them by means of simple examples to the joy that is to be found in putting questions to Nature and in trying to extract answers. It is of secondary importance whether we find answers or not—it is the passion for the search that matters. Science should be taught not so much in preparation for a profession or a business; it should be presented in a form calculated to develop an interest strong enough to make a permanent impression on receptive minds. We need helpers in the cause of research, and it is for us who are engaged in teaching to make clear to those within our sphere of influence the saving grace of a deeply rooted interest in life over and above our daily duties, which will serve not only as a means of advancing natural knowledge but as a guiding star."

(To be concluded.)

RECENT OBSERVATIONS ON THE POLLINATION OF *OPHRYS*.

By Colonel M. J. Godfery, F.L.S.

Ophrys muscifera Huds.

On May 12, 1928, together with Colonel G. H. Evans, F.L.S., I watched some cut spikes of this species at Challes-les-Eaux, Savoie, France, close to an arbour with leaves sticky with honey-dew, which attracted many insects. Suddenly a small wasp-like insect with a yellow abdomen banded with black (*Gorytes mystaceus* Linn.)

alighted on a spike of *O. litigiosa* Camus in the same vase with *O. muscifera*, evidently by accident rather than choice, for we never again saw *Gorytes* alight on *O. litigiosa*, though the latter was constantly exposed in 1929 with *O. muscifera*. Presently *Gorytes* was taken on *O. muscifera*, but it had not withdrawn the pollinia. Then another settled, his wings quivering while he remained on the flower. I could see a short brown sting-like organ (ædeagus?) protruding from the end of the abdomen. The insect placed himself lengthwise on the labellum, with the head uppermost. In all, three visits were observed.

Although called the Fly Orchid, the dark thread-like petals are too suggestive of long antennæ for the visiting insect to be a fly, but they do resemble the antennæ of *Gorytes*. The closed wings of the latter agree well with the contour of the labellum, and conceal the banded abdomen. The gap between the thorax and the abdomen (due to the slender wasp-like waist), seen through the bluish semi-transparent wings, corresponds clearly with the leaden oblong marking in the middle of the labellum. When quiescent on the flower the insect is hard to see. While we were intently watching for the arrival of another visitor, a slight movement caught the eye, and we realised that a *Gorytes* had alighted and remained unseen until he began to vibrate his wings. The weather then broke, and, although watch was kept on subsequent fine days, no more visitors appeared. Whilst we were satisfied that *O. muscifera* possessed a real attraction for *Gorytes*, we felt that until the actual removal of the pollinia by the latter had been witnessed, it would be premature to conclude that that insect was responsible for the pollination of *O. muscifera*.

In May 1929, in the same spot, Colonel Evans, my wife, and I watched *O. muscifera* systematically for many hours on suitable days, and witnessed a number of visits by *G. mystaceus*. On some days nothing came to the flowers, on others several visits occurred. *O. aranifera*, *O. litigiosa*, and *O. arachnites* were exposed at the same time, and also various other orchids, but *Gorytes* never went to any of these, nor did any other insect go near *O. muscifera*. The flower of the latter appears to be organised for the attraction of the male by its mimicry of the female *Gorytes*. As in the case of *O. arachnitiformis*, *O. fusca*, *O. lutea*, and *O. speculum* in S. Europe and N. Africa, all the visitors appear to be males. The pollinia appear to be somewhat difficult of withdrawal, for not infrequently *Gorytes* failed to remove them. They are attached to the head between the eyes and below the antennæ.

On May 24th I was watching a vase of various orchids, including *Ophrys arachnites*, *O. litigiosa*, and a single spike of *O. muscifera* with rather small flowers. A fine *Gorytes* singled out this solitary spike from all the others, and visited a flower. He was quite oblivious of my presence, and I was able to watch him so closely that every motion was visible. He kept on vibrating his wings and waving his antennæ—doubtless a preliminary phase of courtship, for the same movements were observed whenever *Gorytes* alighted on a flower of *O. muscifera*. He tried again and again to pierce the

apex of the labellum with what appeared to be the extruded ædeagus, but the lip was too short for him to reach it, and he kept snuggling closer into the flower, and repeating the same actions. He remained on it at least three minutes, but did not remove the pollinia. I regret that I failed to note whether they had been previously withdrawn.

Then *Gorytes* suddenly ceased to appear, just as it did the previous year, but at a later date, the season being about a fortnight later. Probably the females had begun to emerge, and the flower ceased to attract. It appears to be for this reason that in *Ophrys* the first-opened flowers are the most frequently fertilised, the upper ones being very often unvisited. This was repeatedly observed by Monsieur Pouyanne in Algeria in the case of *O. fusca*, *O. lutea*, and *O. speculum*, and by me in the South of France with various species of *Ophrys*.

I am indebted to Prof. E. B. Poulton, F.R.S., and Dr. R. C. L. Perkins, F.R.S., for the identification of *G. mystaceus*, which is a fossorial wasp placed by Westwood in the Crabronidæ. Its prey has been observed to be the larva of *Aphrophora spumaria* Germ., the "Cuckoo-spit" or "Frog-hopper" insect (Cercopidæ: Homoptera).

This is the only known instance of an *Ophrys* being pollinated by a wasp.

Ophrys arachnites Lamk.

On May 6, 1928, I was sitting with my wife in a garden at Challes-les-Eaux with two or three recently gathered spikes of *O. arachnites* in my hand, when a bee circled rapidly round me. We kept very still, and it came and glanced at the flowers. Presently it returned and alighted on a flower, but at once flew away. Twice it came back, but never stayed more than a moment on the flower. I then put several spikes in a vase on a low terrace-wall. Six times a rather large grey bee with very long antennæ came, alighting five times, but always immediately flying away. It was generally extremely swift, but once it gave me an excellent close view, sailing towards me slowly, keenly on the alert for danger. As it approached the flower, it made a sudden and rapid pounce, and seized the labellum with alacrity, like a hawk darting on its prey, but at once flew away. In 1928 we never succeded in catching this elusive bee.

On May 12, 1929, my wife and I gathered a few spikes of *O. arachnites* on the hills at Challes-les-Eaux, the first seen in flower that year. I carried them home in my hand, hoping they might attract a bee on the way. Nothing happened till we reached the gate of the hotel grounds, when suddenly several bees whirled round us. We stopped dead. Several times a bee circled round the flowers at rather long intervals and went off. Finally, a grey long-horned bee alighted on a flower. Immediately another pounced on him and tried to push him off, but he held on, and the second bee flew away. I have more than once seen the same thing happen with *O. arachnitiformis* in the South of France. We saw the first bee withdraw the pollinia—so easily and neatly as compared with *O. muscifera*—and

fly away. More bees circled round the flowers, and sometimes alighted, but never stayed. Then we gave it up and went away, but a bee followed us and alighted on a flower in my wife's hand. By great good luck I boxed him, with the pollinia attached to his head. He tried hard to scrape them off with his feet, and succeeded in removing one. He was identified at the Natural History Museum of Paris as *Eucera tuberculata* F., ♂. All the visitors to *Ophrys* appear to be males.

Next day several *Eucera* came and looked at the flowers, but did not alight. The following day, towards 4 P.M., I took the flowers down to the gate where we encountered the bees two days ago. In a few minutes at least five *Eucera* appeared, circled round, and made off. They had become quickly aware of the presence of *O. arachnites*, though it has no perceptible smell. At long intervals single bees arrived, and two alighted on flowers. I watched one, which appeared to be exploring the green upturned appendix of *arachnites* with the tip of his abdomen, which he kept on moving actively about. I wondered whether the appendix suggested to him the upturned abdomen of a possible mate. On May 23rd we again took flowers down to the gate. Soon *Eucera* began to appear, but were very shy and not at all keen. Only three alighted, and these left at once. After that no more *Eucera* came to the flowers. Perhaps by this time the females had emerged.

The following points deserve notice:—

1. The promptness with which *Eucera* became aware of the presence of *O. arachnites*.
2. The excessive wariness and caution of this bee.
3. The way in which it absolutely ignored *O. muscifera*, *aranifera*, and *litigiosa* (the only other species of *Ophrys* then in flower), as well as various species of *Orchis*, *Aceras*, *Listera*, and *Cephalanthera* exposed at the same time with it.
4. The suddenness with which the bees ceased to visit the flowers in both years.
5. The first flowers opened are the most frequently visited.

About May 24 a large yellowish fly with spotted wings, *Volucella inflata* Fabr., came frequently to *O. arachnites*, and remained long on the flower. Immediately on alighting it began a series of frantic movements, clawing at the labellum as if it were an extremely slippery surface, requiring desperate efforts to secure a foothold. It kept turning round and round sideways, now facing upwards, now downwards, sometimes resting for a little obliquely on the lip, as if exhausted, and then furiously resuming the same erratic movements.

Evidently *O. arachnites* had a strong attraction for *Volucella*, for sometimes two, and once three, were on different flowers at the same time, and it never went to any other orchid exposed. It was not at all shy, and allowed me to watch it through a lens without interrupting its movements. At first I thought I could see it thrusting its proboscis into various parts of the flower, but the movements were so rapid that I could not be sure whether it was a proboscis or a fore leg. If seeking honey, it seems improbable that it would

waste fifteen minutes on a single flower and then return to it later. On the other hand, its behaviour was quite different from that of *Eucera*, which at once assumes the correct position for withdrawing pollinia, nnd remains in this attitude till it leaves the flower. Though we witnessed a large number of visits, the pollinia were never once removed. It seems doubtful whether it has anything to do with the pollination of *O. arachnites*.

OPHRYS ARANIFERA Hudson.

This *Ophrys* was rare at Challes-les-Eaux. A few specimens were exposed with the other species, but no insect ever went near them.

OPHRYS LITIGIOSA Camus.

This was very frequent higher up on the hills at Challes-les-Eaux, but not on the level of the garden in which the observations were made. Although always exhibited with the other species of *Ophrys*, no insect was ever seen to alight on it, with the exception of *Gorytes mystaceus* as referred to above. It flew to a bunch of *O. muscifera*, among which was the spike of *O. litigiosa*, and evidently alighted on the latter by accident. The adherence of the pollinia to one of its legs showed that it had not assumed the position taken up when a flower is intentionally visited.

The curious phenomena described above have been sometimes criticised as "unnatural acts," and doubts have also been raised as to whether the resemblance of the flower to the female is exact enough to attract the male. The first objection is due to the unconscious application of human ideas of purity to the insect world, to which they have no relevance.

As to the second, it should be remembered that at least in some, if not in all, such cases, the males emerge some time before the females. They have then never seen a female, and can have no exact conception of her appearance. They are thus easily misled by a resemblance which to our physically clearer and better-informed eyesight appears imperfect. If the flower of *O. muscifera* suggests to intelligent human beings the name Fly Orchid, why should it not convince *Gorytes* of the presence of a female of its kind, to which the resemblance is actually closer than to a fly? Insects are driven on by two strong impulses—the spur of hunger, which makes them voracious, and an irresistible sexual urge, which makes them seek eagerly for a mate. No one who has seen Hymenoptera incessantly quartering the ground on this quest, with a speed the eye can scarcely follow, will have any doubt as to the violence of the force which drives them on. When they think they have at last scented or seen the prey, are they likely to hesitate? So far from being an unnatural act, their conduct is the direct result of natural forces.

ABSTRACTS OF PAPERS OF INTEREST TO STUDENTS OF BRITISH BOTANY.

"THE VEGETATION OF BERROW FLATS, SOMERSET," by H. Stuart Thompson (Proc. Brist. Nat. Soc. ser. 4, vol. vii. pt. i. p. 35, 1928).—During the summer and autumn of 1921 the author made a fairly exhaustive survey of the coast and its vegetation between Burnham-on-Sea and Berrow. Particular attention was paid to the new salt-marsh which had developed during the decade, and which formed so conspicuous a feature from about 400 yards N.W. of Burnham lower Lighthouse to about 600 yards S.W. of Berrow Church, which is situated on the sand-hills. A synopsis of the work, with three photographs and a map, was published in the *Journal of Ecology*, May 1922, under the title "Changes in the Coast Vegetation near Berrow, Somerset." The present is an account of the sequence of the vegetation up to the present date.

In August 1921 the author observed and mapped a new tributary channel some 10 feet deep and 40 feet wide near where it entered the Parrett, about 600 yards west of the lighthouse. This was not shown on the 6-in. Ordnance map. The channel drained a portion of the muddy Berrow Flats and may have been the chief cause of the new vegetation by diminishing the force of scour over the flat between it and the sand-hills. It was nearly a mile long and for some distance it formed the western boundary of the *Glyceria–Salicornia* association.

In July 1921 three clumps of Cord-grass (*Spartina Townsendi*) were noticed, two of them being 9 feet across, well established on the mud. By June 1923 the original clumps of *Spartina* were much larger, and many young subsidiary plants extended 10 or 12 yards from the parent clumps. By August 1928 the cord-grass had extended everywhere and was dominant on the western area, with dwarf patches of *Glyceria maritima* here and there.

In 1921 *Salicornia* of several species was at least subdominant on the mud of Berrow Flats. *S. ramosissima* and *S. stricta* were here and there interspersed with *S. dolichostachya*, some of which consisted of a single long spike of 4 to 6 inches on an unbranched stem of similar length. That year the writer saw only two small plants of *Suæda maritima* on the Flats and no *Spergularia, Statice*, or *Armeria*. The absence of Sea-Lavender and Thrift tended to show how recent was the vegetation and how wet the marsh. *Aster Tripolium* was present here and there.

The year 1926 saw important changes. *Aster Tripolium* and *Glyceria* were then dominant. A belt of taller *Aster*, 2–3 feet high, extended 250 yards or more, and was edged with a 2–4 yards' belt of *Glyceria*. There was also on the hard sand the curious association of *Arenaria peploides*, small *Salicornia herbacea*, *Plantago Coronopus*, and minute plants of *Aster Tripolium*. Short clumps of Reed-mace, probably *Typha angustifolia*, were here and there for 100 yards in wet mud at the eastern border of the marsh. A remarkable bend in the vegetation towards the south end, noted in 1924,

was still more marked in 1926; and *Salicornia*, especially *S. dolichostachya*, was still diminishing everywhere. Among strand-plants in 1926 were two small *Polygonum Raii*, which is extremely rare on the Somerset coast. Near them *Salsola* was remarkably abundant, but very little *Cakile*. Probably in 1926 the present remarkable colonies of Sea Club-rush (*Scirpus maritimus*) got established on the wet muddy border of the marsh close to the sand-hills.

In 1928 very little *Salicornia* of any kind was seen, and none of the rare *S. dolichostachya*. At the present time the marsh has appreciably diminished in size. Roughly, the vegetation extends for 1100 yards along the shore, and is separated from the Sea Couch-grass (*Triticum junceum*), which adjoins the Marram (*Psamma arenaria*), of the sand-hills by a strip of hard and usually bare sand which has become narrower each year.

This interesting study of Berrow Flats is accompanied by four plates.—E. G. B.

Watson Botanical Exchange Club Report, 1928–29 (vol. iii. no. 12).—Mr. H. S. Thompson's interesting Report contains many valuable notes upon the 1942 sheets of plants sent in by the Members. Mr. E. C. Wallace not only acted as distributor but was the largest contributor (474 sheets). We note that the Club is in need of a few fresh members, particularly from Ireland, Scotland, Wales, and the North of England.

The following notes from the Referees and others seem worth reprinting for botanists who are not members of the Club:—

P. 473. *Rosa* [Ref. Z 33]. Hedgebank by Pebblecombe, Surrey, Sept. 2, 1928.—J. E. Lousley. This agrees very well with *R. canina* var. *spuria* (Pug.). I should until recently have called it var. *insignis*, but now think *spuria* is a better name, since the true *insignis* Déségl. & Rip. should have very decidedly biserrate leaflets; thus *spuria* is a new name only, not a new variety for Britain. The specimens sent are from a very slightly prickly form, which is not a normal feature of the variety; its very slight biserration and absence of glands take Mr. Lousley's gathering very much towards the *Lutetianæ*, *spuria* being ranked under the *Transitoriæ*.—A. H. Wolley-Dod.

P. 475. *Callitriche intermedia* Roffm. [1287]. Pond at Lynch, near Wyke Regis, Dorset, June 14, 1928.—E. C. Wallace. A very interesting form of *Callitriche*, the first I have seen from our Islands. Dr. Williams (Prod. Fl. Brit. 509, 1912) records it from "Loch Alsh, a sea-inlet on the coast of Ross-shire (G. C. Druce), 1881." This is in the extreme south-west corner of v.c. 105, E. Ross. Williams divided the species into two varieties, "*A. rivularis*, *B. lacustris*." This plant he names as var. *lacustris* f. *callophylla* Kuetz.—*C. autumnalis* var. *lacustris* f. *callophylla* Kuetzing in Reich. Icon. Fl. Criticæ, cent. ix. p. 44, fig. 1208 (1831). The upper leaves, which form a rosette at the apex, much resemble those of *C. deflexa* A. Braun, t. 4, fig. 4*b*, in Hegelmaier, Monog. Gatt. *Callitriche*, p. 58 (1864).—A. Bennett.

P. 476. *Valerianella eriocarpa* Desv. [1268] det. H. W. Pugsley. Rocks below Rufus Castle, Portland, Dorset, June 12, 1928.—E. C. Wallace. This has very pronounced acute teeth to the calyx-limb of fruit, and the fruit itself is practically glabrous. This glabrous state of *V. eriocarpa* I have not seen before, and it must, I think, be rare. It is, however, mentioned that it occasionally occurs thus both here and on the Continent.—C. E. Salmon.

P. 479. *Hieracium aurantiacum* L. Cult. Wimbledon; origin, Yorkshire (naturalised), June 1928. No. 425. This now little-known plant is sent with *H. brunneo-croceum* to illustrate their points of difference, as described at length in Journ. Bot. 1921, 60–69. Since writing that paper I have seen wild plants of the group near St. Anton in the Tyrol, and in Canton Graubunden, Switzerland. This experience tends to confirm my opinion that there are at least two species in the group, distinct not only morphologically but also in the nature of their habitats. At St. Anton a tall broad-leaved form, with intensely red flowers, grows in the sub-alpine meadows which are cut for hay. When brought into my garden, its flowers become paler in colour, but its foliage more luxuriant. This plant is almost identical with these specimens of *H. aurantiacum* L., which was probably first obtained from a similar locality, where the peculiarly bright colour of its flowers would attract attention.

In alpine pastures at higher altitudes near St. Anton quite different forms occur, some with red and some with orange flowers, but all with the lingulate leaves of *H. brunneo-croceum*. These are usually relatively dwarf plants in the wild state, but one form that I cultivated in the garden quickly developed the very rampant habit of *H. brunneo-croceum*, to which it was clearly closely allied.

Last summer in Graubunden I saw hawkweeds of this group in several localities, but always in extremely small quantity. They were all in rough alpine pastures, sometimes among scattered bush. These plants were tall and very slender: one, with bright red flowers and fairly broad leaves, would come under *H. aurantiacum* L., but the rest, with more orange flowers, were nearer to *H. brunneo-croceum*. None of them exactly matched those from St. Anton, and I have not yet attempted to identify them with Naegeli and Peter's subspecies. —H. W. Pugsley. C. E. S.

'The Vasculum,' vol. xiv. (1928), contained the following:—

P. 69. An interesting note by Mr. A. W. Bartlett upon the occurrence of *Cyclamen hederæfolium* Ait. in Northumberland. Two plants were found by Mr. F. E. Lupton four years ago on a wild part of Cerby Moor, altitude over 850 feet, and more than 2000 yards from nearest human evidences of recent times. It is a problem how and when the seeds reached this spot, but the discovery is not sufficient justification for adding the species to the flora of the county.

P. 89. A very interesting article, "On the Variability and Instability of Coloration in the Flowers of *Primula vulgaris* and *P. veris*," by the late Miller Christy.

P. 99. *Lemna trisulca*. Holy Island. Cheviotland (v.c. 68). New county record by Mr. J. E. Hull.

P. 139. "Floral Variation in *Gymnadenia conopsea* L.," by J. W. Heslop Harrison.

Pp. 158–9. *Orchis Morio* × *mascula*, with parents, near the Black Halls (v.c. 66); J. W. Heslop Harrison.

O. mascula × *Habenaria Gymnadenia* Druce. Black Hall Rocks (v.c. 66). Described elsewhere as hybrid *Robsoni*, after Mr. C. E. Robson; J. W. Heslop Harrison.

Anacamptis pyramidalis × *Habenaria Gymnadenia* Druce. Near Easington (v.c. 66), in a mixed colony of the two parents. One plant found and transplanted to garden; J. W. Heslop Harrison.—C. E. S.

CALLUNA VULGARIS, A RECENT ADVENTIVE ON SABLE ISLAND, NOVA SCOTIA.

By Harold St. John, Ph.D.

Soon after the publication of *Sable Island, with a Catalogue of its Vascular Plants**, it was reviewed in the *Journal of Botany* (1921, p. 148). The review was unsigned—hence, presumably written by the editor, Mr. James Britten. The tone of this notice was so complimentary that the present writer could have no cause to start an argument. That eight years have been allowed to pass without the writer's making any reply should indicate that he now submits a rebuttal of one point in a distant and impersonal mood.

The reviewer made one critical comment at the end of a sentence largely abstracted from the writer: "*Calluna vulgaris* is adventive but now well established; it was probably used for or carried in the packing round trees imported from a French nursery; Mr. St. John says that Macoun did not find it, but Mr. Arthur Bennett (Journ. Bot. 1901, 198) writes: 'Prof. Macoun has sent me specimens from Sable Island, just such as one might gather on a Scottish moor.'"

The overlooking of a single plant record mentioned incidentally in a foreign journal would not be a serious charge. However, in this case the record is of some importance. If John Macoun did find the heather on Sable Island, there would be strong presumptive evidence of its being native there, and not an adventive as the writer stated. This is a matter of considerable interest, as evidenced by the many notes already published on the occurrence of *Calluna vulgaris* Hull in eastern North America.

It would be better to quote the entire passage from Mr. Bennett's article, but since it occurs in the *Journal of Botany* (1901, 198), and for the sake of brevity, it will be abstracted and only the essential sentences quoted. The first paragraph of the passage by Mr. Bennett is headed *P*[*otamogeton*] *polygonifolius* Pour., and this pondweed is the principal subject discussed. He refers to Chamisso's early record of the aquatic plant on St. Pierre and Miquelon, then to the "occurrence of *Calluna* in Nova Scotia and Newfoundland." Then

* H. St. John (1921), Proc. Boston Soc. Nat. Hist. xxxvi. pp. 1–103, plates 1–2; also as (1921) Contrib. Gray Herb. n.s. lxii.

comes the sentence partially quoted by the reviewer. Just which plant was recorded depends on the antecedent of "it" and of "specimens." From the immediate context they might refer to either the pondweed or the heather.

Luckily the next paragraph continues the discussion of the range of this plant, mentioning its occurrence on the Azores, Madeira, and the Canaries. Then follow two sentences which dispel all doubt as to the antecedent of "it." "On Sable Island the plant occurs in shallow pools where water was deeper earlier in the spring; indeed in some places the pools were almost dry. It was the common species in the shallow or (nearly) dried-up pools." Now, it can be left to the judgment of our botanical readers whether it was the heather or the pondweed that was so common in the shallow pools.

In addition to this bibliographical evidence, it has been possible to learn other facts from original sources. Mr. Arthur Bennett, in reply to a question, wrote in a letter on June 8, 1928: "Certainly you are right! I referred to the *Potamogeton polygonifolius*." An inquiry as to the existence of any Macoun collections of heather from Sable Island was sent to Ottawa. Dr. M. O. Malte, Chief Botanist of the National Herbarium of Canada, replied on Sept. 29, 1928: "We have no specimen of this species collected by Macoun from Sable Island. The only specimen we have from Sable Island is one collected by yourself." This evidence would seem to dispose of the suggestion that Prof. Macoun collected *Calluna vulgaris* on Sable Island in 1899.

The heather was first collected in 1911 by Dr. H. T. Güssow, who saw four patches, and then in 1913 by the writer who found but two small patches. These were in the areas where the 81,345 trees, imported from a French nursery, were planted in 1901. The writer saw no indication that the plant was a native. Finally, there seems no reason to doubt the statement of the very intelligent and observing Superintendent of Sable Island, Mr. R. J. Bouteillier. He stated that the *Calluna* was not intentionally imported, but that it sprang up near the trees soon after their planting, and was in all probability used for, or carried in, the protective packing around the trees.

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BIBLIOGRAPHICAL NOTES.

XCIV. "Benardgreyn."

This puzzling name is given by Lobel (Stirp. Adv. Nova, 1570, p. 145) as the locality for "Coniza minima *siue* Pulicaria" (now *Pulicaria vulgaris* Gaertn.), "In *Benardgreyn* ara & fossis, altero à Londino lapide fruticat minima inter Camemillam Romanam, inter & Pulgium Regale," which may be translated "At *Benardgreyn* mound and ditch, second stone from London, growing with Roman Chamomille and Pennyroyal." Trimen and Dyer (Fl. Middl. 151)

state: "This may be a Middlesex station, but we have not been able to identify Benard Greyn."

I think the name can be identified with "Baynard's Watering," part of the Westbourne river, now merged in the Serpentine. This was named after Baynard or Bainardus, a Norman follower of the Conqueror, whose name is also associated with the City Castles and Ward, or a descendant or namesake. It is the piece of ground lying between Craven Hill and the Bayswater Road, the approximate site of Baynard's ponds being that of Christ Church, Lancaster Gate. In the course of time "Bear's," "Byard's," or "Bayard's Watering" became Dr. John Hill's botanic or physic garden, the Bayswater, Flora (–1836), Victoria (–1854) Tea Gardens, Hopwood's Nursery, and, finally, the district of Bayswater.

The distances on the road were, up to 1825, measured from the turnpike close to St. Giles's Pound (now St. Giles's Circus), and Clusius (Rar. Pl. Hist. 1601, lib. vi. p. ccxv) gives a clue to the location of the first stone under "Typha media" (now *T. angustifolia* L.), "fossa apud Tyburn sacellum, nõ procul ab eô loco, in quo sepeliuntur, quibus ob maleficia laqueo gula fracta est, primo ab urbe Londinensi miliari, quâ spectat occidentem," which Trimen and Dyer (p. 289) translate as "Plentifully 1581, in a pit by Tyburn churchyard, not far from the place where those who have been hung for crimes are buried, at the first milestone from London towards the west," but, as stated in a MS. note in Trimen's copy of Fl. Middl., in Herb. Mus. Brit., it should be quoted from 'Rariorum aliquot Stirpium, per Pannoniam, 1583,' 716. The place referred to is the little country church of Tyburn (St. John's), which stood in the lonely road, between or near Marylebone-lane and Stratford-place; the church was removed to Marylebone High-street, taken down 1741, and the present edifice erected; this must not be confused with the new Marylebone Church, on the south side of Marylebone-road, opposite York Gate, Regent's Park. A mile further on the west road was the second stone referred to by Lobel.

This identification is apparently confirmed by a letter, dated 7 May, 1697, from Augustus Quirinus Rivinus at Leipzig (Birch MSS., Brit. Mus. 4277, f. 142), addressed "For Mr Edward Lhwyd at the Museum in Oxford; to be left with Mr Walter Thomas at Bernards Grene in London." Thomas was apparently a fellow-countryman of Lhwyd, who acted as a London agent, and handed letters to the Oxford carrier when he called. He is also mentioned as an intermediary in letters from Ray to Lhwyd (12 Mar., 1697), Lhwyd to Martin Lister (28 Mar., 1697), and Ray to Lhwyd (1 Feb., 1698), all printed by Dr. R. T. Gunther in *Further Correspondence of John Ray* (1928, pp. 270, 273, 274).

It is curious that *Pulicaria vulgaris* is also recorded from watery spots on Barnard's Green, Worcs (Lees, Bot. of Malvern Hills, 39), this place being named from the Bernard family, mentioned 1275 (Mawer and Stenton, Place Names of Worcs, 211), but it may be only coincidence, as the plant is usually found in damp situations.

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OBITUARIES.

William Vincent Fitzgerald.

Botanists interested in the Australian flora will be sorry to learn of the death of Mr. William Vincent Fitzgerald, from blackwater fever, at the Daru River in the Mandated Territory of New Guinea, on August 6th. At the time of his death, it is understood that Mr. Fitzgerald was in New Guinea exploring for sandal-wood.

He was a son of Mr. and Mrs. Ambrose Fitzgerald, and was born on the goldfields at Mangana, Tasmania. In his younger days he was an assistant in the National Herbarium, Melbourne, then under the control of the famous Baron Sir Ferdinand Von Mueller.

Mr. Fitzgerald is best known among botanists for his work on the flora of Western Australia, his most important contribution to the flora of that country being an account of the botany of the Kimberleys, North-West Australia, published in the *Journal and Proceedings of the Royal Society of Western Australia*, vol. iii., during his absence on active service. The paper was communicated by the late J. H. Maiden, to whom Mr. Fitzgerald had entrusted his manuscript before departing for the front. It contained the results of two expeditions to this as even yet little-known territory.

In 1903, Mr. Fitzgerald was a member of the Royal Commission on Forests, and in 1904 the Chairman of the Forests Advisory Board of Western Australia. He had done considerable exploratory work both in the Territory of Papua and New Guinea, but did not publish anything so far as I am aware on the flora of these places.—C. T. White.

Dr. Eduard August Vainio (1853–1929).—The recent issue of the Lund *Botaniska Notiser* (October 1929) contains a portrait, and an appreciation by A. H. Magnusson of the work, of the eminent lichenologist, Dr. E. A. Vainio, of Helsingfors, who died on May 14 last. He was born in 1853. Among his numerous contributions to lichenology, we recall his account of the lichens collected by Dr. Welwitsch in Angola, which is included in the *Catalogue of Welwitsch's African Plants*, published by the Trustees of the British Museum in 1901.

Pierre Tranquille Husnot (1840–1929).—A memoir by Auguste Chevalier of the life and work of this eminent Norman bryologist appears in the last issue of the *Bulletin de la Société Botanique* (Sept. 25, 1929). Husnot died on May 25 last, in his ninetieth year, at his native place, Cahan, Athis (Orne). His important *Muscologia gallica* (1884–94) was followed by the *Hepaticologia gallica*. In 1899 he published a *Monographie des Graminées de France et d'Europe Centrale*, and later similar accounts of the *Cyperacées* (1906) and *Joncées* (1908). In 1877 he founded the *Revue Bryologique*, which he edited for fifty years.

DURIÆI ITER ASTURICUM BOTANICUM.

By C. C. Lacaita, M.A., F.L.S.

(Continued from p. 258.)

17. Erica ciliari-tetralix Gay. [Not in Dur. Pl. Astur.]

E. humilis, adscendens; ramulis pedicellisque pubescentibus et hispidissimis; foliis, bracteolis segmentisque calycinis apice longè piliferis, margine utrinque longè 6–8-ciliatis, ciliis pilisque omnibus apice incrassatis; foliis quaternis, planiusculis, ovato-lanceolatis, facie et ad nervum dorsalem cum petiolulo pubescentibus, lateribus dorsalibus pruinoso-canis; floribus oppositis, breviter racemosis; bracteolis in summo pedicello geminis, oppositis, lineari-lanceolatis, segmentisque calycinis dorso lanatis; corolla cylindracea, calycis segmentis triplò longiore, ore hiante; antheris muricatis, basi antica bigibbosis, postica bicalcaratis, calcaribus antherâ dimidio brevioribus, subulatis, obscurè denticulatis; ovario villoso; stylo longitudine corollæ, apice clavato; stigmate planiusculo.

Habitat in Cornubiæ paludosis, promiscuè cum (nuper ibi detecta, prius in Anglia non visa) *E. ciliari*. Misit amiciss. Hooker.

Inter *ciliarem* et *Tetralicem* exactè media, earumque procul dubio hybrida proles, ut rectè jam Hookerus (ex ejus litteris) suspicatus est.

Nostræ sunt folia ovato-lanceolata, dorso pruinosa; inflorescentia racemosa; bracteolæ in summis pedicellis geminæ; corolla cylindracea, ore non constricta; antheræ oblongæ muricatæ, anticè bigibbosæ; stylus apice incrassatus; quæ omnia auctorem habent *E. ciliarem*.

A *Tetralice* proficiscuntur folia quaterna; ciliorum in foliis, bracteolis, calycinisque segmentis numerus, bracteolarum et calycis tomentum, laciniæ calycinæ margine non revolutæ, antheræ calcaratæ, et ovarium villosum.

Mulo propria sunt calcaria antherâ dimidio triplove breviora (non, ut in *Tetralice*, antheræ longitudine) et stylus in parte clavatâ scabriusculus, non glaberrimus.

Ovarium (certò quadriloculare, loculamentis multiovulatis) in nonnullis floribus friabile est visum, infirmitatis sexualis signum.

18. Senecio Duriæi Gay. [Dur. Pl. Astur. 306.]

Perennis, totus glanduloso-pubescens; caulibus uno pluribus, ramosis, basi imbricatim-multisquamatis, ramis 2–4-cephalis, foliis caulinis sessilibus, amplexicaulibus, pinnatifidis, laciniis ovatis obovatisve, sinuato-dentatis, auriculis baseos latis, rotundatis; capitulis campanulatis, radiatis, radio patente; periclinii phyllis lineari-lanceolatis, glanduloso-hispidis, calyculo dimidio breviore, oligophyllo; achæniis sulcato-striatis, sulcis hispidulis.

Habitat in montium Asturicorum occidentalium (*port de Leitariegos* et *pic d'Arvas*) regione alpina, locis declivibus lapidosis, Augusto ineunte florens et fructificans (*Durieu*).

Radix (ex uno specimine) rectà descendens, plus semipedalis, flexuosa, crassa, dura, apice verisimiliter perennis. *Caules* ex ea radice plures, inæquales, erecti ramosi, striati; centralis 1–2-pedalis, ramis distantibus, axillaribus, patentibus, foliatis, 3–4-cephalis; laterales breviores, maximum pedales, apice tantum ramosi, ramis 3, erectiusculis, subaphyllis, 1–3-cephalis, corymboso-fastigiatis; omnes squamis imbricatis (foliorum vernalium confertiorum petiolis residuis?) basi tunicati! *Folia* radicalia non visa. Caulina folia mollia, flaccida, minus quam reliquæ partes glandulosa, potius hirsutula; inferiora majora, oblongo-obovata, maximum 4 uncias longa, supernè sinuata, medio pinnatifida, lobis latis, sinuato-grosse dentatis, dein plus minus attenuata, basi verò in auriculas 2, rotundatas, crenatas, caulem amplexantes valdè dilatata; superiora sensim minora, suprà basin non ità attenuata, magis regulariter pinnatifida; summa pedicellis triplò breviora, lineari-lanceolata, denticulata, basi non aut vix dilatata. *Pedicelli* 1–1½-pollicares, in minoribus speciminibus erecti, in majoribus plus minus patentes, omnes valdè glandulosi et phyllis 2–3 remotis, setaceis, adpressis muniti. *Capitula* campanulata, apice 4–6 lin. lata; calyculo 5–6-phyllo, phyllis setaceo-subulatis, granduloso-hispidis, apice non maculatis. *Ligulæ* 12–13, patentissimæ vel reflexæ, longitudine periclinii (4–5½ lin. longæ), lineari-lanceolatæ saturatè flavæ ferè aurantiacæ, apice 3-crenatæ, in vivo planæ, non revolutæ, tubo gracili, basi inflato, ore villosiusculo, stigmatibus glabris, demum exsertis. *Achænia* teretiuscula, sulcato-10-striata, inter strias pilis brevibus candidis adpressis hispida; interiora fusco-nigra, exteriora pallidiora, fulvescentia.

Obs. Species habitu ferè *S. viscosi*, foliis ferè *S. lividi* (*fœniculæ* Ten.) ab hisce autem et ab omnibus ejusdem tribus quos aut vidi aut descriptos conveni, diversissima, ob radicem validam descendentem, verisimiliter perennem, caules firmiores, basi squamatos, capitula multiflora, hemisphærica, et ligulas elongatas, in vivo non aut vix revolutas. Achænia omnia in *viscoso* glaberrima, in nostro omnia hispida.

19. Eryngium Duriæi Gay. [Dur. Pl. Astur. 315.]

E. perenne, glaberrimum; caule solitario, simplici, oligocephalo; foliis ramosi-nerviis, indivisis, margine spinoso-dentatis, radicalibus spathulatis, basi attenuatis, caulinis latè linearibus, semi-amplexicaulibus; capitulo terminali cylindraceo; involucro sub 20-phyllo, foliolis 8–10 majoribus, lanceolatis, utrinque spinoso- 1–4-dentatis, capitulo dimidio ferè brevioribus, paleis tricuspidatis, flore longioribus; calycis tubo vesiculis crebris toto quasi papuloso; carpellis quinquevittatis!

Habitat in montium Asturicorum editorum (*pic d'Arvas* et *pic de Canellæ*) regione alpina, locis declivibus, inter soluta petrarum fragmenta cum *Rumice suffruticoso*, *Sideriti lurida*, *Silene macrorhiza* et *Pteride crispa* (Durieu). Floret Julio ineunte. Fructus ineunte Septembri maturus, rarius perfectus, sæpissimè abortivus.

Radix crassa, descendens, parum obliqua, semper unicaulis, in uno suppetente specimine caulium 4 exsiccata et truncata vestigia retinens, ideoque procul dubio perennis. *Caulis* sesquipedalis, erectus, teres, striatus, 2–2½ lin. latus, intus copiosa medulla farctus, simplex, apice

tantum in ramulos 3 breves, erectos, monocephalos divisus. *Folia* viridia (non glauca), subcoriacea, plana, uninervia, nervo depresso, venas multas subtiles reticulatim anastomosantes in folii marginem emittente; radicalia 6–10 unc. longa, patentissima, humifusa, basi petioli firmi angusta, canaliculata, 1½–4 lin. longa margine nuda, sensim, nulloque saltu dilatata in laminam dimidio longiorem, planam, oblongo-obovatam, quandoque ferè linearem, apice 8–12 lin. latam, margine undulatam, ibique spinoso longè dentatam; caulina folia 8, 10, alterna, æquidistantia, erecto-patentia, inferiora radicalibus similia, perindè in petiolum inermem attenuata, media et superiora 2½–1½ unc. longa, latè linearia, vèl ovato-lanceolata, basi dilatatâ semi-amplexicauli, apice acutissimo sepè in arcum reflexo, margine (ut in radicalibus) longè spinoso-dentato. *Capitula* inæqualia; lateralia ellipsoidea, unciam maximum longa; terminale super lateralia eminens, cylindraceum, 1½–2½ unc. et ultra longum, 6–9 lin. latum. Involucri foliola ferè 20, biserialia, valdè inæqualia; exteriora 6–7 lin. longa, utrinque unidentata; interiora pauciora (8–10) dimidio triplove longiora et latiora, erecto-patentia, capitulo dimidio breviora, linearilanceolata, coriacea, rigida, longè cuspidata, pungentia, dentibus utrinque 2, rarò 1–3–4, divergentibus, spiniformibus infrà medium armata. *Paleæ* flore paulò longiores, rigidæ, angustæ, apice tricuspidatæ, media cuspide longiore. *Calycis* tubus 1½ lin. longus, ellipsoideus, apice coarctatus, vesiculis numerosissimis confertissimis totus quasi papulosus; dentes tubo triente longiores, erecti, ovato-lanceolati, membranacei; uninerves, nervo in longiusculam spinescentem cuspidem abeunte. *Petala* dentibus calycinis triplo breviora, albida, uninervia, linearia, apice emarginato-infracta, laciniata, conduplicata, acuta, vix longitudine dimidii petali. *Filamenta* petalis plus dimidio longiora, sub anthesin replicata, cum petalis decidua. Antheræ magnæ, pallidè flavæ. *Discus* epigynus annularis, sinuato-quinquelobus. Styli longissimi filiformes, demum divergentes. Fructus, dentibus calycinis exclusis, 2 lin. longus, ovoideo-oblongus, dorso convexus, latere compressiusculus. Mericarpiorum juga rudimentalia, sectio transversa ovato-subrotunda, basi commissurali latiore. Vittæ commissurales nullæ, dorsales 5 quas tamen Eryngiis negant Koch in Nov. Act. Acad. Nat. cur. xii. p. 140, et in Deutschl. Fl. ii. p. 470, et Candollius in Prodr. iv. p. 87, una sub quovis (obsoleto) jugo primario, transversè sectarum ostiolis circularibus. Albumen teretiusculum. Totus caulis, cum foliis floralibus, virens nunquam cœruleus. Folia, involucri foliola et paleæ cum dentibus suis, margine calloso-incrassata, callo spinisque stramineis.

Obs. Species pulchra, inter descriptas nulli arctè cognata! Nomen habeat a meritissimo inventore, cui multa jam accepta refert scientia nostra amabilis, plura in posterum, si Diis placet, acceptura.

20. Angelica lævis Gay. [Dur. Pl. Astur. 322.]

A. caule tereti pedunculisque glabris; foliis bipinnatisectis, segmentis ovatis, glabris, inciso-paucidentatis, margine scabris, omnibus

distinctis; involucro nullo; radiis dorso lævibus; petalis (viridulis) ellipticis emarginatis, acumine subulato, inflexo; fructu elliptico, alis lateralibus subcoriaceis, vittis in commissura geminis.

Habitat in Asturiæ occidentalis convallibus alpinis, nominatim in valle Trecastro, ad rivulos, infrà pagum subalpinum *Brañas de Abaso* non descendens, ibi jam exeunte Julio fructifera (*Durieu*).

Herba valida, 5–7-pedalis (Durieu, *in litt.*), cujus non nisi superior pars fructifera, et folium unum in parte inferiore resectum suppetunt, è quibus tamen patet veram esse *Angelicam*, nulli descriptarum respondentem, quamvis *sylvestri*, *montanæ* et *Razoulsii* cognatam. Differt enim a tribus hisce speciebus (reliquæ in DC. priore sectione recensitæ americanæ sunt) caule non aut vix striato; foliolorum dentibus profundioribus, paucissimis utrinque 4–8, non 20 et ultrà pedunculis, seu ultimo caulis et ramorum internodio, glabris, non nisi apice summo, sub umbella pubescenti-scabris; involucro nullo; petalis minoribus, viridulis, ellipticis, non cuneatis, acumine persistenter reflexo, non demum surrecto et fructu triente minore, breviusque elliptico, alis lateralibus crassiusculis, opacis, ferè coriaceis, non membranaceis. Suppetens folium inferius plus quam pedale est, bipinnatisectum, petiolo plus semipedali, gracili, basi parum dilatato pinnis 2 inferioribus 3-jugis, pinnulis petiolulatis sessilibusque, ovato-oblongis, non acuminatis, omnibus distinctis remotiusculis, una inferiore imparique trilobis. Quibus notis ad *Ang. sylvestrem* maximè quidem accedit, ab *A.* verò *Razoulsii* et *montana*, in quibus foliorum segmenta superiora decurrunt, multum differt nostra. Umbellæ radii minus quam in affinibus angulati, dorso, ut in *A. Razoulsii*, glabri, non ut in *sylvestri* et *montana*, circumcircà densè pubescentes. Petalorum acumen, ut in *A. sylvestri* et *montana*, subulatum, non, ut in *A. Razoulsii*, setaceum. *A. sylvestris*, in planitie, Septembri exeunte semina perficit, *A. Razoulsii* et *lævis*, in subalpinis jam exeunte Julio fructiferæ inveniuntur. Fructus partes singulæ (margo calycinus, juga dorsalia, vittæ tum vallecularum tum commissuræ, carpophorum), præter alas laterales incrassatas, in comparatis speciebus simillimæ apparuerunt.

Obs. Angelicam scabram Petit. (DC. Prodr. iv. p. 168) quatuor abhinc annis (Ann Sc. Nat., Jun. 1832) pro novo genere agnovi et *Petitiam* dixi, illius *Petitiæ* prorsus immemor, quam anno 1763 fundavit Jacquinus, et anno 1789 inter Viticum genera recensuit Jussiæus. Data occasione liceat hic monere me *Petitiam* Umbelliferam nunc appellare *Xatartiam*, a cl. Xatart, pharmacopæo in oppido *Prats-de-Mollo* degente, botanophiloque diligentissimo, qui assiduis itineribus totam Pyrenæorum Orientalium præfecturam exploravit et in adornanda flora pyrenaica (*conf.* Lapeyr. Hist. abr. des pl. des Pyr. préf. p. xiv; Suppl. p. v) multus fuit. Mea itaque *Petitia scabra* mutetur in *Xatartiam scabram*.

21. Herniaria pyrenaica Gay. [Dur. Pl. Astur. 335.]

Confer quæ circa eam scripsi in Ann. Sc. Nat., Jun. 1832 (*Notic. Sur. Endress.* pp. 36–38). In Asturia, ut in Pyrenæis, zonæ alpinæ

propria est. Ad rupes apricas, in Asturiæ occidentalis celsissimo monte *pic d'Arvas* eam legit Durieus. Asturica specimina pyrenaicis simillima sunt, et speciei differentiam optimè confirmant.

22. Epilobium Duriæi Gay & Dur. [Dur. Pl. Astur. 343.]

E. radice stolonifera; caule stricto, simplici, tereti, pubescente, foliis rudimentalibus imbricatis basi quasi squamato; foliis ovato-oblongis, remotè serrulatis, margine et ad basin dorsalem pubescentibus, cæterum glabris, inferioribus oppositis sessilibusque, superioribus quandoque alternis et petiolulatis; petalis calyce majoribus, obcordatis; stigmate quadrilobo.

Habitat in alpium Asturicarum occidentalium uliginosis declivibus lapidosis, nominatim suprà collum *port de Leitariegos* in ascensu ad celsissimum montem *pic d'Arvas*, etiam in subjectis subalpinis ad pagum *Branas de Abaso*, 8ª–17ª Jul. florens et fructificans (*Durieu*).

Epilobio montano et *Ep. origanifolio* habitu simile, sed a priore diversum statura dimidio minore, 5–10-unciali; caule simplici, non ramoso; radicis collo stolonifero!; foliis inferioribus sessilibus, non petiolulatis; petalis majoribus (4–5 lin. longis), saturatè violaceis, non roseis carneisve. Ab *origanifolio* magis adhuc distat, ob caulem teretem, circumcircà pubescentem, non ex foliorum decurrentia lineis 2–4 elevatis filiformibus notatum et inter lineas glaberrimum, folia margine basique et ad nervum medium pubescentia, non glaberrima; capsulam breviter, non longè pedicellatam; et stigma quadrilobum, lobis divergentibus, non integerrimum clavatum! Ab utroque etiam differt caule stricto et foliis minimis carnosis imbricatis sub anthesin exsiccatis squamiformibus basi vestito, non adscendente basique nudo. Procul dubio genuina species, juxtà *Ep. montanum* locanda.

23. Genista obtusiramea Gay. [Dur. Pl. Astur. 346.]

G. humilis, ramosissima, densè cæspitosa, rigidula, ramis alternis, inermibus, ramulis congestis, glaberrimis, prismatico-tetragonis, sulcatis, tuberculatis, sub apice columnari! obtuso! 1–2-floris; foliis raris, alternis, paucioribus (in ramulis novellis) simplicibus, linearilanceolatis, plerisque (in ramulis anni præcedentis) trifoliolatis, foliolis sessilibus, obovatis, utrinque subsericeis; floribus axillaribus, erectis, pedicello infrà medium obscurè dibracteolato; calyce bilabiato, adpressè pubescente; petalis omnibus basi barbatis, vexillo carinaque dorso adpressè villosis, alis paulò brevioribus, glabris; ovario 6–7-ovulato; stigmate capitato; leguminibus compressis, lanceolatis, densè lanatis, 1–2-spermis, ad semina torulosis; seminibus ellipticis, hilo non strophiolato.

Habitat in celsiorum Asturiæ occidentalis montium (*pic d'Arvas*, *pic de Canellas*, etc.) summis cacuminibus, 1200 fortè hexapod. suprà mare, cum *Junip. nana* W., sublimem hanc sedem non derelinquens. Floret exeunte Julio, et semina perficit Augusto exeunte (*Durieu*).

Frutex humilis, depressus, ramosissimus, densè cæspitosus (cæspites

diametro 3–4-pedali), rigidulus, non spinescens. *Rami* alterni, glaberrimi; principes teretiusculi; secundarii patuli, aphylli, teretiusculi, sulcati, remotè tuberculati; tertiarii numerosissimi, congesti, alterni vel fasciculati, subsimplices, oligophylli, breves, glaberrimi, prismatico-tetragoni, sulcati, per intervalla tuberculati, basi fragiles, apice obtusi! ibique distinctè quadrituberculati; quaternarii (novelli) brevissimi, sericeo-pubescentes, minus distinctè tetragoni. *Folia* alterna, minutissima, sessilia, in ramulis novellis simplicia, lineari-lanceolata; in ramulis tertiariis sparsa, trifoliolata, foliolis æqualibus, obovatis, utrinque subsericeis, intermedio quandoque longiore; in tertiariis et secundariis nulla. *Stipulæ* nullæ. *Pulvinaria* in novellis obsoleta, in tertiariis incrassata, dura, bisulcata, in tuberculum persistentia, quibus tuberculis aphyllis exasperati inveniuntur rami secundi ordinis. *Flores* inodori, in summis tertiariis ramis solitarii vel gemini, axillares, breviter pedicellati, pedicello infra medium dibracteolato, bracteolis exiguis oculo armato sæpè inconspicuis. *Calyx* bifidè bilabiatus, adpressè pubescens, tubo obconico, labio superiore bipartito, lobis divergentibus, ovato-lanceolatis, inferiore labio triente longiore, apice tridentato. *Petala* pallidè flava, unguibus glaberrimis, limbo basi barbato; vexillum erectiusculum, amplum, ellipticum, emarginatum, dorso sericeo-villosum; carina longitudine vexilli, apice emarginato subgaleato genitalia retinens, dorso sericeo-villosissimum; alæ carinâ paulò breviores, præter basin barbatam glaberrimæ. *Filamenta* monadelpha, tubo glaberrimo, antheris alternè brevioribus, alternè longioribus. *Ovarium* filiforme, sericeo-villosum, 6–7-ovulatum. *Stylus* glaberrimus, stigmate terminali, hemisphærico. Legumen sessile, compressum, lanceolatum, 8–10 lin. longum, 2–2½ lin. latum, ad semina torulosum, inter semina quandoque coarctatum, tota superficie lanato-hirsutissima. Semina in unoquoque legumine 1–2, perfecta, compressa, oblongo-elliptica, basi non strophiolata.

Obs. Characteristica sunt in hac specie folia minutissima, bracteolæ maximè rudimentales et ramuli prismatico-tetragoni, valdè tuberculati, apiceque obtusè. Pari modo obtusatos ramulos non vidi, nisi in *Genista purgante* et *Cytiso nubigeno*, quibus etiam habitus subsimilis, qui verò staturâ, calycis formâ, seminibus strophiolatis, etc., longè recedunt. Cæterum nec in herbariis nec in libris ullam inveni *Genistam*, nostræ æquiparandam. Quæ inter inermes recensentur, omnes diversissimæ. In spinescentium turba, eodem ferè habitu, eadem ferè saturâ gaudent tum *Anthyllis erinacea*, tum *Gen. horrida*, *acanthoclada*, *Lobelii* et *Salzmanni*, facilè tamen distinguendæ, ob ramulos non ità abbreviatos, semper subulatos et in spinam induratos, pedicellos apice vel basi distinctè bracteolatos, legumina pubescentia, non lanata, etc.

24. Genista leptoclada Gay. [Dur. Pl. Astur. 347.]

G. elata, ramosissima, ramis alternis, inermibus, teretiusculis, sulcatis, ramulis filiformibus, subvirgatis, pubescentibus, striatis, polyphyllis; foliis alternis, omnibus ferè simplicibus, lineari-lanceolatis, acutissimis, dorso griseo adpressè pubescentibus; racemis 5–7-floris, aphyllis, floribus solitariis, secundis; pedicellis basi bracteola

suffultis, medio bibracteolatis ; calyce bilabiato, sericeo adpressè pubescente, labii superioris lobis divergentibus ; petalis subæqualibus, vexillo præter summam dorsalem lineam mediam glaberrimo, alis perindè glaberrimis, carina adpressè pubescente ; ovario 6–7-ovulato ; stigmate laterali, superiorem styli partem occupante.

Habitat in alpium Asturicarum, oppido *Cangas de Tineo* ab austro imminentium, zona media, exindè usque in zonam subalpinam vagans, lignique igniarii copiam vicis montanis suppeditans. Ad latera montium *pico de Canallas* et *pico de Arvas* imprimis frequens. Initium ejus, ex *Cangas de Tineo* in *pico de Arvas* per vallem *del Naviego* tendenti, ad pagum *S. Luado* observatur, finis verò in montibus *de Ladredo*, de *Leitariegos*, etc. Etiam sed parcissimè in montibus humilioribus, per quos è *Cangas de Tineo* in Asturiam inferiorem iter est, nominatim ad vicum *el Puelo* et in septentrionali latere vallis *de Argenza* visa. Floret Julio et Augusto (*Durieu*).

Frutex elatus quandoque 15-pedalis, ramosissimus, ramis inermibus, glaberrimis, sulcatis, non aut vix tuberculatis, ramulis multis, alternis, erectis, longiusculis, subvirgatis, filiformibus, obscurè striatis, subpubescentibus, supernè aphyllis ibique racemoso-floriferis. Folia in ramis principibus vix ulla, ibi fortè nonnunquam trifoliolata, quod ego non distinctè vidi, in ramulis verò frequentia, omnia simplicia, alterna, erecta, petiolulata, plana, lineari-lanceolata, acutissima, facie glaberrima, dorso griseo adpressè pubescentia. Stipulæ planè nullæ. Pulvinaria obsoleta. Flores a foliis remoti (non axillares), solitarii (non fasciculati), in ramorum apice 5–7, æqualibus spatiis distincti, laxè racemosi, secundi, subnutantes, inodori. Pedicelli filiformes, 1–1½ lin. longi, bractea ipsis dimidio breviore basi suffulti, medio oppositè bibracteati, bracteolis parvis, subulatis, hirsutis. Calyx bifidè bilabiatus, adpressè sericeo-pubescens, labio superiore bipartito, lobis divergentibus, inferiore labio paulò longiore, apice tridentato. Petala subæqualia, flava, omnia dorso pallida ; vexillum vix patulum, ellipticum, emarginatum, ad lineam mediam dorsalem, sub apice villosulum, cæterum glaberrimum ; carina longitudine vexilli, apice emarginato subgaleato genitalia retinens, dorso pilis adpressis, minus densis pubescens ; alæ carinâ vix breviores, glaberrimæ. Filamenta monadelpha, tubo toto asperulo-pubescente, antheris alternè brevioribus, alternè longioribus. Ovarium lineari-lanceolatum, sericeo-villosum, 6–7-ovulatum. Stylus glaberrimus, stigmate laterali, superiorem styli partem occupante. Fructus ignotus.

Obs. Pessimè hucusque definita *G. cinerea* DC. aliquam è longinquo cum nostra similitudinem monstrat, differt verò maximè statura humili, ramis floriferis non filiformibus ; foliis eorumdem omnibus trifoliolatis, vel imò stipularum ? plus minus completa evolutione quasi 4–5-foliolatis ; floribus axillaribus fasciculatis, rarò solitariis ; labii calycini inferioris lobis apice convergentibus ; alis basi barbatis, non glaberrimis ; tubo stamineo glaberrimo ; et stigmate inferius, non superius, styli latus occupante. Easdem differentias præbet *G. ramosissima* Poir. (*Spartium ramosissimum* Desf.) quam ego à *cinerea* non nisi varietatis lege (floribus paulò majoribus, calyce et petalis hirsutioribus) distinguo. Diversissima verò est ex ad *G. virgatum* DC. fortè accensenda *G. cinerea* Cambess. ! Enum. Balear. p. 60.

Structurâ partium longè affinior, quamvis habitu magis diversa, est *G. polygalæfolia* DC. seu *G. tinctoria lusitanica maxima* Tournef. Inst. 643. Hæc autem differt à nostra, foliis (in ramis principibus sine dubio trifoliolatis) triplo longioribus latioribusque, *Genistæ tinctoriæ* æmulis, perindè ramulisque glabratis, viridibus ; racemis (perindè aphyllis) elongatis, 12–20-floris ; floribus triente majoribus ; calyce glabriusculo ; petalis saturatius flavis, dorso non pallidis ; alis denique carinâ paulò longioribus.

Linnæana *G. florida*, cui nimium affinis dicitur *G. polygalæfolia* (DC. Prodr. ii. 151), in omnibus herbariis Parisiensibus desideratur. Hæc verò, à Linnæo fortè non visa, nititur *Genistâ tinctoriâ hispanicâ* Clusii (Hist. p. 101), cujus patria descriptio et icon plantam alienissimam sistunt.

Sic et *G. virgata* DC. (juxta specimen Maderense à cl. Webb communicatum) differt a nostra ramulis confertissimis rigidulis, non ità tenuibus, floribus in ramulorum apice congestis, erectis (non secundis) inferioribus axillaribus ; pedicellis suprà medium bracteolatis ; calyce minus profundè bilabiato, densius pubescente ; vexillo hirsutissimo, non glabro, et stigmate terminali, non laterali.

Comparanda restat una *G. congesta* W. (a me non visa) cui flores racemosi et vexillum glabrum tribuuntur, cujus verò specifica differentia ex patriæ diversitate (si quidem verè Canariensis) facilè præjudicari potest.

25. Ervum Salisii Gay. [Dur. Pl. Astur. 363.]

E. cirrhis simplicibus, 2–3-fidisve ; foliolis 6–10, oblongo-ellipticis, mucronulatis ; pedunculis 1–7-floris, folium æquantibus vel superantibus ; laciniis calycinis subæqualibus, subulato-setaceis, tubo longioribus ; leguminibus oblongis, compressis, adpressè villosulis, obscurè reticulatim nervatis, 5–6-spermis.

Ervum latifolium. Salzm. ! Pl. exsicc. Tingit. (*forma foliis latioribus*).

E. Salisii Gay. Salis Marschl. ! Aufzahl der in Korsika bemerkt. Pfl. in Flor. od. Bot. Zeit. 1834, ii. Beibl. p. 61.

Habitat in umbrosis Mauritaniæ circà Tingidem (Salzm.), in pascuis maritimis et sylvaticis Corsicæ (Salis-Marschl.), et in declivibus subumbrosis Asturiæ inferioris, tum ad rupes pontis de Peñaflor, tum in sylvula quadam supra Gradum (*Durieu*).

Statura et habitu similis *E. tetraspermo* et *E. gracili*, à quibus recedit foliolis multò latioribus, dentibus calycinis subulato-setaceis, tubo multò longioribus, non è basi dilatata lanceolatis tuboque brevioribus, et leguminibus pubescentibus. Calycinis dentibus elongatis et legumine pubescente accedit ad *E. agrigentinum* Guss., quod tamen stipulis profundè dentatis, pedunculis folio brevioribus, leguminibus ovatis, non oblongis, satis superque differt. Nequit esse, a me nondum visum, *E. pubescens* DC. cui laciniæ calycinæ latiusculæ, tubo

breviores, in DC. Prodr. ii. p. 367, a Seringeo tribuuntur. Nostra planta caulem habet foliaque et pedunculos pilis raris mollibus inspersa. Stipulæ ipsi pleræque lineari-lanceolatæ, indivisæ, paucissimæ semi-sagittatæ.

(To be concluded.)

REVIEWS.

A Supplement to Frederick Townsend's 'Flora of Hampshire and the Isle of Wight.' By J. F. Rayner. 8vo, pp. xix, 132. Author: Swathling, Southampton, 1929. Price 6*s*.

It is always difficult to write a supplement to another man's work, and Mr. Rayner is to be congratulated on his success. He has evidently put a great deal of work into it, and has got together a very considerable number of fresh locality-records from different parts of the county, besides giving particulars of the discovery of several species additional to those in the 'Flora,' of which the most interesting is *Equisetum hyemale*.

He has also made a praiseworthy effort to give localities for many varieties and "small species," discriminated or brought into prominence during the twenty-five years since the publication of the second edition of the 'Flora.' In the present state of knowledge, however, the results of such an attempt cannot be altogether satisfactory. There is a crying need for a fresh 'British Flora,' from the pen of a competent botanist, with a first-hand knowledge of the plants, and with a sense of proportion, to get this vast horde of segregates into something like perspective, discriminating, for instance, between those proved to be racially distinct, those which arise in genera with apogamous reproduction, and those which may be regarded as due to external conditions.

The author has wisely restricted the scope of the Supplement to the native plants and those apparently naturalised, having already given a list of aliens in another work. The districts are shown on separate lines under each species, a great improvement on the somewhat stodgy setting in the 'Flora,' where they are "run on," no doubt with a view to economy of space. The printing is not sufficiently black, and there are too many broken letters, to make the Supplement quite comfortable reading.

Mr. Britten's memoir of Frederick Townsend, which appeared originally in this *Journal*, is fittingly included in the book.—J. G.

The Plant in relation to Water: a Study of the Physiological Basis of Drought Resistance. By N. A. Maximov, Professor in the Institute of Applied Botany, Leningrad. Authorised English Translation edited with notes by R. H. Yapp, Mason Professor of Botany in the University of Birmingham. 8vo, pp. 451, 46 figs. Allen and Unwin: London, 1929. Price 21*s*. net.

Probably no factor of the environment, with the exception of temperature, has so much effect on the distribution of species as water, and probably no other factor is so much related to the form of plants. Water constitutes 70 to 90 per cent. of the mass of most growing plants, and its significance in the physiology of the plant is obviously of the greatest. A work dealing adequately in English with the water-relations of the plant is therefore very desirable. Professor Maximov's book treats of the plant in its relation to water in a very thorough and clear manner. It is divided into three parts, treating respectively of water-absorption by the plant, the loss of water by the plant, and the water-balance and drought-resistance of plants. The third section of the book is the longest, comprising about half the text. Indeed, the first two parts may be regarded as more or less preliminary matter, expounding, as they do, the scientific principles necessary for the proper understanding of the third part, which constitutes the main theme of the work, for, as Professor Maximov indicates in his Introduction, it is with drought-resistance and its physiological basis that he is particularly interested.

The book can be thoroughly recommended to all botanists who wish for information on the water-relations of the plant; indeed, no botanical library, private or public, should be without it. It is the only English book dealing in such exhaustive manner with the water-relations of the plant, and it is an extremely well-presented and well-arranged account of these relations.

One or two points call for comment. In the footnote on p. 39 the reviewer's use of the term "suction-pressure" has been misquoted; his use of the term is the same as that therein suggested. Again, on p. 52 it is stated that the value of the suction-pressure of the root could be independent of that of the surface-cells, which might even possess no suction-pressure at all. But, although the suction-pressure of the root as a whole *may* be determined by the concentration of the solution of its vessels, it is not made clear how water could possibly enter the root if the surface-cells possessed no suction-pressure.

Finally, the work of the late Professor Yapp in preparing the book for publication in English deserves some words of appreciation. Professor Maximov tells us that Professor Yapp practically re-wrote the book, while he also supplied abundant additional information in the form of footnotes. It must be a lasting regret to all botanists that Professor Yapp was not spared for many years of work on the subject of the water-relationships of the plant in which he was so interested, and that he did not live to witness the publication and success of this book, a success which he did so much to secure.—W. Stiles.

Iconographie des Orchidées d'Europe et du Bassin Mediterranéen. By E. G. Camus et A. Camus. 2 vols., pp. 559, pls. 11. Lechevalier: Paris, 1929. Price 400 francs.

Ostensibly this great work by Mdlle A. Camus (her father, whose photograph forms the frontispiece, died in 1915) forms the descriptive text of the Atlas of 122 plates published in 1921, and is a

very considerable amplification of the typewritten Monograph of 1908. It embodies a surprising wealth of information about European orchids from the systematic, microscopic, biological, and almost every point of view except the horticultural.

The first part deals with the internal morphology of the various organs and the life-history of orchids generally, from germination to pollination and fructification. There are keys to the genera and species, and also keys to the latter founded solely on microscopic structure. The synonymy is unusually full, and practically constitutes a bibliography of each species, with references to previous iconography and exsiccata. The work has been brought thoroughly up to date by the inclusion of recently discovered species, varieties, and hybrids, both British and Continental, of which many are figured for the first time. A special feature peculiar to this work and its predecessor of 1908 is the microscopic morphology of each species, illustrated by 237 text-figures, a subject which Mademoiselle Camus has made especially her own. An entirely new feature is the method of cross-pollination of various species, and enumeration of the insects by which it is effected, so far as is at present known. The eleven coloured plates include the most recently-discovered species and hybrids, and are of great interest. The book is beautifully printed, and there is a pleasing absence of unnecessary changes of name. It is an epitome of present-day knowledge of European Orchidaceæ, embodying the results of wide botanical and literary research.—M. J. G.

BOOK-NOTES, NEWS, ETC.

NEW YORK BOTANICAL GARDEN.—We learn that Dr. Elmer D. Merrill, Director of the Botanical Garden and of the experimental station of the University of California, will take up his duties as Director of the New York Botanical Garden on January 1, 1930, in succession to Dr. N. L. Britton. Dr. N. L. Britton has been Director-in-Chief since the Garden was organized in 1896, and the remarkable growth and development of the Garden and Museum are a monument to his energy and skill. We understand that Dr. Britton wishes to have more time for private research, especially on the vegetation of Porto Rico and the Virgin Islands which for some years past he has been studying. Our best wishes follow him in his retirement.

MR. CHARLES WRIGHT, A.L.S.—Our best wishes also to Mr. Charles Wright, who retires from the Herbarium of the Royal Botanic Gardens, Kew, after forty-five years' service. Mr. Wright's courtesy and willingness to help have been familiar for many years to home botanists and those from overseas who have worked in the Kew Herbarium. In addition to his published papers he has rendered yeoman service in the production of the African Floras, the reading of the proofs of which has formed no inconsiderable part of his work.

THE Cryptogamic Section, Department of Botany, British Museum, will be closed to visitors for a few weeks, owing to structural alterations.

INDEX.

For Classified Articles, see—Obituaries; Reviews. New genera, species, and varieties, and new names are distinguished by an asterisk.

For Supplements see end of Index.

Supplements.

[The Editor acknowledges the help of Mr. J. Ardagh, Department of Botany, British Museum, in preparing the Index.]